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Mandatory Disclosure of Non-financial Information

The effect of introducing regulation on non-financial disclosure - Evidence from Norway

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Abstract

This study investigates the effects of the introduction of the Norwegian Accounting Act on Non-Financial Disclosure and the removal of the transition rule. We investigate whether Norwegian firms have increased their disclosure on the mandated topics in terms of key performance indicators, narrative disclosure and the outside-in impact of the environment relative to a control group. Our sample consists of Norwegian firms listed on Oslo Stock Exchange and a matched control group of US firms. We use computer-assisted textual analysis to measure disclosure in firms' annual- and sustainability reports, and a difference-in-difference model to investigate the treatment effect. We find that Norwegian firms have increased their disclosure on all disclosure measures throughout the sample period, and a significant increase in disclosure on the impact on the external environment and the outside-in impact of the external environment. We conclude that both events have induced Norwegian firms to increase their non-financial disclosure, and had a treatment effect in terms of the above-mentioned disclosure measures.

Keywords – mandatory sustainability disclosure; sustainability reporting; regulations; textual analysis; difference-in-difference

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1 Introduction

During the last two decades, an increasing number of countries have introduced mandatory sustainability disclosure regulations to monitor firms' performance and effort towards sustainability. The most well-known initiative is the EU Directive 2014/95/EU, which mandates firms with over 500 employees to disclose information related to non-financial performance and diversity. The main objective of mandatory sustainability disclosure is to provide transparency between firms and investors, regulatory authorities, governments, and stakeholders in terms of firms' contributions towards sustainability. With uniform disclosures, stakeholders have reliable information on firms' non-financial performance to assess their relative disclosures. Consequently, capital will flow towards firms who contribute in a positive manner.

The problem with today's reporting standards is twofold. First, it appears to be difficult for those who disclose the information to convey their key measures in a meaningful way, as there are few common standards or guidelines to follow when the reports are created. Additionally, reporting is costly and time-consuming. Second, those who use the reports find it difficult to use the information in their investment decisions, or for other purposes, as firms use different reporting frameworks, making firm comparisons difficult (Amaeshi and Greyson, 2009; Amel-Zadeh and Serafeim, 2018; Jouvenot and Krueger, 2019). Furthermore, reporting on non-financial performance is also an important contributor to reaching the goals of the Paris Agreement as regulators will be able to monitor firms' performance and efforts.

Regulations are increasingly demanding firms to disclose precise and reliable information, and we will see further changes and more strict and comprehensive requirements from the beginning of 2022 as the EU Taxonomy takes effect. This means that we will see a further increase in the quality and comparability of non-financial disclosure of firms in the years to come. In Norway, the EU Taxonomy primarily affect firms listed on Oslo Stock Exchange and large corporations that are considered large by law. Approximately 250 firms fall under the scope of this mandatory regulation. In 2013, Norwegian firms became legally obliged to disclose non-financial information either in their annual report or in

a separate report through the introduction of the Norwegian Accounting Act on Non-Financial Disclosure, hereinafter referred to as §3-3c. The regulation requires firms to disclose their performance and effort on all ESG dimensions, that is, impact on the external environment, gender equality, work environment and human rights, as well as efforts against corruption and bribery (Lovdata2, 2013). However, by a transitional rule under the same law, firms were allowed to disclose in accordance with other reporting frameworks, i.e., the UN or GRI standards, until the fiscal year starting January 1st, 2018. This incentive was intended to provide firms with the opportunity to transition towards a more strict and comprehensive reporting framework.

This thesis will investigate how mandatory sustainability disclosure affect the disclosure choices of Norwegian firms in terms of non-financial reporting, compare the findings to a control group where the same rules do not apply, and study the differential effect. This gives rise to the following research question:

Do Norwegian firms, on average, increase disclosure of information on their ESG performance relative to a matched control group of US firms following the introduction of the Accounting Act on Non-Financial Disclosure?

An increase in the level of disclosure on non-financial information should allow rating agencies to assess ESG scores which to a greater extent reflect firms' true contribution towards all ESG dimensions. Reporting in accordance with the new laws require firms to use substantial resources to identify relevant key performance indicators, hereinafter referred to as KPIs, and implement systems that allow them to efficiently and reliably measure them. To get an overview of the transition, we use a sample period of 10 years. The sample period starts in 2010, three years prior to the introduction of the regulation, and ends in 2020, the last year with sufficient data. For clarity later, the different sub-periods can be illustrated as follows:

Table 1.1: Overview of Sub-Periods

Periods	**Span**
Sub-Period 1:	2010 - 2012 (Pre §3-3c)
Sub-Period 2:	2013 - 2017 (Post §3-3c, Pre Transition Rule)
Sub-Period 3:	2018 - 2020 (Post Transition Rule)

Our sample consists of Norwegian firms that are listed or have been listed on Oslo Stock Exchange during the period 2010 to 2020 and a control group consisting of US firms, matched based on the Global Industry Classification Standard (GICS) and market value of equity. To examine the degree of compliance with §3-3c and the overall sustainability disclosure, we have defined five separate disclosure measures: impact on the external environment (GHG emissions), gender distribution, work environment, narrative sustainability disclosure, and outside-in impact of the environment. The former three serves as a proxy for disclosure of quantitative measures, i.e., KPIs, while the latter two captures the narrative disclosure on ESG-related topics. For the narrative sustainability disclosure we have constructed an ESG dictionary inspired by Baier, P., Berninger, M. and Kiesel, F. (2020), which captures how much of the content in the reports that is devoted to addressing ESG-related topics. The outside-in impact measure is intended to partially reflect the requirements of the EU Taxonomy and The EU Adaption Strategy, and captures whether firms address the impact of the external environment on their operations. To investigate whether firms' have disclosed the mandatory information and measure the narrative disclosure, we use computer-assisted textual analysis and construct a set of regular expressions that reflect the above-mentioned disclosure measures. The results from the textual analysis will thereafter be used to investigate the treatment effect of §3-3c and the removal of the transition rule through difference-in-difference analyses, hereinafter referred to as DiD.

The results from the textual analysis reveals a steady increase for all disclosure measures throughout the sample period. Prior to the introduction of §3-3c, the textual analysis reveals that, on average, 28 percent (87 percent, 89 percent) of Norwegian firms disclose the mandatory information in quantitative

measures on their impact on the external environment (gender distribution, work environment). This measure increased to 36 percent (89 percent, 92 percent) in sub-period 2, and increased further to 48 percent (91 percent, 93 percent) in sub-period 3. In regards to the narrative sustainability disclosure, the textual analysis reveals that prior to §3-3c, 3 percent of the content in the reports is devoted to addressing ESG-related topics. This measure increased to 3.1 percent in sub-period 2, and 3.5 percent in sub-period 3. For the outside-in impact measure, the quantities are 13, 19 and 47 percent for sub-period 1, 2 and 3, respectively. In light of our research question, the results from the DiD analyses reveal a significant increase in disclosure on the impact on the external environment for the treatment group relative to the control group after the introduction of §3-3c; however, we find no significant treatment effect in terms of the other four disclosure measures following this event. In regards to the removal of the transition rule, the results reveal a significant increase in disclosure on the outside-in impact of the environment for the treatment group relative to the control group; however, we find no significant treatment effect in terms of the other four disclosure measures. In sum, the textual analysis reveals a steady increase in all disclosure measures throughout the sample period, while the DiD analyses reveal a treatment effect for disclosure on the impact on the external environment and the outside-in impact after the introduction of §3-3c and the removal of the transition rule, respectively. These findings suggests that the two events resulted in an increase in the overall non-financial disclosure level among Norwegian firms, a treatment effect in terms of the two above-mentioned disclosure measures, and that the increase in disclosure on KPIs had spillover effects on firms narrative disclosure, both in terms of the narrative sustainability disclosure and the outside-in impact.

This study aims to contribute to literature on this topic in several ways. Hombach & Sellhorn (2018, p. 26) stated that research should work to both broaden and deepen the available empirical evidence on targeted transparency via corporate disclosure regulation. By using computer-assisted textual analysis and natural language processing, we are able to measure firms' narrative disclosure, in addition to their quantitative disclosure. Besides contributing to the academic literature, this study also has practical implications for firms and

regulators as the results reveal that regulations have led to higher disclosure levels among treated firms.

The remainder of the paper is organized as follows. In the next section, we address the background, that is, the emergence and importance of sustainability reporting, current regulations, and reporting frameworks. In section three, we review previous literature, theory, and develop our hypotheses. In section four, we explain the empirical methods to be used and describe the data. Section five provides the descriptive- and bivariate statistics, and the main findings from the computer-assisted textual analysis and the difference-in-difference analyses. In the final section, we conclude and discuss alternative methods and disclosure measures, implications and future research.

2 Background

2.1 Background

ESG reporting starts with a materiality analysis that consists of mapping opportunities and risks that firms are facing and identifying their most important stakeholders, both those that affect the firm and are affected by the firm. The purpose of this approach is to get an idea of relevant indicators to monitor, and is intended to reflect the firms' significant economic, environmental, and social impact, as well as to ensure that firms address issues that may influence the decision-making of stakeholders. Intuitively, the outcome of the materiality analysis will vary across firms operating in different sectors and geographical areas, as they have different business models and are exposed to different risks and opportunities. However, topics of relevance may vary across firms operating within the same industry as well. Hence, a common standard for all firms, even within the same sector, might be sub-optimal to map a business' true contribution towards sustainability (Khan, Serafeim, and Yoon, 2016; Grewal, Hauptmann and Serafeim, 2020).

In terms of measurement and disclosure of ESG performance, KPIs must be defined for all relevant indicators within the two dimensions of risks and opportunities, i.e., the significance to stakeholders and the significance for the

firm's economic, social and environmental impacts. In recent years, legislation has ensured mandatory disclosure of non-financial performance. As of now, we can divide the compulsory reporting on non-financial information in Norway into three periods. Prior to 2013, firms were not required to disclose non-financial information, meaning that disclosure at this point was purely voluntary. Consequently, few firms committed to reporting on ESG information. Those who did disclose typically had incentives from stakeholders that imposed or wanted disclosure. Between 2013 and 2018, large firms were mandated to disclose non-financial information through §3-3c; however, by a transition rule under the same law, firms that initially were subject to §3-3c could circumvent its requirements as long as they reported in accordance with either the Global Reporting Incentive or the UN's Global Compatc Report (Lovdata, 2013; Lovdata2, 2013). Thus, significant variations among firms disclosure on the topic is observed, if they report at all. The third period starts after the removal of the transition rule in 2018. In light of the two events, and the increasing focus on sustainability in general, it is reasonable to expect that the disclosure level will increase for each sub-period. From 2022 and 2024, one can expect further increases, as the EU Taxonomy and the Corporate Sustainability Reporting Directive (CSRD) takes effect.

2.2 The Norwegian Accounting Act on Non-Financial Disclosure

§3-3c came into force on June 1st, 2013, and applies to all large Norwegian firms. §3-3c requires firms to prepare a report and disclose their environmental, social, and governance performance to the extent necessary to fully understand the firms' development, results, and their impact on society at large (Lovdata2, 2013). Prior to the introduction of §3-3c in 2013, Norwegian firms were not required to disclose their performance on ESG-related topics, resulting in limited transparency between firms, financial markets, government, and society at large. Despite not being legally required to disclose information on these topics, some firms choose to do so regardless as several key stakeholders demanded them to do so. One of the key objectives of §3-3c, besides contributing to increased

transparency and corporate awareness of social responsibility, was to meet the EUs current reporting requirements regarding non-financial disclosure. Through the agreement on the European Economic Area (EEA), members of the EU and the European Free Trade Association (EFTA) go together to facilitate participation in the European market trade and movement without being member of the EU (EFTA, 2022). This entails that Norway as a member of the EFTA is a part of the agreement on EEA, and therefore must comply to EU laws and rules, such as the Non-Financial Reporting Directive (NFRD), the Corporate Sustainability Reporting Directive (CSRD), Sustainable Finance Disclosure Regulation (SFDR) and the EU taxonomy, which will be discussed in more detail in the next subsections.

Even though firms choose freely how they want to disclose their performance, i.e., which KPIs to pursue within different attributes, the reporting requirements in §3-3c are comprehensive and require firms to develop and implement systems and disclosing procedures. Due to the extensive requirements, the Ministry of Finance in Norway introduced a transition rule which stated that the requirements of §3-3c do not apply for firms that disclose their non-financial performance in accordance with UN's Global Compact Report (GCR) or the Global Reporting Initiative (GRI) (Lovdata, 2013). Both frameworks cover the same topics as §3-3c; however, they are less comprehensive and require less transparency from firms, especially in regard to defining relevant KPIs and disclosing guidelines, measures, results, and goals (PwC2, 2019). This rule gave firms time to transition towards a more strict and comprehensive reporting framework.

The transition rule came into force in June 2013 and lasted until 01.01.2018. From then on, firms that had used the GCR or GRI frameworks as guidance for their sustainability disclosure would no longer meet the reporting requirements in §3-3c and thus needed to expand their sustainability disclosure. For the last period, firms must report on guidelines, principles, procedures for compliance with human rights, employee rights and social conditions, the external environment, as well as their efforts against corruption, regardless of whether the firm considers these topics as relevant. Additionally, firms must assess their performance and to what extent they have reached their

predetermined goals within the four areas. Besides this, firms must disclose information about five business concepts: business model, policies, the outcome of the policies, risks and risk management, and KPIs relevant to the business. In short, section 3-3c sets fairly comprehensive reporting requirements for sustainability and social responsibility, although it is still up to the companies themselves how they present and structure results, which leads us to the currently available standards to use when reporting information on this topic (PwC2, 2019).

2.3 EU Rules on Non-Financial Information Disclosure

In recent years, EU has introduced several regulations and directives, such as the NFRD, SFRD and the CSDR. These are guidelines and regulations that mandates certain firms in its member countries to disclose non-financial information. NFRD was introduced in 2018 and has been in application since. It aims to provide stakeholders with information on ESG to assess the value creation, and to identify and assess key risks for the establishment. Additionally, it aims to promote responsibility on environmental and social issues. The NFRD mandates firms to disclose information on several core aspects in their annual reports: human rights, environmental protection, anti-corruption and bribery, gender, education, profession and age diversity, social responsibility and the treatment of employees. It applies to large public interest entities with over 500 employees, all listed companies, as well as banks and insurance companies. In total, 11 600 firms fall under this scope in the EU. There are however no requirements of what reporting frameworks to use under the NFRD (EU-Commission2, 2020).

On April 21st 2021, the EU Commission adopted a proposal for a more comprehensive and detailed reporting directive, which would amend the existing requirements of the NFRD, namely the CSRD. CSRD imposes strict reporting requirements in terms of reporting scope on firms' non-financial performance, external auditing of the reported information, and the format in which the information is published, meaning that the information must be published in

a format that is machine-readable (Corporate Sustainability Reporting, n.d.). Complying with the new regulations require a significant restructuring in how companies define relevant ESG-risks, how they measure their performance, and how it should be disclosed. It concerns all listed companies on EU regulated markets as well as all large firms meeting at least two of the three following criteria: more than 250 employees, more than €40 millions in turnover, and/or more than €20 millions in total assets. In total, 49 000 companies in EU will be affected by this regulation; however, it will not be in application until January 1st 2024, meaning that the NFRD applies until then (EU-Commission4, 2021).

As previously mentioned, Norway has to adopt and comply with EU regulations through the agreement on EEA. Therefore, changes in §3-3c are a result of expansions and new directives, such as the NFRD and CSRD.

2.4 Reporting Standards

2.4.1 Global Reporting Initiative

In light of the standards mentioned and discussed above, the Global Reporting Initiative (GRI) is the most widespread. During the last decade, the organization has focused on being present in key areas and has established offices all around the world. Its main objective is to facilitate for local organizations to incorporate sustainability into their reporting both regionally and globally and make it a standard practice. Furthermore, it aims to help corporations and governments to understand and communicate their impact on sustainability issues such as climate change, human rights, governance, and social well-being. GRI focuses on four main areas to achieve the objective mentioned above: creating standards and guidance to advance sustainability development, harmonizing the sustainability landscape, lead efficient and effective sustainability reporting, and drive effective use of sustainability information to improve performance. Additionally, through a common standard amongst firms, the standard claims to enhance the comparability of firms on a global scale and the quality of reporting on ESG-related topics across regions (GRI, 2021).

The GRI standard consists of three series of standards that support the reporting

process. First, the GRI Universal Standard applies to everyone that chooses to report according to the GRI and aims to build a foundation for disclosures, what to generally disclose, and how the management should approach the disclosure. Second, the GRI Sector Standards apply to firms within specific sectors, meaning that firms that operate within shipping must use the sector standards for this particular sector. Third, the GRI Topic Standards present standards for various topics and suggests different disclosure for that topic. Combined, this disclosure will help firms determine what topics are relevant to report to indicate how a firm contributes either negatively or positively towards sustainable development. Finally, the standards provide requirements that organizations must comply with, as well as recommendations; though they are not compulsory, they are encouraged to report it. There are 37 standards developed by the GRI that supplement each other to help firms prepare their non-financial reporting (GRI, 2021).

2.4.2 EU Taxonomy

To meet the EU's climate and energy target for 2030, we must facilitate and direct investments towards sustainable activities and projects. To achieve these goals, we need a clear definition of sustainability - giving rise to a common classification system for sustainable activities called the EU Taxonomy (EU-Commission3, n.d.). The regulation focuses mainly on the environmental aspect, and defines six requirements that must be met in order for an activity to be characterized as environmentally sustainable. The first criteria for defining sustainable economic activities was published by the EU on April 21st 2021, and will apply for all large companies in the EU from January 2022. The EU Taxonomy also requires companies to disclose the share of their turnover and investments that can be linked to sustainable activities - as defined by the EU Commission. The EU's political goal is that firms that can show a large share of sustainable activities will be rewarded with more access to financing, as well as more favorable financing terms (PwC1, 2021). Thus, the EU Taxonomy will provide firms with an incentive to contribute to reaching the goals of the Paris agreement by moving to more sustainable activities and solutions in the future.

The current legislation on non-financial reporting applying to Norwegian

firms is relatively vague compared to the EU Taxonomy and has, arguably, had an insignificant impact on their non-financial disclosure. According to Ernst Young's sustainability team, few Norwegian companies currently have a reporting structure that satisfies the requirements of the EU Taxonomy, especially in terms of the life cycle assessment of their products. Thus, to be aligned with the reporting requirements of the EU Taxonomy, Norwegian companies must be able to document and report on the sustainability of their entire supply chain (EY, Bærekraftsrapportering, n.d.).

In the eurozone, financial institutions were the first to report in accordance with the EU Taxonomy requirements and disclose the share of their portfolios that could be classified as "green". This implicitly means that they already have implemented the EU Taxonomy compliance criteria in their due diligence- and "green lending" processes, which will become more prevalent in other industries in the eurozone in the years to come. For many years, the eurozone has been Norway's largest and most important trading partner. As a result, Norwegian companies have a large exposure to the eurozone - both in terms of investments and investors. Therefore, the new reporting requirements will be essential and highly relevant for Norwegian companies in the years to come. Thus, it is essential to reduce the gap between statutory obligations and practices in the future.

2.4.3 Task Force on Climate-Related Financial Disclosure

The framework presented by TCFD concerns mainly four widely adoptable recommendations applicable for all sectors and jurisdictions and was first published in 2017. The key features of the recommendations are that it is adaptable by all organizations, included in financial filings, designed to solicit decision-useful, forward-looking information on financial impacts, and has a strong focus on risks and opportunities related to the transition to a low-carbon economy (TCFD, n.d.). Furthermore, the core elements in their recommended reporting are set to be governance, strategy, risk management, and metrics and targets. Altogether, it is a comprehensive guide for preparers to improve and understand how and why their reporting matters.

3 Literature Review and Hypotheses

3.1 Effects of Mandatory ESG Disclosure

Traditional accounting theory suggests that, in a voluntary setting where there are no disclosure requirements, firms choose an equilibrium disclosure level in which the marginal costs of disclosure equal its marginal benefits (Verrecchia, 2001). Introducing mandatory disclosure requirements can therefore be considered as an external shock to the equilibrium as firms must deviate from the optimal level. During the last decade, many countries have been implementing mandatory reporting requirements on firms' non-financial performance. As these regulations only have been in force for a relatively short period of time, a limited number of studies have been conducted on this topic, and the results are mixed.

Some studies found a positive relationship, i.e., an increase in non-financial disclosure after the introduction of mandatory requirements, including Ioannou and Serafeim (2017), and Hummel and Rotzel (2019). Hummel and Rotzel (2019) investigated the effects of the introduction of the SR Regulation in the UK, and show an increase in disclosure level among UK firms relative to the control group of US firms in terms of GHG emissions and gender equality. They also examined the incremental effect on disclosure measures, that is, whether the increase is moderated by firm-level reporting incentives such as market visibility, price-to-earnings ratio and analyst coverage, and found that the effect was positive for most incentives for their treatment group. Ioannou and Serafeim (2017) investigated the effect of sustainability disclosure regulations across four different countries, i.e., China, Denmark, Malaysia and South Africa. Similar to the findings of Hummel and Rotzel, they found that treated firms significantly increased disclosure following the regulations.

Contrastingly, other studies find no significant effect, e.g., Fallan, E. and Fallan, L. (2009) and Chauvey, J., Giordano-Spring, S., Cho, C. and Patten, D. (2014). The inconsistent empirical evidence on this topic must be assessed based on the background of the specific regulations under study. For instance, Chauvey et al., (2014), who based their study on French firms, states that

non-compliance can be explained by a lack of specificity by the law. The legislation did not include specific constraints regarding standards, norms, or pollution thresholds, and can be considered a soft law without clear sanctions for non-compliance. Fallan, E. and Fallan, L. (2009) studied the development of environmental disclosure in Norway during periods of voluntarism and periods with changed statutory requirements (1987 - 2005), they found that no statutory regulations are necessary for companies to meet the various requirements from their stakeholders or society at large. Moreover, they found that statutory regulation has an immediate effect on environmental disclosure only, and that companies do not fully comply with these regulations.

A more recent study by Krueger, P., Sautner, Z., Tang D. Y., and Zhong, R. (2021) investigated the effect of mandatory disclosure in 29 different countries. They suggest that compulsory ESG disclosure has advantageous informational and real effects. They find that mandatory ESG disclosure increases the available information and the quality of ESG reporting, particularly for firms with low ESG performance. This allows for more accurate ESG scores, and the probability of negative ESG incidents is less likely after implementing such laws - positively contributing to the goal of the Financial Stability Board (FSB). Empirical evidence also shows that sustainability disclosure has a positive impact on both firm value and corporate financial performance, as ESG strengths increase firm value and weaknesses decrease it, as Fatemi, A., Glaum, M. and Kaiser, S. (2017) and Friede, G. and Busch, T. and Bassen, A. (2015) found in their studies. The study further stresses that disclosure plays an important moderating role in which it mitigates the negative effects of ESG weaknesses and dampens the positive effects of ESG strengths. In turn, this might incentivize one way or the other in terms of disclosure.

Non-compliance can be explained by several factors, e.g., misinterpretation and unintentional neglect due to vaguely formulated reporting requirements, and intentional neglect following cost-benefit analyses (Glaum and Street, 2003). Empirical evidence also shows that firms are more willing to comply if they operate in environmentally sensitive industries, e.g., oil and gas, or are subject to large penalties (Krueger, 2015). In terms of attributes relating to GHG emissions and gender distribution, which are relatively straightforward to

both measure and disclose, regulations seem to be rather precise and easy to interpret. However, due to the vague phrasing in §3-3c, which states: "disclose to the extent necessary to understand the company's development, performance, position and consequences of the company's activities", disclosing on attributes in relation to the social aspect, such as organizational policies and practices regarding human rights, reporting discretion amongst companies tend to be greater (Hummel and Roetzel, 2019). This gives companies some flexibility in defining which KPIs to pursue within this dimension. The overall awareness and focus on sustainability has increased in recent years, and it is reasonable to expect that the level of non-financial disclosure would have increase also in the absence of regulations. However, to investigate whether the introduction of §3-3c and the removal of the transition rule had a treatment effect, we have formulated the following hypothesis:

H0: The introduction of the Accounting Act on Non-Financial Disclosure has not led to an increase in the level of ESG disclosure among Norwegian firms, relative to a matched control group of US firms.

H1: The introduction of the Accounting Act on Non-Financial Disclosure has led to an increase in the level of ESG disclosure among Norwegian firms, relative to a matched control group of US firms.

3.2 Difference-in-Difference

After the introduction of new policies and programs, regulators are often interested in the effect of the intervention on the group that is affected by it. A common non-experimental research designed used to examine this effect is a difference-in-difference (DiD) model. DiD models compare changes over time in a group that is unaffected by the policy, the control group, to changes over time in a group that is affected by the policy change, the treatment group (Stuart, E., A., Huskamp, H. A., Duckworth, K., Simmons, J., Song, Z., Chernew, M. E., and Barry, C. L., 2014). When selecting a control group, two main requirements must be met to avoid selection biases. First, the trend between the treatment- and control group should be the same in the absence of treatment. Second, there are no permanent, unobserved differences between

the two groups prior to the treatment, e.g., no current laws that forbid the control group from implementing the same treatment. Hypothetically, the DiD technique is a great tool to use to examine the effect of new policies; however, due to the strict requirements, it has some limitations. In a DiD model we implicitly assume that the dependent variable would be equal for both groups in the absence of treatment. This assumption might not hold in the real world as there could be factors that are unrelated to the program that could affect the trends in the two groups.

To compute the difference in the pre- and post periods, and investigate the treatment effect, the following research design can be applied:

Table 3.1: Difference-in-Difference Design

	Pre-period	Post-period	Difference
Control Group	x_0^{pre}	x_0^{post}	x_0^{post} - x_0^{pre}
Treatment Group	x_1^{pre}	x_1^{post}	x_1^{post} - x_1^{pre}
			$\Delta = (x_1^{post}\text{-}x_1^{pre})\text{-}(x_0^{post}\text{-}x_0^{pre})$

The quantity of interest for investigating the treatment effect is the difference in the differences, here denoted by Δ. In light of this study, x_1 denotes the disclosure level for the treatment group, and x_0 denotes the disclosure level for the control group, which is obtained through the computer-assisted textual analysis. We use this method to examine the treatment effect in the absence of control variables, i.e., the computations are solely based on x_0 and x_1. To control for firm characteristics or other external factors that may influence the outcome, and obtain significance levels for the DiD estimate (Δ), a DiD model can be constructed. The general form of the model is as follows:

$$Y_{ij} = \beta_0 + \beta_1 * T_i + \beta_2 * P_j + \beta_3 * T_i * P_j + \sum_k \beta_k * controls + \varepsilon$$

Y_{ij} is the outcome, T indicates whether the observation is in the treatment group or in the control group (1 or 0), and P reflects the time period, i.e., pre- or post the introduction of the treatment (1 or 0). In the model, the interaction term β_3 is the DiD estimator and is the quantity of interest. DiD is one of the most common methods to apply when evaluating the effect of new policies. By using a DiD model, we are able to evaluate the treatment effect of the two events, and control for factors that potentially could influence the outcome. The model to be used in this study is presented and discussed in more detail in the next section.

4 Empirical Methods and Data

4.1 Sample Selection and Discription

We conduct a DiD analysis to investigate the change in disclosure among Norwegian firms after the introduction of §3-3c and the removal of the transition rule - relative to a control group consisting of US firms. The rationale for choosing US firms is the absence of laws and reporting requirements on sustainability disclosure (Clarkin, C., Levin, J., Hu, J., Sawyer, M., and Lindsay, S., 2020). As mentioned in 3.2 above, two main requirements must be met to avoid selection bias, that is, there must be parallel trends between the two groups, and that there are no permanent, unobserved differences between the two groups prior to the treatment. We believe that by using US firms as a control group, both requirements are met to a satisfactory degree. Thus, by applying a DiD model, we can examine how the regulation has affected the group of Norwegian firms in terms of non-financial disclosure relative to the control group, and study the differential effect. Our research differs from most prior research on mandatory sustainability disclosure, which often do not compare the results to a control group. In that regard, we also have to address another important aspect, namely the ownership structure of the firms and how it may differ between the two groups. Acar, E., Caliyurt, K. and Karaibrahimoglu, Y. (2021) investigated the relationship between ownership structure and sustainability disclosure across 72 countries from 2002 to 2017 and found that the disclosure level among firms with high state ownership is higher compared to firms with low state ownership. Considering that state ownership in Norway is high, this must be borne in mind when assessing the results from this study (Regjeringen, 2020).

The sample selection is presented in Table 4.1. Sample distribution by year and sector is presented in the appendices in Table A1.1 and A1.2, respectively. The sample period starts in 2010 and lasts until 2020. We believe that starting three years prior to the introduction of §3-3c is sufficient enough to determine whether the treatment had an effect. During the sample period, 252 firms have been listed on Oslo Stock Exchange and thus affected by the regulation.

Table 4.1: Sample Selection

	Listed [1]	**Foreign** [2]	**Unavailable Reports** [3]	**Valid Obs.**
2010	206	35	79	92
2011	198	37	68	93
2012	194	37	56	101
2013	186	41	42	103
2014	185	41	38	106
2015	184	41	32	111
2016	187	39	27	121
2017	191	41	20	130
2018	196	40	27	129
2019	198	36	25	137
2020	198	41	18	139
Total	**2123**	**429**	**432**	**1262**

Two screening criterias were used in the matching process, namely GICS and market value of equity. As §3-3c first came into force in 2013, we match based on market value of equity as of year-end 2012. To prevent survivorship bias, we included all Norwegian firms that have been listed on Oslo Stock Exchange during the sample period, and matched them with US firms based on market value of equity at year-end the year they were listed. Bloomberg's Relative Valuation-function was used to identify all potential matches for our treatment firms. Specifically, we used the GICS and narrowed down to industry and sub-industry to the extent possible. Furthermore, we also ensure that all US firms are listed on a regulated marketplace in the US. In terms of market value of equity, we seek to find the closest match and avoid significant deviations. 77 percent of the matched control firms lies within a boundary of ± 10 percent, and the mean log of market value of equity for the treatment- and control group is 19.246 and 19.251, respectively. Thus, we were to a high degree successful in finding comparable firms.

Due to issues such as missing reports, foreign firms, and reports that are not machine-readable, adjustments have been made to the initial sample. For

[1] No. of listed firms in each year. Throughout the sample period, 252 different firms have been listed on the Oslo Stock Exchange

[2] No. of observations that have been removed from the sample due to firms that are domiciled in a foreign country and therefore not affected by §3-3c

[3] No. of observations that have been removed due to missing annual reports that could not be retrieved, encrypted reports, or not in a machine-readable format

instance, some reports are encrypted or scanned as a picture, and some firms listed in 2020, or delisted in 2010, have not published any reports at all. In total, we excluded 70 firms from the sample due to the fact that they are domiciled in a foreign country. After exclusions and adjusting for the above-mentioned issues, we ended up with a sample of 182 firms, 1,262 observations for the treatment group, and 1,255 observations for the control group. The slight deviation in observations is due to missing reports in the control group.

This research paper is first and foremost based on firms' annual- and sustainability reports, either as a stand-alone document or integrated in the annual reports. §3-3c provide firms with the flexibility to disclose in either document; thus, to capture whether firms disclose KPIs on the mandatory topics, we include both documents in the computer-assisted textual analysis. For the narrative disclosure measures, we are only looking into the annual reports, as this measure is not a part of the regulation. In regards to the treatment group, the reports are manually retrieved from the firms' websites or from Oslo Stock Exchange's NewsWeb archive. If the reports are not available online or are published in a format that cannot be processed in the computer-assisted textual analysis, we have contacted investor relations for the firms in question and received the missing reports if they are available. For the control group, we use the built-in Python package for downloading company filings from SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR). Searches are conducted using either the ticker or the Central Index Key (CIK).

4.2 Empirical Model and Variables

To examine the treatment effect of §3-3c and the removal of the transition rule, we have estimated the following equation:

$$Disclosure = \beta_0 + \beta_1 * treated + \beta_2 * post + \beta_3 * post * treated + \sum_i \beta_i * controls$$

The disclosure variables are listed and described in Table A1.3 in the appendices. To distinguish between the treatment- and control group and the sub-periods of interest, we implement a set of dummy variables. *treated* is a dummy variable that takes on the value 1 for firms that are domiciled in Norway (treatment

group) and 0 for firms that are domiciled in the US (control group). *post* is a dummy variable that takes on the value 1 in 2013 (2018) and onwards, i.e., after the introduction of §3-3c (removal of the transition rule) and 0 otherwise. In light of our research question, we are particularly interested in the interaction term β_3, which indicates the change in the level of sustainability disclosure for the treatment group relative to the control group. We use firm characteristics that are commonly used in prior research on this topic as control variables, namely, firm size (MVE), market-to-book (MB), leverage (Lev), and financial performance (ROA). Firm size is measured as the natural logarithm of market value of equity at year-end for each reporting year. Most studies on this topic control for firm size, often in terms of total assets, based on the assumption of economies of scale with respect to information production costs (Clarkson et al., 2008). However, we would also expect to see a positive relationship between overall disclosure level and market value of equity. Financial performance is measured as the return on assets each reporting year. Evidence on the relationship between return on assets and sustainability disclosure is mixed. Thus, we do not expect to see a significant relationship between the measures. Leverage is measured as long term debt in percent of total capital each reporting year and is intended to serve as a proxy for the creditors influence on the firms' disclosure level. Thomas, G., Aryusmar, A., Indriaty, L. (2020) found a positive relationship between sustainability disclosure and both profitability and leverage; however, they found no significant relationship between firm size. A study that found a positive relationship between firm size and sustainability disclosure is Kend, M. (2015). To limit the impact of outliers, we winsorize all control variables at the top and bottom 5 percent.

We distinguish between the sub-periods because in order to examine the treatment effect of the two events separately, meaning that the treatment effect of the removal of the transition rule is excluded when we examine the treatment effect of the introduction of §3-3c and vice versa. Thus, we conduct the analyses twice and adjust the sample periods in order to examine the treatment effect more in detail. As an additional analysis, we have also conducted the analyses using data from the entire sample period to assess the aggregate effect of the two events.

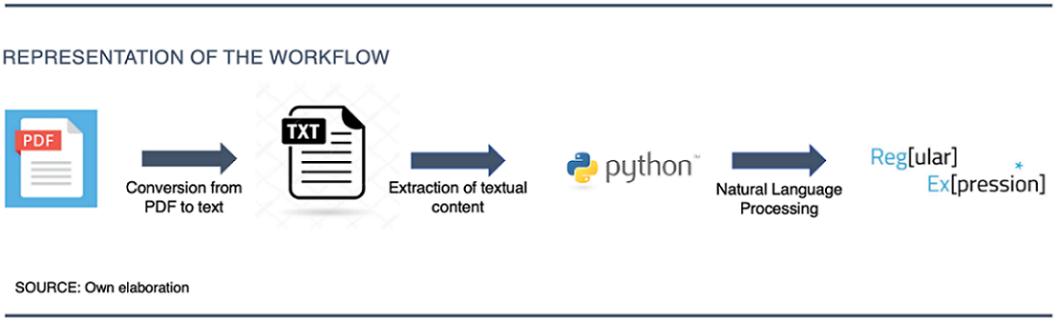
4.3 Measurement of ESG Disclosure

Financial disclosure literature generally refers to measures of financial reporting quality, e.g., earnings quality and disclosure practices (Bassemir & Novotny-Farkas, 2018). The use of self-constructed and hand-collected data is not that prevalent in financial disclosure literature; however, this is far more prevalent for sustainability disclosure literature. An issue with this method is that it comes at the expense of smaller sample sizes as it is comprehensive and time-consuming. Thus, by applying text-mining techniques, we can overcome the limitations of small sample sizes, and even measure and quantify firms' narrative disclosures.

To overcome this issue, we use computer-assisted textual analysis to capture whether firms disclose information on the mandatory topics, and use KPIs on GHG emissions, gender distribution, and work environment as proxies, as well as firms' narrative sustainability disclosure. Computer-assisted textual analysis can be considered as a subset of qualitative analyses and can be considered as "the notion of parsing for text patterns" (Loughran & McDonald, 2016). More specifically, we use Python and the built-in Natural Language-Toolkit (NLTK) packages to import the reports, extract the text data and analyse the content. The raw text data contain punctuations and other forms of noise that frequently appear in the text but convey minimal meaning on a stand-alone basis. Thus, we clean the texts by applying various standard pre-processing procedures in advance of the analyses [4]. We conduct the analysis on each firm separately, meaning that we import the respective reports for each firm into Python separately. A representation of the workflow is illustrated in the figure below.

[4]The standard pre-processing procedures include tokenizing the text, removing unnecessary line breaks, blanks, stop-words, tabulators and special characters, and converting the text from upper case to lower case letters.

Figure 4.1: Representation of the Workflow



We assess three types of disclosure: disclosure of KPIs on the mandated topics, narrative sustainability disclosure, and disclosure on the outside-in impact of the environment. Narrative sustainability disclosure is non-financial information that is not mandatory to disclose but is included in the annual reports to provide a broader and more meaningful understanding of a firms' business (PwC3, n.d.). In light of the EU Adaption Strategy and the climate change adaptation objective of the EU Taxonomy, which aims to increase and accelerate the efforts to protect nature, people and livelihoods the unavoidable impacts of climate change, the outside-in measure will provide data on the number of firms that address this issue in their annual- and sustainability reports (EU-Commission1, n.d.).

The disclosure measures are captured by running regular expressions on the cleaned text data. Regular expressions are one of the key concepts within natural language processing, and are defined as patterns that the engine tries to match in the input text (Microsoft, n.d.). With respect to the KPIs, we define patterns that reflect the requirements in §3-3c. The expressions require disclosure of specific words in conjunction with numerical content that must appear together within a limited word window. To enhance the validity of our findings, we limit the window to eight words for the KPIs. For instance, to detect whether the reports contain the mandatory information on GHG emissions, we defined a pattern that contains combinations such as "tonne" or "tonnes" and "GHG", "carbon" or "CO2", in addition to a numerical expression. In regards to gender equality, we defined a pattern that contains combinations such as "gender", "female" or "women", and "employees", "managers" or "executives", in addition to a numerical expression. We implement a binary variable that takes

on the value 1 if the information is present, and 0 otherwise. Once the firms start to disclose the mandatory information, the binary variable takes on the value 1 and stays equal to 1 for the remainder of the period.

In regards to the narrative sustainability disclosure, we have created an ESG dictionary consisting of 241 ESG-related words and expressions, including words such as "sustainability" and phrases such as "corporate social responsibility", inspired by the ESG dictionary created by Baier et al., (2020). To capture the number of ESG-related words present in the reports, we have created one regular expression for each ESG dimension. Subsequently, to obtain the narrative sustainability disclosure, we combine the number of words from all three dimensions and divide by the total number of words in the report after applying the pre-processing procedures. This method allows us to quantifiably examine quantitative content, and assess whether firms have increased their focus on ESG besides reporting on their performance in quantitative measures. Lastly, in regards to outside-in impact, we have constructed a regular expression that searches for combinations of words, such as "climate" or "transition" combined with "risk" or "impact" within a word window of eight words. To capture whether firms address the outside-in impact of the environment, we implement binary variables that takes on the value 1 if the information is present in the report, and 0 otherwise. Using continuous variables on this disclosure measure, i.e., counting the number of matches in each report, could provide us with misleading results as some firms address the outside-in impact to a far greater extent than others. Thus, to prevent potential biases, we find it more appropriate to use binary variables. Table A1.4 - A1.6 provides a complete overview of the search queries for all disclosure measures, and Figure A1.1 provides examples of the output from the computer-assisted textual analysis. All tables and figures are presented in the appendices.

5 Results and Analysis

5.1 Descriptive Statistics

The descriptive statistics for the regression variables obtained from the computer-assisted textual analysis for the treatment- and control group are presented in Table 5.1 and Table 5.2, respectively. The variables *EnvKPI*, *GenKPI*, and *HSEKPI* represents disclosure of KPIs on the impact on the external environment, gender distribution and work environment, respectively. *NarSD* and *Outside-in* represents firms' narrative sustainability disclosure and whether they address the outside-in impact of the environment. To get an overview of the disclosure level in the three different sub-periods, we distinguish between the period prior to the introduction of §3-3c, the period after §3-3c and prior to the removal of the transition rule, and lastly, the period after the removal of the transition rule.

First, in regards to the treatment group and disclosure of KPIs, the findings from the textual analysis show that, on average, 37 percent (89 percent, 92 percent) of firms in the treatment group disclose the mandated information on their impact on the external environment (gender distribution, work environment). The mean values for the respective sub-periods and disclosure measures are presented in Table A1.7 and A1.8 in the appendices. The highest disclosure level is, as expected, observed in sub-period 3 for all disclosure measures. In terms of the narrative disclosure measures, i.e., *NarSD* and *Outside-in*, we find that, on average, 3.21 percent of the textual content in the reports is devoted to addressing ESG-related topics, and that 25 percent of firms address the impact of the external environment. The report with the highest narrative sustainability disclosure, 10.74 percent, is observed in sub-period 2. The results from the textual analysis reveals a steady increase in all disclosure measures throughout the sample period, where *EnvKPI* and *Outside-in* can be considered the most significant - increasing from 28 to 48 percent, and 13 to 47 percent from sub-period 1 to sub-period 3, respectively.

[5]The sample of 1,262 is based on observations of KPIs. As some of the reports are not machine-readable, we were unable to extract the data to assess the narrative sustainability disclosure and the outside-in impact, which explains the deviation.

Table 5.1: Descriptive Statistics for Regression Variables: Treatment Group

	Mean	**SD**	**Min.**	**Median**	**Max.**	**N**
EnvKPI	0.3732	0.4884	0.0000	0.0000	1.0000	1262
GenKPI	0.8873	0.2975	0.0000	0.0000	1.0000	1262
HSEKPI	0.9177	0.2680	0.0000	0.0000	1.0000	1262
NarSD	0.0321	0.0118	0.0000	0.0314	0.1074	1177
Outside-in	0.2500	0.4658	0.0000	0.0000	1.0000	1216
MTB	2.5077	2.6056	0.2011	1.5008	10.3286	1071
Lev	0.3059	0.2008	0.0287	0.2788	0.7244	962
ROA	-0.0153	0.1476	-0.4717	0.0190	0.1692	1057
MVE	18.2102	1.9734	14.6494	18.1173	22.0180	1067
Total sample:						**1262** [5]

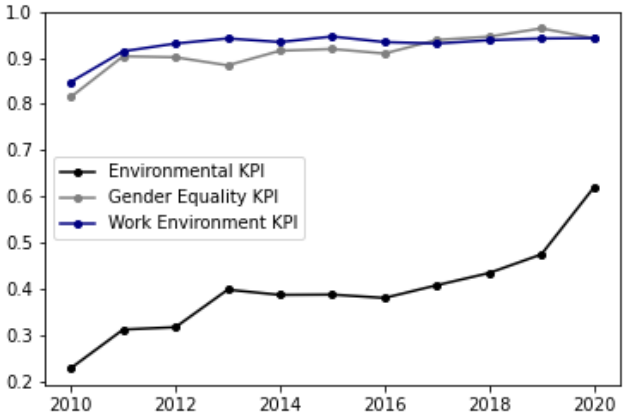
Second, in regards to the control group, the mean values for disclosure on KPIs are, as expected, significantly lower than for the treatment group. The findings from the textual analysis show that, on average, 2.8 percent (4 percent, 3.4 percent) of the firms in the control group disclose the mandated information on their impact on the external environment (gender distribution, work environment). For the narrative disclosure measures, we observe greater similarities between the two groups. Similar to the treatment group, the highest disclosure level is observed in sub-period three. The narrative sustainability disclosure remains more or less unchanged throughout the sample period, while we observe a 50 percent increase in the outside-in measure from sub-period one to sub-period three.

Table 5.2: Descriptive Statistics Regression Variables: Control Group

	Mean	**SD**	**Min.**	**Median**	**Max.**	**N**
EnvKPI	0.0283	0.1513	0.0000	0.0000	1.0000	1255
GenKPI	0.0401	0.0948	0.0000	0.0000	1.0000	1255
HSEKPI	0.0342	0.1589	0.0000	0.0000	1.0000	1255
NarSD	0.0227	0.0052	0.0110	0.0217	0.0930	1261
Outside-in	0.3565	0.4690	0.0000	0.0000	1.0000	1254
MTB	2.6813	2.5962	0.5258	1.8372	11.0260	1081
Lev	0.3176	0.2454	0.0019	0.2836	0.8677	872
ROA	-0.0391	0.1764	-0.5940	0.0138	0.1309	1060
MVE	18.7895	1.8614	16.4718	19.8498	23.2902	1109
Total sample:						**1255**

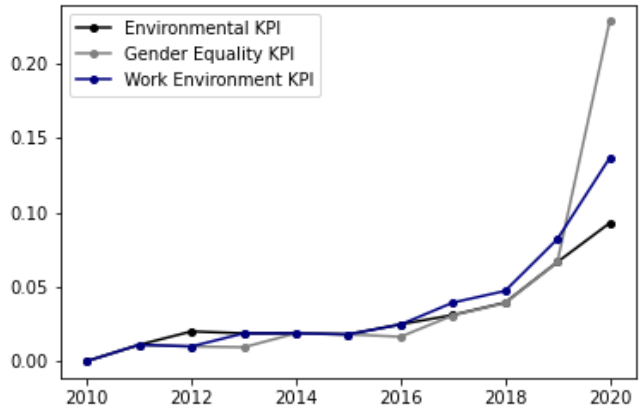
To visually present the data, we have created several figures that show the changes in disclosure level for the two groups. Figure 5.1 below shows the changes in disclosure level on KPIs for the treatment group. From the figure we can observe an incline in disclosure on GHG emissions after the introduction of §3-3c in 2013, and after the removal of the transition rule in 2018; however, in sub-period two, the disclosure level to remain more or less unchanged. In terms of *GenKPI* and *HSEKPI*, the disclosure level remains high throughout the sample period. This indicates that the two events had an effect on disclosure on GHG emissions among firms in the treatment group immediately after they were introduced; however, not on disclosure on the two other aspects of §3-3c. Considering that the disclosure level was high already in 2010, this is expected.

Figure 5.1: Disclosure of KPIs - Treatment group



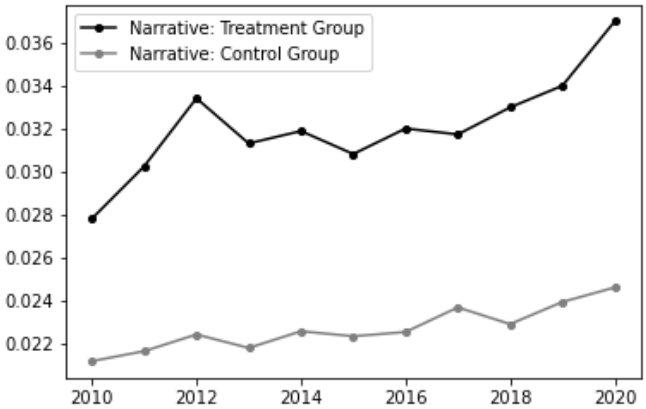
For the control group, the disclosure level on KPIs is low compared to the treatment group. From 2010 to 2018, the patterns are relatively similar across all disclosure measures; however, we observe a sharp increase after 2018, particularly for disclosure on gender distribution, which increases from 3.13 percent in 2018 to 22.86 percent in 2020. The sharp increase in disclosure on this topic may be explained by several factors. Although US firms are not required to disclose this information in their 10-K, an increasing number of firms have chosen to do so regardless. This suggests that US firms seek to meet society's increasing demand for information on this topic.

Figure 5.2: Disclosure of KPIs - Control group



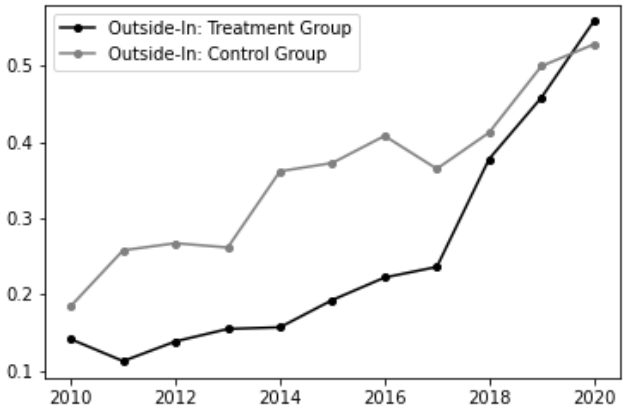
In regard to the narrative sustainability disclosure, Norwegian firms on average include more ESG related information in their reports compared to the matched group of US firms based on our ESG dictionary. At the start of the sample period, 2.8 percent of the content in the Norwegian reports was devoted to addressing sustainability topics, and we observe a steady increase throughout the period, ending at 3.7 percent in 2020. In comparison, the narrative sustainability disclosure for the control group were 2.1 percent in 2010 and 2.5 percent in 2020, indicating a weaker development in this particular disclosure measure. The findings are visually presented in Figure 5.3 below.

Figure 5.3: Narrative Sustainability Disclosure



The final measure, the outside-in impact, might be the most similar disclosure measure across the two groups. In the beginning of the sample period, 14 percent of firms in the treatment group addressed this issue. This quantity increased to 38 percent in 2018 and 56 percent in 2020, indicating that the removal of the transition rule had a spillover effect on addressing outside-in risk factors. For the control group, a higher percentage of firms addressed this issue in the beginning of the sample period compared to the treatment group. 18.5 percent addressed the outside-in impact in 2010, steadily increasing throughout the sample period, ending at 53 percent in 2020. The findings are visually presented in Figure 5.4 below.

Figure 5.4: Outside-In Impact Disclosure



In regards to the textual measures, i.e., *EnvKPI*, *GenKPI*, and *HSEKPI*, and identifying the KPIs in the reports, we manually check the validity of our findings. The format and structure of the reports may influence the findings. For instance, if the KPIs are presented in a table, the content may be rearranged when we apply the standard preprocessing procedures, which might result in the search query not being able to identify the pattern due to the limited word window. Elements such as page numbers, table numbers, et cetera, may also result in false positives. Thus, if we observe any abnormal or unusual patterns, we manually check the report in question. However, our code and search queries appear to be adequate in identifying the KPIs in the different ESG dimensions. In regards to the narrative sustainability disclosure and the outside-in impact, there might be a language bias. Approximately 2.5 percent

of the Norwegian reports are published in Norwegian, which we have solved by constructing a Norwegian equivalent of the ESG dictionary. One could argue that the Norwegian equivalents may not be used in the same context or appear as frequently as the English words, meaning that we might get biased results for the companies it regards. However, considering that this issue only relates to 2.5 percent of the sample, it will not have a significant influence on our findings.

5.2 Bivariate Statistics

To study the correlation between the disclosure measures, we have constructed a correlation matrix, presented in Table A1.15 in the appendices. All disclosure measures are positively and significantly correlated with each other, which indicates that narrative sustainability disclosure and addressing outside-in impact accompanies compliance with §3-3c, and that compliance with the different aspects of the law accompanies each other. With respect to the control variables, both *MVE* and *ROA* is negatively correlated with all five disclosure measures, thereby indicating that neither an increase in firm size nor improved firm performance seem to induce firms in the treatment group to increase their sustainability disclosure. These findings are inconsistent with the findings of Kend, M. (2015), who found a positive relationship between firm size and sustainability disclosure, and with the findings of Thomas et al. (2020), who found a positive relationship between performance and sustainability disclosure, and an insignificant relationship between firm size and disclosure. *Lev* is negatively correlated with both *GenKPI* and *HSEKPI*; however, positively correlated with *EnvKPI* and both narrative disclosure measures. On the other hand, we find that *MB* is positively correlated with all five disclosure measures, thereby indicating that the higher the market value of equity is relative to the book value, the higher the compliance of the law by firms, as well as higher disclosure on ESG matters in general. These results are somewhat unexpected. It is reasonable to believe that large value firms with a high market value of equity that have the opportunity to spend resources on disclosing their non-financial performance would do so, and that growth firms would not. However, the nature of the sample selection, where we have included newly listed firms

continuously, which typically are growth firms with a lower value of equity, might have influenced the results.

Table A1.11 - A1.14 in the appendices presents the results from the univariate difference-in-difference analyses (DiD) for all five measures and all periods of interest based on the design presented in Table 3.1. Figure A1.11 and A1.12 presents the results from the DiD analyses on the entire sample period, while A1.13 and A1.14 presents the results where the sample period is limited to 2010 to 2017 and 2013 to 2020, respectively. We compute the difference in the disclosure measures between the pre- and post-periods for both the treatment- and control group, and then compare the difference in the differences.

In regards to the treatment group, the results reveal a significant increase in disclosure on GHG emissions (10.64 percent) after the introduction of §3-3c (A1.13). We also observe an increase in the disclosure level on the other KPI measures; however, the increase can be considered as insignificant. In terms of the treatment effect, the DiD estimate reveals an increase in disclosure on GHG emissions of 9.44 percent, relative to the control group. For disclosure on gender distribution and work environment, the DiD estimate is positive, however, the increase cannot be considered as significant relative to the control group. For the control group, the results reveal an increase in all disclosure measures, where the outside-in impact measure is the most significant. In terms of the narrative sustainability disclosure, the results reveal a slight increase for the treatment group relative to the control group; however, the increase is not significant. For the outside-in impact measure, we observe that firms in the control group provide more information on this topic compared to the treatment group, and that the increase in this measure from sub-period one to sub-period two is greater for the control group compared to the treatment group. Thus, the DiD estimate is negative for this disclosure measure. Moreover, if we include the effect of the removal of the transition rule (A1.11), we obtain relatively similar results. However, we observe a slight increase in both disclosure on GHG emissions and the outside-in impact.

In regards to the effect of the removal of the transition rule (A1.14), the results reveal a significant increase in disclosure on GHG emissions (11.7 percent) and outside-in impact (27.3 percent) for the treatment group. In terms of

the treatment effect, the DiD estimate is significantly positive for both these measures, 7.3 and 14.6 percent, respectively. Although we observe an increase in disclosure on gender distribution and work environment, the DiD estimate is now negative, indicating that disclosure in the US has increased, relative to the treatment group. In terms of the narrative sustainability disclosure, the result from the DiD is relatively similar to the results discussed in the section above. Finally, in regards to the DiD where we have included the effects of §3-3c (A1.12), the results are approximately identical - except for a slight incline in disclosure on GHG emissions, and a slight decline in disclosure on the outside-in measure.

5.3 Regression Analysis

Table 5.3 and 5.4 below presents the findings from the DiD regression analyses for examining our research question. As we are interested in the effect of both the introduction of §3-3c and the removal of the transition rule, we run the regressions twice and adjust both the sample period and the dummy variable in order to examine the stand-alone effect of the two events. First, to examine the effect of the introduction of §3-3c, we use data from sub-period 1 and 2, and implement a dummy variable that takes on the value 1 in 2013 onwards. Second, to examine the effect of the removal of the transition rule, we follow the same procedure and use data from sub-period 2 and 3, and implement a dummy variable that takes on the value 1 in 2018 onwards. In addition to adjusting the sample period to exclude the effects of one event on the other, we have also conducted the regressions using the entire sample period to examine the aggregate effect of the two events. Findings from these regressions, presented in Table A1.16 in the appendices, are similar to the results discussed below. *treated* presents the difference in disclosure between the treatment group and the control group before the treatment, while *post* presents the difference between the average disclosure for the control group before and after the treatment. *post*treated* presents the interaction term β_3, and is the coefficient of interest in for investigating our research question.

Table 5.3: Regression Analysis: Introduction of §3-3c (2010-2017)

	EnvKPI	**GenKPI**	**HSEKPI**	**NarSD**	**Out-in**
treated	0.3137***	0.8615***	0.9231***	0.0103***	−0.1814***
	(7.4360)	(21.5430)	(27.4710)	(4.1990)	(-2.3580)
post	-0,0224	0.0002	-0.0150	−0.0009*	0.1484
	(-0.6960)	(0.0080)	(-0.5840)	(-0.4610)	(2.5260)
post*treated	**0.1267*** **	**0.0085**	**0.0441**	**0.0012**	**-0.1142**
	(2.5390)	(0.1800)	(1.1090)	(0.3950)	(-1.2550)
R-Squared	0.9920	0.9990	0.9990	0.9600	0.9010
observations	1710	1710	1710	1644	1674
controls	YES	YES	YES	YES	YES

First, in terms of the treatment effect of the introduction of §3-3c, the results reveal a positive and significant coefficient for our DiD estimator β_3 for disclosure level on *EnvKPI* [6]. In terms of *GenKPI*, *HSEKPI* and *NarDS*, the results reveal positive coefficients; however, the effect is not as significant. For the outside-in disclosure measure *Out-in* however, the coefficient for the DiD estimator is negative. This indicates that the introduction of §3-3c had a treatment effect in terms of disclosure on GHG emissions, and no treatment effect in terms of the other disclosure measures.

Second, in terms of the treatment effect of the removal of the transition rule, the results reveal negative coefficients for the DiD estimator β_3 across all three KPI disclosure measures. For the narrative disclosure measures however, the coefficient for the DiD estimator is positive, particularly for *Out-in*. Although the coefficients for the DiD estimator is negative for all KPI disclosure measures and indicates that there is no treatment effect in this case, our findings from the textual analysis reveals a significant increase in disclosure level on GHG emissions for the treatment group. The significant increase in *Out-in* thereby suggests that the removal of the transition rule and the increase in disclosure of GHG emissions had a spillover effect on firms' focus on the outside-in impact of the external environment as well.

[6] In table 5.4 & 5.5, the coefficient estimates and t-statistics (in parenthesis) is represented based on OLS regressions. ***, **, and * indicates statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5.4: Regression Analysis: Removal of the Transition rule (2013-2020)

	EnvKPI	**GenKPI**	**HSEKPI**	**NarSD**	**Out-in**
treated	0.5986***	1.0212***	1.0279***	0.0128***	-0.0507
	(4.6990)	(8.9550)	(27.3690)	(3.4860)	(-0.2490)
post	0.0763*	0.0671*	0.0611***	0.0016	0.1189*
	(2.2580)	(2.2160)	(6.1320)	(1.6800)	(2.1990)
post*treated	**-0.0276**	**-0.0422**	**−0.0705*****	**0.0001**	**0.0740****
	(-0.5150)	(-0.8800)	(-4.4600)	(0.0820)	(0.8640)
R-Squared	0.9850	0.9970	1.0000	0.9790	0.9000
observations	1952	1952	1952	1907	1916
controls	YES	YES	YES	YES	YES

5.4 Discussion of Results

The results from the DiD regressions and the univariate DiD are consistent with the findings of Hummel and Rotzel (2019), and Ioannou and Serafeim (2017) in terms of disclosure on GHG emissions following the introduction of §3-3c; however, the results for the other KPI measures and the effect of the removal of the transition rule are not consistent with their findings. The inconsistency may be explained by several factors. First, our sample period differs from both Hummel and Rotzel (2019), who examined the change in disclosure levels in the UK from 2010 to 2015, and Ioannou and Serafeim (2017). Our results reveal a significant increase in disclosure on all three KPIs for the control group in the period after 2018, which is not included in their studies. Due to this substantial increase, we observe a significantly more positive percentage increase for the control group compared to the treatment group, ultimately reducing the treatment effect. Second, compliance with §3-3c in terms of gender equality (*HSEKPI*) and work environment (*HSEKPI*) has been high among treatment firms throughout the entire sample period, meaning that the potential for improvement is somewhat limited. On the contrary, these two disclosure measures are at a low level in the start of the sample period for the control group. Thus, the potential for improvement is greater for the control group. The high compliance among treatment firms, combined with a significant increase in disclosure level among the control firms, has undoubtedly influenced the results.

The high disclosure level on gender distribution and work environment for

treatment firms may also be due to other external factors. Norway's strict Working Environment Act mandates Norwegian firms to take good care of their employees in terms of paid maternity leave, paid vacation, and other goods, as well as maintaining a safe and sound work environment in general. In turn, one could argue that these benefits and schemes have a positive impact the work environment, and thus, Norwegian firms may be more inclined to disclose their performance. With respect to gender equality, Scandinavian countries are among the top performers (OECD, 2018). In fact, Norway is one of the most gender-equal countries globally and is the country with the smallest pay gap, and will likely have no objections disclosing information on this matter. Additionally, another Norwegian law mandates firms to disclose a description of the company's guidelines for equality and diversity with regard to, e.g., gender background for the composition of the board, management and control bodies, and their possible subcommittees. However, some firms might choose not to disclose this information. If they do so, they will have to justify their choice.

As §3-3c states that firms have the flexibility to disclose KPIs either integrated in the annual report or as a stand-alone document, sustainability reports have been merged with the annual reports in the textual analysis to detect whether the firm in question has disclosed the mandated information. To avoid biased results, the same approach is applied for the control group. Considering that US firms are not required to disclose this information in their 10-K, the majority of firms choose to disclose this in a stand-alone sustainability report. Thus, conducting this study solely based on annual reports, as Hummel and Rotzel (2019) did, would arguably have revealed a more significant treatment effect across all three KPIs.

Several firms were removed from the sample during the matching process, 36 of which operate in the energy sector. As previously mentioned, empirical evidence show that firms are more willing to comply with regulations if they operate in environmentally sensitive industries, e.g., oil and gas, or are subject to large penalties. Thus, removing firms that operate in the energy sector may have influenced our results as the degree of compliance would, arguably, have been high. However, due to the nature of the matching process, where an equal number of firms belonging to the same sector have been removed from both

groups, one could argue that this bias is avoided. Furthermore, our sample was reduced to some extent during the data-collection process because a small number of the Norwegian annual- and sustainability reports are published in a format that is not machine-readable. This issue occurred more frequently at the beginning of the sample period; however, this may also have influenced our results.

It is important to emphasize that evidence on this topic must be assessed based on the background and nature of the specific regulations under study. Even though §3-3c is relatively vague, the results indicate that it has had an effect and has induced an increase in disclosure among Norwegian firms. Although we observe an increase in disclosure on GHG emissions after the introduction of §3-3c in 2013, the average disclosure level remained relatively stable at 30-40 percent until the removal of the transition rule in 2018. This indicates that implementing a transition rule that allows for compliance with other reporting frameworks only resulted in slight increase immediately after, and not a continuous increase. Besides the steady increase in disclosure on KPIs, the results also reveal an increase in the narrative disclosure measures, which we have shown to be positively correlated with the KPI measures. The increase in narrative disclosure thereby indicates that there is a spillover effect from both §3-3c and the removal of the transition rule on other sustainability dimensions as well.

The increase in disclosure can also be seen as a result of increased demand for information from shareholders, customers, financial institutions, and other stakeholders, as well as the increasing focus on climate change and achieving gender equality in general. In particular, institutional investors have intensified their engagement with companies in order to promote ESG-oriented policies and disclosure. These investors have also adjusted their proxy votes correspondingly, incorporating ESG topics and awareness in a business has transitioned from a nice-to-have to a must-have from an investor's perspective. Thus, the increase in disclosure by firms, both Norwegian and US, may also be explained by this transition.

6 Summary and Conclusion

6.1 Conclusion

This paper examines the effects of the introduction of the Norwegian Accounting Act on Non-Financial Disclosure and the removal of the transition rule on sustainability disclosure in Norwegian firms' annual and sustainability reports. §3-3c requires Norwegian firms to disclose key performance indicators on impact on the external environment, gender equality, work environment, and human rights. In addition to investigating whether firms have disclosed the mandatory information, we also investigate the spillover effect of the two events on firms' narrative disclosure. We distinguish between two separate measures for the narrative disclosure; that is, how much of the reports that are devoted to ESG-related topics, and whether firms address the outside-in impact of the external environment. In light of §3-3c, we are interested in whether Norwegian firms, on average, have increased their non-financial disclosure relative to a matched control group of US firms following the introduction of the regulation, and the removal of the transition rule. Considering that the EU Taxonomy will demand a higher degree of transparency and more comprehensive reporting requirements in terms of sustainability, the findings in this study will, to some extent, indicate whether Norwegian firms are starting to align themselves with these requirements and objectives.

To measure the degree of compliance with the regulation and the narrative disclosure, we use computer-assisted textual analysis. This method allows us to quantitatively examine qualitative content and conduct the study on a larger sample than we would be able to with hand-collected data. Our focus is divided into three main disclosure measures, namely, disclosure of key performance indicators, narrative sustainability disclosure on the mandated topics, and disclosure on the outside-in impact of the environment. To measure disclosure, we construct a set of search queries that reflect the above-mentioned disclosure measures using natural language processing and regular expressions. In terms of the narrative sustainability disclosure, we seek inspiration from an ESG dictionary constructed by Baier et al. (2020). We have added words

and phrases we see fit and removed those we consider unnecessary. For the outside-in measure, we have constructed a search query that detects whether firms' address the outside-in impact of the external environment. This measure is intended to partially reflect the requirements of the EU Taxonomy and the EU Adaption Strategy.

Our sample consists of 182 Norwegian firms listed on the Oslo Stock Exchange and a matched control group of US firms. To investigate the treatment effect of the regulation, we conduct several difference-in-difference analyses where we compute the difference in the disclosure measures between the pre- and post-periods and then compare the difference in the differences. The analyses are conducted using both a simple difference-in-difference design without control variables, and a difference-in-difference equation where we control for several firm characteristics. The findings from the textual analyses reveal a steady increase in all disclosure measures for both groups throughout the sample period, particularly for disclosure on the impact on the external environment and addressing the impact of the external environment. In regards to the treatment effect of the two events, the difference-in-difference analyses reveal a positive and significant difference-in-difference estimator for disclosure of key performance indicators on the impact on the external environment (GHG emissions) after the introduction of §3-3c. For the other key performance indicators, i.e., gender distribution and work environment, the estimator is slightly positive after the introduction of §3-3c, and slightly negative after the removal of the transition rule. These findings indicate that §3-3c had a treatment effect in terms of disclosure on GHG emissions, and no treatment effect in terms of disclosure on gender distribution and work environment. Considering that the disclosure level on the latter two was high already prior to the treatment, this was expected.

In regards to the narrative sustainability disclosure, the textual analyses reveal an increase in disclosure level for both the treatment- and control group; however, in terms of the treatment effect, the analyses reveal an insignificant difference-in-difference estimator after both the introduction of §3-3c and the removal of the transition rule. For the outside-in measure, the findings are more mixed. The results reveal a negative difference-in-difference estimator

after the introduction of §3-3c, and a positive and significant estimator after the removal of the transition rule. Although neither the regulation nor the removal of the transition rule requires firms to address sustainability related topics besides disclosing key performance indicators, these findings suggest that there is a spillover effect from both events on firms' narrative disclosure, both in terms of the narrative sustainability disclosure and the outside-in impact measure. In light of the environmental objectives of the EU Taxonomy, and the EU Adaption Strategy, which the outside-in measure partially reflects, one can argue that the findings from the analyses suggest that Norwegian firms are starting to align themselves with these objectives. Although there are still firms that do not disclose the mandated information, we observe a positive trend for for all disclosure measures. However, considering the strict requirements of the EU Taxonomy, particularly in terms of disclosing the share of the turnover that can be linked to sustainable activities and that the reports must be published in a machine-readable format, a large proportion of Norwegian firms are facing a significant transition in terms of how they chose to disclose their sustainability performance.

Computer-assisted textual analysis can be efficient when analyzing textual- and numerical content and be a helpful tool for both researchers and practitioners. This method allows us to extract and analyse large amounts of textual data, and is a more efficient method compared to hand-collecting data. It also allows for a lot of flexibility as we are able to construct patterns and search queries that reflect the topic under study. However, this methodology is still under development and has some limitations in terms of practical application as some reports, or other electronic documents, are published in a format that is not supported by this tool. This study addresses an aspect of computer-assisted textual analysis that can be used to evaluate topic-specific narrative disclosure, and quantifiably measure qualitative content in annual- and sustainability reports. The introduction of the EU Taxonomy offers a good setting for future studies on this topic. In particular, it would be interesting to apply a similar methodology to investigate the effect of the EU Taxonomy on firms' disclosure of mandatory information - and the potential spillover effects on their narrative sustainability disclosure.

6.2 Alternative Disclosure Measures and Future Research

Hummel and Rotzel (2019) examined whether firm-level reporting incentives such as media coverage, growth orientation and governance structure, interact with the change in disclosure. Their findings show a positive relationship between all of the above-mentioned reporting incentives and disclosure in a voluntary setting, and a positive relationship between some of the incentives in a mandatory setting. Thus, for future research on this topic, particularly in Norway, it would be interesting to examine whether firm-level reporting incentives interact with an increase in disclosure. Furthermore, in the regression analyses we have only used financial firm characteristics as control variables, as opposed to non-financial characteristics, such as sector or industry and report length. Hummel and Rotzel (2019) controlled for report length in their investigation, and found a positive correlation between the report length and all disclosure measures, indicating that longer reports contain more information on the mandated topics, in percent of total number of words. One could therefore argue that such characteristics should have been controlled for in this study. Differences in disclosure level and choice could also be systematically related to firm- or industry characteristics. For instance, one could argue that industries such as information technology would choose to delay, or even avoid to disclose information on gender distribution as the industry is known to be more or less male dominated. The same intuition also applies for disclosure on GHG emissions for industries that do not consider this as relevant. Furthermore, considering that empirical evidence shows that firms that operate in an environmentally sensitive industry, or are subject to large penalties, are more willing to comply with these regulations. Thus, for future research, it would be appropriate to control for this characteristic, or distinguish between the different industries in the analyses to examine this at the sector-level.

With respect to our disclosure measures, several alternative constructions could be considered. In terms of the narrative sustainability disclosure, where we used the sum of all three ESG dimensions as a proxy for firms' sustainability narrative, it could be interesting to look at the development in the three

dimensions separately - particularly the environmental dimension. The ESG dictionary used in this study is a modified version of an already existing dictionary constructed by Baier et al. (2020). We have excluded words we consider unnecessary, and added words we think should be included. However, it is difficult, or close to impossible, to construct a dictionary that perfectly captures all ESG-related information. Thus, the ESG dictionary used in this study could be used as a foundation for future development and application.

The key performance indicators used in this study broadly covers GHG emissions, gender equality and work environment; however, the human rights aspect is not included despite being covered by §3-3c. The reasoning behind this is that firms do not provide key performance indicators on this matter, but typically disclose their performance and effort as a part of their narrative disclosure. The human rights aspect is therefore only included in the narrative disclosure measure. However, it could be interesting to look at this aspect as a stand-alone measure as well. Moreover, this study only examines the level of compliance, and not the real effects of the regulations, that is, firms' actual performance on the respective mandatory sustainability topics.

As previously mentioned, one of the assumptions in the difference-in-difference method is that there must be parallel trends between the treatment- and control group in the absence of treatment. However, in the real world, it is difficult to identify a control group with an identical trend as the treatment group. A change in trends could also be due to unrelated, external factors, and thus, the change is not solely explained by the regulation. In terms of the matching process, one could also argue that the control group should have been constructed using a more comprehensive matching method, e.g., propensity score matching, which would allow us to construct a more accurate control group. However, finding a control firm that fulfill all requirements in terms of the defined characteristics is difficult. Thus, we found it appropriate to construct the control group solely based on market value of equity and sector, industry and sub-industry as we consider these characteristics to be the most relevant in regards to the chosen level of non-financial disclosure.

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Appendix

A1 Appendix

Table A1.1: Sample Distribution by Year

	Treated	**Matched**	**Total**
2010	92	88	180
2011	93	91	184
2012	101	100	201
2013	103	107	210
2014	106	106	212
2015	111	111	222
2016	121	121	242
2017	130	129	259
2018	129	127	256
2019	137	135	272
2020	139	140	279
Total Sample	**1262**	**1255**	**2517**

Table A1.2: Sample Distribution by GICS Sector

	Total	**Less**	**Obs.**
Communication Services	8	0	8
Consumer Discretionary	10	1	9
Consumer Staples	20	2	18
Energy	72	36	36
Financials	17	0	17
Health Care	17	4	13
Industrials	58	12	46
Information Technology	30	10	20
Materials	10	4	6
Real Estate	8	1	7
Utilities	2	0	2
Total Sample	**252**	**70**	**182**

Table A1.3: Overview of Disclosure Measures and Variables

Variable	Definition	Source
Env KPI	Binary variable that indicates whether firms disclose KPIs on their impact on the external environment	Textual Analysis
Gen KPI	Binary variable that indicates whether firms disclose KPIs on gender distribution	Textual Analysis
HSE KPI	Binary variable that indicates whether firms disclose KPIs on work environment	Textual Analysis
Outside-In	Binary variable that indicates whether firms address the outside-in impact of the external environment	Textual Analysis
NarSD	Quantitative measure representing the number of ESG-related words and phrases in percent of the total number of words in the report	Textual Analysis
post	Dummy variable that takes on the value 1 after 2013 (2018) and 0 otherwise.	
treated	Dummy variable that takes on the value 1 if the firm is in the treatment group and 0 otherwise.	
MB	A firms market value relative to its book value, winsorized at the top and bottom 5%	Bloomberg
Lev	Financial leverage of the firm measured as total debt divided by total assets at fiscal year end, winsorized at the top and bottom 5%	Bloomberg
ROA	Return on assets, a firms profitability measure calculated as net income divided by total assets at fiscal-year end, winsorized at the top and bottom 5%	Bloomberg
MVE	Measures the firms size, its value at fiscal-year end, winsorized at the top and bottom 5%	Bloomberg

Table A1.4: Overview of Search Queries for the Disclosure Measures

Measure	Search Query	Word Window
Env KPI	("tonne" OR "ton" OR "tonnes" or "tons") AND ("GHG" OR "CO2" OR "carbon" OR "greenhouse gas" OR "emission" OR "emissions") AND Digit **OR** ("scope 1" OR "scope 2" OR "scope 3") AND ("emission" OR "emissions") AND ("Digit OR "tonne" OR "ton" OR "tonnes" OR "tons")	8 words
Gen KPI	(("female" OR "women" OR "woman" OR "gender" OR "sex") AND ("board" OR "director" OR "executive" OR "executives" OR "manager" OR "managers" OR "management" OR "employee" OR "employees" OR "leader" OR "leaders" OR "leadership" OR "workforce" OR "staff" **OR** ("split" OR "diversity" OR "ratio" OR "distribution" OR "composition" OR "percentage" OR "breakdown") AND (Digit OR "numerical"*)	8 words
HSE KPI	("number" OR "reported" OR "reportable" OR "total") AND ("injury" OR "injuries" OR "accident" OR "accidents" OR "incident" OR "incidents" OR "fatality" OR OR "fatalities" OR "sickness absence" OR "sick leave") AND Digit **OR** ("TRI" OR "OSHA" OR "TCIR" OR "TRIR" OR "TRIFR" OR "TRCF" OR "AIFR" OR "AFR" OR "LTI" OR "LTIR" OR "LTIFR" OR "LWDR")** AND Digit	8 words
Outside-in	("climate" OR "planet" OR "transition" OR "physical") AND ("risk" OR "risks" OR "impact" OR "impacts") NOT Digit	8 words

* "numerical" refers to quantitative words.

** Common acronyms for key performance indicators on the topic.

Table A1.5: ESG Dictionary - English

(a) Environmental

sustainable, sustainability, renewable, global warming, ecology, environment, environmental, paris agreement, biodiversity, biofuel, biofuels, wildlife, deforestation, reforestation, fairtrade, fair trade, emission, emissions, recycling, energy, responsibility, responsible, planet, climate, pollution, waste, air, SDG, sustainable development, sustainable development goal, sustainable development goals, greenwashing, hazardous, ozone depletion, CO2, NO2, carbon dioxide, nitrogen, CSR, corporate social responsibility, GHG, greenhouse gas(es), natural resources, net-zero, net zero, zero-waste, Sectoral Decarbonization Approach, SDA, TCFD, circular economy, EU-taxonomy, EU taxonomy, GRI, global reporting initiative, TCFD, Task Force on Climate-Related Financial Disclosure, scope (1 | 2 | 3), footprint, UN Environment programme, asbestos, contamination, radioactive, divestment, transition, toxic

(b) Social

gender, genders, transgender, female, women, woman, sex, ethnicity, ethnic, ethnicities, minorities, minority, diversity, diverse, inclusive, inclusion, race, religion, religious, nationalities, nationality, lgbt, lgbtq, lgbtq+, human rights, labor rights, equality, equal pay, pay gap, wage gap, discrimination, discriminate, discriminating, discriminated, harassment, nondiscrimination, harass, harassment, charity, donate, donation, donations, donated, community, communities, poverty, society, welfare, HSE, health, safety, injury, injuries, accident, accidents, wage, wages, illness, disabilities, disability, dignity, overtime, workplace, sickness absence

(c) Governance

governance, conduct, misconduct, audit, audited, auditing, auditor, control, controls, oversee, overseeing, evaluate, evaluated, reviewed, reviewing, compliance, comply, board structure, board member, board members, composition, independence, independent, succession, tenure, vacancies, vacancy, nomination, nominations, award, awarded, reward, rewarded, bonus, bonuses, compensation, compensated, compensate, payout, payouts, pension, salary, salaries, vesting, vest, ballot, ballots, proposal, proposals, election, electing, vote, votes, voting, proxy, proxies, conflict, conflicts, family, relatives, insider, insiders, transparency, transparent, attract, attracting, incentive, incentives, recruit, recruitment, talent, grassroots, disclose, disclosing, disclosure, integrity, investor, investors, stakeholders, stakeholder, shareholders, shareholder, corruption, anti-corruption, bribery, fraud, business ethics, ethic, ethics

Table A1.6: ESG Dictionary - Norwegian

(a) Environmental

bærekraftig, bærekraft, bedriftsansvar, fornybar, ESG, global oppvarming, økologi, miljø, miljømessig, parisavtalen, kyotoprotokollen, biodiversitet, biologisk mangfold, biodrivstoff, biobrensel, avskoging, skogplanting, utslipp, gjenvinne, gjenvinning, energi, forurensning, planet, avfall, klima, luft, SDG, bærekraftige utviklingsmål, ozonnedbrytning, radioaktiv, radioaktivt, farlig avfall, CO2, CO 2, GHG, nitrogen, asbest, CSR, karbon, drivhus, klima, netto null, SDA, GRI, TCFD, sirkulærøkonomi, scope 1, scope 2, scope 3, taksonomi, avtrykk, miljøprogram, overgang, giftig, klimanøytral

(b) Social

kjønn, transseksuell, transseksuelle, dame, kvinne, kvinner, etnisitet, etnisk, etnisiteter, minoritet, minoriteter, mangfold, inkludere, inkluderende, rase, religion, religiøs, nasjonalitet, nasjonaliteter, lgbt, lgbtq, lgbtq+, menneskerettigheter, arbeidsrettigheter, likestilling, likelønn, lønnsforskjell, lønnsforskjeller, lønnsforskjellen, diskriminering, diskriminert, diskriminere, trakassere, trakassering, veldedighet, donere, donasjon, donasjoner, donerte, samfunn, fattigdom, velferd, HSM, sikkerhet, helse, sykdom, skade, skader, ulykke, ulykker, lønn, lønninger, uførhet, funksjonshemninger, verdighet, overtid, arbeidsplass, sykefravær, fairtrade, fair trade

(c) Governance

styresett, revidere, revidert, reviderer, kontroll, kontroller, kontrollerer, gjennomgå, gjennomgang, gjennomgår, evaluere, samsvar, overholdelse, etterkomme, styrestruktur, styremedlem, styremedlemmer, uavhengighet, uavhengig, suksesjon, ledige stillinger, ledighet, nominasjon, nominasjoner, bonus, bonusordning, bonusordninger, bonuser, kompensasjon, kompensert, kompensere, pensjon, lønn, lønninger, opptjening, forslag, stemme, stemmer, proxy, proxies, konflikt, konflikter, familie, slektninger, innsider, innsidere, åpenhet, insentiv, insentiver, rekruttere, talent, grasrot, avdekke, integritet, investor, investorer, interessenter, interessent, aksjoner, aksjonærer, korrupsjon, anti.korrupsjon, bestikkelser, bedrageri, forretningsetikk, etisk.

Figure A1.1: Examples of Output from the Textual Analysis

(a) Impact on the External Environment

```
[('greenhouse gas', '1000', 'tonne'), ('emissions', '600', 'tonne'), ('emissions', '350', 'tonne'), ('emissions', '
3057', 'tonne'), ('emissions', '0803061', 'tonne'), ('emissions', '3704403061', 'tonne')]
```

(b) Gender Equality

```
[('seven', 'directors', 'women'), ('four', 'board', 'gender'), ('47', 'management', 'women'), ('415', 'management',
'women'), ('80', 'employees', 'women'), ('30', 'employees', 'women'), ('18', 'management', 'women'), ('3050', 'mana
gers', 'women'), ('33213', 'employees', 'female'), ('284013', 'employees', 'female'), ('4', 'employees', 'female'),
('4', 'employees', 'women')] 12
```

(c) Work Environment

```
[('number', 'incidents', '1'), ('total', 'injuries', '37'), ('total', 'fatalities', '2052'), ('number', 'injuries',
'8')] 4
```

(d) Outside-in Impact

```
[('climate', 'risk'), ('climate', 'impacts'), ('climate', 'risk'), ('climate', 'risk'), ('climate', 'risk'), ('clim
ate', 'impact'), ('climate', 'risk'), ('climate', 'impact'), ('climate', 'impact'), ('climate', 'risk'), ('climate'
, 'impact'), ('climate', 'impact'), ('climate', 'risk'), ('climate', 'impact'), ('climate', 'impact'), ('climate',
'impacts'), ('climate', 'impact'), ('climate', 'impact'), ('climate', 'impact'), ('climate', 'risk'), ('climate', '
impact'), ('climate', 'impact'), ('climate', 'impact'), ('planet', 'impact'), ('climate', 'impact'), ('climate', 'i
mpact'), ('climate', 'impact'), ('climate', 'impact'), ('climate', 'impact'), ('climate', 'impact'), ('climate', 'i
mpact'), ('climate', 'impact'), ('climate', 'impact'), ('climate', 'risk'), ('climate', 'risk')] 35
```

Table A1.7: Descriptive Statistics Regression Variables Sub-Periods: Treatment Group

	Mean	**SD**	**Min.**	**Median**	**Max.**	**N**
2010 - 2012						
EnvKPI	0.2823	0.4504	0.0000	0.0000	1.0000	286
GenKPI	0.8665	0.3375	0.0000	0.0000	1.0000	286
HSEKPI	0.8942	0.3048	0.0000	0.0000	1.0000	286
NarSD	0.0305	0.0182	0.0000	0.0291	0.1053	245
Outside-in	0.1306	0.3382	0.0000	0.0000	1.0000	268
Mkt-to-Book	1.9832	2.3194	0.2011	1.1480	10.3286	222
Leverage	0.3171	0.1888	0.0287	0.2984	0.7244	200
ROA	-0.0085	0.1463	-0.4717	0.0170	0.1692	219
Market cap	18.6940	1.9937	14.6901	18.6962	22.0180	214
2013 - 2017						
EnvKPI	0.3642	0.4832	0.0000	0.0000	1.0000	571
GenKPI	0.8874	0.3172	0.0000	0.0000	1.0000	571
HSEKPI	0.9241	0.2645	0.0000	0.0000	1.0000	571
NarSD	0.0316	0.0121	0.0000	0.0314	0.1074	541
Outside-in	0.1925	0.3937	0.0000	0.0000	1.0000	552
Mkt-to-Book	2.4194	2.4486	0.2011	1.4852	10.3286	506
Leverage	0.2950	0.2010	0.0287	0.2620	0.7244	442
ROA	-0.0109	0.1441	-0.4717	0.0245	0.1692	500
Market cap	18.1443	1.9703	14.6623	18.0817	22.0180	494
2018 - 2020						
EnvKPI	0.4789	0.4925	0.0000	0.0000	1.0000	405
GenKPI	0.9081	0.2885	0.0000	0.0000	1.0000	405
HSEKPI	0.9306	0.2542	0.0000	0.0000	1.0000	405
NarSD	0.0347	0.0125	0.0004	0.0334	0.0945	391
Outside-in	0.4651	0.4950	0.0000	0.0000	1.0000	396
Mkt-to-Book	2.9775	2.9154	0.2011	1.8516	10.3286	343
Leverage	0.3138	0.2076	0.0287	0.2880	0.7244	320
ROA	-0.0261	0.1535	-0.4717	0.0120	0.1692	338
Market cap	18.0125	1.9235	14.6494	17.7274	22.0180	359
Total sample:						**1262**

Table A1.8: Descriptive Statistics Regression Variables sub periods: Control Group

	Mean	SD	Min.	Median	Max.	N
2010 - 2012						
EnvKPI	0.0103	0.0818	0.0000	0.0000	1.0000	279
GenKPI	0.0070	0.0681	0.0000	0.0000	1.0000	279
HSEKPI	0.0070	0.0681	0.0000	0.0000	1.0000	279
NarSD	0.0218	0.0045	0.0140	0.0211	0.0658	286
Outside-in	0.2367	0.42499	0.0000	0.0000	1.0000	286
Mkt-to-Book	2.3186	2.2395	0.5258	1.5290	11.0260	228
Leverage	0.3210	0.2202	0.0019	0.3050	0.8677	128
ROA	-0.0135	0.1513	-0.5940	0.0239	0.1309	161
Market cap	19.5476	1.9824	16.4718	19.5431	23.2902	252
2013 - 2017						
EnvKPI	0.0223	0.1473	0.0000	0.0000	1.0000	574
GenKPI	0.0186	0.1337	0.0000	0.0000	1.0000	574
HSEKPI	0.0239	0.1513	0.0000	0.0000	1.0000	574
NarSD	0.0226	0.0057	0.0110	0.0214	0.0930	572
Outside-in	0.3539	0.4774	0.0000	0.0000	1.0000	568
Mkt-to-Book	2.8138	2.5717	0.5258	1.9559	11.0260	507
Leverage	0.3262	0.2531	0.0019	0.2848	0.8677	413
ROA	-0.0357	0.1816	-0.5940	0.0189	0.1309	539
Market cap	19.9538	1.8078	16.4718	19.9678	23.2902	534
2018 - 2020						
EnvKPI	0.0564	0.2274	0.0000	0.0000	1.0000	402
GenKPI	0.1088	0.2821	0.0000	0.0000	1.0000	402
HSEKPI	0.0788	0.2626	0.0000	0.0000	1.0000	402
NarSD	0.0238	0.0051	0.0142	0.0228	0.0515	403
Outside-in	0.4804	0.4990	0.0000	0.0000	1.0000	400
Mkt-to-Book	2.7263	2.7776	0.5258	1.7193	11.0260	346
Leverage	0.3056	0.2450	0.0019	0.2512	0.8677	331
ROA	-0.0558	0.1778	-0.5940	0.0087	0.1309	360
Market cap	19.7066	1.8306	16.4718	19.6732	23.2902	323
Total sample:						**1255**

Table A1.9: Descriptive Statistics for the Disclosure Measures by Year

treated = 1											
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Env KPI	0.2283	0.3118	0.3168	0.3981	0.3868	0.3874	0.3802	0.4077	0.4341	0.4745	0.6187
	(0.4220)	(0.4658)	(0.4676)	(0.4919)	(0.4893)	(0.4894)	(0.4874)	(0.4933)	(0.4976)	(0.5012)	(0.4875)
Gen KPI	0.8152	0.9032	0.9010	0.8835	0.9151	0.9189	0.9091	0.9385	0.9457	0.9635	0.9424
	(0.3902)	(0.2973)	(0.3002)	(0.3224)	(0.2800)	(0.2742)	(0.2887)	(0.2412)	(0.2274)	(0.1882)	(0.2337)
HSE KPI	0.8478	0.9140	0.9307	0.9417	0.9340	0.9459	0.9339	0.9308	0.9380	0.9416	0.9424
	(0.3612)	(0.2819)	(0.2552)	(0.2354)	(0.2495)	(0.2271)	(0.2495)	(0.2548)	(0.2421)	(0.2353)	(0.2337)
NarSD	0.0278	0.0303	0.0334	0.0313	0.0319	0.0308	0.0320	0.0317	0.0330	0.0340	0.0370
	(0.0129)	(0.0128)	(0.0289)	(0.0143)	(0.0140)	(0.0110)	(0.0118)	(0.0095)	(0.0119)	(0.0122)	(0.0134)
Outside-in	0.1412	0.1124	0.1383	0.1546	0.1569	0.1927	0.2222	0.2362	0.3780	0.4586	0.5588
	(0.3502)	(0.3175)	(0.3470)	(0.3634)	(0.3654)	(0.3962)	(0.4175)	(0.4264)	(0.4867)	(0.5001)	(0.4983)
Mkt-to-Book	1.6325	1.9261	2.3596	2.1564	2.1965	2.8225	2.5123	2.3577	2.5559	3.0710	3.2912
	(1.9843)	(2.1729)	(2.6822)	(2.3129)	(2.3336)	(2.8049)	(2.3739)	(2.3605)	(2.6023)	(3.0775)	(3.0072)
Leverage	0.3313	0.3066	0.3136	0.3088	0.3075	0.2972	0.2876	0.2794	0.2917	0.3206	0.3265
	(0.1885)	(0.1961)	(0.1838)	(0.1934)	(0.2041)	(0.2103)	(0.2041)	(0.1954)	(0.1983)	(0.2098)	(0.2137)
ROA	-0.0032	-0.0135	-0.0086	0.0044	0.0001	-0.0332	-0.0063	-0.0158	-0.0299	-0.0173	-0.0316
	(0.1461)	(0.1448)	(0.1496)	(0.1355)	(0.1243)	(0.1586)	(0.1464)	(0.1487)	(0.1573)	(0.1452)	(0.1589)
MVE	18.7449	18.6223	18.7093	18.6281	18.1762	17.9548	17.9249	18.1175	18.0089	17.9944	18.0332
	(2.0474)	(2.0272)	(1.9355)	(2.0184)	(2.0122)	(1.9048)	(1.9087)	(1.9792)	(1.9808)	(1.9563)	(1.8529)

Table A1.10: Descriptive Statistics for the Disclosure Measures by Year

treated = 0											
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Env KPI	0.0000	0.0109	0.0200	0.0187	0.0189	0.0180	0.0248	0.0310	0.0394	0.0666	0.0929
	(0.0000)	(0.1048)	(0.1407)	(0.1361)	(0.1367)	(0.1336)	(0.1561)	(0.1740)	(0.1952)	(0.2504)	(0.2912)
Gen KPI	0.0000	0.0109	0.0099	0.0093	0.0187	0.0164	0.0312	0.0391	0.0390	0.0667	0.2286
	(0.0000)	(0.1048)	(0.0995)	(0.0966)	(0.01360)	(0.1336)	(0.1275)	(0.1747)	(0.1945)	(0.2504)	(0.4214)
HSE KPI	0.0000	0.0109	0.0099	0.0187	0.0187	0.0180	0.0246	0.0394	0.0472	0.0821	0.1367
	(0.0000)	(0.1048)	(0.0995)	(0.1360)	(0.1360)	(0.1336)	(0.1555)	(0.1952)	(0.2130)	(0.2755)	(0.3447)
NarSD	0.0212	0.0217	0.0224	0.0218	0.0226	0.0223	0.0225	0.0237	0.0229	0.0239	0.0246
	(0.0040)	(0.0037)	(0.0058)	(0.0041)	(0.0058)	(0.0044)	(0.0044)	(0.0096)	(0.0050)	(0.0054)	(0.0049)
Outside-in	0.1848	0.2581	0.2673	0.2617	0.3619	0.3727	0.4083	0.3651	0.4127	0.5000	0.5286
	(0.3902)	(0.4399)	(0.4447)	(0.4416)	(0.4828)	(0.4857)	(0.4935)	(0.4833)	(0.4942)	(0.5018)	(0.5009)
Mkt-to-Book	2.3341	2.1748	2.4309	2.9235	2.9775	2.4703	2.6838	3.0126	2.3003	2.7677	3.0769
	(2.1159)	(2.4653)	(2.4113)	(2.6553)	(2.6735)	(2.2137)	(2.3196)	(2.9229)	(2.4541)	(2.8821)	(2.9206)
Leverage	0.3199	0.2800	0.3426	0.3311	0.3191	0.3509	0.3242	0.3082	0.3245	0.3174	0.2800
	(0.1595)	(0.1945)	(0.2523)	(0.2516)	(0.2483)	(0.2596)	(0.2581)	(0.2511)	(0.2425)	(0.2562)	(0.2359)
ROA	-0.0047	0.0261	-0.0334	-0.0178	-0.0188	-0.0473	-0.0358	-0.0539	-0.0413	-0.0477	-0.0771
	(0.1059)	(0.0979)	(0.1783)	(0.1665)	(0.1770)	(0.1949)	(0.1708)	(0.1951)	(0.1758)	(0.1696)	(0.1866)
MVE	19.6982	19.4876	19.4662	19.9728	20.0969	19.8493	19.9277	19.9384	19.6383	19.6661	19.8659
	(1.8871)	(2.0150)	(2.0494)	(1.8614)	(1.8126)	(1.8211)	(1.8014)	(1.7778)	(1.8461)	(1.8476)	(1.7951)

Table A1.11: Univariate Difference-in-Difference Analyses: §3-3c (2010-2020)

(a) Disclosure on GHG Emissions

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0103	0.0388	0.0285
treated = 1	*(ii)*	0.2856	0.4359	0.1503
	(ii) - (i)	0.2753	0.3971	**0.1218**

(b) Disclosure on Gender Distribution

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0070	0.0534	0.0465
treated = 1	*(ii)*	0.8731	0.9271	0.0539
	(ii) - (i)	0.8662	0.8737	**0.0075**

(c) Disclosure on Work Environment

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0070	0.0482	0.0412
treated = 1	*(ii)*	0.8997	0.9385	0.0388
	(ii) - (i)	0.8928	0.8904	**-0.0024**

(d) Narrative Sustainability Disclosure

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0218	0.0231	0.0013
treated = 1	*(ii)*	0.0305	0.0327	0.0022
	(ii) - (i)	0.0087	0.0097	**0.0009**

(e) Outside-In Impact

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.2367	0.4014	0.1647
treated = 1	*(ii)*	0.1306	0.2948	0.1641
	(ii) - (i)	-0.1061	-0.1066	**-0.0005**

Table A1.12: Univariate Difference-in-Difference Analyses: Removal of the Transition Rule (2010-2020)

(a) Disclosure on GHG Emissions

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0178	0.0663	0.0485
treated = 1	*(ii)*	0.3521	0.5091	0.1570
	(ii) - (i)	0.3343	0.4428	**0.1085**

(b) Disclosure on Gender Distribution

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0143	0.1114	0.0972
treated = 1	*(ii)*	0.8981	0.9506	0.0525
	(ii) - (i)	0.8838	0.8391	**-0.0447**

(c) Disclosure on Work Environment

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0175	0.0887	0.0711
treated = 1	*(ii)*	0.9224	0.9407	0.0183
	(ii) - (i)	0.9048	0.8520	**-0.0528**

(d) Narrative Sustainability Disclosure

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0224	0.0240	0.0016
treated = 1	*(ii)*	0.0306	0.0347	0.0040
	(ii) - (i)	0.0083	0.0107	**0.0024**

(e) Outside-In Impact

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.3100	0.4804	0.1704
treated = 1	*(ii)*	0.1693	0.4651	0.2958
	(ii) - (i)	-0.1407	-0.0153	**0.1254**

Table A1.13: Univariate Difference-in-Difference Analyses: §3-3c (2010-2017)

(a) Disclosure on GHG Emissions

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0103	0.0223	0.0119
treated = 1	*(ii)*	0.2856	0.3920	0.1064
	(ii) - (i)	0.2753	0.3697	**0.0944**

(b) Disclosure on Gender Distribution

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0070	0.0186	0.0117
treated = 1	*(ii)*	0.8731	0.9130	0.0399
	(ii) - (i)	0.8662	0.8944	**0.0282**

(c) Disclosure on Work Environment

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0070	0.0239	0.0169
treated = 1	*(ii)*	0.8975	0.9373	0.0398
	(ii) - (i)	0.8905	0.9134	**0.0229**

(d) Narrative Sustainability Disclosure

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0218	0.0226	0.0008
treated = 1	*(ii)*	0.0305	0.0316	0.0011
	(ii) - (i)	0.0087	0.0090	**0.0002**

(e) Outside-In Impact

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.2367	0.3539	0.1172
treated = 1	*(ii)*	0.1306	0.1925	0.0619
	(ii) - (i)	-0.1061	-0.1614	**-0.0553**

Table A1.14: Univariate Difference-in-Difference Analyses: Removal of the Transition Rule (2013-2020)

(a) Disclosure on GHG Emissions

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0223	0.0663	0.0440
treated = 1	*(ii)*	0.3920	0.5091	0.1171
	(ii) - (i)	0.3697	0.4428	**0.0730**

(b) Disclosure on Gender Distribution

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0186	0.1114	0.0928
treated = 1	*(ii)*	0.9130	0.9506	0.0376
	(ii) - (i)	0.8944	0.8391	**-0.0552**

(c) Disclosure on Work Environment

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.0239	0.0887	0.0648
treated = 1	*(ii)*	0.9373	0.9407	0.0034
	(ii) - (i)	0.9134	0.8520	**-0.0614**

(d) Narrative Sustainability Disclosure

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.026	0.0238	0.0012
treated = 1	*(ii)*	0.0316	0.0347	0.0031
	(ii) - (i)	0.0090	0.0108	**0.0019**

(e) Outside-In Impact

		post = 0	*post = 1*	
		(a)	*(b)*	*(b) - (a)*
treated = 0	*(i)*	0.3539	0.4804	0.1265
treated = 1	*(ii)*	0.1925	0.4651	0.2726
	(ii) - (i)	-0.1614	-0.0153	**0.1461**

Table A1.15: Correlation matrix

	EnvKPI	GenKPI	HSEKPI	NarSD	Outside-in	MVE	Market-to-Book	Leverage	ROA
EnvKPI	1.0000								
GenKPI	0.7606	1.0000							
HSEKPI	0.6808	0.8266	1.0000						
NarSD	0.8839	0.7509	0.6831	1.0000					
Outside-in	0.8797	0.6625	0.3839	0.8007	1.0000				
MVE	-0.6609	-0.7483	-0.5957	-0.4863	-0.6212	1.0000			
Market-to-Book	0.8786	0.7937	0.7086	0.8468	0.8376	-0.7487	1.0000		
Leverage	0.0204	-0.3734	-0.4314	0.0945	0.2007	0.4470	0.0001	1.0000	
ROA	-0.5495	-0.5853	-0.3546	-0.4594	-0.6289	0.5923	-0.6897	0.1311	1.0000

Table A1.16: Results from Regression Analyses

(a) §3-3c (2010-2020)

	Env KPI	**Gen KPI**	**HSE KPI**	**NarSD**	**Out-in**
*t*reated	0.2842*	0.8819***	0.9031***	0.0090**	−0.2193***
	(4.2280)	(17.7360)	(26.8750)	(4.5620)	(-1.6230)
*p*ost	-0.0277	-0.0220	0.0040	-0.0003	0.1060
	(-0.5670)	(-0.6070)	(0.1630)	(-0.2240)	(1.0780)
***p*ost*treated**	0.0982	0.0250	0.0140	-0.0002	-0.1411
	(1.1900)	(0.4090)	(0.3390)	(-0.0710)	(-0.8510)
R-Squared	0.9670	0.9960	0.9980	0.9580	0.7210
observations	2,517	2,517	2,517	2,438	2,477
controls	YES	YES	YES	YES	YES

(b) Removal of the Transition Rule (2010-2020)

	Env KPI	**Gen KPI**	**HSE KPI**	**NarSD**	**Out-in**
*t*reated	0.2843***	0.8958***	0.9151***	0.0098***	-0.0876
	(4.9170)	(22.2020)	(39.2140)	(5.9870)	(-1.1140)
*p*ost	0.0483	0.0499	0.0509***	0.0015	0.1315***
	(1.3940)	(2.0620)	(3.6370)	(1.4800)	(2.7880)
***p*ost*treated**	0.0180	-0.0213	−0.0614**	0.0001	0.0796
	(0.3450)	(-0.5850)	(-2.9060)	(0.0720)	(1.1190)
R-Squared	0.9680	0.9970	0.9990	0.9790	0.9320
observations	2,517	2,517	2,517	2,438	2,477
controls	YES	YES	YES	YES	YES