Lisbon School of Economics & Management
Universidade de Lisboa

MASTER

ACCOUNTING

MASTER´S FINAL WORK

DISSERTATION

ESG AND ROE:
BEFORE AND AFTER THE IMPLEMENTATION OF ESG PRACTICES ACROSS GERMAN INDUSTRIES

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ABSTRACT

This dissertation conducts research into the relationship between ESG and ROE, centred around the post-implementation of the EU Non-Financial Reporting Directive, in a sample of 45 German firms spanning across 6 industries. Using a timeline of 2011 to 2022, results find that there is a statistically significant non-linear relationship between mandatory non-financial reporting (ESG) and firm performance (ROE), and that the implementation of the NFRD played a role in this result. Results also find that statistical results per industry vary, and highlight differences in mandatory non-financial reporting difficulties and ESG trends. Literature contributions are evident due to researching this variable relationship in a German context, which is largely marginalised. Findings of this dissertation have crucial policy and managerial implications for a stronger focus on non-financial reporting quality and the investment thereof to be prioritised.

Key words: Non-financial reporting, firm performance, ESG, ROE, NFRD

GLOSSARY

ESG – Environmental, social and governance
ROE – Return on equity
NFRD – Non-Financial Reporting Directive
SDG – Sustainable development goal

TABLE OF CONTENTS

1. INTRODUCTION

Non-financial reporting in firms has become a topic of increasing importance in recent years. Due to constant changes in the business landscape at a time where sustainability lies at the forefront, firms have faced an increased pressures to report on environmental, social and corporate governance (ESG) initiatives and implementations. A diverse array of stakeholders which include investors demand an increase of attention to report various ESG factors, in a time where sustainability management has become a key focus area (Christensen et al., 2021). To manage this demand, many firms have responded through engaging in non-financial reporting, of which the level thereof is considered voluntary (Aluchna et al., 2022). According to Dincer et al. (2023), non-financial reporting is said to provide an overview of sustainability-driven concerns and shed light on the level of accountability of a firm in addition to traditional financial reporting.

While the number of non-financial reports have increased majorly in recent decades, Aluchna et al. (2022) posit that the quality and transparency thereof are subject to question. Furthermore, Christensen et al. (2021) outline that investors that harness the availability and content of these reports have expressed a lack of comparability due to loose guidelines, as well as availability due to voluntary disclosure without legal requirements. It is with this gap that the Non-Financial Reporting Directive 2014/95/EU under legislation of the European Union was introduced, making it a mandatory requirement that a specific range of large firms in member states disclose non-financial information in their annual set of reports from the 2017 financial year (European Parliament and Council, 2014).

Hahnkamper-Vandenbulcke (2021) outlines that this directive was meant to increase transparency and standardise reporting of ESG information. This directive has since been replaced by the Corporate Sustainability Reporting Directive ((EU) 2022/2464) which was issued in 2023 and implemented from the 2024 financial year, building on the foundation provided by the NFRD (European Parliament and Council, 2022). Although the scope of the CSRD outlines mandatory non-financial reporting in more detail, leaning into sustainability reporting areas and aligns with global reporting initiatives, the assessment of effects of the NFRD remain crucial to understanding how this regulatory

framework shaped corporate behaviour over years of implementation. It is important to note that this dissertation is grounded on the implementation of the NFRD, which encompasses non-financial reporting, being the disclosure of ESG information, with an emphasis on risks and outcomes. This mainly provides transparency to stakeholders and investors. Sustainability reporting serves as a focussed subset of non-financial reporting and is centred more around a focus on social and environmental performance regarding goals and impact, which can be broader in vision and catalysed by the CSRD (Dincer et al., 2023). Whereas non-financial reporting is driven by compliance through the NFRD, sustainability reporting can be viewed as a topic within of the concept of non-financial reporting, which is more evident through the CSRD.

With non-financial reporting already considered as a prominent area of research within the accounting field, this mandatory reporting directive has brought additional attention to the importance of non-financial reporting and its influences, particularly firm performance. Firm performance used in this research will refer to financial performance. The European Commission (2021) mentions that the main aim of the NFRD was to ensure that investors have access to non-financial information. Therefore, gaining insights into how this directive has shaped non-financial reporting is crucial to assess how firms adapted to the initial reporting requirements, as well as any impact these requirements have on firm performance related to investor decisions.

While the NFRD is applied to various firms in various industries across European countries, there is a scarcity of research examining the effects of mandatory non-financial reporting in the context of specific legal environments as well as various industries. Understanding industry-specific dynamics is crucial for assessing the true 2 of this reporting on performance as some might be more ESG-driven than others. Although the NFRD applies to all EU member states, Cinquini & Luca (2022) mention that researching effects of this directive across member states could lead to inconsistencies, due to varying reporting frameworks in countries as well as difficulties existing in standardising reporting. According to Hoffmann et al. (2018), the non-financial reporting environment in Germany specifically, was extremely voluntary, leading to various differences in disclosures. Paired with this was the public scrutiny that German firms face as a key

player in the European Union to lead the example with non-financial reporting, the German firm landscape sparks intrigue in this research umbrella.

While the influence of the NFRD on firm performance is at face value assumed to be a positive relationship, studies on the topic have depicted differing results and research methods (Dincer et al., 2023). Although existing literature on the relationship explores implications of ESG practices on firm performance, a substantial gap in research remains, specifically concerning the results of the post-implementation of this mandate. García-Sánchez et al. (2020) posit that there is a high need for more empirical evidence on the long-term effects of mandatory non-financial reporting. Additionally, currently available studies predominantly provide research for shorter periods and not a longer timeframe, such as results before and after implementation.

Implications for this research are multifaceted for various researchers and academics, but also firms and policymakers of this implementation. This dissertation provides evidence of the NFRD and its effectiveness in ESG practices, as well as outlines areas for adjustment.

This dissertation also contributes to the sustainable development goals created by the United Nations in two key areas (United Nations, 2015). Firstly, the 12th SDG is evident in this research, namely responsible consumption and production, which encourages sustainable practices and patterns. By analysing how non-financial reporting affects firms and how various industries with ESG pressure are affected, it aids in evaluating whether this type of reporting drives ESG transparency as well as the level of transparency in sustainable practices. Secondly the 16th SDG of peace, justice and strong institutions is given a nod to in this dissertation as the research into the NFRD as a regulatory intervention is valuable in evaluating if this mandate supports transparency in corporate governance. It reinforces the large role of institutional mandates in fostering corporate behaviour and relates to the goal of developing accountable firms through this directive.

While research on the initial effect of mandatory non-financial reporting requirements exists, studies that track changes in firm performance over a longer period post-

implementation are sparse. Due to the scarcity of studies that analyse changes over multiple reporting cycles in the specific regulatory context of Germany, it is imperative to bridge this gap in research in order to gain a clearer understanding of not only the influence on firm performance, but the evolution thereof. Moreover, the outcomes of this mandate regarding non-financial and firm performance in highly regulated industries in Germany has not yet been widely researched, which calls for addressing to gain insights into how German firms adapted to new reporting requirements.

Due to the research gaps outlined, the objective of this dissertation is to answer the following research question:

Is there a significant relationship between mandatory non-financial reporting and firm performance in German industries?

The paper will first review relevant literature on the topic regarding the NFRD as well as the effects of non-financial reporting on firm performance. A hypothesis will then be developed, whereafter a methodology with data collection, variable explanation, and research design will be discussed. An analysis of results and findings will follow, finalised with a conclusion including implications and recommendations for further research, also touching upon limitations of the research and how this can be combatted.

2. REVIEW OF LITERATURE

2.1. The Non-Financial Reporting Directive

In order to conduct a thorough review of literature encompassing the research topic, including a deeper understanding of mandatory non-financial reporting is imperative. The European Parliament and the Council of the European Union (2022) outline that disclosing such non-financial information can help measure undertakings of performance in companies and provide investors with ample amounts of comparable information.

According to the European Parliament (2017), the directive applies to firms with more than 500 employees, which requires these firms to “disclose useful information that is

necessary to understand their development, performance, position and the impact of their activity" (p. 1). Hahnkamper-Vandenbulcke (2021) outlines that about 6000 firms were initially affected by this mandate, namely listed companies. Although the directive sees a breakdown of reporting requirements, it leaves a fair level of flexibility in disclosure of ESG practices and risks, with no fixed standard for implementation. As result, the firms affected are free to disclose non-financial information in the manner they find most suited, creating a further gap of the level of transparency and the quality of non-financial reporting presented (Hahnkamper-Vandenbulcke, 2021). Firms affected usually report according to national guidelines. However, the implementation of this directive serves as the first step to manage and raise the level of disclosure of non-financial information in large entities which are an inherent part of management towards environmental, social and governance changes in the European, and more specifically, German landscape.

The more recently implemented CSRD calls for a further harmonisation of standards outlined in the NFRD and heightens the quality of reporting for companies subject to the NFRD, as well as increases the number of firms in the pool (European Parliament and the Council of the European Union, 2022). It is crucial to note that this dissertation researching into how the initial directive has affected firm performance remains valuable in pinpointing the effects thereof, and how it was possible that the CSRD could be implemented and adjusted with guidance from results of NFRD implementation.

2.2. Mandatory non-financial reporting and firm performance

Research on the effects of mandatory non-financial reporting and firm performance is varied. Albeit the pattern that non-financial reporting should increase firm performance, the manner in which this is researched differs across studies through classification and measurement of variables, and method of research. Additionally, a few studies report an inverse or insignificant relationship and discuss another angle when assessing the relationship

Dincer et al. (2023) research the effects of non-financial reporting in firms of developing countries and take into consideration market-oriented as well as accounting-

oriented measures. The research encompasses short-term and long-term effects, used by similar studies in a cross-sectional analysis. According to the return on assets (ROA), non-financial reporting is concluded to have a positive relationship with short-term firm performance (Dincer et al., 2023). ROA is calculated by diving firms' net income after tax by its total portfolio of assets. The researchers then use the ROA model to assess the risk associated with market performance and conclude that there is a significant negative correlation between risk and financial performance of these firms in the long-term (Dincer et al., 2023).

Similar research is mirrored in the study by Amahalu (2018), where a cross-sectional analysis is conducted to determine the effect of non-financial reporting on corporate financial performance. Using data of oil and gas firms, regression analysis was run to determine a positive effect. In this study, Amahalu (2018) uses ESG indexes, including the number of indicators and level of disclosure regarding the non-financial reports, as used in Dincer et al. (2023). However, in this study, firm performance is measured by return on equity (ROE) instead of ROA. ROE is calculated by diving firms' net income after tax by its total value of shareholder's equity. Amahalu (2018) concludes that non-financial reporting positively affects corporate performance when assessing ROE indicators. Although this study encompasses research in a particular industry, the firms are not subject to the NFRD leaving a gap in literature as there is no room for comparison regarding a non-mandated or mandated approach in this study.

Almashhadani & Almashhadani (2023) also provide research on the effect of mandatory non-financial reporting on firm performance and concludes that there is a significant positive relationship between the two, using both ROA and ROE as measurements. This study analyses public firms on the Barcelona Stock Exchange, which are subject to non-financial reporting requirements. It would serve as useful to use a similar approach with German firms, of which the research is still scarce.

Higgins et. al. (2020) investigate the relationship between non-financial reporting practices and firm performance among banks, with a focus on regulatory impacts. It provides empirical evidence that this type of mandatory reporting can enhance

stakeholder engagement and corporate reputation, positively influencing financial performance over time.

The effect of a non-linear relationship is evident in a study of Castellano et al. (2024), where non-financial reporting measured by ESG indicators is researched on how this affects firm performance. The study reveals that the relationship can vary over time and is non-linear. These indicate the complexity of mandatory non-financial reporting and its influences and suggests an inverse relationship, with different results across industries. The study hints at ESG reporting increasing firm performance for a specific period of time, and then actually changing to a negative relationship. In a study by Siddiqui et al. (2024), researchers conclude a similar relationship regarding ESG scores and firm performance in 11 markets, including Germany. They find that there is a non-linear relationship with firm performance, and that beyond a certain point, mandatory non-financial reporting can affect firm performance negatively.

Although most literature encompassing non-financial reporting outline significant positive relationships, there are some researchers that investigate the relationship to conclude a negative or insignificant relationship. Soana (2009) researches this, specifically through using social performance and firm performance, using accounting and market ratios. By reporting on firms in the banking industry, the author concludes that there is no statistical significance indicating a positive or negative relationship between the two variables.

Radu et al. (2023) examine the relationship between mandatory non-financial reporting and financial performance as a factor and conclude that the effect of non-financial reporting and the quality thereof on firm performance remains inconclusive, yielding insignificant results in the model. The authors suggest that further research into specific contexts on a national or industry level may yield significant results.

2.3. Pre- and post-implementation

There are only a few studies researching the effects on firm performance specifically before and after implementation of the NFRD, and even less research exists on this topic in a German context, although the NFRD is so widely spread in such a prominent EU economy. Research conducted in Aluchna et al. (2022) investigates the relationship of mandatory non-financial reporting and firm performance over time, questioning a possible increase in significance of the relationship. Using non-financial reporting data over a timeframe of 6 years, namely 3 years before and 3 years after the implementation of the NFRD, the study concludes that firm performance was only improved in the second and third years of implementation of the NFRD. The study also analyses firms from different industries, which have various sustainability differences when preparing non-financial reports. This study is however not focussed on one country of context.

Martinez & Vazquez (2023) also examine the effects of mandatory non-financial reporting on firm performance with evidence from large private firms in Sweden that were affected by the mandate. In this study, Martinez & Vazquez (2023) confirm that mandatory non-financial reporting for private firms does increase firm performance. Although this study mirrors the mandatory shift to non-financial reporting as in this dissertation, it does not analyse public firms affected by the mandatory reporting legislation. Martinez & Vazquez (2023) posit that there is grounds for further research in assessing how public firms listed on stock exchanges should be analysed due to public investor confidence being affected by firm performance, and that firms in more intensive and regulated environments should be tested too.

Another study by Mion & Adaui (2019) researches the effect of the NFRD on German and Italian companies through a qualitative analysis. The timeline sees only one year before and one year after implementation, which limits findings to yield a pattern of results. The results showcase that the NFRD does affect mandatory non-financial reporting, but that relevant other indicators need be included such as asset size and industry type, calling for research into this, as well as an extension of the timeline.

The most similar study that encompasses this topic is found in the research of Pulino et al. (2022). The study assesses firms in Italy, affected by the NFRD, by using a timespan of 2011 to 2020. Using panel regression data, the authors find that mandatory ESG disclosure and ESG ratings are increased by the NFRD, and increases EBIT, which is their measure of firm performance. They conclude that the indicator of firm performance is positive. The companies all belonged to various industries, however, the timeframe is not balanced by an equal amount of years before and after implementation, and the Italian regulatory environment may yield different results than the German scope.

2.4. Hypothesis development

Due to the mixed results of the relationship between mandatory non-financial reporting and firm performance, and the wide gap in research showcasing how this is affected by the NFRD, it is imperative to further research this relationship, particularly around long-term effects.

The results post-NFRD implementation make up a narrow crevice of accounting research, but there is a trend that ESG scores are used to proxy non-financial reporting and that ROE as a firm performance indicator is widely used. However, with marginalised research into this topic in a specific country where key industries are subject to stringent reporting requirements, basing this research on German industries subject to the NFRD can give rise to an opportunity for more insights to be uncovered about the effects this mandate has catalysed.

Through diverse conclusions from previous researchers, either highlighting a significant positive, non-linear or negative relationship, as well as no significance, a priori direction on the relationship between ESG scores and ROE is not hypothesised. Through this review of literature and key variable selections, as well as gaps and limitations in existent findings, the hypothesis that will be investigated are as follows:

H1: There is a significant relationship between ESG and ROE after the implementation of the NFRD.

3. RESEARCH METHODOLOGY

3.1. Data collection

Due to this dissertation being centred around the NFRD mandated by the European Union, a sample of large firms will be chosen that were part of the initial mandatory shift towards mandated non-financial reporting. The research gaps in literature has presented an opportunity to conduct research in specific industries, and to do so using data from publicly listed firms. This will also allow for an abundance of financial and non-financial information to be available (Donner et al., 2024).

As the NFRD was implemented from the 2017 financial year, and this research encompasses pre- and post-implementation of this mandate, it was crucial to select a database that maintains historical data over a longer timeframe. The Bloomberg Terminal allows for this, as well as efficient data extraction and filtering. The pre-implementation period in this dissertation is considered the financial years 2011 to 2016, whereas post-implementation covers financial years 2017 to 2022. 2022 was the last year that the NFRD affected these companies.

Data for this model was thus collected using the Bloomberg Financial Database (Bloomberg L.P., 2024). Due to the nature of the research, which aims to research the significance of the relationship between the implementation of the NFRD and firm performance, many firm-level indicators were required to construct the proposed model.

Bloomberg provides extensive data coverage over a timespan of years regarding financial metrics as well as ESG-related data. The database also covers a wide range of industries within various countries, including Germany. Climent et al. (2021) mentions that using Bloomberg's database centralises data collection to a single source without the need for integration with other databases that use different measurement techniques and indicators. Data from Bloomberg is considered a trusted source and frequently used in prior research connected to this topic due to its credibility and link for financial reports of a plethora of firms. Using Bloomberg has ensured that the data extracted allows for comparability and no need for integrations with other data sources.

The Bloomberg terminal is able to deliver high-quality financial metrics in line with reporting of these specific companies, ensuring credibility (West et al., 2019). Regarding the ESG scope and standards, of which there are many different ESG scores calculated in numerous different manners, Bloomberg's ESG database aligns with major reporting frameworks and signals adherence to reporting standards of major companies subject to the NFRD. This ensures robustness and reliability of results to construct the model for analysis. Regarding German firms specifically, Bloomberg considers German reporting in alignment with the *Deutscher Nachhaltigkeitskodex* (German Sustainability Code) (German Council for Sustainable Development, 2024).

3.2. Sample construction

To collect data from the Bloomberg terminal, the *EQS - Equity Screening* tool was used. Using this terminal generates an output of various options regarding filtering for firms needed to construct the dataset. After accessing the tool, the initial query had to be built. A filter of *Trading Status: Active* was added to ensure all firms selected are operational. As this research focusses solely on German firms subject to the NFRD, the *Country/Territory of Domicile* filter was used to selected Germany as the primary country. Thereafter, another filter was added to ensure only public firms would be displayed, namely *Security Types: Common Stock*. In the context of non-public firms mandated by the NFRD, this research could also hold, however, the availability of all data points would be limited due to private firms having differing financial reporting requirements. The decision to use only public firms arose as these have a wider range of data due to public reporting standards, which ensures reliability and a chance of less gaps in the data when data cleaning at the later stage was implemented. The aforementioned filter ensured that the firms appearing after filtering are all public, all subject to the NFRD. For a comprehensive overview of firm size from an asset point of view, the filter *LF Total Assets* as a metric was also added.

Hereafter, data for firms of various German industries had to be collected. These industries have exhibited significant ESG relevance in recent years, which will be outlined in their respective subsections starting with the next paragraph. Using

Bloomberg's *Sectors (BICS)* filter, 6 industries were selected individually to filter through firms with data for these respective industries. The choice to include specific industries is due to the increasing importance of ESG reporting in each of them respectively, and their role in being subjected to mandatory non-financial reporting. Additionally, these 6 industries served as a justified choice due to data availability. It can be noted that other industries, perhaps with more sustainability and ESG risks would have been included, however, many industries had a high level of missing data, which could decrease the significance of the proposed models.

The energy industry is considered crucial when exploring German firms affected by the NFRD, as it lies at the forefront of the transition to the reduction in carbon emissions. This is mandated by the *Energiewende* (Energy Transition Act) (Center for Public Impact, 2016). Firms in this industry face significant scrutiny due to their environmental impact and are heavily affected by national guidelines to promote renewable energy adoption, influencing the ESG score. The NFRD further mandated transparency in non-financial reporting of this industry, requiring energy firms to disclose their environmental performance. To filter for firms in the energy sector, under the *Sectors (BICS)* filter, *Energy* was selected, which includes *Oil & Gas* and *Renewable Energy* as subsections.

The consumer sector is too, highly relevant to include in the sample due to a growing consumer demand of environmentally friendlier products. Sellers and retailers find themselves under increasing pressure to report their sustainability initiatives covering the entire supply chain cycle. This is reinforced by the *Lieferkettensorgfaltspflichtengesetz* (German Supply Chain Act) (Federal Ministry of Labour and Social Affairs, n.d.). The NFRD further required these firms to disclose ESG practices and scores, making mandatory non-financial reporting an essential tool for transparency to investors and other stakeholders, namely consumers. To filter for firms in this sector, the selection of subsections *Consumer Discretionary - Products* as well as *Retail - Consumer Discretionary* were used. Consumer discretionary products are non-essential goods like luxury items, electronics, and automobiles. These are purchased with disposable income. Consumer discretionary retail products, on the other hand, are products that businesses that sell products directly to their consumers.

Germany's industrial industry, which encompasses manufacturing and engineering of industrial products, also faces significant regulatory backlash and societal pressure focussed on using resources more efficiently in production settings. The industry, due to its high energy emissions, is governed by the recent *Energieeffizienzgesetz* (The Energy Efficiency Act), promotes energy-cutting measures (Federal Government, 2023). The NFRD required industrial firms to disclose detailed ESG data, which signals the importance of including this industry in the model. To filter for this industry, the *Industrial Services* filter was selected within the *Sectors (BICS)* filter.

Central to Germany's industrial output and common for having a substantial environmental footprint, the materials industry also appears to be inherent to studying ESG trends. The *Kreislaufwirtschaftsgesetz* (German Circular Economy Act) catalyses waste reduction, particularly in this industry (Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection, n. d.). Transparency in this industry was further enhanced by the NFRD. For this filtering, the *Materials* filter was added. It is possible that this industry could give way to the assumption of overlapping. However, the materials industry focuses on production of raw materials, while industrials are centred around manufacturing and engineering of finished goods or machinery products. Including both industries in the sample highlights the full lifecycle of production, capturing the wide range of environmental and financial issues that are reported under the NFRD.

Recently, an increasing number of financial institutions have also been met with the need for a clearer and higher level of ESG responsibility, due to the complexity of sustainability initiatives in this industry (Jo et al., 2014). As sustainability in finance and the need for transparent reporting thereof continues to grow, this financials industry could provide valuable insights into how the NFRD has affected firm performance. Germany's financial industry is a critical driver of sustainability due to its role in ESG-focused investments. The NFRD has specifically stipulated that financial institutions need to disclose how their activities align with sustainability objectives, making this sector pivotal in understanding ESG trends. For this industry, the *Financials* filter was selected, which includes the subsections of *Banking, Financial Services* and *Insurance*.

Finally, the German healthcare industry faces unique ESG pressures. This industry experiences the need for mandatory non-financial reporting in two ways, namely with a push for sustainable products (devices and pharmaceuticals) as well as ethical practices across the healthcare supply chain. This is governed by the *Lieferkettensorgfaltspflichtengesetz* (German Supply Chain Act), as the consumer discretionary industry (Federal Ministry of Labour and Social Affairs, n.d.). The NFRD further mandated ESG disclosures, emphasising social and governance impacts alongside environmental considerations. For this industry, the *Health Care* filter was selected, including subsections of *Biotechnology & Pharmaceuticals*, *Health Care Facilities*, and *Medical Equipment & Devices Manufacturing*.

Limitations of data collection arose when filtering firms and assessing the results. Availability of data for a lengthily timespan was not available for all firms in these industries. This required manual review of each firm list to find a significant number of firms that have available data for pre- and post-implementation years, which needed to be balanced. Earlier years have shown a lack of comprehensive sustainability disclosures, namely ESG scores that influence ESG trends, affecting pre-NFRD analysis, which is why broadening the scope to six industries heightened the chance of creating a complete dataset.

To manage these limitations, firms had been selected with complete or near complete values of variables needed for the dataset. There existed a total of 4 missing values of firms that had all other data points. All nonsenses where the value of net income as well as the value of shareholder's equity are negative, have been excluded due to the fact that these nonsenses could showcase misleading positive equity values. In order to maintain true data, the 4 missing values remained missing and the nonsenses of ROE were excluded.

After selecting firms with sufficient data over a timespan of 12 years from 2011 - 2022, namely 6 years pre-implementation and 6 years post-implementation of the NFRD, each unique firm identified, called a *Firm Ticker* was typed into the Bloomberg database. After doing so, the *FA - Financial Analysis* section was selected, where financial data as well

as ESG scores were accessible. After ensuring that the financial years aligned with the desired timespan for this research, the data was exported into Excel, to clean the data before exporting to statistical software of choice. The statistical software STATA was used for this research. To prepare the dataset for analysis, checks for missing data were employed. Due to selecting firms with complete data, except for the 4 datapoints mentioned in the limitations of data collection, the dataset exhibited high quality with very few missing values and a standardised manner of categorisation.

The final sample is constructed as follows: There are 45 firms in the sample that are subject to the NFRD in Germany. Of these 45 firms, 5 are in the energy industry, 9 are in the consumer discretionary industry, and 9 are in the industrials industry. The materials industry is comprised of 8 firms. Finally, 7 firms are from the financials and health care industries respectively. The materials industry is comprised of 7 firms. A limitation is also exhibited in the availability of data for the energy sector, as many firms in this industry had a high number of missing datapoints. However, due to the high importance of the energy sector through stringent ESG reporting requirements under German law, it was decided that the energy industry should remain included in the model. It would provide valuable insights to research how such a highly-environmentally strung industry could be benchmarked against other industries. Over a timespan of 12 financial years from 2011 - 2022, with a total of 45 firms in the dataset, 540 observations are calculated for the sample. After removing the observations that contained nonsenses, 498 observations remained.

3.3. Variables

To measure the dependant variable of firm performance, ROE was used. The decision to use ROE instead of ROA or EBIT is the fact that ROE factors in leverage, which is highly important due to the varying debt levels of German industries (Fischer et al., 2017). ROE is calculated by the value of net income over shareholder's equity. These values are also available on the Bloomberg terminal for cross-checking the calculations. The decision to add ROE is rooted in the fact that it is, as a metric, when nonsenses are removed, linked to investor decision-making when assessing firm performance. ROE is also a useful in the case of common stock companies, such as the firms in this sample.

This metric is commonly used across various accounting research to measure firm performance (Cantero-Saiz et al., 2024).

For the independent variables, a large amount of literature uses non-financial reporting as the independent variable for their studies. However, due to a broad definition and term that can be differently interpreted, as well as the quantitative and qualitative aspect, the manner in which non-financial reporting is measured, differs greatly. Ahmed et al. (2020) outline that a gap in literature also exists due to the inconsistencies around reporting measurements. Using ESG scores as a proxy for non-financial reporting links with the requirement that firms mandated by the NFRD are required to disclose information regarding their ESG scores, making these scores a reflection of compliance. The enhanced disclosure due to the post-NFRD period expects these firms to provide more transparent ESG information, which over time can serve as an indicator. The availability of data also plays a role inherent to this research, as the numeric and quantifiable nature thereof allows for broader use in this context. However, the limitation of ESG should also be outlined, namely that these scores are not only influenced by compliance, but also by voluntary levels of disclosure due to the interpretable nature and level of disclosure mandated by the NFRD.

In the study of Ahmed et al. (2020), a sustainability reporting index is created using disclosure information accounting for various ESG impacts. Similar procedures for measurement are also used in the research of Almashhadani & Almashhadani (2023). In this study, the level and scope of non-financial reporting is measured using a sustainability disclosure index. Aluchna et al. (2022) engages in similar variable measurement, where the researchers use ESG scores based on non-financial reporting information. The scores are calculated based on metrics in ESG reports, as well as other reports from non-financial public information. The NFRD has an influence on these scores, especially if non-financial reporting before implementation was voluntary and therefore diluted.

Following limitations of ESG scores, incorporating control variables is crucial. Firm size is given by the natural logarithm of total assets. Smith et al. (2020) outline that this

approach mitigates the risk of extreme values to ensure normality. Industry specific differences are controlled for by adding industry dummies for each industry minus energy. A dummy variable for pre- and post-implementation of the NFRD is also constructed. Table I depicts a summary of all variables used in the baseline model as well as model variations thereof, that will follow in the next subsection.

TABLE I

SUMMARY OF VARIABLES

Variable	Description
ROE	Return on equity given by total net income over shareholder's equity
ESG	ESG numeric scores from 0 to 100 based on the Bloomberg ESG rating system
FirmSize	Given by the natural logarithm of total assets
PostNFRD	Dummy variable regarding pre- and post-implementation periods of the NFRD Dummy variable = 0 (pre-NFRD) Dummy variable = 1 (post-NFRD)
Industry	5 industry dummies in the industries of consumer discretionary, industrials, materials, financials and health care Dummy variable = 0 (if not part of specific industry) Dummy variable = 1 (if part of specific industry)
ESG^2	ESG numeric scores squared to test a non-linear relationship
ESG x PostNFRD	Interaction term between ESG and PostNFRD
ESG^2 x PostNFRD	Interaction term between ESG^2 and PostNFRD
ESG x Industry	Interaction term between ESG and Industry
ESG^2 x Industry	Interaction term between ESG^2 and Industry

Table II depicts a summary of descriptive statistics of the variables.

TABLE II

DESCRIPTIVE STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
ROE	498	8.399871	10.77047	-51.3036	23.8718
ESG	498	43.19069	17.24307	6.7297	86.0276
Firm Size	495	9.466803	2.322673	3.520254	14.58752
Post-NFRD	498	0.504016	0.500487	0.0	1.0
IndustryConsumer	498	0.180723	0.385175	0.0	1.0
IndustryIndustrial	498	0.206827	0.405438	0.0	1.0
IndustryMaterial	498	0.170683	0.37661	0.0	1.0
IndustryFinancial	498	0.164659	0.371245	0.0	1.0
IndustryHealthcare	498	0.160643	0.36757	0.0	1.0

Table III depicts the average ESG scores per industry relating to the timeframe of 2011 to 2022. The lowest ESG score of the energy industry also aligns with the decision to remove the energy dummy variable from the model. The energy industry faces a difficult transition into renewables which could be relevant when discussing the low score. The healthcare industry scores the second lowest in terms of ESG scores over the time period. The near lower result of the industrials industry be connected to the fact that this industry finds itself in an increasingly large predicament due to energy consumption fir manufacturing. Apart from this, it is therefore an effective choice to include industries with varying ESG scores into the model, so that ESG trends in line with the NFRD can be further researched.

TABLE III

AVERAGE INDUSTRY ESG SCORES FOR PERIOD 2011 TO 2022

Industry	Average ESG score
Energy	26.2403
Consumer	51.4596
Industrials	39.6303
Materials	49.9531
Financials	47.3252
Healthcare	39.3382

3.4. Models

This study employs a panel data regression to examine the relationship between non-financial reporting (proxied by ESG scores) on firm performance (ROE), following the implementation of the NFRD. Panel data is used as the design for this research due to firm level data being collected, as well as time series data covering 2011 to 2022.

After data cleaning was employed and the dataset completed, various data checks were employed, including checking if all data was categorically correct for running regressions, and variables were converted from string to numeric if necessary. The dataset was set to a panel data structure and was concluded to be balanced.

Various regression models were created to research the hypothesis outlined in the prior section. A baseline model was created to research a possible linear relationship. The model choice is justified by the significance of the Fixed Effects estimator, as the Fixed Effects model controls for time-invariant changes.

$$\textbf{(1)}\ ROE_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 FirmSize_{it} + \beta_3 PostNFRD_{it} + Industry + \epsilon_i$$

To test for a possible non-linear relationship, ESG^2 was added into baseline model (1).

$$\textbf{(2)}\ \boldsymbol{ROE_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ESG_{it}^2 + \beta_3 FirmSize_{it} + \beta_4 PostNFRD_{it} + Industry + \epsilon_i}$$

Thereafter, to analyse how the NFRD played a role in these changes, specifically pre- and post-implementation, an NFRD interaction term ESG x PostNFRD was added to model (2).

$$\textbf{(3)}\ \boldsymbol{ROE_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ESG_{it}^2 + \beta_3 (ESG_{it} \times PostNFRD_{it}) + + \beta_4 FirmSize_{it} + \beta_5 PostNFRD_{it} + \epsilon_{it}}$$

For industry-specific analyses, separate regressions were run to determine industry-specific differences regarding ESG scores, and how these have a relationship with ROE, specifically post-implementation of the NFRD. Here, an interaction term ESG x PostNFRD was created, as well as ESG^2 x PostNFRD, exploring linear and non-linear relationships in various industries in the sample, in order to discuss industry-specific differences, which can already be deduced primarily through Table III in the previous subsection.

These regressions will be run separately for all 6 industries to analyse whether a significant or insignificant, as well as what kind of relationship exists in these differing environments.

$$\textit{(4)}\ \boldsymbol{ROE_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ESG_{it}^2 + \beta_3 (ESG_{it} \times PostNFRD_{it}) + \beta_4 \left(ESG_{it}^2 \times PostNFRD_{it}\right) + \beta_5 (ESG_{it} \times Industry) + \beta_6 \left(ESG_{it}^2 \times Industry\right) + \beta_7 FirmSize_{it} + \beta_8 PostNFRD_{it} + \epsilon_{it}}$$

4. RESEARCH ANALYSIS AND FINDINGS

4.1. ESG and ROE

Regressing model (1), it can be concluded that ESG has a statistically insignificant relationship with ROE due to the high p-value of 0.726. This suggests that in the sample, higher ESG scores do not hold a meaningful relationship with firm performance, suggesting a need to run regressions researching a possible non-linear relationship. FirmSize showcases a statistically significant relationship with ROE, suggesting that size does influence firm performance in the model, which was controlled for. Here, the PostNFRD variable is also statistically significant, hinting that the implementation of the NFRD did play a role in the result. The overall model fit given by the R^2 Within value suggests that only 2.27% of the variation in ROE in this sample of firms over time is explained. The overall value shows that other unobserved factors not accounted for may have played a role in results. The F-statistic of 0.0012 however, shows that the independent variables, in a joint sense, explain some variation in ROE over time. Table IV depictss these results.

TABLE IV

RESULTS OF BASELINE MODEL (1)

Variable	**Coefficient**	**Std. Err.**	**t**	**P > |t|**
ESG	-0.020732	0.059098	-0.35	0.726
FirmSize	2.768327	1.619835	1.71	0.088
PostNFRD	-2.570551	1.208366	-2.13	0.034
Constant	-29.156731	12.228562	-2.38	0.017

R^2: Within = 0.0227, Between = 0.1703, Overall = 0.4116

F (47.45) = 6.65, **Prob > F** = 0.0012

These results and no statistical evidence of a positive linear relationship differ significantly from the results from Amahalu (2018), Almashhadani & Almashhadani (2023) and Higgins et. al. (2020), that conclude a positive linear relationship regarding ESG and firm performance, either measured by ROE or ROA.

When regressing model (2) with the added ESG^2 variable, it became apparent that the inclusion of a squared term might reflect a non-linear relationship due to the statistically significant p-value of 0.064. The implementation of the NFRD has also played a role here, due to the p-value of 0.045 for the PostNFRD variable. In this model, 3.02% of ROE variation in firms showcases the improvement of model fit. The ESG^2 coefficient in the model supports the hypothesis of a non-linear relationship between ESG and ROE. The F-statistic with a value of 0.002, which is lower than the F-statistic of the baseline model with a value of 0.0012, signifies that the independent variables in this model jointly explain more of the variation in ROE. Table V depicts these results.

TABLE V

RESULTS OF MODEL (2)

Variable	Coefficient	Std. Err.	t	P > |t|
ESG	0.197257	0.131416	1.50	0.134
ESG^2	-0.002709	0.00146	-1.86	0.064
FirmSize	2.666346	1.616358	1.65	0.010
PostNFRD	-2.425588	1.207604	-2.01	0.045
Constant	-31.933217	12.286683	-2.60	0.010

R^2: Within = 0.0302, Between = 0.1866, Overall = 0.4161

F (48,446) = 6.62, **Prob > F** = 0.0002

Results in this model as closely mirrored by research by Castellano et al. (2024) and Siddiqui et al. (2024), discussed in the review of literature. The researchers inferred a non-linear relationship where firm performance, in this case ROE, increases for a specific period of time and then starts to diminish.

Implications hereof are that the firms benefitted from mandatory non-financial reporting, but only up to a certain extent. Beyond this point, the costs of reporting might have outweighed the benefits of increasing firm performance. The statistically significant coefficient of PostNFRD suggests that further testing should be run to infer stronger conclusions, through interactions with the ESG term as well as industry-level analyses.

The link of ESG as a proxy to mandatory non-financial reporting thus far is found in the fact that ESG scores can reflect disclosure practices, influenced by the NFRD and mandated reporting requirements. This non-linear relationship implies that while complying with the NFRD, excessive investment in ESG and reporting thereof can diminish returns, rather than increase ROE in the long-term. This creates the implication that firms should balance their investments regarding non-financial reporting practices, However, this would perhaps be more effective with regards to budgets and allocations if the NFRD provided a higher level of standardisation, as firms in the sample have varied levels of non-financial reporting quality.

To further research the hypothesis, an interaction term ESG^2 x PostNFRD was added, as shown in model (3). This was orchestrated to examine the pre- and most inherently, post-implementation effect. Model (2) has confirmed a non-linear relationship, whereas model (3) was regressed to infer whether or not ESG has a significant relationship with ROE after the implementation of the NFRD. The interaction term allows for insights into whether or not, and how, this non-linear relationship changed after the mandate was implemented and links directly to the research question in this dissertation. Due to the high p-value of 0.103, the interaction term is concluded to be statistically insignificant in the model. The PostNFRD dummy variable is also statistically insignificant in the model with a value of 0.355, shining light on the fact that there is no large enough standalone change regarding the implementation ofn the NFRD when assessing changes in ROE. These results are evident in Table VI.

Although this statistical insignificance exists, the inclusion of ESG^2 from model (2) suggests an increasing but then diminishing effect of ESG scores and ROE. The lack of statistical significance in the interaction term hints that the NFRD itself has not led to measurable changes in firm performance over the chosen timespan in this sample of 45 German firms. Table VI depicts the results of this regression.

TABLE VI

RESULTS OF MODEL (3)

Variable	Coefficient	Std. Err.	t	P > |t|
ESG	0.021051	0.169751	0.12	0.901
ESG^2	1.3e-05	0.002212	0.01	0.995
ESG x PostNFRD	-0.134262	0.082101	-1.64	0.103
FirmSize	2.847965	1.617151	1.76	0.079
PostNFRD	3.571502	3.860231	0.93	0.355
Constant	-31.166707	12.27264	-2.54	0.011

R^2: Within = 0.0360, Between = 0.1868, Overall = 0.4196

F (49, 445) = 6.56, **Prob > F** = 0.0040

This may indicate that German firms in the dataset were not leveraging mandatory non-financial reporting for profitability in the timeframe, or that the materialisation of the implementation needs to be studied over a longer post-implementation period. The timing of the NFRD has been inefficient in explaining significant changes in ROE and further analysis with more recent data could provide deeper insights, such as a look into the CSRD.

This statistical insignificance also calls for a look into the vague reporting requirements of the NFRD. It may be a mandate for these publicly listed firms, but robust and clear guidelines are still sparse, which is why the NFRD was replaced by the CSRD that outlines more stringent reporting requirements and a focus on non-financial reporting. Industry specifics might also be the reason of statistical insignificance, as advised by Radu et al. (2023), where researching these interactions in specific German environments in the next subsection has provided clearer insights into the effect of the directive.

4.1. Industry differences

Due to the non-linear relationship with statistically significant results in model (2), elaborated upon in the previous subsection, it was crucial to assess whether this holds across German industries, and how the NFRD and post-implementation period affects firm performance across these 6 groups. It is also valuable to draw separated industry insights due to the average ESG scores from 2011 to 2022 depicted in Table III, to infer possible reasoning as to why these scores yield the values they have.

Results regressing model (4) for the energy sector was performed as a starting point, due to this industry being the reference, as it had no industry dummy present in the 3 previous models. The results reveal a statistically significant non-linear relationship between mandatory non-financial reporting of firms in the energy industry and their performance, due to the p-value of 0.068. The interaction term ESG^2 x PostNFRD holds a p-value of 0.081, hinting at diminishing returns of mandatory non-financial reporting post-implementation. Due to the NFRD pressing firms to create more transparency in their non-financial reports, this could align with the fact that increased transparency led to an increase of ESG-related issues faced by energy firms. This in turn could decrease firm performance due to a decrease in net income through these issues coming to light.

With the energy industry holding the lowest ESG score of the 6 industries, a link could be found in this issue. If an array of ESG risks are reported on in the German energy industry due to strict adherence to national and EU guidelines, ESG scores can experience a decline far from within the line of the other 5 industries. However, the energy industry is represented weakly in the sample, with only 5 firms, which calls for future research into a higher number of energy firms and their ESG practices. The results for this industry

suggest that mandatory non-financial reporting had a very limited effect regarding ESG scores on firm performance in healthcare companies in the sample, and as the F-statistic value of 0.0003 is close to 0, these conclusions can be confirmed due to the models' statistical significance (Table XII). These results hereof are depicted in Table VII.

TABLE VII

RESULTS OF MODEL (4) – ENERGY

Variable	Coefficient	Std. Err.	t	P > |t|
ESG	-3.222302	1.91758	-1.68	0.100
ESG²	0.078056	0.041764	1.87	0.068
ESG x PostNFRD	3.044928	2.401548	1.27	0.211
ESG² x PostNFRD	-0.083353	0.046699	-1.78	0.081
FirmSize	5.373006	6.793585	0.79	0.433
PostNFRD	-14.237309	30.324801	-0.47	0.641
Constant	-25.056574	45.326041	-0.55	0.583

R^2: Within = 0.1555, Between = 0.9000, Overall = 0.4292

F (10,47) = 4.32, **Prob > F** = 0.0003

The results running model (4) for the consumer industry showcased no statistically significant relationship between ESG and ROE due to the p-value of 0.587. Both interaction terms are statistically insignificant and it cannot be conclusively inferred that there is an effect of the NFRD on firm performance in this industry. The p-value of 0.120 for PostNFRD suggests that the NFRD implementation does not come into the forefront here, and that there is no statistically significant relationship between ESG and ROE,

This conclusion could tie in with the fact that the consumer industry in this specific sample had the highest ESG scores. If ESG and the reporting thereof remained on a certain constant level, there might be limited variation on mandatory non-financial reporting affecting ROE, as other factors could be crucial. The results for this industry are depicted in Table VIII.

TABLE VIII

RESULTS OF MODEL (4) – CONSUMER

Variable	Coefficient	Std. Err.	t	P > |t|
ESG	0.568293	1.042791	0.54	0.587
ESG²	-0.005789	0.011004	-0.53	0.600
ESG x PostNFRD	1.340439	1.264684	1.06	0.293
ESG² x PostNFRD	-0.009524	0.012709	-0.75	0.456
FirmSize	3.250396	3.923017	0.83	0.410
PostNFRD	-48.577099	30.847541	-1.57	0.120
Constant	-44.466787	57.088631	-0.78	0.438

R^2: Within = 0.1211, Between = 0.8170, Overall = 0.3029

F (14,75) = 2.33, **Prob > F** = 0.0101

The results of running model (4) for the industrials industry have led to similar results as the consumer industry. Both linear and squared ESG terms are statistically insignificant, as well the interaction terms. This suggests that the NFRD implementation had no discernible effect regarding the relationship between ESG and ROE. There is no change indicated in firm performance and this suggests that mandatory non-financial reporting in this industry does not largely affect ROE. This presents a call to action for this specific industry that faces heaps of external pressure to cut down on environmental

emissions. It could also be that due to a push for more regulation and ESG focus, the effect of the NFRD cannot be measured in this timeframe yet, and needs to be extended, with a look into how the CSRD affects this industry. This is depicted in Table IX.

TABLE IX

RESULTS OF MODEL (4) – INDUSTRIALS

Variable	Coefficient	Std. Err.	t	P > |t|
ESG	-0.38117	0.406355	-0.94	0.351
ESG²	0.006384	0.00627	1.02	0.311
ESG x PostNFRD	0.406637	0.543992	0.75	0.457
ESG² x PostNFRD	-0.007287	0.006885	-1.06	0.293
FirmSize	1.798068	4.204356	0.43	0.670
PostNFRD	-5.92788	11.103911	-0.53	0.595
Constant	-0.508939	48.885087	-0.01	0.992

R^2: Within = 0.0648, Between = 0.9793 Overall = 0.2938

F (14,88) = 2.61, **Prob > F** = 0.0033

In the materials sector, it became apparent that no statistically significant non-linear relationship exists when regressing model (4). The positive ESG term with a statistically significant p-value of 0.101 indicates that the initial push to mandatory non-financial reporting did not enhance firm performance. Both interaction terms and the PostNFRD variable have very high p-values, indicating no statistically significant relationship. However, the overall model is statistically significant due to the F-statistic of 0.0153, suggesting that the predictors, in a joint sense, explain some variation in ROE. The results for this industry are depicted in Table X.

TABLE X

RESULTS OF MODEL (4) – MATERIALS

Variable	Coefficient	Std. Err.	t	P > |t|
ESG	0.94214	0.566735	1.66	0.101
ESG²	-0.010792	0.006758	-1.6	0.115
ESG x PostNFRD	-0.724904	1.823125	-0.4	0.692
ESG² x PostNFRD	0.008689	0.015237	0.57	0.570
FirmSize	11.35972	10.479997	1.08	0.282
PostNFRD	6.312122	54.844775	0.12	0.909
Constant	-128.513042	118.721967	-1.08	0.283

R^2: Within = 0.0986, Between = 0.5320, Overall = 0.2921

F (13,71) = 2.25, **Prob > F** = 0.0153

Due to the known complexity of the financials industry, the relationship between mandatory non-financial reporting proxied by ESG scores and ROE could provide valuable insights into management of non-financial reporting in this regulatory landscape. Results for the financials industry show a similar conclusion as for that of the consumer, industrials and materials industries, namely no linear or non-linear significant relationship, with statistically insignificant ESG interaction terms. Table XI highlights these conclusions.

So far, this research shows that the energy industry has yielded the only statistically significant results thus far when using model (4) to gain conclusions to the research question with separate regressions per industry. The results for running model (4) for the financials industry are depicted in Table XI.

TABLE XI

RESULTS OF MODEL (4) – FINANCIALS

Variable	Coefficient	Std. Err.	t	P > |t|
ESG	0.164466	0.298749	0.55	0.584
ESG²	-0.001256	0.003712	-0.34	0.736
ESG x PostNFRD	-4.946605	3.46522	-1.43	0.158
ESG² x PostNFRD	0.048693	0.032002	1.52	0.133
FirmSize	0.358688	2.814116	0.13	0.899
PostNFRD	121.90261	93.48158	1.3	0.197
Constant	-8.967991	39.495331	-0.23	0.821

R^2: Within = 0.1428, Between = 0.6945, Overall = 0.7913

F (12, 67) = 21.17, **Prob > F** = 0.1040

Lastly, results for the healthcare industry show a differed conclusion when comparing to the above regression results thus far, excluding that of the energy industry The interaction terms are positively statistically significant, suggesting that if there are higher ESG scores post-NFRD, this can lead to increased ROE. The post-NFRD dummy with a p-value of 0.088 is also statistically significant, highlighting an overall improvement of ROE after NFRD implementation.

The results for the healthcare industry provide strong evidence of a statistically significant non-linear relationship between ESG and ROE after the implementation of the NFRD, suggesting that ESG scores influenced financial returns in the post-NFRD period, like in the energy sector. This is depicted by the data on Table XII on the following page.

TABLE XII

RESULTS OF MODEL (4) – HEALTHCARE

Variable	Coefficient	Std. Err.	t	P > |t|
ESG	-0.830795	0.482144	-1.72	0.090
ESG²	0.00693	0.006254	1.11	0.272
ESG x PostNFRD	1.925973	0.907901	2.12	0.038
ESG² x PostNFRD	-0.022005	0.009264	-2.38	0.020
FirmSize	3.858337	2.79637	1.38	0.172
PostNFRD	-34.810172	20.095374	-1.73	0.088
Constant	-2.71147	29.83489	-0.09	0.928

R^2: Within = 0.1428, Between = 0.6945, Overall = 0.7913

F (12, 67) = 21.17, **Prob > F** = 0.1040

5. CONCLUSION

5.1. Key points

This dissertation researched a possible relationship between ESG and ROE through the implementation of the Non-Financial Reporting Directive. Through a lack of standardised non-financial reporting at a time where ESG is gaining traction at increasing speed, the NFRD, implemented in 2017, gave rise to a push for more transparent reporting on ESG initiatives and risk-management. All publicly listed firms in the EU were affected by the directive, including German firms within various industries. An opportunity presented itself to research how this directive influenced firm performance in a sample of German firms, specifically in the post-implementation period, due to ESG reporting as well as firm performance influencing investor decisions.

Many gaps in current literature around the topic were outlined, namely the lack of post-implementation data, as well as a longer and balanced timeframe. Most importantly, a critically low volume of research looks at firms specifically in Germany, a country where stringent ESG laws already exist and continue to be rigorously enforced. The fact that not many results are available on such a widespread directive presented a further opportunity to conduct research on this topic, not only regarding one country and a longer post-implementation period but selecting various industries to account for ESG trend differences to do so.

A sample was created with 45 publicly listed German firms using the Bloomberg financial database. These firms belong to one of six industries in the sample and were all subjected to the NFRD. Mandatory non-financial reporting was measured using ESG scores, and firm performance was measured by ROE. Using panel regression analyses, a statistically significant non-linear relationship between ESG and ROE was concluded.

H1 mentioned prior in the dissertation due to previous literature, should therefore be accepted, as statistical evidence was found to corroborate the hypothesis. The null hypothesis that there is no relationship, when running regressions for all firms in the sample, is therefore rejected.

Industry differences were also researched. The energy industry saw a statistically significant non-linear relationship between the two key variables and firms in this industry experienced diminished returns post-NFRD. Conversely, the consumer, industrials, materials and financials industries saw no statistically significant relationships. Finally, the healthcare industry experienced a statistically significant non-linear relationship of the NFRD on firm performance, with improved ROE and strengthened ESG-ROE relationships post-implementation up to a point in time.

5.2. Implications and recommendations for future research

Implications of this research are multifaceted for many stakeholders. This dissertation provides insights into the post-implementation effect of the NFRD, useful to public

lawmakers. The Corporate Sustainability Reporting Directive, which has replaced the NFRD, was signed into place to mandate a more structured set of standardised non-financial reporting guidelines that the NFRD failed to employ to its full capacity. This dissertation aligns with the decision to revise the NFRD to implement the CSRD, and calls for a deeper study into how the new CSRD affects firm performance in the coming years. The NFRD has highlighted the need for more stringent reporting, which the CSRD has employed, linking to the fact that perhaps the timeframe was too short in yielding statistically significant results of the NFRD in its time of implementation.

The data and findings in this dissertation also contribute to key insights that investors and shareholders of public firms require to make financial investment decisions. This dissertation has the ability to open the door to further research on a topic of such magnitude. Building on the foundations of the NFRD, the CSRD can be used as a strategic tool to enhance firm performance by providing clearer, standardised reporting requirements that strengthen compliance, improve investor confidence, and turn non-financial reporting into a source of competitive advantage rather than just a regulatory obligation. These results show that mandatory non-financial reporting doesn't have the same effect everywhere. This implies that regulators and managers need to tailor their approaches by industry, and that simply requiring more reporting won't necessarily improve firm performance in all sectors. This research also gives rise to the questioning and complexity around ESG scores and mandatory non-financial reporting quality and catalyses a call to action for conducting these analyses with other ESG scoring systems, and focussing on the actual reporting quality these firms set standard to.

Recommendations for future research are also multifaceted due to the broad scope of this topic, and how far it may stretch due to various methods. It is recommended to add in additional controls to see if model significances improve, especially in industry analyses. Conducting the same research with ROA as a measure of firm performance and then comparing results would also give way to understanding these conclusions with different variables. Regarding the ESG scores, it would be of interest to dive deeper into each ESG pillar, to research the specific impact of each one respectively. A suggestion to add in other industries in the German landscape is also noted. Adding more EU countries

to the sample would also not only grow its scope, but allow for the comparison of how the new CSRD affects EU countries differently.

On the topic of the research model itself, it could be valuable to conduct a difference in differences analysis with one control group of firms affected by the NFRD and CSRD, and one control group who were not required to adhere to the directives. This would perhaps give way to adding private firms not affected by the directives into the sample, in order to gain clearer insights encompassing the research question in a private context. The non-linear model of this dissertation could also be adjusted in further manner to really conclude in what year the returns diminished, and firm performance turned negative.

Researching the relationship between ESG and ROE focussed on mandatory non-financial reporting through the NFRD with evidence from German industries provides an array of stakeholders with the opportunity to lend more focus to ongoing ESG issues, as well as reporting struggles that come with it. This is a pivotal time in research to continuously heighten the level of insights into the effectiveness of directives, firm performance influences, and mandatory non-financial standardisation, and how they transform firms as well as fit into strategies toward a step closer in reaching the SDG's.

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