Norwegian School of Economics
Bergen, Autumn 2020

Which Sustainability Efforts are Most Profitable to Prioritize?

A proxy approach to sustainability effort measurement

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Master thesis, Economics and Business Administration

Major: Business analysis and Performance Management (BUS)

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ABSTRACT

In this thesis, we look at annual- and sustainability reports as a proxy to sustainability efforts for companies listed on the OSEAX-index. By using textual analysis on annual and sustainability reports, along with other sustainability measures, we then investigate the link between profitability and various types of sustainability efforts in a Norwegian context.

The study utilizes a custom crafted database of 133 companies, 504 annual reports, and 111 sustainability/ESG/CSR-reports, along with accounting data and secondary variables resulting in 639 observations and a wide range of sustainability variables spanning over 5 years.

I find a positive link between sustainability efforts and profitability for the sample, and the proxy-approach proves promising. However, I am not able to determine any categorical prioritization of sustainability efforts, which gives support to the existing common practice of contextual assessments and materiality matrices when it comes to sustainability effort prioritization.

The thesis struggles with data availability and the methodological question of how to filter and aggregate easily accessible sources of empirical information. It contributes to existing sustainability research by providing an original approach to sustainability efforts measuring.

The results are generalisable for companies listed on the OSEAX-index, however the thesis is conditioned on the acceptance of the proxy-solution to measure sustainability efforts. There is also no way of determining causality in the study, but the results are robust with varied robustness-measures in place.

Per Fredrik Hoel Ulsnes

Bergen, December 2020

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1. Introduction

This thesis is written as a part of my MSC in Economics and Business Administration at NHH – Norwegian School of Economics. The thesis is credited 30 ECTS in the major of Business Analysis and Performance Management (BUS).

I wish to thank my supervisor Stein Ivar Steinshamn for giving me the nudges needed in the early stages of the thesis development. I would also like to thank uncountable and monotonous papers written by professors and researchers trying to make sense of the world around us.

1.1 Background and Motivation

In the historic period which we are a part of in the first quarter of the twenty-first century, where sustainability, social responsibility and the planet itself is becoming increasingly crucial for the survival and prosperity of the human species, there seems to be a shift in corporate responsibility. Suddenly companies aspire to be the institutions which drive the green shift, by taking responsibility for its own, and others, impact on the environment and society at large.

During the course Sustainable Business Models at NHH, I was intrigued by the idea that profitability and sustainability may be aligned. The whole course focuses on making value propositions which position businesses to capture value by either solving external or internal sustainability problems. For instance, the Plastic Bank at Haiti solves problems related to plastic waste, and at the same time creates jobs, values and important work experience for their employees, while they exploit an excess resource which otherwise would be regarded as waste (Jørgensen & Pedersen, 2018). This form of upcycling of resources, and creation of value from waste and poverty gives me hope for the future regarding the creation of a truly sustainable human race. In my opinion, we either get sustainable, or find alternate planets to live on. The former seems a lot more viable in the nearest future. The idea that circular economy, new reinventions of traditional business models and new ways to create, deliver and capture value might be the way to go for any business student that is about to undertake his or hers career, to actually leave a planet and society worth fighting for, gives me inspiration. And that is the motivation behind this master thesis. We will investigate how well Norwegian businesses are able to align sustainability and profitability, based on available data. The main problem will be to get a good grasp on what sustainability really is, and how it may be measured.

1.2 Purpose of the Thesis

The research goals applied in this study, is split in three. Firstly, I wish to examine if textual analysis of public reports can be an acceptable measure for sustainability efforts. Secondly, I wish to investigate the link between sustainability and financial performance in a Norwegian context. Third, as I am quite motivated by practical implications of a master thesis, I wish to study differences in sustainability efforts, and if these differences have any practical implications which may be applied in sustainability effort prioritizations for companies. I will make it clear already here, that I on the third point wish to investigate if there are some kind of categorical *best efforts* when it comes to sustainability efforts and financial performance alignment in a Norwegian context.

1.3 General Information

In the literature review, we visit varying sources to create a framework for the thesis. In general, we will delve into both academic and more practical sources to develop definitions for ourselves in a theoretical field where there is a lack of specific consensus regarding definitions. The term sustainability is our prime example here.

To measure sustainability efforts, I aim to analyse sustainability or annual reports as a proxy for actual sustainability efforts. It struck me when I began the preliminary research for this thesis, that sustainability measurements are overwhelmingly based on partial self-reporting, with all the bias which comes with it (see e.g. Appendix 4). Therefore, I thought that to get around this bias, how about I analyse their annual reports? Of course, the first thing you should think now is that such reports are biased as well, as they address stakeholders. And you are probably right. However, I am curious to see if my proxy is a viable measure of sustainability efforts, compared to the existing ones. The other thought behind using annual reports, alternately sustainability or ESG reports, as a proxy to sustainability efforts is that recent research shows that top-level anchoring is crucial to successful implementation of sustainability efforts (see e.g. Jørgensen & Pedersen, 2018). As annual reports are a representation from the companies' top-level management, and dedicated sustainability/ESG reports shows some level of dedication towards sustainability efforts and goals, we can use some simple collectible metrics from these sources to measure the companies' sustainability efforts. However, this whole thesis ultimately rests on the assumption that what companies

say they do in their stakeholder communication, is aligning with their actual efforts and focus. This assumption is of course up for debate, but as far as sustainability measurements go, it's an original approach which may give us some insight into sustainability, sustainability reporting, and sustainability efforts. Especially in areas relating to the UN Sustainable Development Goals, stakeholder communication, and their links to company performance.

I would also like to point out, as a general notice before we step into this thesis, that we use a category-based approach in an attempt to separate sustainability efforts from one another. This category-approach, which most research in reality use, have some implications. Our human brains are actually built around categories and a form-structure to help us out with storing and sorting the world around us (Kaufmann & Kaufmann, 2015). Research is no different, we try to categorise the world into theories and groups, which in reality are interrelated on an uncountable level. However, no cases, events or categories of sustainability efforts are truly the same, and our categorisation is actually a weakness when it comes to validity, as one sustainability effort which fits into one form, might not fit into another. These facts however, provide interesting discussions in chapter 5. Keep it in mind as we indulge in this study, as it has implications for categorisations which will be somewhat a revisited topic during this thesis.

1.4 Thesis Question

Our thesis question is a question of differences within categories of sustainability efforts for companies listed on the Oslo Stock Exchange.

Thesis Question: *Which sustainability efforts are most profitable to prioritize?*

Following the thesis question (TQ), we have a few questions that needs answers. Firstly, are sustainability efforts truly linked to profitability? And secondly, which categories of sustainability efforts is it possible and appropriate to obtain and measure? The second question must refer to international or local frameworks, and we have a few at hand. The Global Reporting Initiative is one, UN's Sustainable Development Goals another. In addition, we have academic literature, whereas a three-split-categorisation emerges between three separate pillars: Environmental, Social, and Economic sustainability. These matters will be discussed thoroughly in the literature review. For now, let's take a look at the research questions which aim to answer the overall TQ:

Q1*: Does sustainability efforts correlate with sustainability, ESG or CSR communication?*

Q2*: Does sustainability efforts effect profitability for Norwegian companies?*

Q3*: Are there any differences in profitability between companies which prioritize different sustainability efforts?*

In research question 1 (Q1), we look at sustainability, ESG and/or CSR communication as three sides of the same case. In other words, we join these types of communication, under the label of sustainability. This intertwinement of the phrases will become clear in the literature review chapter, as most of our time there is spent debating these terms. Q1 is a question which seeks to provide valuable insight into our proxy-solution, and if it is a valid measurement of sustainability efforts.

The second research question is where the magic happens, it's where we aim to determine a link between sustainability efforts and profitability for companies listed on the OSEAX index through Ordinary Least Squares (OLS). In addition, we will use binary variables for different types of sustainability efforts to see if they also have an effect on profitability.

Implicated in the third research question is an expectation of differences between categories of sustainability in terms of profitability. However, these differences may be hard to prove, and we will discuss why different sustainability efforts may not be segregated into defined categories in relation to financial performance.

1.5 Limitations and structure

In terms of limitations, you should notice that we don't present the research questions as causal facts we seek to confirm, as we have no way of determining causality in this study. However, we may interpret causality as a possibility, even though we may not determine it. This means that regressions with independent and dependent variables does give us insight, even though we lack the causal conditions in this study. In addition, we will limit ourselves to study companies listed on the OSEAX-index, and will not attempt to generalise too decisively outside of this boundary.

I do not aim at investigating specific sustainability indexes or phenomena's, the aim is to investigate the link between sustainability efforts and profitability, and if there are any

indications of a “best efforts” approach to maximise return on sustainability investments. By doing so, the structure of the thesis becomes quite deductive where we first present existing literature and contemplate on the theory to see if there are any traces of categories which may provide such “best efforts” (Chapter 2). Then I gather (Chapter 3) and analyse (Chapter 4) empirical data to investigate the theory. Lastly, we will discuss why we find, or do not find, what we expected based on the theory (Chapter 5), before concluding and plot out potential avenues of further research (Chapter 6).

2. Literature review

2.1 Content of the literature review

In the following, we will go through relevant literature to have a better understanding of the theoretical fundament which the thesis is built on. We will investigate sustainability, ESG, SDGs, CSR, profitability and more, to create a common understanding of the terms we aim to measure. The key takeaway from the literature review is how we view the sustainability term, in addition to its facets and complexity.

We start by defining sustainability using a wide range of sources, from early economists' views on trade-offs in society to modern ESG-frameworks. Then, we take a brief look at profitability, and how sustainability and profitability may be aligned. Third, we develop hypotheses and a thesis model, and we look at how sustainability may be measured. Finally, I sum up important definitions at the end of the chapter, which makes us well prepared for the following chapters.

2.2 Defining Sustainability

The most interesting thing about sustainability, purely theoretically, is how vaguely it is defined in the literature of sustainable economics. Most academics tend to leap over the definition of sustainability and presume that we all have the same underlying definition of the term, even though it is a massive and wide expression that seems to have unclear boundaries. For instance, where does Social Corporate Responsibility (CSR) stand in relation to the sustainability-term? What is materialistic sustainability? What is social sustainability? And how wide is actually the term? Is CSR included in it? Is sustainability purely about the environment and natural resources? And are there actually any clear definitions of sustainability?

In this thesis, it is appropriate to establish a theoretical framework which identifies separate categories of the sustainability term, which hopefully is possible to quantify in some way or another. Binary variables are to some degree also favourable, as we seek to find out how different sustainability efforts are related to financial performance.

2.2.1 Our Common Future

To answer the question of what sustainability truly is, we must go back to where it all started. Where the sustainable focus, which has become mainstream in the business, management and academic world, became popular in the late 1980's (Purvis, Mao, & Robinson, 2018). As a Norwegian student, you are probably not surprised that I am referring to the Brundtland-commissions *Our Common Future* from 1987.

Brundtland's foreword in "Our Common Future" widens the term *the environment* to not only include specific environmental issues such as pollution or the global rise in temperatures. She defines *the environment* as "where we all live" (Brundtland et al., 1987), which includes the society at large, not only the earlier and traditional meaning of the environment as something around and outside of us people, and our societies. In other words, the Brundtland commission redefines *the environment* to also include humans and their actions, ambitions, and needs. Consequently, societal factors, materialistic and economic factors, the exploitation of natural resources and so on, is included in our environment. You can almost say that everything which influences and has consequences for human life, including the humans themselves, is included in the definition. Furthermore, the commission highlights the sustainability of ecosystems and societies, and concludes with the definition of *sustainable development* as: "… development that meets the needs of the present without compromising the ability of future generations to meet their own demands" (Brundtland et al., 1987 p.41). The commision also concludes that the goals of social and economic development must be defined in terms of sustainability, in all countries. If we think about it, it is obvious that sustainable development is a type of resource exploitation where we do not deplete resources, but rather use resources which we may reproduce, recycle, reuse, or upcycle (as McDonough & Braungart put it (2013)). If we also take the wide definition of the environment into account, we may also think of sustainable development as development that does not weaken or damage society with its people, institutions, economy, needs and opportunities at any point in the future.

Even though *Our Common Future* is often credited for the popularisation of the sustainability-term, keep in mind that sustainability (earlier often referred to as *eco-development*) came as a reaction to the overwhelming focus on economic growth, production, and consumption following the great depression and the two world wars. The works of Ignacy Sachs for instance, calls for solidarity to align economic and social objectives with ''ecologically sound management''(Glaeser, 1984, p.25).

Now that we have gone to the very cradle of the global sustainability focus, especially if we also mention William C. Frederick whom already in 1960 tried to endorse a global focus on business responsibility through socio-economic welfare-boosting, and also have the 1987 definition of *sustainable development* at hand, we might delve deeper into the actual definition of sustainability in the 21th century. Let's look at a set of well-diversified sources and see if we can't find a common understanding for the sustainability-term.

2.2.2 Oxford English Dictionary

In the Oxford English Dictionary, sustainability is defined as ''The property of being environmentally sustainable; the degree to which a process or enterprise is able to be maintained or continued while avoiding the long-term depletion of natural resources'' (Oxford College of Procurement and Supply, u.d.). This definition does not congregate with the Brundtland-commissions wider definition of sustainable development, as the dictionary's definition lacks the social aspect, and to some degree the economic aspect of sustainability and sustainable development. Oxford's College of Procurement and Supply themselves describes the sustainability-term as ''…hijacked'', ''…dilluted'' and ''…misunderstood'' (u.d.). Therefore, it seems like we need to make our own definition of sustainability for this thesis.

2.2.3 Three Pillars

When we dive into the various definitions of sustainability, academics find it appropriate to split the term in two or three different categories, which may be perceived as both independent or/and dependant of each other. The concept of three pillars (or categories) are given the labels *Social, Environmental* and *Economic* sustainability (Purvis, Mao, & Robinson, 2018). An alternative which is widely used to the *Economic* label, are *Governance* when we go into the topic of sustainability reporting. The substance of each pillar varies depending on the academic sources you investigate. Thompson (2017) speaks of the pillars and other similar three-way splits of sustainability as organized ''...without much disciplined thought about how it does and does not translate into a more comprehensive understanding of sustainability''. In other words, it is unclear what exactly these pillars include or exclude, purely theoretically.

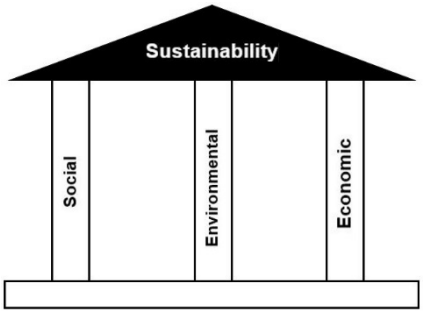

Illustration 2.1: Sustainability pillars. Based on (Purvis, Mao & Robinson, 2018).

The three pillars emerge from academic works in the wake of the Brundtland Commission's report in 1987, with contributions from the likes of Brown et al. (1987), Barbier (1987), and Hancock (1993), among others. This higly debated theoretical framework (see e.g. Purvis, Mao, & Robinson, 2018), also shares striking similarities and links to the popular triple-bottom-line introduced by Elkington in the late 90's (Elkington, 1997). The categorisation of sustainability into three pillars provides a solid base for us moving forward in this thesis, so lets try to define the three categories for ourselves, and if they can be related to sustainability efforts.

Social sustainability must be said to be a type of sustainability where the focus lies on improving or maintaining equality, freedom, health, institutions, and possibilities for human beings to fullfill their needs in a societal way (based on United Nations, 2015). The United Nations (UN) define social sustainability development as sustainable development focused on securing humans right to a good and just, decent life (United Nations, 2020). Social sustainability therefore have strong links and actually is a part of the economic pillar, as institutions and businesses are important parts of a societys economy, and a societys economy and institutions may limit or expand freedom if we think of freedom in terms of the possibilities to travel, the freedom of speech, the freedom to commerce, or the opportunity to endure studies, selfenightment, and self-fullfilling in thread with Maslows much beloved needs-pyramd. In addition to basic human rights of course. In other words, societal opportunities related to fulfill needs are intertwined with both the economic and environmental pillars. However, it's main substance is based on efforts contributing to equality, freedom and possibilities in the society. But still, it is closely interrelated to the other pillars as freedom, justice and the foundation to live a decent life over a given period of time is hard to come by without a functioning economy, or an environment with sustainable resources.

Environmental sustainability is the most intuitive pillar of sustainability, and the part of sustainability which truly lies close to the historically original meaning of the sustainability-term (Purvis, Mao, & Robinson, 2018). As a definition, environmental sustainability focuses on sutainability in form of materialistic resources, natural resources, and the exploitation and conservation of these. The UN defines the environmental part of their definition for sustainable

development as development which protects the nature and the climate as a renewable resource for humanity (United Nations, 2020). As far as sustainability efforts go, a sustainability effort can be classified into this group if its aimed at the exploitation of resources or reduction of negative ecological impacts due to their own or others operations. Or as Jacobsen & Pedersen puts it, to cast light or reduce shadow (2018) on resource use and consequences.

Economic sustainability concerns the sustainability of large-scale economies, or in a microperspective: businesses, and concerns the differences in wealth-distribution throughout the local, and world population. We may also include workforce conditions, like equality and fair pay or governance practices as part of the definition. Economic sustainable development is about securing economic security for humans and society (United Nations, 2020). Hence, factors that apply in the economic sustainability pillar is poverty, economic inequality, and the possibility to meet needs through an economic perspective, both for businesses, households and individuals. Economic sustainability is therefore a form of sustainability where economies, businesses and people manage to not deplete, but rather enhance, economic possibilities in the future. Hence, economic sustainability is strongly intertwined with both social and environmental sustainability, and responsible consumption or production, as the depletion of natural resources is not economical sustainable, neither is the weakening of institutions or limitations in freedom or possibilities, or uneven distribution of wealth throughout mankind. Do note the strict separation from early economic thinking, where the depletion of natural resources was no concern at all, and that traditionally there has been a trade-off between environmental sustainability and economic sustainability where economic sustainability (or rather: growth) came at the cost of depleting natural resources. This, of course, still happens today, just look at how the Norwegian economy prospers economically by depleting non-renewable resources off the coast. Anyways, we will interpret and define economic sustainability as sustainability efforts which either is economicly sustainable for a given firm, or for the society around it. And, as you see, the interrelations of the sustainability pillars comes to play again, as it does not help to include a societal factor into the definition of the economic pillar.

Ultimately, we will look at the three sustainability pillars as interrelated, in the way that Brown et al. views them (1987). This means that the very definition of sustainability is strongly contextual, and in the assesment of a plan, project or company as truly sustainable, we should define it from the context of the specific assesment and related sustainability definition (Brown et al. 1987). Ultimately, this means that that we will have a framework which consists of a

social sustainability pillar, an environmental sustainability pillar, and an economic sustainability pillar, which are closely interrelated, and implicitly have an element of trade-offs between them. However, for measurement purposes we must have fairly clear boundaries between the efforts.

To summarize: sustainability in its purest form *is the use and improvement of environmental, social and economic factors and resources which does not limit the possibilities of future human generations to fulfill their needs* (based on United nations, 2020, Brundtland, 1987, Purvis, Mao & Robinson 2018).

2.2.4 Trade-offs

We can't just mindlessly assume that sustainability efforts have positive effects on profitability. It might be a negative effect as wellt, as sustainability efforts and projects take time and resources. Interestingly enough, the early political economists such as Smith, Ricardo and Mill in the early industrial days, identified trade-offs between wealth generation and social justice (Purvis, Mao, & Robinson, 2018), or economic sustainability and social sustainability, in our terms. These trade-offs are of relevance to us, as there seems to be debate of how businesses and institutions make trade-offs between the different types of sustainability, examplewise between social and economic sustainability (see e.g. Porter & Kramer, 2011).

The case with trade-offs is that the goals of economic, environmental and social sustainability is equally desirable, and tends to come at cost of one another. If a company wishes to be sustainable in economic terms, it may have to give up and weaken the accomplishment of equally desirable environmental goals. For instance, economic sustainability through a steady-state economic profit for a singular business, might come at the cost of environmental factors, such as the use of scarce resources, or rather the use of non-renewable resources. Or economic profitability can come at the exploitation of workers with low wages. However, topics like sutainable business models (see Jørgensen & Pedersen, 2018) challenge the theoretical idea that trade-offs have to occur between the different pillars of sustainability. In other words, sustainability and sustainable businesses in its purest form does not need to engage in trade-offs when it comes to sustainability, as sustainability itself may be profitable.

The profitability of sustainability itself is a hot topic in the business world, and at relevance to the thesis at hand is Holmelid & Kvistad's master-thesis from 2018, which seem to confirm a positive correlation between sutainability efforts and profitability for companies listed on Oslo

Stock Exchange. Although Holmelid & Kvistad's sample is small, they also identify that top-level anchoring and business model integration of sustainability is key to linking sustainability efforts and financial performance. However, they can not identify a causal relation between sustainability and profitability, neither do they find links between which sustainability efforts that coreelates strongest with profitability.

In our case, regarding trade-offs, we will use the trade-off theoretical approach to some degree. It is important to understand the trade-off background of sustainability, to further understand the segregation of sustainability categories as a part of the framework for the operationalisation of sustainability, without throwing ourselves into the explicit debate of trade-offs between different sustainability efforts in this thesis. However, its an important recognition that every business or company has limitations regarding sustainability efforts, and that they intuitively will use resources allocated to sustainability in the way the company see as most profitable or favourable. In other words, a form of trade-off will occur for every company when it comes to sustainability effort. It lies implicitly in the recognition of resources (also economical resources) as scarce, and the faact that every businesses's main objective is to increase the return of resources applied, in thread with traditional microeconomic theory.

2.2.5 UN Development Goals

The United Nations Sustainable Development Goals (SDGs) are a set of 17 sustainable development goals which were adopted by all UN member states in 2015. The SDGs build on the Brundtland commissions earlier work presented above, and seeks to provide a blueprint for prosperity and peace fur the humankind here on earth. The goals themselves focuses on ending poverty, improving health and education, reducing inequality and prompt economic growth while preserving the environment (United Nations, 2020).

It has become common to use the SDGs for businesses, by claiming specific SDGs as focus areas for the specific business to contribute to sustainable development (see e.g. annual reports of publicly listed companies). In our case, these SDG ''claims'' might be useful for creation of binary variables concerning which kind of sustainability that correlates the most with financial performance for businesses enlisted on Oslo Stock Exchange.

Illustration 2.2: Sustainable Development Goals (United Nations, 2020 May)

To systemize the SDGs to a more concretized conceptual framework for this thesis, we may seek to allocate the SDGs into the three pillars of sustainability. In the systematisation of the SDGs, let's take a seemingly simplistic approach. In this categorization, some of the SDGs, such as SDG 7 and 11, may fit in with more than one pillar of sustainability, as the pillars are undoubtedly interrelated. However, to effectively operationalize the SDGs, we will allocate them where the primary substance of the specific SDG naturally belongs in accordance with the UN definitions (United Nations, 2015:14-27).

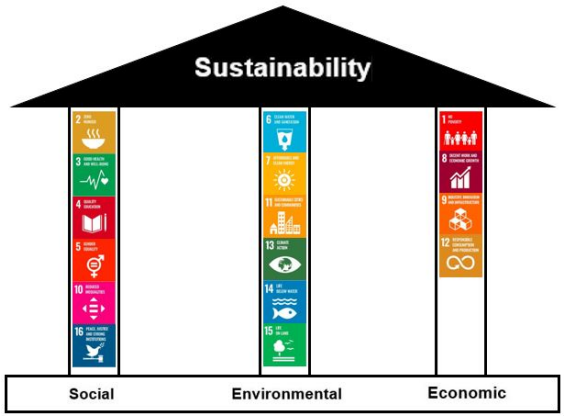

Illustration 2.3: Sustainability pillars and SDGS. Based on Purvis, Mao & Robinson, 2018 and United Nations 2020, may.

In the social sustainability pillar, we allocate SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 10 (Reduced Inequalities), and SDG 16 (Peace, Justice and Strong Institutions).

The environmental sustainability pillar will concise of SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life On Land).

Finally, in the economic sustainability pillar we categorize SDG 1 (No Poverty), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production).

Notice that SDG 17 (Partnership for the Goals) is a bit less defined in relation to our purpose in this thesis, and we will therefore leave it out of this categorisation as it can be viewed as more of an SDG designed to boost the other SDGs through collaboration. The SDGs will be important in our analysis of sustainability effort prioritization.

2.2.6 Sustainability Reporting and communication - Materiality

There is a distinct difference between material and immaterial sustainability, in terms of reporting standards. The distinction occurs in the level of substance that lies in public information regarding sustainability investments (Khan, Serafeim, & Yoon, 2016). In our case, it is important to recognise that not all sustainability information will be available in annual reports, due to the substance-demand of sustainability reporting. However, it's important to notice that research has linked companies whom score high on material sustainability reporting to financially outperforming companies that rather score high on immaterial sustainability reporting (Khan, Serafeim, & Yoon, 2016). In Norway, the Department of Finance published a report in 2020, determining that Norwegian companies gives little information about substance and risks in their sustainability reporting. They also found that sustainability reporting, which, to some degree is required by law in Norway since 1998 (Regnskapsloven), regarding climate risk is limited and rarely quantified (The Financial Supervisory Authority of Norway, 2020). My textual analysis of annual and sustainability reports confirms this for several companies. This matters for us, as we seek to compare different types of sustainability efforts among Norwegian companies, in addition to see if companies whom prioritize sustainability outperforms the others. However, we must be aware of the standardizations regarding sustainability reporting in Norway, which the Norwegian Institute of Public Accountants has criticized as being unprecise (Brandsås, 2019). EY's Global Climate Risk Disclosure Barometer from 2018 shows that only four countries provides poorer climate risk reports than what is the case in Norway (EY, 2018).

Materiality Matrix

Companies that report on their sustainability efforts often use a materiality matrix to identify key sustainability performance areas. The matrix works by assessing impact on the business

on one axis, against the importance for stakeholders on the other. They can then prioritize sustainability efforts based on the matrix. The matrix appears several places in theories as well as in practice (see e.g. Jørgensen & Pedersen, 2018), and the matrix has both positive and negative sides.

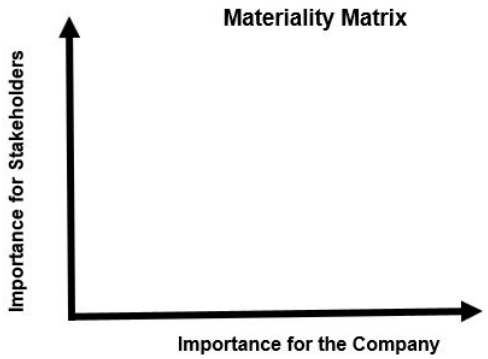

Illustration 2.4: Materiality matrix. (Based on Jørgensen & Pedersen, 2018)

It's positive that the use of the matrix prioritizes the importance of stakeholders, as the stakeholders may include the local society and communities, employees and partners in addition to the shareholders. The matrix prioritizes their concerns. However, it might be so that no company takes any responsibility for the larger problems that humanity face, as this matrix incentivises small or local problems. Whatever effects the materiality matrix might have, it shows that companies tend to prioritize based on what is beneficial for themselves. In other words, it's a true result of classical theory of self-interest, with the mentioned problems that comes with such a mindset. Anyway, such analyses may have substantial value, shows a study by Harvard researchers (Khan, Serafeim, & Yoon, 2016). The study utilizes the Sustainability Accounting Standards Boards (SASB) standards and finds that to enhance financial performance, companies should prioritize sustainability efforts which relates to material sustainability issues (Jørgensen & Pedersen, 2018). It shows us that the amount of resources allocated towards sustainability efforts is not the most important aspect in terms of financial performance, but that materiality is key (Jørgensen & Pedersen, 2018). This has great impact for us, as we might expect to find differences between sustainability efforts. However, in this thesis we have a different approach to determining sustainability efforts, based on the UN's SDGs. We do not explicitly differentiate on materiality in the analysis. However, the fact that materiality is key to financial performance through sustainability efforts is an important insight, although this thesis focuses on sustainability efforts in type-categories, not materiality. To sum materiality up, it seems logical that prioritizing sustainability efforts from the company-specific characteristics, including stakeholder interests and importance for the company, are beneficial in terms of financial performance, based on Khan et al.'s results (2016).

2.2.7 Sustainability Indexes

There are several sustainability indexes available to analyze. The secondary data, which will be presented in the next chapter and Appendix 4, mainly comprise of sustainability indexes. Now, many of the indexes are at least partially calculated on the base of self-reporting, which we wish to avoid in this thesis (example: Questionnaires). However, the sustainability indexes are well thought through and offer possibilities to validate our primary data. More on the validation and indexes can be found in the next chapter.

The indexes mainly refer to ESG, which stands for Environmental, Social and Governance. The environmental and social part of ESG vary little from our definitions of the corresponding sustainability pillars above, where the environmental factor relates to resource use, emmisons and innovation and the social factors relate to workforce, human rights, community and product responsibility (see e.g. Refinitiv, 2020, or Robeco, 2020). What is interesting is that the Governance section also corresponds to our definition of the economic pillar, as a term that includes management and shareholders and their interests, with the consequence of economic sustainability over thime. Thus, we will regard ESG as an equivalent to the sustainability pillars, to enable easier data aggregation in the reports which I have analysed. Now, here lies a potential problem of courrse, as this simplifying and merging of two different frameworks may be unfortunate. As the Governance in the ESG definition relates to a company's apllied day-to-day rules for governing and developing a given company, our definition of the economic pillar focuses rather on the outcome of such rules and principles in form of value creation and positive firm accounts. However, I asess them as so closely interrelated that it is an acceptable approach for our goals. As stated in the introduction, categorisation is a neccessary evil in academic endeavours.

2.2.8 CSR and Sustainability

Corporate Social Responsibility (CSR) refers to business responsibility, and its popular use actually predates the sustainable development-term, back to the middle of the 20th century (Carroll, 1999). The World Business Council for Sustainable Development defines CSR as ''the contionus commitment by businesses to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large.'' (Science Direct, 2018, Mugurusi, 2008). In our case, we may define CSR as a term which consists of initiatives and efforts which is a part of

a business' social and economic responsibility. Hence, both economic, environmental and social sustainability will fall in under the CSR definition as the above definition involve *the environment* as Brundtland (1987) put it. In other words, we may regard CSR as one of the precessors to the modern sustainability-term, and we will not go through the trouble of discussing it too thorough. Allthough, it is worth mentioning that empirical studies suggests a positive correlation between CSR-efforts and financial perfomrance (see e.g. Agle, Roman, & Hayibor, 1999), even though causal effects of CSR on financial performance have been hard to prove (Utgård, 2017).

CSR efforts has sometimes been called out as ''Greenwashing'', or in clear speech: lies. Take the Volkswagen scandal as an example, where Volkswagen created software in cars to trick emission testing systems, so the cars would appear more environmentally friendly with lower emissions than in reality (Environmental Protection Agency, 2019). In relation to Volkswagens, and other fraudulent CSR efforts, CSR has been blamed as more of a set of words and documents to create a positive picture, than an actual effort for sustainability or responsibility itself (see e.g. Mugurusi, 2008, or Porter & Kramer, 2011). With marketing playing such a high role in the competitive nature of most businesses, and sustainability as increasingly linked to financial performance (Flammer, 2015, Utgård, 2017), it's possible that a percentage of acclaimed CSR efforts actually are fake in reality, and nothing but a hollow commercial strategy. But, due to some of the greenwashing scandals being unveiled, with all the negative effects of being caught functioning as scarecrows, we will take a possibly naive approach and assume CSR and sustainability efforts reported by companies in this study as real. The high level of trust in Norway (Innovasjon Norge, u.d.) also supports the assumption of truthfulness in CSR and sustainability reporting.

In any case, CSR has been important in the way that enlightenment and trend-words set the daily agenda of businesses. Even though the term itself may or may not have been used as a scape-goat for profits, and the reporting standards regarding any materiality have varied (Eccles et al. 2012), it has put exceedingly focus on the interrelated sustainability term, which in many ways has taken over for CSR as a framework for corporate responsibility.

2.2.9 Sustainability Defined

As Purvis, Mao, & Robinson (2018) points out, even though the sustainability term and the three sustainability-pillars are often attributed to the Brundtland-report (1987), and is used

both wide and broad, it is not a theoretically concretisized and clear framework. It's been developed in several directions (see Purvis, Mao, & Robinson, 2018) which creates a messy academic subject to study. The above discussion is a manifest to the realisation of the three pillars and sustainability as an unclear theoretical framework, chanalised into a understanding for our purpose. Moving forward, based on the overhead discussion, we will use the following definitions in this thesis.

Sustainability

We will define sustainability as the use and improvement of environmental, social and economic factors and resources which does not limit the possibilities of future human generations to fulfill their needs (based on United nations, 2020, Brundtland, 1987, Purvis, Mao & Robinson 2018). The Sustainability term will in the following be interpreted as a synonym to CSR and ESG.

The three pillars

Social sustainability is a type of sustainability where the focus lies on improving or maintaining equality, freedom, health, institutions and possibilities for human beings to fullfill their needs in a societal way.

Environmental sustainability focuses on sutainability in form of materialistic resources, natural resources, and the exploitation and conservation of these.

Economic sustainability is sustainability in terms of economical sustainability for a given firm, household or for the society around it, including efforts that relates to mangerial practices and business principles.

Sustainability Efforts

Sustainability efforts are efforts aimed at improving either social, environmental or economic factors for the benefit of society.

2.3 Profitability

Profitability is the most common measure of performance for businesses (Kaplan & Atkinson, 2014). It therefore fits as our measure of financial performance and consists of alignments of revenues and costs to determine results. One may choose to include or exclude imputed costs

and create profitability measures which are made comparable by weighing it with capital-sizes. We will handle the profitability measures and its portion of theory in chapter 3.

To improve profitability, companies may increase income or reduce costs, with the same results on profitability measures. For our sake, it is important that the profitability measures we use are comparable. This normally means that one adjusts absolute profit-measures by weighing it with various measures of size. Later on, you will see that we use total assets and equity as our selected weights to make the profitability measures comparable (see section 3.4).

Profitability in relation to sustainability efforts refers to increases in income or reduction of costs which comes from sustainability efforts. Some reasons for such effects of sustainability efforts are increased public opinion (Orlitzky, 2008) which obviously may drive sales or attractiveness for talent up, the lowering of risks (Reinhardt, 1999), or reduction of various input factors (Porter & Kramer, 2011), for instance through upcycling, reuse of materials or by handling by-products as a resource rather than waste. Although this thesis does not have data to study efforts on such a level, we will acknowledge that such efforts are what lies behind our rather wide definition of sustainability efforts and its potential effect on profitability. The phrase *financial performance* will be used as a synonym for profitability in this thesis.

It's important to recognise that most firms ultimately operate to maximise return to the owners, as any introductory book to microeconomics will tell you. In consequence, sustainability efforts may be subject to profitability-analyses where the firms try to assess a potential for increased income, reduced costs or a potential result, as Bjørnenak (2019) calls it.

2.4 Aligning Profitability with Sustainability

Profitability and sustainability have traditionally been subject to trade-off theory, where it's been claimed that sustainability, or for instance social justice and profitability comes at the cost of one another (Purvis, Mao, & Robinson, 2018). This aligns with the trade-off theory presented earlier.

However, these trade-offs seems to have cahnged. According to a study from 2015, which separates from other studies on sustainability and profitability due to its causal design (Utgård, 2017), the researcher finds a significant increase in Return on Assets by 3.1% in the year after intitating a sustainability effort. Furthermore, the significant effect prolasts stable through year

2, 3, and 4 after the initiation (Flammer, 2015). The key take-away from this study, along with meta-studies whom suggest positive links between sustainability and profitability (see e.g. Utgård, 2017), is that profitability and sustainability seems to be positively correlated.

Earlier meta-analyses also suggests a positive association between CSR and financial performance (Orlitzky, Schmidt, & Rynes, Corporate Social and Financial Performance: A Meta-analysis, 2003). The problem that persists in the meta-analyses are **s**ampling-errors and measurement error. Hopefully, the proxy approach in this thesis will prove itself as a valid and representable measure for sustainability efforts. The reason that the proxy-solution might be a good solution, is the idea that official reports reflect top-level managements focus on sustainability, which is crucial to success with sustainability efforts (Jørgensen & Pedersen, 2018).

In this thesis, we will compare profiability and sustainability by using two alternate measures of profitability, and a textual analysis of sustainability/annual reports for sustainability. The measures will be presented and utilized in chapter 3 and 4.

2.5 Measuring Sustainability – Thesis Approach

As Purvis et al. mentions early on when describing the three pillars of sustainability (2018), the unclear theoretical conceptualisation of the term makes ‘’…a theoretically rigouros operalisation of sustainability’’ quite difficult (Purvis, Mao, & Robinson, 2018 p.681). Also Barbier (1987) highlights the problem of defining a clear and ‘’…analytically rigouros way’’ of sustainable development. Therefore, the main challenge of this thesis will be the operationalisation of sustainability, and finding adequate ways it may be measured.

One way to go about measuring sustainability could be by sending out a questionnaire that ultimately may provide low response rates, which often is a problem withinin management research (Saunders, Lewis, & Thornhill, 2016). I could alternatively perform qualtitative interviews to dig deep into sustainability efforts. However, as our goal is to find more universal and generalising “best efforts”, it won’t do as an initial analysis in a Norwegian context. Flammer (2015) investigates CSR shareholder proposals whom pass and does not pass by a small margin of votes, however such data is hard to come by for our population in a master thesis. Ultimately, I wish to prioritize sample size, both to investigate if there actually is a positive link between profitability and sustainability efforts, and to be able to generalise and

make use of the results. A form of best practice with sample size in mind are the sustainability indexes. They often rely on questionnaires along with materiality assessments and industry-specific challenges (see e.g. Appendix 4, Refinitiv, 2020 or Unruh, 2016). But, these statistics are not collected for the majority of Norwegain companies, which includes the majority of firms listed on the OSEAX-index. And, for a one-man team it is hard to create and collect such deep and complex measures. The solution might be to focus on sample-size and exclude outliers so that we may analyze companies from the population which are in an economical steady state?

As stated, the availability of data are a huge issue when measuring sustainability efforts in a Norwegian context. As we shall se later on, the observation count for available measures are depressingly low. However, while poundering about the availability of data, I tried initial OLS-estimations with some of the available sustainability indexes, and found no significance-levels that were worth noticing. A few were promising, but not significant. These results led me to believe that due to the expected marginal effect which sustainability theoretically should have on profitability (e.g. Flammer (2015) found approx. 3% ROA increase), as there undoubtedly are an extreme number of variables which have an effect on profitability (as managerial practices, production facilities or technology, etc.), the low observation counts were to blame. Research theory states that when you are studying small effects, larger samples are preferred (Saunders, Lewis, & Thornhill, 2016). And so it was, that prioritizing sample-size became fundamental for this thesis.

When sample size are the primary concern of the data collection process, availability of data becomes equally important. As already mentioned, questionnaires might give low response rates, and the already existing measures were too low on sample sizes. So why not go to the annual report, where companies report ont heir annual progress? In addition, it is signed and reviewed by top-management, which we already have stated as crucial to sustainability effort success (Jørgensen & Pedersen, 2018). By applying a tedious textual analysis of annual reports, it's possible to collect the companies' reporting on the general focus of the firm, with hopefully sustainability-effort-related information as well. With the discovery of GRI and sustainability reports, I assessed textual analysis of commitment displayed in annual and sustainability reports towards sustainability efforts as an interesting measure which is easy, and at least partially efficient to collect. The data collection process is described in chapter 3, and we will not go deeper on the data collection here, but the measurement and proxy-solution through annual and sustainability efforts are deemed as acceptable due to the link between

reports which are summaries of a firms operations and progress, and the top-level anchoring of sustainability efforts as crucial.

2.6 Developing Research Hypotheses

Research Question 1

Now, we must recognise that sustainability efforts and sustainability communication is not the same thing. However, as the sustainability indexes aim to measure actual efforts towards various sustainability goals through more complex assessments than we are about to apply, we will regard the sustainability indexes, which our secondary data variables mainly are, as measurements of sustainability efforts. By making this assumption, we gain the possibility to validate our proxy-solution to measuring sustainability efforts in the primary data collection. Hence, we arrive at our first research question.

Q1*: Does sustainability efforts correlate with sustainability, ESG or CSR communication?*

To investigate Q1, which is a necessity to have any kind of internal validity when assessing Q2 or Q3, we may use correlation tests. If the primary data's main continuous variables correlate with the sustainability indexes which are theoretically most closely related to sustainability efforts (mainly ESG Disclosure Score, see Appendix 4 and the discussion under 4.3.1), we may validate the measure. To test these correlations, we need the first hypothesis:

Q1 Hypothesis
$H1_0$: Sustainability efforts does not correlate with sustainability, ESG or CSR communication.
$H1_A$: Sustainability efforts correlates with sustainability, ESG or CSR communication.

Rejecting the null hypothesis would give a clear answer to Q1; if the proxy-solution to measuring sustainability efforts is a valid measure.

Research Question 2

In the second research question, we will investigate the link between profitability and sustainability. To test it, we have continuous variables, and we must look for an effect. We have defined sustainability, discussed its similarities with CSR and ESG, and arrived with a quite wide understanding of the term. Consequently, we will also test it quite wide, as the

research goals of the thesis is partially to determine if there is a link between sustainability efforts and financial performance in a Norwegian context..

Q2: Does sustainability efforts effect profitability for Norwegian companies?

Q2 Hypothesis
$H1_0$: Sustainability efforts has not an effect on profitability
$H1_A$: Sustainability efforts has an effect on profitability.

Research Question 3

When differentiating between sustainability efforts, I am interested to see if there are universal laws or correlations across industries and sectors regarding sustainability efforts and profitability. Therefore, we will not take a materiality approach, such as Khan et al. (2016) which we discussed earlier. I would rather focus on the sustainability pillars, to see if there is any type of difference between companies which prioritizes one pillar over another. To do this, we may apply the UN SDGs, and the classification of SDGs into sustainability pillars as represented in section 2.2.5. The hypotheses related to these are split in two: one set of hypotheses which regard effects between the three pillars and profitability, and one that focuses on differences within the groups of sustainability efforts. In result we may apply three smaller hypotheses to the tests for Q2 which concentrates on effects through OLS, and one main hypothesis for Q3, which focuses on differences between groups:

Q3: Which sustainability efforts correlate the most with profitability?

$H2a_A$: Social sustainability efforts have an effect on profitability
$H2b_A$: Environmental sustainability efforts have an effect on profitability
$H2c_A$: Economic sustainability efforts have an effect on profitability

The null hypotheses are quite self-explanatory for these three and will not be presented here for the purpose of being concise.

Q3 Hypothesis

$H1_0$: There are no differences in profitability between the three sustainability pillars.
$H3_A$: There are differences in profitability between the three main sustainability pillars.

By answering these hypotheses, we will be well equipped to discuss the thesis question; which sustainability efforts are most profitable to prioritize?

2.7 Thesis Model

To help with the intuitive interpretation of the overall idea and plan for the thesis, I have designed the following model, which displays the process from theory to testing.

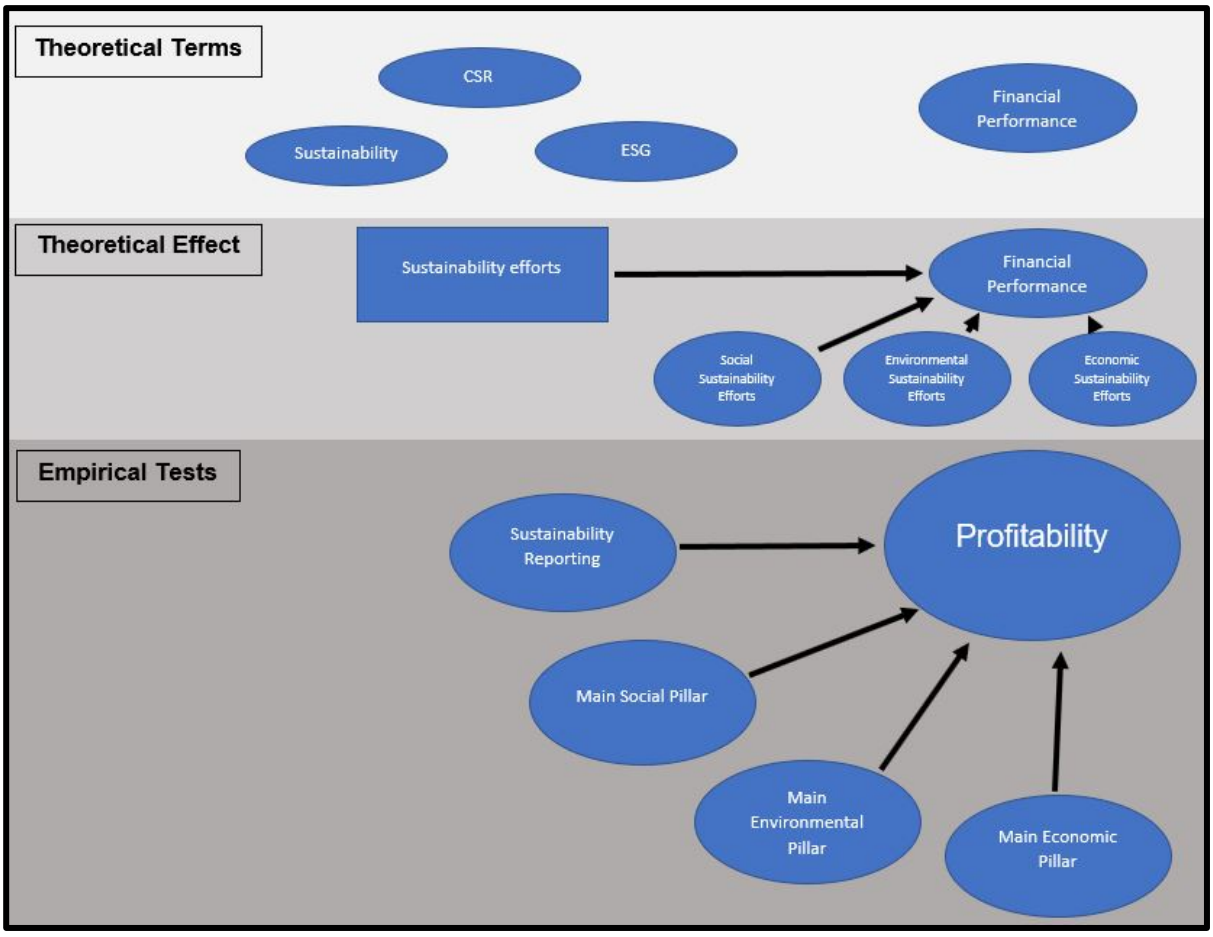

Illustration 2.5: Thesis Model

The thesis model is split in three, from top to bottom. The first section displays the *theoretical terms* which I want to evaluate. The second section displays how the three main terms (Sustainability, CSR and ESG) has been merged into Sustainability efforts, which is the main

independent variable I want to evaluate on financial performance, in addition to a three-way-split between sustainability efforts (social, environmental and economic). The section displays which theoretical effects we are interested in. Finally, the third section displays how the effect is operationalised, so that it may be measured.

2.8 Definitions – Summarized

Sustainable Development: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own demands" (Brundtland, 1987).

Sustainability: The use and improvement of environmental, social and economic factors and resources which does not limit the possibilities of future human generations to fulfill their needs (based on United nations, 2020, Brundtland, 1987, Purvis, Mao & Robinson 2018).

Sustainability Efforts: Efforts aimed at improving either social, environmental or economic factors for the benefit of society.

Sustainability Pillars: Three different aspects of sustainability which are interrelated and hard to separate from one another.

Profitability: The efficiency of a firm, measured by monetary results.

A last reminder of a key take-away is that we in the following will use the word sustainability as a term involving both CSR- and ESG-related substance. In other words: *sustainability* refers to the three sustainability pillars, which include both the CSR and ESG-term.

3. Method

In this chapter I will present the methodology applied in the thesis, along with a number of choices and clarifications to provide quality in terms of reliability and validity. We will first go through the methodology and research design, before shifting our focus to the data collection, preparing the data and creating some variables. After that, I describe how we will analyse the dataset, and finally discuss reliability, validity and ethics.

Note that we will consistently throughout this thesis use the terms "*primary data*" and "*primary variables*" when referring to the data collected through textual analysis as described in this chapter. "*Secondary data*" and "*secondary variables*" will refer to the data collected through available databases, also described in this chapter.

3.1 Methodology and Research Design

The research philosophy throughout this thesis is based on positivism, which is based on the assumption that the best scientific evidence is found in objective facts (Saunders, Lewis, & Thornhill, 2016). It focuses on the explanation and operationalization of variables to find causal effects (Gripsrud, Olsson, & Silkoset, 2016). The whole thesis is built up around the implicit acknowledgement that objective facts is where we will find our answers. And, it leads us to challenges on how to measure sustainability, how it's linked to profitability, and consequently how businesses should invest their sustainability-marked funds. I will, as a researcher in this thesis, also take an objective and independent stance, which is a key axologic characteristic of positivism (Saunders, Lewis, & Thornhill, 2016). This also means that we will use a deductive approach, which is most common in scientific research (Saunders, Lewis, & Thornhill, 2016). A deductive approach is characterized by putting forward an idea or hypothesis, examining existing literature to see if the idea offers additional theoretical understanding, testing the hypothesis and then provide results which either nullifies the idea or hypothesis or provides support for it (Saunders, Lewis, & Thornhill, 2016). We will do this by offering an idea that suggests different correlations between different types of sustainability efforts and profitability in a Norwegian context, testing it out on the empirical data, and then finally contribute to existing theory either by throwing away the hypotheses, or provide new theoretical insight.

As you may have noticed from the thesis and research questions, a descripto-explanatory approach is the most natural research strategy. This means that we have a combination of explanatory and descriptive designs where we first seek to describe the phenomena or situation, to later establish causal relationships based on the described situation between sustainability and financial performance (Saunders, Lewis, & Thornhill, 2016). However, do note that we do not have data to determine causality. The causality between sustainability efforts and profitability may go either way.

This will also be a multi-method quantitative study, using primary data from textual analysis and secondary data partially from various questionnaires' summed up scores. These will be described later in the chapter and in Appendix 4. All variables are gathered through intranet-mediated access (Saunders, Lewis, & Thornhill, 2016), which basically means that the variables are collected through the internet. The choice of collecting textual data is linked with the objective approach of the thesis. As I measured sustainability measures, a lot of the measures were based on self-reporting, with its well-known biases such as the tendency to score yourself higher on measures that is perceived as positive for yourself (Gripsrud, Olsson, & Silkoset, 2016). As a last important realisation before we look at the population and sample for the study, the research questions are built on one another. First, we wish to validate our research strategy which is based on a proxy sustainability efforts (Q1). Secondly, we seek to confirm a link between sustainability and profitability (Q2). Third, we seek final answers to our thesis question (Q3). If we do not find any correlations in the first or second research question, the others will be of little significance.

Regarding textual analysis, one has the choice of either doing it manually, or by computer. The goal is to reduce the data which lies within the reports by aggregating it into numerical variables so that it may be analysed. I have opted to do this process manually. The positive sides of doing this process by hand is that it may provide more detailed, tailored and precise measures (Li, 2010). On the other hand, it requires resources, or as Li calls it: costs. Luckily, master-students work for free. But it often brings limitations with regards to sample size, due to the pure time it takes to conduct such an analysis (Li, 2010). In addition, subjectivity in the coding process may be an issue for reliability. I have tried to be open about choices regarding the data collection, focusing on which choices and assumptions that are made, and how the data were collected. In Appendix 4 you can find a description of the variables, which are partially a reliability-measure to help account for the reliability and assessment of this thesis.

Regarding the sample size, it should not be a problem, as most available and comparable data are analysed in context of the population, which leads us to the next headline.

3.2 Population and Sample

The population for this study was intended to be Norwegian companies in general. However, due to the lack of data availability regarding sustainability efforts and financial reports, not to mention resource-limitations in the primary data collection, we will settle with Norwegian companies listed on the Oslo Stock Exchange. More precisely, companies listed on the OSEAX-index, which is an index of all shares listed on Oslo Stock Exchange. The abbreviation OSEAX stands for Oslo Stock Exchange All share Index.

Our dataset consists of all companies listed on the OSEAX-index which have delivered accountings to Brønnøysundregisteret and later been made available through Proff Forvalt (2020). Ultimately, we have a dataset of 133 of the 195 listings registered at the end of our longitudinal data in 2019, although some firms has been removed due to lack of comparability in their accountings, and we do not have observations for each year of every company. In the final sample, which is exhibit for a reduction in preparation of the analyses in chapter 4, we have a total of 127 companies and 546 observations. In the sample reduction, observations lacking annual or sustainability reports are dropped, along with other outliers and missing values. The fact that the sample has been drawn from the population due to practical reasons, leads us to having conducted *convenience sampling*, also called *availability sampling* (Saunders, Lewis, & Thornhill, 2016). The sample spans over five years and can therefore be classified as longitudinal data, often referred to as panel data. Since we are looking for small effects (profitability is affected by a lot more than sustainability efforts alone!), it's a strength that our sample is quite large in relation to the population (Saunders, Lewis, & Thornhill, 2016).

Unfortunately, such availability samplings often lead to low credibility of the results (Saunders, Lewis, & Thornhill, 2016). However, our generalisation value based on the sample can be classified as good. Since our database contains observations for about 68% of the population, we may draw conclusions based on the sample size. However, there is a potential bias in the companies that's left out of the sample due to the practical reasons which leads to their absence. In addition, we do not have five years of observations for each company, which

we will look at in the next section. I still deem the generalisation value (external validity) of the results as rather good due to the sample-population-size ratio.

3.3 Dataset

The dataset is the result of comprehensive work to align several sources (Bloomberg, Eikon, Proff) into one detailed database. The database is a custom merged result of countless excel-files, which all has gone through detailed reviewing in terms of assessment of names, variables, numbers and relevance. I have used STATA version 16.0 for the database generation, variable generation and statistical analysis. Microsoft Excel has been used to retrieve data, as this was the standard format for the accounting data and secondary data. The primary data have been gathered by the use of manual entries in Excel-sheets. The database is therefore custom-made for the purpose and goals of the thesis. Variable definitions can be found in detail in appendix 4.

3.3.1 Primary data – Textual analysis

For our primary data, I have analysed 615 annual and sustainability reports for 133 companies spanning over 5 years of annual reporting. It withholds numeric and binary variables. The variables concentrate on sustainability, CSR, ESG and SDG-phrases observed in the reports, as well as a page count of sustainability/CSR/ESG-related pages and binary variables for SDG claims. A few of the reports (<30) were in Norwegian, these will have equivalent Norwegian search-terms as well as the English ones in terms of the phrase-analysis (translated phrases in Appendix 4). English language was preferred if the reports were available in multiple languages. All reports are collected through the respective companies' websites, and the variables are defined in Appendix 4.

Each observation in the textual analysis is matched with the accounting-data and the secondary sustainability data collected from Bloomberg and Eikon. I was unable to retrieve annual reports for 24 observations. These are deemed as insignificant in terms of the validity of the data material, and most of them seem to be removed from the companies' websites due to changes in accounting standards (IFRS, NGAAP, etc.), or other lack of comparability (or existence) with available annual reports. Therefore, the observations which are missing annual/ESG/sustainability reports registration have been removed during the sample reduction process. Now. Let's go through some of the primary data variables.

CSR/ESG/SUS External Report

This binary variable identifies if the data is gathered from an external CSR/ESG/Sustainability-report, rather than the annual report of the current year. In the case where a company has such a sustainability-report it will be used for the textual analysis. If such reports are presented both independent and integrated with an annual report, the annual report is preferred. Do note that many of our analysed annual reports have substantial integrated sustainability reports within them, and the scope of the various sustainability reports are attempted to be measured by the page count variable. The CSR/ESG/Sustainability External Report variable does not identify sustainability efforts by itself but acts as a descriptive variable for our data-gathering in relations to the validity and reliability of the database generation.

Phrase Counts

We have four phrase count variables, which identifies the number of times a keyword is present throughout the report. The phrases are “Sustainability”, “CSR”, “ESG”, and “SDG” with closely related phrases. For a full review of the phrases, see Appendix X. These variables aim to be a measure of the company’s sustainability focus. We will also make a summarization-variable, which summarizes all Phrase count variables as a variable to identify a summarized Sustainability/ESG/CSR-focus in the reports.

Sustainability/ESG/CSR Page Count

The sustainability/ESG/CSR page count refers to the number of pages accumulated with substantial Sustainability-, ESG- or CSR-related information. The assessment of pages as substantial depends on the focus of the text. If the content in the text holds information about Sustainability/ESG/CSR-efforts, the pages will count. This means that namedropping sustainability, ESG or CSR-phrases will not count, as many CEO’s do in their preface or comments in annual reports. This individual assessment of substantiality is subject to reliability discussions, which you can see under the *Reliability* headline.

SDGs Claimed

This variable displays the number of individual Sustainable Development Goals which is explicitly claimed by the company in the specified report. Vague claims of SDGs will not be accounted for, and the variable mostly contains explicit claims of specific SDGs.

SDG Goals 1-17

The 17 SDG Goal variables are binary variables to identify which of the SDG's each company has claimed for each year. We use these to generate the 3 variables explained under 3.4.3, which is another set of binary variables that shows which sustainability pillar(s) the specific company prioritize.

3.3.2 Secondary data

We also have a set of 16 secondary variables gathered from Bloomberg- and Eikon-terminals at NHH. The variables are thoroughly defined or explained in Appendix 4, while we will only shortly present them here.

The secondary variables relate to either the sustainability-term, ESG-term, or the three pillars which we investigated in the literature review. We also have one variable which handles resource use. The variables are either numeric or based on percentiles. In general, most of these variables are collected through various questionnaires and therefore have the bias of self-reporting in them. The variables will be explained continuously where they are used in the analysis, and for precise definitions see the headline *Secondary Data* in the Appendix referred to above.

It's worth notice that most of the secondary data variables contain observations for one-year only, while three of them are over the panel-data's five-year period. However, problematic in both cases are the low observation count, which means we will rely mostly on our primary data in regressions. We will use the secondary data mainly for validity-purposes to substantiate our primary data (Q1), in addition to robustness-testing. Together with the primary data I believe we have a strong base to go through with a wide range of descriptive statistics and investigate the links of financial performance and different sets of sustainability efforts.

3.3.3 Data Preparation

To account for differences in reporting-currency I have converted the monetary variables to NOK, using historic currency exchange rates on the last reported currency day of each calendar year (typically 31. December). The historic currencies were retrieved from Norges Bank (2020). There are 18 observations with EUR currency, 111 observations with USD and 510 observations with NOK. There was also one abnormality with Nordic Semiconductor ASA's financial report for 2015 which was reported with the currency USN, while 2016-2019 were

in USD. I have assessed the difference in USN (US Dollar Next day) and USD to be insignificant and corrected it to USD and subsequently NOK.

The monetary variables are also inflation-adjusted using *Konsumprisindeksen* (SSB, 2020), which is the Norwegian Statistical department's Consumer Price Index (CPI). We use SSB's yearly average CPI and the base year of 2015, so all monetary variables have been fixed to 2015-levels. Which base-year we choose will be irrelevant, as we seek to compare the panel-data with itself.

3.3.4 Control Variables

As with all econometric analyses, we are greatly concerned with omitted variable bias, which is the case with missing variables which has an effect on the dependent variable (Hill, Griffiths, & Lim, 2017). It is generally a rule of thumb to include one too many explanatory variable than one too few. In our case, there will be many variables that may affect profitability which we do not have available. The lack of control variables is due to limitations in the dataset, and a weakness in this thesis. It is still possible to estimate OLS, but we should expect low explanation-power (R^2), as it will probably be a small portion of the variance which is caught by our sustainability measure. However, we may find relatively valid results using OLS which gives us valid significant effects in this thesis. As the operationalisation of the sustainability efforts itself is quite wide, alternate measures for alternate views on sustainability would be hard to find, and probably have high correlation with our main independent variables. If we had control variables, we could ensure that it wasn't measuring the same underlying term via Cronbachs Alfa, however, we have no such variables here. To sum it up, if a high R^2 is identified in the OLS, we should be worried about an extreme case of omitted variable bias.

3.4 Variable Generation

To compare the companies' profitability, we need a measure of their financial performance. The most important thing when choosing such a measure as a dependant variable in management research is whether the measure matches the theoretical concept (Richard, Devinney, Yip, & Johnson, 2009). Here, we will present two, whereas one will be our main dependent variable in regressions, while the other will be tested to offer robustness in the measure. We will also go through the generation of a main-sustainability-pillar-variable,

which we will use to investigate the difference between the three different categories of sustainability.

3.4.1 Return On Assets (ROA)

The first financial performance variable is Return On Assets (ROA), which is a very popular accounting measure of performance (Richard, Devinney, Yip, & Johnson, 2009). It is defined as a company's operating profit plus financial income, divided by average total assets (Kinserdal, 2000). It shows us the profitability of the company's assets in generating revenue. In the numerator we put in the profit gathered on the asset, before assigning any costs to the creditors (such as the loan holders). We do this as we want a financial performance measure which does not take into account differences in e.g. interest rates or loan covenants, in addition we avoid potentially unfortunate taxation effects, as Norwegian multinational companies have a tendency to engage in aggressive tax planning (Bakke, Hopland, & Møen, 2016). In the denominator we average the total assets, as the assets don't magically jump or reduce its size from e.g. 12.31.2015 to 01.01.2016, but rather build up or degrade gradually over the course of the financial year (Kinserdal, 2000).

$$ROA = \frac{Operating\ Profit + Total\ Financial\ Income}{Average\ Total\ Assets} * 100$$

The thought behind this measure is that it's comparable and relatively expressed as a percent. It shows us how much value the assets yield relative to the assets themselves. It can be used to compare yearly changes, or differences between companies, which is perfect for our dependent variable. In addition, this measure has the positive characteristic of being easily comparable between companies. However, profitability measurements utilizing capital sizes are affected by value assessments which may differ to some degree between companies (Eklund & Knutsen, 2003). In addition, ROA might increase due to asset depreciation, while the numerator remains stable, which gives a somewhat incorrect profitability measure (Eklund & Knutsen, 2003). However, we will use ROA as our main dependent variable as it makes generally a good comparison-measure.

We could also have opted for a Return On Equity measure as our main independent variable, but as we are mostly interested in the general financial performance of the companies, rather than the profitability which falls to the owners, and the potential skewness of the measure due to high equity (Richard, Devinney, Yip, & Johnson, 2009), I have assessed ROA as a better

main measure for our purpose. In addition, earlier and well renowned research on sustainability and profitability alignment have chosen ROA as an adequate measure (Flammer, 2015). ROE will instead be our alternative measure, to validate potential findings. Note that *average total assets* will be calculated using the former years total assets. For the first year of observation, the total assets will not be averaged and equal to total assets on reporting date.

3.4.2 Return On Equity (ROE)

We will also calculate the return on equity (ROE), which is a measure of how much a firm generates for its owners (Richard, Devinney, Yip, & Johnson, 2009). We will use averaged equity as we did an average denominator for ROA, due to the argument that equity changes throughout the year (Kinserdal, 2000).

$$ROE = \frac{Net\ Profit\ Before\ Taxes}{Average\ Equity} * 100$$

Alternatively,

$$ROE = \frac{Ordinary\ Result\ Before\ Taxes}{Average\ Equity} * 100$$

We exclude the taxes as tax-effects is not what we are studying, even though sustainability efforts' effect on taxes would be an interesting study. In addition, multinational companies have a record for more aggressive tax-planning than domestic companies (Bakke, Hopland, & Møen, 2016), an effect we wish to avoid. Anyway, this measurement of performance is aimed to be an alternative to ROA, to investigate the robustness of our regression.

3.4.3 Main Sustainability Pillar

We will soon describe the dataset, where you will be presented with three sustainability-pillar variables which are sustainability pillars prioritized by the companies, based on the definitions in the literature review-chapter by using SDGs claimed in the reports analysed. Now, to further differentiate sustainability efforts, we will generate three main sustainability pillar binary variables, which we will use to analyse effects on profitability.

We will register the main sustainability pillar for each observation which have claimed SDGs and define it as the sustainability pillar with most claimed SDGs related to it for the given observation. The SDG-classification can be found in the literature review. However, the

problem will be that several observations claim an equal number of SDGs within each sustainability pillar. To prioritize a main pillar in such cases, we will use the ESG score within the different pillars retrieved by Eikon for each company. In other words, if the company associated with the observation assessed where two or more sustainability pillars have an equal number of SDGs claimed, we will assign the main sustainability pillar based on the ESG score collected through Eikon. E.g., if a company has 2 SDGs claimed in both the social and environmental pillar for an observation in 2018, the main sustainability pillar will be the one with the highest pillar-ranking in the ESG pillars for the given company in 2018. However, we only have 47 observations in the ESG-variables from Eikon, which means that we will have to use a different approach for the remaining observations which does not seem to have a clear main sustainability pillar.

The solution to this comes by using the phrase count variables. If the given observation has an equal amount of sustainability pillar SDGs within the social and environmental pillar, the main pillar will be decided by the highest number of phrase counts within the sustainability or CSR phrase count. We can make an argument that companies that often refer to CSR, or corporate social responsibility, leans towards the social pillar, while the ones that refer predominantly to sustainability leans towards sustainability in terms of environmental sustainability. For the economic sustainability pillar, things get a little more trickier, as we do not have a variable which can be some sort of measure in context of the other two pillars. However, as this pillar only holds 4 SDGs, contrary to the 6 in each of the other pillars, we will always prioritize the economic pillar over the other two when the SDG-claims are alike, and the ESG-rating does not give us a prioritization. We end up with the following set of main sustainability pillars:

Table 3.1: Main Sustainability Pillars

Main Pillar	Count
M Social Pillar	32
M Environmental Pillar	43
M Economic Pillar	62
No Pillar Observed	409

* See Appendix 4 for definitions

We can investigate if this prioritization is somewhat valid by comparing it to the measures of sustainability pillars in the secondary variables. More precisely, we compare the companies which have claimed a main sustainability pillar in our primary data with their score in the

Refinitiv ESG Scores collected through Eikon. There are few observations though, due to the poor data availability in the ESG scores.

Table 3.2: Main Sustainability Pillars and ESG Scores

	Count	Percent
Match	20	61%
Unmatched	13	39%
Missing	513	

* See Appendix 4 for definitions

As we can clearly see, the main sustainability pillars match in 61% of the observations. The tendency of congruence is a bit low and does not clearly support claims through the main sustainability pillar prioritization algorithm presented above. However, the observation count is low. If we delve deeper into the ESG Scores we can see that there are small margins between which pillar that is prioritized, as is the case with the sustainability pillars in the primary data. Most ESG pillar scores varies only by 1 or 2 on an integer scale ranging 1-100. I therefore choose to proceed with the assumption that the main sustainability pillars identify prioritization's within companies regarding sustainability efforts. Alas, this assumption undermines the measurement validity in our primary data for Q3.

At last, I also generate a sustainability pillar variable, where 0 = no sustainability pillars claimed, and 1 = sustainability pillar or pillars claimed. Obviously, this variable is simply enough a dummy variable which measures if the company in the given year has claimed any SDGs in their annual or sustainability report. There is a total of 137 observations which have a claimed pillar in the final sample, and 409 without.

3.5 Analytical approach

In this section, I will describe the analytical approach which will be conducted in the next chapter. We will look at which analyses I wish to perform to answer our research questions, and how we will perform them. The choice of putting this part of the analysis in the method-section, is made to help concentrate the analysis chapter.

3.5.1 Generally about the analytical approach

First thing on the agenda in the analysis-chapter will be the descriptive statistics where I describe variables, possible challenges in their characteristics, and which solutions we may opt for. Then, we proceed with the analytics to answer our three research questions, through correlation tests, OLS and ANOVA. Finally, we sum up the chapter by pointing at possible weaknesses in our results, how they may have been biased, and how our methodological choices have affected the results. Now, let's look at some hypothesis tests.

3.5.2 Tests

For the hypothesis testing of correlations, we will mainly use Pearson's Product Moment Correlation Coefficient (PMCC), which quantifies the strength of correlation between two variables, and tests for the probability of this correlation happening by chance alone (Saunders, Lewis, & Thornhill, 2016). In general, we apply a 5%-level for significance testing in this thesis. In the correlations we will investigate the first research question (Q1), by assessing the correlations between the secondary variables and two of the primary ones. If we can reject the null hypothesis for Q1, we can say that the proxy-solution to sustainability effort measurement is satisfying, which will strengthen the validity of whichever conclusions may deprive from Q2 and Q3.

To answer the overall thesis question of *Which sustainability efforts are most profitable to prioritize?* I have developed several research questions that build on one another to hopefully find statistical differences between our identified pillars of sustainability. We will develop a main regression (OLS), which aims to answer research question 2: *Does sustainability efforts effect profitability for Norwegian companies?* By using the phrase sum variable as a proxy to overall sustainability efforts, in combination with the main sustainability pillar dummy variables, I hope to find significant effects on ROA. If that is the case for the phrase sum variable and the binary variables, we may proceed to investigate the differences between the three sustainability pillars, to answer our third research question: if there are differences between the three pillars' effect on profitability. For this last test, we may use a one-way-ANOVA-model (Saunders, Lewis, & Thornhill, 2016) with only the observations which have claimed a main sustainability pillar, with some modifications.

In addition, we will robustness-test the main regression by using our secondary dependent variable ROE. We will also robustness-test it by using our secondary main independent

variable, the page count, and various alternate variants of the main OLS (see Appendix 2). In general, these analyses require us to do several tests for assumptions regarding the regressions, which we will go through under the next heading.

3.5.3 Assumption Testing

Regressions

OLS, or Ordinary Least Squares, which we intend to use for our regressions, are based on a set of assumptions. If these assumptions fail, we may need to alter the variables, or the estimations will lose some or all validity, and the conclusions will become more uncertain (Hill, Griffiths, & Lim, 2017). OLS is a form of hypothesis testing, where we compare the data we have collected, with what we would theoretically expect to happen, formulated in the hypothesis (Saunders, Lewis, & Thornhill, 2016). There is a total of seven classical assumptions for OLS, presented in the table below.

Table 3.3: OLS Assumptions

ASSUMPTIONS, CONSEQUENCES AND SOLUTIONS			
	Assumption	Consequence of violation	Possible Solutions
1	Linearity in the coefficients and error term	Often cause failure in the other assumptions. Critical violation which leads to little, if any, validity.	Alternate functional forms. Other tests.
2	Constant variance in the error term (Homoscedasticity)	Heteroscedasticity. Reduces precision of the OLS-estimates.	Robust standard errors
3	No Multicollinearity	Reduces precision of the OLS-estimates. Error in the model specification.	Remove variable from regression.
4	Normal distribution in the error term	Might give unreliable confidence intervals and prediction intervals.	Data transformation.
5	The error term has a population mean of zero	Systematic error bias	Investigate and determine the cause.
6	Observations in the error term is uncorrelated with each other (serial-/auto-correlation)	Reduces precision of OLS-estimates.	Add an independent variable that captures the error term

			correlation/prediction. Distributed lag models.
7	The independent variables are uncorrelated with the error term (Exogeneity)	Biases the coefficient estimate.	Other tests. IV.

Based on: (Hill, Griffiths, & Lim, 2017), (Saunders, Lewis, & Thornhill, 2016), and (Frost, 2019)

Under these assumptions, OLS produces the best possible estimates, often referred to as BLUE (Best Linear Unbiased Estimator) (Hill, Griffiths, & Lim, 2017). Some of these assumptions will be tested in the analysis chapter, and we will apply clustered robust standard errors to deal with some of them. In addition, the functional form of our main independent variable will be altered to its natural algorithm to pass the linearity assumption.

One-way-Anova

One-way-ANOVA, or a one-way-analysis of covariance, can be used to assess if the likelihood of whether three or more groups being different is a strike of chance alone (Saunders, Lewis, & Thornhill, 2016). It analyses variance within and between groups by using means. The F-value of an ANOVA indicates if the chance is low for the differences appearing by chance. In other words, we can regard a high F-value with a probability less than 0.05 as significant (Saunders, Lewis, & Thornhill, 2016). However, there are assumptions that needs to be met.

Two of the assumptions are fairly easy to meet, or at least investigate. First, data for each group should be normally distributed, unless the number of cases for each group is 30 or more. As we have more than 30 observations per group, this assumption should hold. Secondly, the variance should be equal to all groups, but this doesn't tend to be a problem as long as no group is more than 1.5 times bigger than one of the other groups (Saunders, Lewis, & Thornhill, 2016). As our groups do vary greatly in size, we need to investigate this assumption. The third assumption might be a bit of a problem.

The data values should be independent from one another, states the third assumption (Saunders, Lewis, & Thornhill, 2016). In our data, the values are obviously not independent as we have longitudinal data, and the one-way ANOVA will not be sufficient to analyse our sample. To at least get an indication of any differences, knowing that the sustainable development goals were first publicly announced by the UN in 2015, and that there is some lag before companies started to claim them, we may do an ANOVA only for the years of 2018

and 2019 independently. By splitting the dataset, we can thereby satisfy the assumption. See the analysis chapter for further details.

3.6 Reliability

Reliability is defined as how reliable data are in terms of consistency (Saunders, Lewis, & Thornhill, 2016). In other words, research and results should be reproduceable in such a manner that if someone were to create the same research design and gather the same data, they should end up with corresponding results. For our master thesis it means that data collection, handling, analysis and interpretation can be assessed by the reader, so that it may be evaluated. Questions like how the data is gathered, how it's handled, how the research strategy is designed and so on, gives the reader a possibility to evaluate the findings in relation to its context. In short, reliability refers to transparency so that results are reproduceable and therefore more robust. Reliability is a premise for drawing any types of conclusions that rejects hypotheses. Studies are deemed reliable if a researcher is able to replicate and achieve the same results using the same research strategy (Saunders, Lewis, & Thornhill, 2016).

Reliability in this thesis is secured by detailed descriptions of key elements in the research design. First, we do a thorough theoretical breakdown of the sustainability-term, how I see it as measurable and how financial performance is determined. Secondly, we go through how I gathered the data, and the dataset, in such detail that the research strategy is reproducible. Thirdly, I emphasize all matters of reliability that is deemed relevant throughout the thesis. As you may have noticed already, both reliability and validity are reoccurring themes in all chapters. As the fourth argument to further substantiate our reliability, let us discuss some of the issues.

The big elephant in the room is the fact that during the primary data collection, there are some variables which must be interpreted during the collection phase. More precisely, I talk about the CSR/ESG/Sustainability page count variable, which requires substance in the text for the page to be counted (as explained in 3.3.1). Regarding this substance, I have chosen to draw the line while registering observations between mentioning keywords, and explaining or referring to actual sustainability efforts such as frameworks, projects or initiatives, whereas the latter is accounted for. It's a big point to make out that the reliability here, is exposed to researcher bias, which is "…factors that induce bias in the researcher's recording of responses"

(Saunders, Lewis, & Thornhill, 2016). In other words, researcher bias is a potential in the collection of the primary data, as mentioned in section 3.3.1.

In addition, we do have the challenge of external reports. If one were to attempt a replication of the data collection, it is possible that different search methods or accesses would give a higher or lower count of sustainability reports, instead of annual reports which are used if stainability reports are not present. We can interpret this challenge as a potential researcher error (Saunders, Lewis, & Thornhill, 2016). However, I have taken measures by both investigating company websites and used various keywords in various search engines online to retrieve such reports. I am therefore satisfied with the thoroughness of the data collection due to the effort put into report-searching, and rate the reliability as strong on this point. The two challenges we have discussed so far also has implications for validity, which we will discuss in the next subchapter.

The fact that we are gathering our data from sources that is not necessarily solely intended to showcase sustainability efforts, is what you can compare to participant errors in questionnaires (Saunders, Lewis, & Thornhill, 2016). Companies' do not communicate like a homogenic group. Some companies are small, others are large with extra resources for stakeholder communication. Some companies are more liberal in the way they present annual reports, while others are conservative and focus on the financial aspects of the company. However, these challenges are more related to validity.

Also, it is worth mentioning that due to the fact that I am writing this thesis alone rather than in a duo, the researcher bias potential is greater. In a duo or a team, one can discuss choices and observations consecutively through the collection process, while a one-man/woman-army must refer to briefer discussions with fellow students, family, or the monotonous monologues of books and papers. However, the detail in explanation of choices throughout the thesis is an effort aimed at controlling this reliability issue, along with the ethical approach which will be presented further down.

Lastly, mistyping is also a matter of reliability, as mistyping when registering observations may shift results. As a quality measure, the variables have been examined in terms of extreme values, and base statistical measures through descriptive statistics are presented in the next chapter. In addition, extreme values (outliers) have been removed from the final sample, which

you can read about in 4.1. As we all know, reliability is a condition for validity in research, and I value the reliability in this study as satisfiable-to-strong.

3.7 Validity

Validity is a central criterion for the assessment of research-results quality. In general, validity refers to accuracy in the analysis, the generalisability of findings, and the appropriateness of measures used (Saunders, Lewis, & Thornhill, 2016). In other words, validity concerns if we measure what we intend to measure, if we analyse what we intend to analyse, and if we can draw conclusions from our analyses and generalise. There are several different aspects or forms of validity, which is important to recognize (Gripsrud, Olsson, & Silkoset, 2016).

Internal Validity

Internal validity, sometimes termed as measurement validity, concerns the very fundamental question that asks if we measure what we aim to measure (Saunders, Lewis, & Thornhill, 2016). There are several facets of measurement validity, and without prolonging this chapter for too long, we will look at *content validity* which refers to by which extent our measurement device "… provides adequate coverage of the investigative questions." (Saunders, Lewis, & Thornhill, 2016). It's hard to precisely determine how we may achieve adequate coverage, but through careful definitions of earlier research in the litterature review it is possible to claim content validity. However, this is where we have our main challenge in terms of validity. By using a proxy to sustainability efforts for our primary data, it is hard to prove that we actually are measuring sustainability efforts. Yes, some research shows that successfull sustainability efforts and business model implementation is linked (see Jørgensen & Pedersen, 2018), and we may make a logical assumption that such implementations will be reported in stakeholder communication. But, we must also take marketing into account as annual reports have two main functions: 1) Fulfilling law required reporting, and 2) communicate with stakeholders. In other words, it is possible that we only measure stakeholder communication, and not actual sustainability efforts. The last point is the main reason for including our secondary data, as they can help validate our primary data, as these are aknowledged measures of sustainability efforts. Although these secondary variables are low on observation counts, it will at least strengthen our content validity if they covariate positively with our corresponding primary data, popularly called convergent validity (Saunders, Lewis, & Thornhill, 2016).

We could also argue that the there is a direct link between top-management focus of sustainability and the extent or scope of sustainability efforts in a given company. Sustainability is, without doubt, a crucial part of businesses in the 21st century, as sustainability is on UN's agenda, The World Bank's agenda, and more and more companies report or comment on sustainability and sustainability efforts. Green bonds and initiatives like the GRI (Global Reporting Initiative, 2020) or Sustainalytics (2020) also emphasizes this cruciality, which gives me the opportunity to asess our internal validity as satisfying, conditioned on the overhead discussion.

In terms of additional threats to validity, we do not have control over the collection of the secondary data. And for the secondary valuables which are time series data, we do not know if the instrumentation changes between the sample periods. In addition, as we have pointed out a few times, there is definetely ambiguity about causal direction between our variables. We can not determine if companies that score high on profitability measures do so because of superior sustainability efforts, or if the causality goes the other way around. This is a crucial take-away from the validity-section, that the causal direction of the results is not possible to securely determine.

GRI – Global Reporting Initiative

GRI, or Global Reporting Initiative is an initiative to help standardize global reporting on sustainability. By December 2020, GRI reports a total of 15 377 organisation members in their Sustainability Disclosure Database (GRI, 2020). GRI has become the leading standard for sustainability reporting, and several companies in our sample, like DNB, Equinor and Sats are included in their database. When such sustainability reports in accordance with the GRI reporting standards are available, it will be beneficial to use them instead of annual reports, as they represent the information on sustainability that we are after. This reporting standard makes it easier to compare companies which are using the standard, however, there may be a potential bias as such a thorough reporting standard differs greatly from the annual reports analysed, which is used for the companies who do not report in accordance with GRI. In consequence, we may expect to see gaps in sustainability standards.

External Validity

External validity concerns the generalisation of results to other relevant contexts or groups (Saunders, Lewis, & Thornhill, 2016). In our case, the aim is to generalise for our population. As stated earlier in the reliability-section, the potential bias due to accessibility of annual

reports and financial statements, weakens our external validity. In those cases where we have a lot of missing observations in the secondary variables, we would be wise to be very careful about concluding. In other words, due to the large amount of missing values, most of the secondary variables will generate low external validity. This is not the case for the primary data, which is borderline representable for the population, with a little weakened generalisation value due to the potential bias in accessibility. However, we may conclude quite certain based on our results for the sample, which makes up about two thirds of the population, as long as the internal validity holds. We can also generalise carefully for the population, as long as we keep in mind the potential bias.

General About Validity in the Thesis

The phrase count variables from the primary data gathering are a proxy to measure sustainability-focus for each individual company, in individual years. However, we must take into consideration that some of the companies does not comment on or provide reports on sustainability efforts on a yearly basis. Several companies have dedicated sustainability pages on their websites without any reports, which means that the sustainability-focus which clearly is present in the company, is not measured in this study in those cases. However, with limited resources in a master thesis, and the acknowledgement that top-level anchoring of sustainability efforts are crucial for successful sustainability-implementation (see Jørgensen & Pedersen, 2018), we choose to recognise and comment on it as weakening for the validity of the study, and move on. As commented on in the introduction, the proxy-solution to sustainability measurements is a premise for the study.

To sum up, our internal validity is satisfying, based on certain assumptions, investigated in research question 1. The external validity and generalisability come with a but, which is the potential bias in data access. Overall, I deem the validity as cautiously satisfying, as validity never will be perfect in empirical research, and the difference between the observed and real value in our data potentially is quite large as we use a proxy for sustainability efforts. But, the proxy to sustainability efforts is the condition for this study, and besides that I assess the validity as satisfiable.

3.8 Ethics

Ethically, there are few challenges using mainly public data through published reports. Such reports must be expected to be subject to business and management research at some point, as well as the financial state of publicly listed companies. The thesis can be characterized as highly objective, handling values from texts and various sustainability scores, and does not directly involve human interaction in the data collection process. However, the human factor is always involved, for as long as AI can't build its own research projects. Here, the human factor lies in the researcher himself, and I will therefore explain which ethical and moral philosophic guidelines which I have applied for this study.

My conduct is guided by social norms of trust and equality. I take a deontological stance (Saunders, Lewis, & Thornhill, 2016), which basically means that I will be following the rules of conduct associated with research. This means that I will act as independent, as unbiased as possible, measuring and analysing variables and observations fairly with the same set of rules. The consequences of this stance show itself in the data collection process. During the collection process, a few companies had designated parts of their company websites to sustainability, CSR or ESG. These were not accounted for, as I set out to look at reports, which are linked to individual years. A premise for the thesis is that we investigate reports, not websites, based on the assumption that reports more directly is communicated by key individuals within each company, rather than a website developer or a market communicator.

As far as ethical guidelines go, the NHH values for research ethics is fundamental for the thesis, which include impartiality, honesty and the willingness to accept your own fallibility (NHH, u.d.). In these values, there are aspects of independency, dignity and freedom. For us, it means that data collection, analytical choices and conclussions shall reflect independency and objectivity to maintain the integrity of the thesis. With a positivistic approach, these values are fundamental if we are to conclude this thesis with any kind of credibility.

3.9 Methodological Limitations

The methodology does come with its limitations and restraints. The choice of using textual analysis on reports, which in reality is secondary data not designed solely for the intent to measure sustainability, cannot be stressed enough. Even though our approach is to investigate sustainability communication in annual reports as a proxy to sustainability efforts, it's not

given that it is the best measure. It is, however one of the best options available without passing out questionnaires or relying on questionnaire-based data. This thesis is an original approach to measuring sustainability without the bias of self-reporting (even though one could argue that annual reports are self-reporting as well). When setting out to use reports which are mainly designed to communicate financial states and investor relations, we have this big limitation of conditioning on the fact that the proxy may or may not be a more or less precise measure of sustainability efforts. What I am implying is that a limitation to this study is the internal validity of the main variables due to the proxy-approach. The goal for research question 1 is to investigate the validity of the proxy-approach, which does provide good support for the solution. However, one should be aware of these limitations before reading the final conclusions.

4. Analyses

In this section, we will analyse the empirical data. We start off by reducing the sample, before describing both the primary and secondary data. Then, it's time for the main analysis of the three research questions, including assumption- and robustness-tests. We round off the chapter by pointing at potential weaknesses in the analysis, although potential problems will be commented continuously throughout the analyses.

4.1 Datapreparation – Sample Reduction

As raw data may yield unexpected and incorrect results, I will in this section go through the sample reduction process to ensure that we can utilize the database in harmony with hypothesis-testing assumptions and the theoretical context. The sample reduction starts off by reducing the number of observations in the dataset due to missing values or inconsistency. After a review of extreme values for monetary variables, which normally is defined as +/- 3 standard deviation (SD) (Garson, 2012), it's clear that the accounting data has some abnormalities (e.g. approx. 1,5 billion NOK negative total assets in our data, while a strong positive balance when comparing the observation to annual reports). These have been taken out during the sample reduction and will be described in section 4.2.3. Note that we will not follow such a static +/- 3 standard deviation rule, as we will take a more practical approach in congruence with our research goals. More descriptions follow under the reduction-table.

Table 4.1: Sample Reduction

Actions	Companies	Observations	Obs. Reduction
Baseline obs.	133	639	
Removing obs. w/ missing reports	133	614	25
Removing obs. w/missing key values	132	604	9
Removing outliers and abnormal ROA/ROE	128	551	53
Removing outliers from Phrase sum	127	546	5
Final Sample	127	546	92

*obs. = observations

The baseline sample consisted of 133 companies and 639 observations. We end up with 127 companies and 546 observations, which means that we have an average mean of 4,3 observations per company. In the sample reduction, I first removed the observations with

missing reports from the textual analysis, due to their lack of accounting comparability as described in the explanation of the primary data. Then, we remove observations which have missing key accounting variables (Net Profit for the year, Total Assets, Total Equities and Liabilities, and financial performance measures), before removing values which may be interpreted as mistyped or wrong values (e.g. negative total assets, or -358% ROA), or in statistical terms: outliers. In addition, as we wish to assess the differences between companies, we will remove all abnormal observations of ROA and ROE. Abnormal observations of the financial performance measures may be due to faults in the accounting data, or special company- or industry-specific conditions (e.g. biotech companies or newly listed/started companies, observations on their way to bankruptcy, etc.). Abnormal ROA and ROE is classified as higher than 30% or lower than -30%. We remove these to gain comparability between the observations in the sample. Finally, we remove some extreme values from the phrase sum variable, as such extreme values often have an unwanted effect on OLS-estimation (Saunders, Lewis, & Thornhill, 2016). Extreme values (or outliers) for phrase sum variable is defined as observations > 400. Note that 10 observations were missing the Total Equities and Liabilities variable, but these were reconstructed by summing up total equities and total liabilities and controlled with the left side of the balance.

4.2 Descriptive Analysis

In this part of the chapter I will present descriptive statistics for both our primary data, secondary data, and financial performance measures. We will also go through some of the sample reduction causes and identify the characteristics of the different variables.

4.2.1 Primary Data

First, we will look at primary data descriptives, which are the data gathered through textual analysis of annual/sustainability reports, which we use as a proxy for sustainability efforts. Under the table, we will delve into certain key characteristics of the variables.

Table 4.2: Primary Descriptive Statistics

Variable	N	Mean	SD	Skewness	Kurtosis	Min	Max	Binary
Sustainability_phrase_count	546	32	55	2.2	7.5	0	288	NO
CSR_phrase_count	546	10	17	5.4	44	0	172	NO
ESG_phrase_count	546	1.4	7	9	96	0	89	NO
SDG_phrase_count	546	3.4	8.9	5.2	42	0	99	NO
Phrase_sum	546	47	64	2	6.7	0	374	NO
Logphrase	528	3	1.4	-0.22	2.2	0	5.9	NO
SUS/ESG/CSR_page_count	546	12	19	2.7	14	0	171	NO
Logpage	528	1.6	1.4	.47	2	0	5.1	NO
SDGS_claimed	546	1.4	2.6	1.7	4.5	0	10	NO
MSoc_pillar	546	.059	.24	3.8	15	0	1	YES
MEnv_pillar	546	.079	.27	3.1	11	0	1	YES
MEcon_pillar	546	.11	.32	2.4	6.9	0	1	YES

* Statistics are for the “Final Sample”, after sample reduction.
* See Appendix 4 for definitions * SUS = Sustainability

The primary data have two variables which seeks to measure general sustainability effort. These are the Phrase_sum variable which is a sum of the four phrase counts above it in the table, and the SUS/ESG/CSR_page_count variable. As these two variables aim to measure the same underlying factor we might expect high collinearity, which gives high standard errors and consequently might breach statistical significance requirements in OLS (Richard, Devinney, Yip, & Johnson, 2009) if we put them in the same regression, which we set at the 5%-level ($p<0,05$). However, unless we identify perfect collinearity, a high value of collinearity does not violate OLS assumptions (Richard, Devinney, Yip, & Johnson, 2009). In the end, it is rather unlogical to use two independent variables which measures the same underlying factor, and I choose to produce two independent regressions using the two different variables (One main OLS, the other for robustness). We could have opted for combining the two variables by applying proportionate weights. However, as the table above shows us, the two variables have similar characteristics both in terms of a relatively low mean compared to the observation range, and proportionately similar standard deviation, skewness and kurtosis.

It is a problem that both the skewness and kurtosis of both the phrase sum and page count variables are a bit off if we want to assume normal distribution. Skewness is close to zero, and kurtosis close to three when the variables are normally distributed (Saunders, Lewis, & Thornhill, 2016). Consequently, I had to alter their form to satisfy linearity assumptions in the later presented OLS’s. The result of this alteration is the natural logarithm of the two, labelled *Logphrase* and *Logpage* in the table above.

To get a little more in-depth understanding of the main primary variables, let us take a look at the percentiles of the phrase sum and page count variables, and the frequencies in the binary pillar-variables, before they were distributed into main pillars, which they are In the table above.

Table 4.3: Primary Percentiles and Frequencies

Stats	Phrase_sum	Page_count
P1	0	0
P10	2	1
P25	6	2
P50	17	3
P75	65	16
P90	149	36
P99	270	76

Obs.	Soc_pillar	Env_pillar	Econ_pillar
=0	434	426	420
=1	112	120	126

* Page_count = SUS/ESG/CSR_page_count * See Appendix 4 for definitions

As we see, the skewness of the two continuous variables also shows itself here, as many of the observations are close to one or two. The right tails are also displaying themselves, as we see in the higher percentiles. As already stated, we can opt for a log-approach to these two independent variables (Richard, Devinney, Yip, & Johnson, 2009), and that is what we do.

The percentiles show an interesting fact; there are clusters of observations with few phrase and page counts, which helps ease the log-transformation, cause as you might have noticed, the logphrase and logpage variables from table 4.2 have 18 fewer observations than the rest of the variables. During the data collection, it became obvious that there are little to no difference between 0 and 1 or 2 phrase or page observations. This is likely a fact due to Norwegian law requiring reporting on “Samfunnsansvar”, or Corporate Social Responsibility. Therefore, it’s deemed as safe to use a log-transformation even though a log transformation removes the observations which are equal to 0, because of the undefined $\log(0)$. I assess the bias as being insignificant when leaving these observations out of the sample for the regressions.

The log phrase and log page variables will be our main independent variables, whereas log page will only be used in alternate regressions. They are characterised by acceptable levels of skewness and kurtosis, and very similar characteristics, which supports the claim that they measure the same underlying term.

For the binary pillar-variables (which registers if the observations has claimed an SDG related to the given pillar) we see that there are quite a few observations with SDG claims, which hopefully is sufficient to provide statistical significance for some kind of effect on profitability. Do note that the observations which claim one sustainability pillar, often claim another as well, a problem we handled in the variable generation of the main sustainability pillars.

4.2.2 Secondary data

To start off the secondary data descriptives, let's look at a descriptive table, putting emphasis on missing values, observations, and whether the variable offer panel data or not.

Table 4.4: Secondary Descriptive Statistics

Variable	N	Missing	Mean	SD	Skewness	Kurtosis	Min	Max
RSAM tot. rank	34	512	31	23	.85	2.7	0	81
RSAM soc. rank	34	512	35	24	1	3.3	5	100
RSAM econ rank	34	512	29	20	1.1	3.9	0	85
RSAM environ rank	34	512	35	22	.45	2.5	4	86
CDDP prf. S	30	516	5.4	1.6	-.25	2.6	2	8
ESG Disclosure S	262	284	31	13	.43	2.6	7.4	64
ISS quality S	93	453	5.3	2.7	.18	2.2	1	10
Sustainalytics rank	59	487	70	26	-.87	2.8	2.1	100
ESG Score	45	501	51	21	-.09	2.3	9	91
Environ. pillar S	45	501	47	25	-.19	2.3	0	95
Social pillar S	45	501	54	24	-.25	2.1	8	95
Governance pillar S	45	501	49	23	.17	2.1	13	95
CSR strategy S	45	501	50	31	-.13	1.8	0	97
Emission S	45	501	56	28	-.46	2.3	0	98
Innovation S	45	501	29	32	.79	2.5	0	97
Resource use S	45	501	48	28	-.41	2	0	97

*RSAM = RobecoSAM
* S = Score
* prf. = Performance
* See Appendix 4 for definitions

As we see from Table 3, we have few observations in the secondary data. As far as research 2 goes, only the ESG Disclosure Score variable seems to be the only one which can be tested with OLS in our sample. Remember, the reason that I wish for a large sample is that the expected effect between sustainability efforts and profitability is marginal, as there are several other factors which has effects on sustainability, like e.g. market conditions. However, this

insight highlights the main challenge of business sustainability research in a Norwegian context: data is hard to come by. In addition, only 4 of the variables provides panel-data, and the observation count in these variables are also far from satisfying. The ESG Disclosure Score variable being the only on with a three-digit observation count.

To sum up the secondary data, they will mainly be used for validity-purposes and the answering of Q1, through correlations with our primary variables. We will not delve deeper into them, but refer to Appendix 4 for definitions and interpretation of the table above.

4.2.3 Accounting Data

The original accounting data had some extreme values. We have defined them as values of +/- 3 SD (Garson, 2012). Examples are Average ROA's of -358% or 162%. These values may have unfortunate effects on OLS-approaches, and other estimations (Gripsrud, Olsson, & Silkoset, 2016), as it may violate the assumption of linearity in OLS (Saunders, Lewis, & Thornhill, 2016). It is recommended to exclude such values if the dataset is of a greater size (Saunders, Lewis, & Thornhill, 2016). However, it is also possible to estimate the models with and without the extreme values (Hill, Griffiths, & Lim, 2017). Here lies a problem in our case, as we might run low on companies present in our panel data if we mindlessly reduce the sample, and do remember that our approach rests upon a large sample relative to the population. If we sum up these outliers for the main financial performance measure (ROA), we must remove 14 observations, resulting in a total of 580 observations. In addition, as we aim to measure profitability on a general basis for companies which are in a steady-state, or normal development, it would be unwise to include observations of companies which either are on their way to bankruptcy, or have industry-specific special profitability, as stated in the sample reduction-section. If we sum up the abnormal ROA's and ROE's we exclude an additional 29 observations, and due to the relatively low amount of observation removals, I chose to exclude these extreme values. In addition, observations missing key accounting variables, such as the balance, are also dropped during the sample reduction which were presented in chapter 3. Following is a table of descriptive table for the profitability measures, to get an insight into our dependent variables for the OLS.

Table 4.5: ROA – ROE – Descriptive Statistics

Variable	N	Missing	Mean	SD	Skewness	Kurtosis	Min	Max
ROA	546	0	4.6	9.3	-.55	4.3	-29	30
ROE	546	0	1.7	10	-.54	3.6	-30	27

* See chapter 3.4 for definitions

As you can see from the table above, the two measures display quite similar characteristics. Not very surprisingly, ROA has a higher mean and kurtosis, as it is a measure before assigning profits to the creditors. These measures are also acceptable in terms of skewness and kurtosis, although it looks like they are fairly to moderately skewed, but within acceptable range of kurtosis, though a bit excess.

4.3 Main Analysis

4.3.1 Proxy-validation (Q1)

As we have stated earlier, research question 1 aims to validate our proxy-solution to sustainability efforts. To do this, we will look at the correlations between secondary-data variables which measures sustainability efforts and sustainability, ESG or CSR communication, and our primary variables which also measures such communication through the reports analysed as described in chapter 3. If the correlations are significant, it will give credibility to our proxy-solution as a way of measuring sustainability efforts. Correlations are often used to investigate if several variables measures the same underlying term (Saunders, Lewis, & Thornhill, 2016), therefore it's fitting for our purpose as well. However, keep in mind the obvious fact that communication and efforts are not the same, therefore we will test if our two main primary variables (Phrase sum and Page count) which actually are measures of sustainability, ESG and CSR communications correlate with sustainability efforts.

To investigate the correlations between various measures on sustainability efforts from the secondary data, and our mentioned measures from the primary data, we will use Pearson's Product Moment Correlation Coefficient (PMCC), as it assesses the strength of relationship between two variables on numerical scales (Saunders, Lewis, & Thornhill, 2016). Pearson's r, as it is often is referred to as, quantifies the strength of correlation between the variables assessed, ranging from -1 to +1, and also tests how probable it is that the correlation happened by chance alone (significance) (Saunders, Lewis, & Thornhill, 2016). We will analyse the

correlations between our phrase sum variable, the page count variable, and a number of the secondary variables collected through Eikon and Bloomberg by formulating a null hypothesis and test it on the 5%-level. Remember the alternative hypothesis derived from research question 1:

Q1 Hypothesis	
$H1_0$: Sustainability efforts does not correlate with sustainability, ESG or CSR communication.	$H1_0: \rho = 0$
$H1_A$: Sustainability efforts correlates with sustainability, ESG or CSR communication.	$H1_A: \rho \neq 0$

Table 4.5: Q1 Hypothesis

Let's test the null hypothesis:

Table 4.6: Pearson's R (Phrase sum)

Variable		Phrase sum
Phrase sum	Pearsons corr.	1
	Sig.	
	Obs.	551
RobecoSAM Total Sustainability Rank	Pearsons corr.	0.3875**
	Sig.	0.0214
	Obs.	35
RobecoSAM Social Dimension Rank	Pearsons corr.	0.2781
	Sig.	0.1057
	Obs.	35
RobecoSAM Economic Dimension Rank	Pearsons corr.	0.1996
	Sig.	0.2502
	Obs.	35
RobecoSAM Environmental Dimension Rank	Pearsons corr.	0.3437**
	Sig.	0.0432
	Obs.	35
ESG Disclosure Score	Pearsons corr.	0.5184***
	Sig.	0.0000
	Obs.	267
Sustainalytics Rank	Pearsons corr.	0.1746
	Sig.	0.1860
	Obs.	59
ESG Score	Pearsons corr.	0.5116***
	Sig.	0.0003
	Obs.	46

Environmental Pillar Score	Pearsons corr.	0.5009***
	Sig.	0.0004
	Obs.	46
Social Pillar Score	Pearsons corr.	0.5403***
	Sig.	0.0001
	Obs.	46
Governance Pillar Score	Pearsons corr.	0.2684*
	Sig.	0.0713
	Obs.	46
CSR Strategy Score	Pearsons corr.	0.4969***
	Sig.	0.0004
	Obs.	46
Emissions Score	Pearsons corr.	0.4822***
	Sig.	0.0007
	Obs.	46
Innovation Score	Pearsons corr.	0.3526**
	Sig.	0.0162
	Obs.	46
Resource Use Score	Pearsons corr.	0.3176**
	Sig.	0.0315
	Obs.	46

*/**/*** = Significant on 10%/5%/1%-level (Selected output of pairwise correlation)

Note that the observation numbers for most of the variables are low in the table above, which emphasizes the limited availability of sustainability measures for Norwegian companies. From this nearly endless list of correlations, we may sum it up by concluding that the only correlation which has over 59 observations (ESG Disclosure Score) is extremely significant, down to the 1%-level, and the correlation can be assessed as moderate to strongly positively correlated (Saunders, Lewis, & Thornhill, 2016). In addition, 10 of the variables have a significant (5%-level), mainly moderate or moderate-to-strong positive correlation with our phrase sum measure.

Based on these correlations, we can claim that the phrase sum variable measures what it intends to measure: sustainability efforts. If we investigate the variables, it also becomes clear that the variables which correlates with the phrase sum variable, are predominantly characterized as being measures of sustainability efforts (see Appendix 4). The only variable that's not correlated and quite alarming at first sight, is the Sustainalytics-rank. However, this ranking-based measure is an industry-specific relative rank, which splits the ranking into industries, which we do not. The lack of correlation and significance in this specific variable is therefore of lesser value. To sum up, we may reject the null hypothesis for 10 of the correlations, while the other correlations can be ignored due to the theoretical background of

the measures that are not significant, as they are looser related to sustainability efforts in themselves. A brief explanation is that all of the variables whom do not have significant correlation with phrase sum, are different dimensions of sustainability efforts, and not sustainability efforts on its own (e.g. RobecoSAM Social Dimension Rank, or the Governance Pillar).

We may also attempt to validate our proxy solution by assessing the correlation between the CDP Integrated Performance Score or the ISS Quality Score, and our main independent variables. However, these are on a ranked 1 to 8, and 1 to 10-scale, which means we will have to apply Spearman's rank correlation coefficient (Spearman's rho). Spearman's rho is used when we assume that the sample is collected at random, and that the data are on a ranked/ordinal scale (Saunders, Lewis, & Thornhill, 2016). It's interpreted and tested in the same way that Pearson's r is. So, the null and alternative hypothesis remain the same, and the results is presented in the following table.

Table 4.7: Spearman's ρ (Phrase sum)

	Variable		1	2	3
1	Phrase sum	Pearsons corr.	1		
		Sig.			
		Obs.	551		
2	CDP Performance Score	Pearsons corr.	0.3726**	1	
		Sig.	0.0426		
		Obs.	30	30	
3	ISS Quality Score	Pearsons corr.	-0.0477	0.1106	1
		Sig.	0.6498	0.6621	
		Obs.	93	18	93

*/**/*** = Significant on 10%/5%/1%-level

We can barely reject the null hypothesis for the CDP Performance Score, which measures a company's self-reported commitment to climate change mitigation, adaption, and transparency (see Appendix 4 for definition). The correlation is also positive, which one could expect, and it provides support to our alternative hypothesis. However, with the low observation count and close proximity to our 5%-level of confidence, this variable proves more doubtful than the preceding ones.

The ISS Quality Score has an expected negative correlation, as the score is inverted so that one is best, and 10 is worst. However, it is not significant, and we may not reject the null

hypothesis for this measure. The ISS Quality Score is of lesser importance for the answer of Q1, as we overall find moderate or moderate-to-strong and mainly significant correlations between our phrase sum variable and the more established measurements of sustainability efforts, reporting and/or performance.

To summarize the analysis of research question one (Q1), I find acceptable support for the alternative hypothesis, and reject the null hypothesis. To conclude, *sustainability efforts correlate with sustainability, ESG and CSR communication* in the way that we have measured it through annual and sustainability reports.

I also conducted an equal correlation test (and Spearman's rho) for the alternative measure of sustainability efforts from the primary data (page count), which you can find in Appendix 4. These showed similar results, and further strengthens the page count variable's use as a robustness measure for the phrase sum variable. I also conducted a correlation test between the phrase sum variable and the page count variable, which rejected the null hypothesis, and showed a strong correlation between the variables.

4.3.2 Main Regression (Q2)

Q2 asks the question if sustainability efforts have an effect on profitability. Our answer to the question will be tested on the derived null hypothesis of H2. We also seek to answer the null hypotheses of H2a, H2b and H2c in this regression, which will give us valuable insight towards Q3.

Q2 Hypothesis
$H1_0$: Sustainability efforts has not an effect on profitability
$H1_A$: Sustainability efforts have an effect on profitability.
$H2a_A$: Social sustainability efforts have an effect on profitability
$H2b_A$: Environmental sustainability efforts have an effect on profitability
$H2c_A$: Economic sustainability efforts have an effect on profitability

The Main Regression:

$$ROA_{ij} = \beta_0 + \beta_1 * \log(phrase\ sum)_{it} + \beta_2 * Main\ social\ pillar_{it} + \beta_3 * Main\ envrionmental\ pillar_{it} + \beta_4 * Main\ economic\ pillar_{it} + \epsilon_{it}$$

Our main regression aims to explain profitability in the dependent variable of ROA, with the variation in the independent variables of the phrase sum and main sustainability pillars. We examine panel data as stated in the method-chapter, with 128 companies and 546 observations spanning over the calendar years of 2015-2019. The first independent variable (log(phrase sum)) represents sustainability efforts for company i, in year t. The three following independent variables are the main sustainability pillar variables, which we generated in chapter 3. The main sustainability pillar variables are dummies which aim to capture the variance between the observations which have explicitly claimed specific SDGs and those who haven't. The reference-category for the dummies are companies which have not claimed any SDGs (or sustainability pillars as we have defined them). The epsilon at the end is the error term.

If we find coefficients with a significant p-value (>5%), we may conclude that the independent variables have an effect on the profitability of the companies (though we lack causality). If the phrase sum variable proves significant, we will interpret it in the way that sustainability efforts have an effect on profitability. If any of the binary sustainability pillars have a satisfying p-level(>5%) and positive coefficient, we will interpret it as if the companies' that prioritize the specific sustainability pillar, will be more profitable than if it does not prioritize any sustainability pillars. If it has a negative coefficient, we will interpret it as less profitable to prioritize the given sustainability pillar compared to not prioritizing any pillar (ref. to the trade-offs discussed in the literature review). These binary variables simply represents a shift in the linear regression-curve, and mathematically changes the constant in the regression by the variables coefficient. To investigate the difference *between* the pillars, we must analyse further by ANOVA, which is a matter for research question 3.

The main regression shows the following results:

Table 4.8: Main OLS Results

Linear regression

Number of obs	= 528
F(4, 125)	= 5.13
Prob > F	= 0.0007
R-squared	= 0.0744
Root MSE	= 8.742

(Std. Err. adjusted for 126 clusters in companyid)

ROA_AVERAGE	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
logphrase	1.704718	.4475512	3.81	0.000	.8189588	2.590478
Msoc_pillar	.3781196	1.796937	0.21	0.834	-3.178242	3.934481
Menv_pillar	.515115	1.619221	0.32	0.751	-2.689523	3.719753
Mecon_pillar	-.2595106	1.309411	-0.20	0.843	-2.850998	2.331976
_cons	-.2565363	1.562394	-0.16	0.870	-3.348707	2.835634

Note: For the main regression I have applied clustered robust standard errors for each company to account for heterogeneity and autocorrelation. I have also used the natural logarithm of the phrase sum variable to account for non-linear characteristics in the variable.

As we see from the main regression above, our main independent variable has an effect on ROA, and is significant on the 1%-level. However, the main sustainability pillars are far from significant. Based on these results, we may reject the null hypothesis for H2, while we must keep it for H2a, H2b, and H2c. The intuitive interpretation of the model is that by each increase of the logphrase variable by one percent, we may expect ROA to increase by $\frac{1.7}{100} = 0{,}017$. Since ROA already is a relative measure, this means that our model estimates the relationship in a way that an increase in sustainability efforts of 1 %, increases ROA by 0,017 percent. But predictions are not the takeaway from this analysis. As we use a natural logarithm as the main independent variable it becomes obvious that ROA is a decreasing function of sustainability efforts, as with most investments in businesses. The marginal profit of capital invested in sustainability efforts will probably have decreasing returns the more you invest. Interestingly enough, our phrase sum variables were a decreasing function, with concave characteristics.

Obviously, there will be other factors or variables which have an effect on profitability, such as marketing, management practices, or capital intensity, just to mention a few. In other words, omitted variable bias might be a problem for us. However, the R^2 is relatively low, and the adjusted R^2 (adjusted for multiple explanatory variables) shows us that our independent variables only explain $\approx 6{,}7\%$ of the variation in the independent variable. This low R-

squared is due to the fact that we do not have any control variables. The lack of control variables is a problem for our analyses, as several factors determine profitability, not just sustainability, as stated above. However, the lack of control variables is due to limitations in the dataset and is indeed a weakness in this thesis. In sum we can say that our OLS-estimates shows a positive relationship between sustainability efforts in the way we have measured it, and ROA.

We may also note that by altering the functional form of the main independent variable to the natural logarithm of the phrase sum, we exclude some observations from the sample. As $\log 0$ is undefined, we exclude 18 observations and 1 company compared to the final sample. I chose to transform this variable, as the variable in its original form broke with the linearity assumption of OLS. By transforming it, the linearity assumption holds, and a fewer less observations is a price worth to pay, as violation of the linearity assumption would be fundamentally destructive for the OLS precision and efficiency (Hill, Griffiths, & Lim, 2017). It's also important to notice that the observations excluded are from a variety of years and companies, and that Norwegian law requires companies to provide disclosures around "samfunnsansvar", or social responsibility (Norwegian Department of Finance, 1998), which leads these observations to be likely randomly observed to zero because of the lack of specific terms in the reports, rather than any difference in substance compared to observations with a value of 1 or 2. The point is that during the data collection it became obvious that there is little to no difference between observations which score 1, 2 or 3 on the phrase sum variable, and those who score 0. Hence, I feel confident leaving these observations out of the equation, regarding the omitted observations potential effect on the results. Discussions of the results will follow in the next chapter.

4.3.3 OLS Assumption Tests

As stated in the third chapter, OLS rests on a set of assumptions, which must be satisfied to be certain of unbiased and efficient results. We will go through these assumptions, test the ones we need to test, and see if there is reason to suspect bias in our estimations.

A1 - Linearity

We test for linearity by investigating an ACPR plot (Augmented component-plus-residual-plot), which gives us a plot with the regression-curve and a curve which adjusts to nearby

values (Midtbø, 2012). You can see the plot for the main independent value in the following illustration.

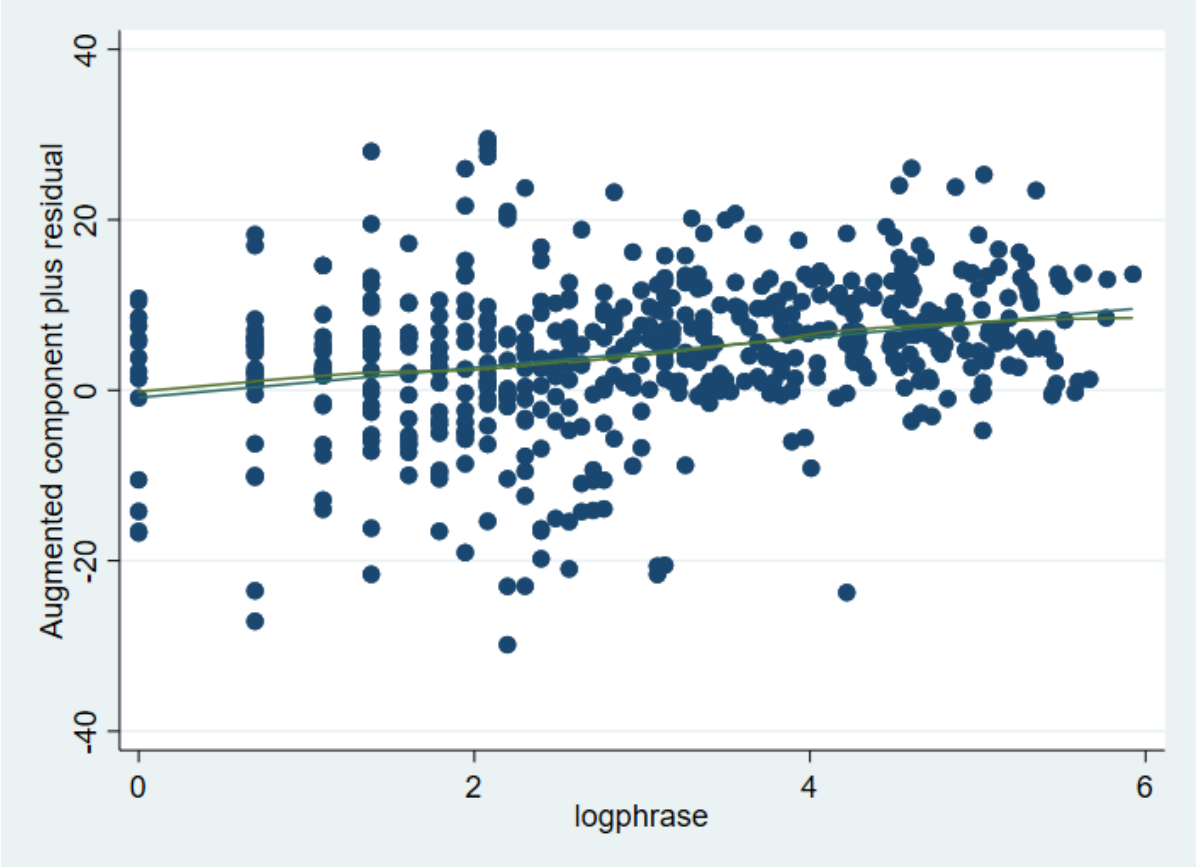

Illustration 4.1: acprplot for logphrase in main regression.

As we see, the linearity assumption holds, as the predicted curve and fitted curve nearly are identical. If we had used the raw phrase sum variable (without log-transformation), we would violate this assumption, and we would get a specification error. This linearity assumption is also part of the explanation for the tedious sample reduction. Believe me when I say that it was not easy to drop nearly a hundred variables with collected primary data, as it represents many hours of work.

A2 - Homoscedasticity

The homoscedasticity assumption is the assumption that the dependent and independent variables have equal variances (Hill, Griffiths, & Lim, 2017). Or more intuitively, we must investigate if the variance in the error term depends on the explanatory variables. Heteroscedasticity, which we don't want, affects t-values, F-values and confidence intervals (Midtbø, 2012). We can usually test for heteroscedasticity by using the popular Breusch-Pagan test (BP), which uses the squared residuals as a dependent variable (Midtbø, 2012). Because I

could not rule out heteroscedasticity through the BP-test (or white-test) when estimating the OLS model with the original phrase sum variable, I apply robust standard errors into the model. As lectured in the master class of econometrics at NHH (BUS444), and in the literature (Midtbø, 2012), applying robust standard errors solves the problem of heteroskedasticity. In addition, we have already adjusted for heteroskedasticity by applying relative profitability measures (ROA and ROE) instead of absolute measures which would give heteroscedasticity due to size-differences. As already stated, the log-transformation of the main dependent variable also adjusts for heteroscedasticity by making the variable relative. Since we have clusters in our data due to its nature as panel data, I also apply clusters for companies to control for this type of heteroskedasticity as well. The following plot displays the residuals on the y-axis, and the predicted values of logphrase on the x-axis. If there is no obvious pattern or tendency in the plot, we can assume homoskedasticity.

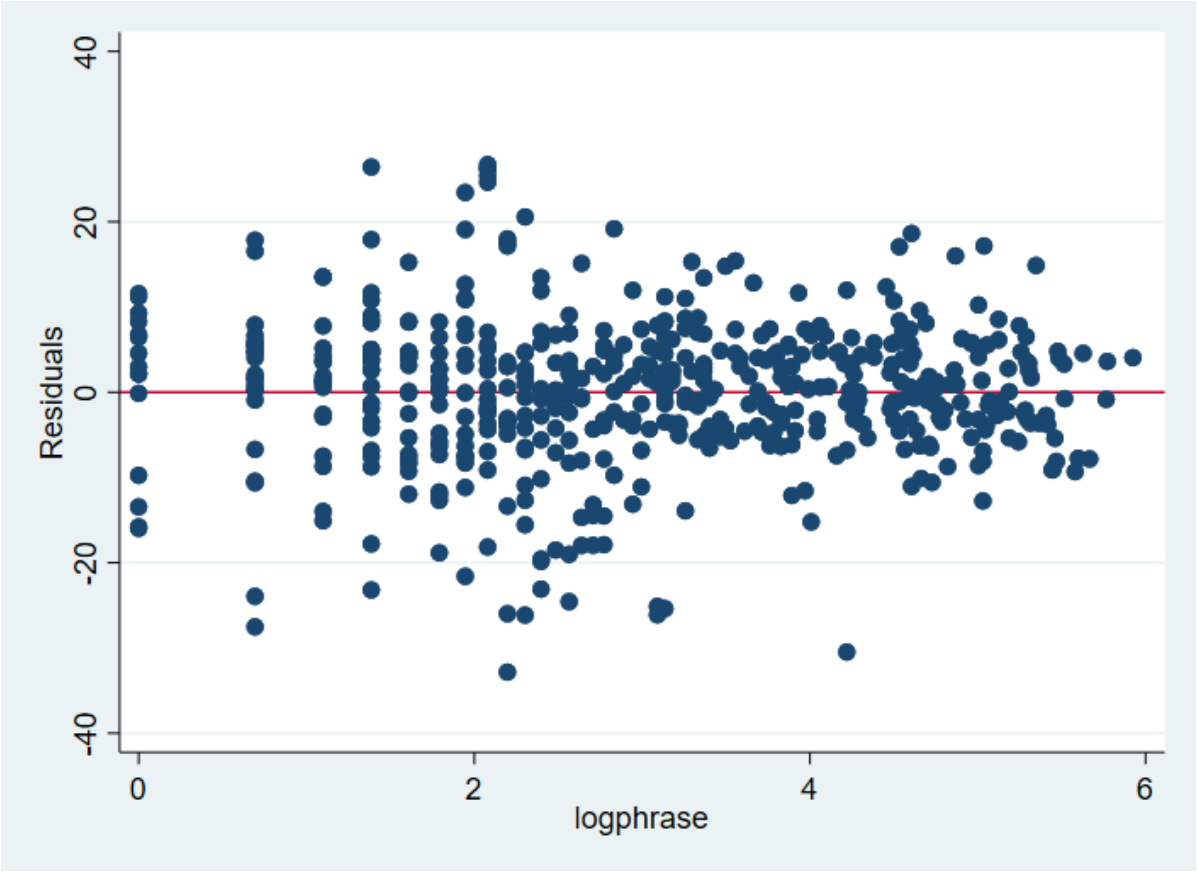

Illustration 4.2: rvpplot for heteroscedasticity

We can assume homoskedasticity, based on the plot and the fact that we use clustered robust standard errors.

A3 - Multicollinearity

Multicollinearity refers to the situation where several of the independent variables correlate with one another, which may affect the coefficients in the OLS (Hill, Griffiths, & Lim, 2017). As we only have one continuous variable, we should not be too concerned about multicollinearity. In addition, Stata excludes perfect collinear variables when detected. The simplest way to investigate multicollinearity is by using correlation coefficients, where extreme values of correlation gives multicollinearity problems (Saunders, Lewis, & Thornhill, 2016).

In addition, we can detect multicollinearity by applying a VIF-test, the results follow below.

Table 4.9: VIF-test

Variable	VIF	1/VIF
logphrase	1.81	0.552353
Mecon_pillar	1.38	0.724594
Menv_pillar	1.34	0.746012
Msoc_pillar	1.21	0.829014
Sumeiendeler	1.17	0.852553
Mean VIF	1.38	

VIF stands for Variance Inflation Factor, and multicollinearity problems tend to occur at a low tolerance value (<0.10) or a large VIF-value (>10) (Saunders, Lewis, & Thornhill, 2016). We see that we have no problems with multicollinearity in our regression.

A4 - Normal distribution in the error term

This assumption about the error term states that the residuals in the regression is normally distributed. This assumption is related to the probability for under- or over-estimation, and the probabilities should be fairly equal. However, robust standard errors can be used when this assumption is violated (Hill, Griffiths, & Lim, 2017), as we have. We should not be too worried about normal distribution in the error ter . It’s easy to investigate by displaying a normal probability plot.

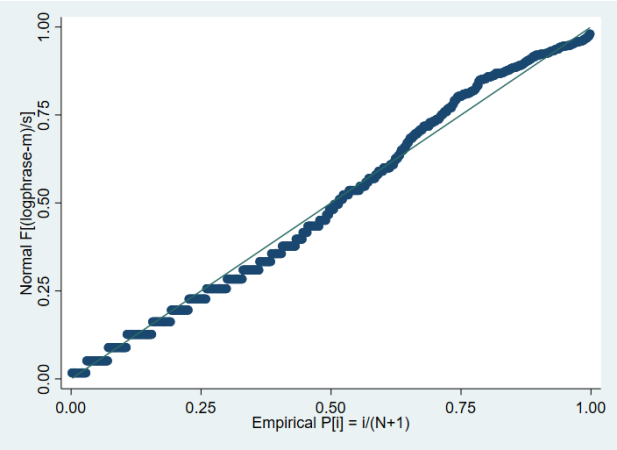

Illustration 4.3: Normal probability plot.

As we see from the plot above, the error term in our main independent variable seems normally distributed.

A5 - Population Mean of Zero in the Error Term

This assumption holds if we include a constant in the regression (Frost, 2019), which we do.

A6 – No Autocorrelation

The sixth assumption is one that nearly guaranteed will be violated in panel data with several observations related to one company. Serial correlation (or autocorrelation) refers to the level of relationship between an observation value and its observation at the previous time period (Saunders, Lewis, & Thornhill, 2016). However, by applying clusters and robust standard errors in panel-data makes the standard errors robust to both autocorrelation and heteroskedasticity. Hence, we have taken into account autocorrelation by clustering the data in the regression on the company's ID numbers.

A7 - Exogeneity

The exogeneity assumption is a hard one to not violate for our regression. Exogeneity is a state where the error term is uncorrelated with all the independent variables. If they are indeed correlated, we have endogeneity (Hill, Griffiths, & Lim, 2017), which may occur due to unclear causal direction between the dependant and independent variables, measurement error in the independents or omitted variable bias, which we have already stated as a potential problem. However, these cases are quite normal in OLS, and if we have strictly exogeneous variables, OLS is still the best linear unbiased estimator. This is the baseline regression assumption (Hill, Griffiths, & Lim, 2017). Instrumental Variable techniques are often the

solution to opt for in these cases, but for our sake, we will stick to the OLS-approach. However, we may not conclude on any causal effect following this regression.

Main Regression Summary

We have used the OLS-approach, satisfied the assumptions in an acceptable way, and our results rejects the null hypothesis for H2. In other words, sustainability efforts in the way we have measured it, has an effect on ROA. However, this effect is small with a low R-squared, we may have omitted variable bias, and the causal direction is unclear. For the three alternate hypotheses H2a, H2b, and H2c we must keep the null hypotheses, as we find no significant effect on ROA. Nonetheless, we will try to see if we find significant differences between the three sustainability pillars in the next section of the analysis. All in all, the OLS findings are interesting, and supports earlier studies into sustainability in a Norwegian context. But let's keep the discussions for the discussion-chapter.

In the Robustness-section later in this chapter, we will seek to robustness-test this analysis using alternate regressions with alternate variables. You can find these robustness-tests in a thorough but compact form in Appendix 2.

4.3.4 One-way-ANOVA (Q3)

Unfortunately, we did not find significant effects between our main sustainability pillars and profitability through either ROA or ROE (see above, and Appendix 2). If we had done so, Q3 would perhaps be easier to answer. Therefore, we may not determine effects between sustainability efforts measured with the main sustainability pillars, and profitability. What we can do, is to assess the difference between the three groups of sustainability that we found in the theoretical chapter. To be clear, we seek to determine differences, not effects. An efficient way of determining differences between groups is by assessing the groups' variances in one-way-ANOVA. However, as stated in the Method-chapter, one-way-ANOVA does not apply to panel data as it violates the assumption of independent values. But we may be able to apply ANOVA to a small part of our sample, to get an indication of differences between the three groups of sustainability pillars. But first, let's remind ourselves of what Q3 aims to investigate.

Q3 asks: *Are there differences in profitability between companies which prioritize different sustainability efforts?*

Q3 gives the alternate hypothesis:

Q3 Hypothesis
$H1_0$: There are no differences in profitability between the three sustainability pillars.
$H3_A$: There are differences in profitability between the three main sustainability pillars.

So, if we analyse the differences between the different groups of sustainability, we may be better equipped to answer Q3. Let's use ANOVA by creating two separate tests, one for observations in 2018 and one for 2019. To use ANOVA however, we must also satisfy assumptions for normality, variance and outliers. In addition, ANOVA requires the dependent variable to be continuous, the independent to be categorical and of course independency between the measured companies (Saunders, Lewis, & Thornhill, 2016). These first three assumptions are tested and presented briefly under the analysis. The latter three are satisfied. For the full assumption-tests, see appendix 3.

Table 4.10: one-way ANOVA (2019)

PillarGroups	Summary of ROA_AVERAGE		
	Mean	Std. Dev.	Freq.
1	4.831918	9.7606304	12
2	6.906292	10.180653	22
3	6.4631579	5.6001094	30
Total	6.3096278	8.1345305	64

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	34.7428379	2	17.371419	0.26	0.7747
Within groups	4134.00414	61	67.7705597		
Total	4168.74698	63	66.170587		

I have made a categorical variable for the main sustainability pillars (PillarGroups), where 1 = the social pillar, 2 = the environmental pillar, and 3 = the economic pillar. I have also reduced the sample by removing any observation which does not claim a main sustainability pillar as we aim to study the difference between sustainability efforts. In addition, the observations are obviously restricted to the years of 2019 and 2018 respectively. We can see from the 2019-ANOVA that we are from any reasonable significance-level. By performing a Levene's test

for homogeneity of variances, the assumption of homogeneity is met. The assumption of normality in the dependent variable within each category can be tested using a Shapiro-Wilk test of normality. The assumption of normality holds for two of the three categories, and is barely violated (p=0,04449) for the environmental pillar. However, as approximately normal distribution is required (Saunders, Lewis, & Thornhill, 2016), I deem the assumption as satisfied. Lastly, there should be no significant outliers, which we already have made sure of in the sample reduction.

Table 4.11: one-way ANOVA (2018)

PillarGroups	Summary of ROA_AVERAGE Mean	Std. Dev.	Freq.
1	10.328117	5.5173566	11
2	9.4827051	6.8505233	13
3	5.9736061	5.6111559	12
Total	8.5713256	6.186689	36

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	125.725189	2	62.8625945	1.71	0.1967
Within groups	1213.90404	33	36.7849709		
Total	1339.62923	35	38.2751208		

The one-way ANOVA for the year 2018 seems more promising, but alas no significance is found here either. Based on significance standards we must attribute these results to randomness (Saunders, Lewis, & Thornhill, 2016). But a conclusion that involves keeping the null hypothesis is a conclusion as well! The results are quite interesting, as we will point out in the discussion-chapter. To validate the result, we use the same tests as we did in the first ANOVA-tests and find similar results. Leneve's test has a high p-value, while the Shapiro-Wilks test reveals problems with normality for the social pillar group. However, the result is similar as in the first ANOVA and deemed acceptable.

To sum up the ANOVA-tests and give an answer to Q3: We find no difference between the three groups of sustainability pillars. The second ANOVA seems promising, with high differences in the means for the social and environmental pillar compared to the economic pillar, and similar standard deviations. However, the results are not statistically significant,

and we must keep the null hypothesis which states that there is no difference between the three groups. In the ANOVA for 2019 there is a large difference of over 1,5 times the observation count between the groups, which may give problems as stated in chapter 3. Another weakness in the ANOVA-analyses is the observation count. With groups containing as low as 12 or 10 observations, statistical significance can be hard to determine when we are studying such a marginal effect as sustainability is expected to be on profitability. However, this discussion is a matter for the next chapter.

4.3.5 Robustness Tests (Alternate OLS's)

In this section, we will briefly look at alternate regressions to investigate the robustness of our statistical analysis. If the results here differ from the results in the main regression, then the robustness of our measures will be undermined, and the internal validity of our results will be lower. If we find that the results between the main regressions and these robustness-testing OLS's are consistent, our internal validity will be stronger, as the practical choices made throughout the analyses does not affect the results. In other words, this section is a validity-test. Q1 is thoroughly tested and validated earlier in the analysis, which is also the case for Q3. Consequently, our focus here will be on Q2, and mainly its main hypothesis H2. We will start off by presenting the alternate regressions.

Table 4.12: Alternate OLS's

OLS identifier ->	MAIN	A1	A2	A3	A4	A5
Dependent Variable ->	ROA	ROE	ROA	ROE	ROA	ROA
log(phrase sum)	1.704***	1.772***				1.711***
log(page count)			2.186***	2.141***		
ESG Disclosure Score					0.146**	
Social pillar	0.378	0.286	-0.235	-0.153	2.138	
Environmental pillar	0.515	1.046	-0.104	0.697	1.574	
Economic pillar	-0.259	0.844	-0.657	0.689	1.269	
General pillar						0.121
Observations	528	528	526	526	260	528
Companies	126	126	126	126	57	126
R-squared	0.0744	0.0761	0.0976	0.0905	0.0756	0.0740

The table shows coefficients. Blank coefficients are for variables not included in the given regression. Constants not reported.
***p<0,01 **p<0,05 *p<0,1 * See Appendix 2 for the full OLS's
*A=Alternate OLS * See Appendix 4 for definitions

As we can see, there are 5 alternate regressions (A1-5), which uses varying dependent and independent variables. The first OLS is our main regression, described earlier in this chapter. The five consecutive ones can be found in Appendix 2. At first glance, we can see that our results are not sensitive to changing the dependant variable. Whether we use ROA or ROE does not affect the results. However, the coefficient for the sustainability efforts effect changes by approx. 0.4 when we use our alternate main independent variable. This inconsistency or sensitivity may be due to the fact that the page count in reports will vary depending on font sizes, pictures and illustrations or other graphical differences. As you probably know, annual reports vary greatly in design which is also the case for sustainability reports. Therefore, we can assume that the phrase count variable is a better measure for the level of sustainability communication in the reports, and ultimately the sustainability efforts themselves. However, we are not too interested in the coefficients, but rather the significance-levels. As we see, the P-value remain significant on the 5%-level for all alternate regressions. And 4 out of 5 remain

significant on the 1%-level. The high significance is only the matter for the part of the equation which predicts the relationship between sustainability efforts and profitability, not the dummies.

The dummy variables for sustainability pillars remain far from significant for all alternate regressions, which supports our findings in the main regression. Not even if we gather all the sustainability pillars into one dummy (A5), the dummy is significant. Even though the general pillar dummy is more significant than the others, it's far from any kind of confidence level we would be satisfied with. As a result, keeping the null hypothesis for H2a, b and c, must be regarded as a robust result.

To summarize the robustness-tests, they support the initial conclusions of rejecting $H2_0$. They also support that we may not reject the three other nulls. I regard this robustness test as a vital part of the validity, and reliability of the study, and it gives confidence to the analysis results for the second research question and in consequence the discussion in the next chapter.

4.4 Weaknesses in the Analysis

As emphasized greatly in the literature review, the three sustainability pillars are highly interrelated. A clear weakness in the analysis is how categorical we approach the classification of the companies into these pillars. There are several cases where the main sustainability pillar observations are distributed nearly at random (described in section 3.4.3). As stated in the preface, the categorical approach of human minds may not fit all research. We do not find any significant effects between the operationalized sustainability pillars (main pillar dummy variables) and financial performance. However, this might be due to the categorical approach, and lack of in-depth data. Further discussion on this weakness are reserved for the discussion-chapter.

The proxy-solution to sustainability efforts are also a weakness of sorts. By measuring a variable which is theoretically approached as a substitute for actual projects, investments and efforts toward sustainability goals, we may be measuring simply how well a company communicates such efforts to stakeholders. At least we may discuss and give support to the importance of stakeholder communication regarding sustainability efforts, but it is important to recognise that the results rest on the assumption that we are measuring what we aim to measure in the primary data. Yes, the measures are validated through correlations with existing

measures of sustainability, but is it enough? The question is hard to answer, the most important thing is to recognise and consider the ambiguity when we discuss the results.

5. Discussion

5.1 Research Questions, Have We Grown Any Wiser?

Now, it's finally time to discuss the results in light of the theoretical fundament presented in chapter 2. Our research goals were to investigate textual analysis of reports as a measure for sustainability efforts, investigate the link between sustainability efforts and financial performance, and study differences between general categories of sustainability efforts. Let's handle the proxy-approach first.

Note that the discussion in this chapter rests and relies on the definitions and review in chapter 2. To focus the discussion, there will not be many explanations of concepts, indexes or theories here. You should go back to the literature review if anything seems unclear.

5.1.1 The Proxy-approach, a Good Measure?

Sustainability indexes have complicated and in-depth scores, ranks and indicators for a term which itself is complicated. Sustainability relates and is in this thesis defined to withhold CSR, ESG, sustainable development and so much more. The term is thrown out wide and low these days, through popular media, commercials, government policies and strategic plans which aims to make the world a better place for current and future generations. But what type of efforts and roles does firms actually play?

Well, they alter production processes, material use, workforce conditions, environmental impact, charity funding, local community boosting and so much more (see Jørgensen & Pedersen, 2018). Sustainability efforts is therefore wide and broad, and hard to capture in one defined category. These facts make the sustainability efforts hard to measure precisely, and my approach was one that prioritized comparability and size across sectors and industries. You may call it quite a simplistic approach, utilizing easily obtainable data which to some degree is standardized thanks to national and international regulations, and reporting standards such as the GRI. The approach is quite the opposite of the leading sustainability indexes which aims to segregate and customise scores based on industry-affiliations, company-specific risks and local structures (see e.g. Refinitiv, 2020).

The strength of a simplistic approach combined with a great sample size, is that it enables the assumptions which derives from the central limit theorem. As we have seen throughout the

other chapters, availability of good data from well-renowned indexes and scores are rather scarce in a Norwegian context. However, they do give indications of comparability with such a simplistic approach as the one my primary data represents. Comparing the two "schools" of thought, we find significant moderate to strong correlations between our primary independent variable, and 10 of 14 sustainability indexes/scores. The results suggest that the simplistic approach is an adequate measure of general sustainability efforts. And why shouldn't it be?

We all can agree on the fact that annual and sustainability reports to some degree has marketing in them. And we learnt from the greenwashing-scandal of Volkswagen that firms might go out of their way to produce a false reality when it comes to sustainability-related marketing. However, a measure which indicates top-level anchoring and focus on sustainability, and in consequence sustainability efforts, may not be unprecise after all, at least not on an aggregate level.

And that is important to remember, that our proxy-solution is not well-suited for the analysation of specific firms, but to get a glimpse of sustainability efforts on an aggregated level. As the correlations tested for Q1 proved mainly significant and moderate to strong (and robust!), we may conclude by claiming the proxy-solution to measuring sustainability efforts on an aggregate level as acceptable. It correlates with well-renowned measures of sustainability efforts, and it is theoretically at least semi-robust in its assumptions. Remember that the assumptions are that the level of sustainability efforts within a given firm will be displayed in the focus on sustainability which is laid down in stakeholder reports. We can at least say that the proxy-solution to measuring sustainability efforts are adequate at an aggregated level.

Now, indeed, the sustainability indexes rests on recent research which suggests that contextuality is paramount in the assessment of sustainability efforts (see e.g. Brown et al. 1987, or Purvis, Mao, & Robinson 2018), which weakens this conclusion of adequacy by a fair amount. However, for aggregated puproses, the results in this study regarding Q1 validates the use of standardized reports as a measure of sustainability efforts, although we should be careful not to conlude too determinantely, as this adequacy clearly is up for debate.

5.1.2 Sustainability Efforts and Profitability in a Norwegian Context – Confirmed?

The trade-off between economic profits and sustainability seems to be mainly a phenomenon of a past era. Recent research shows that sustainability efforts increase profits (Flammer 2015, Utgård, 2017, Jørgensen & Pedersen, 2018), with the development of the triple bottom line, sustainable business models, and awareness of consumer choices in its wake. However, the seemingly bleakening development of the traditional trade-off between profits and sustainability, does not mean that it doesnt exist.

There will probably be trade-offs for a long time, as human kind does not have the technology to be truly sustainable yet. When you buy a new smartphone, the materials may be re- or up-cycled to some degree, but there is still mining activities, oil and gas production and consumption, and depleting of non-renewable resources going on as a consequence of economic activity. The main change regarding trade-offs is that sustainability efforts seem to have a positive effect on profitability, without taking into account if the firms are repairing or limiting it's negative consequences of operations, or if they are bringing true sustainability-efforts in the meaning of truly sustainable solutions.

My results supports the positive effect between sustainability efforts and profitability on an aggregated level in a Norwegian context. With an OLS-approach, positive and significant coefficients and an adequately acceptable validity, I find a positive relationship between sustainability efforts the way it is measured in this thesis, and profitability based on ROA and ROE for Norwegian companies listed on the OSEAX-index. Companies which focus more on sustainability in stakeholder reports have higer return to assets, which undoubtedly is true given the five-year period of 2015-2019 for our final regression sample. However, the research design does not support this relathionship as a causal one. It may just be that firms from our sample are more focused on sustainability due to the fact that they are more profitable than those who don't.

This realisation is important, as we may say that sustainability efforts and profitability is linked to one another, but the real question is: which came first? The sustainability efforts, or profitability? The answer to this question in a Norwegian context requires a more causal research design, such as Flammer's (2015), which has been mentioned beyond count throughout this thesis. However, the recognition of a positive relationship between

sustainability efforts and profitability in a Norwegian context is interesting, as it gathers support to the understanding of sustainability efforts as something value-creating (see e.g. Jørgensen & Pedersen, 2018) also for Norwegian stock-listed firms.

5.1.3 No Universal Best Efforts?

When it comes to our third research question, we set out to investigate the title of the thesis, *which sustainability efforts are most profitable to prioritize?* The existing literature and research does find causal effects of sustainability efforts on financial performance (Flammer, 2015), but suggests no rule of thumb to which efforts firms should prioritize. Instead, the existing sources focuses on materiality in the form of how important a set of given sustainability issues is for the company and the issue importance for stakeholders. These materiality assessments are found in both the literature (see e.g. Jørgensen & Pedersen 2018, or Eccles et al. 2012) and in practice (see e.g. Aker Solutions 2019).

Now, these material issues may range from workforce conditions to the global rise in temperature, all depending on the given firms assessment of importance. The practical use of materiality in sustainable effort prioritzation fits well with both the real world, and the academical background for sustainability efforts. In practice, no firm is the same, neither are their immediate challenges or stakeholders. Hence, their prioritization should be founded in company-specific challenges, needs and opportunities, which is a rather rational assumption to make. In the academic world, the term sustainability is wide and variously defined, as we made a rather big point out of in the literature review. The academic background may be shattered, hard to operationalise and difficult to comprehend because of the fact that sustainability itself is strongly contextual and varied across the globe. For instance, a bus-company in Sweden may assess it as important to prioritize equal pay between genders, while a bus-company situated in Moldova might think it's important to give women the right to drive a bus with more than fourteen seats (which actually wasn't legal in Moldova as of 2018 (Wood, 2018)). This proves that the challenges and views on prioritizing a given sustainability effort, like equality, vary dramatically in substance across countries and industries.

My goal however was to identify a general best-practice when it comes to sustainability effort prioritization with regards to financial performance in a Norwegian context. The reason I could not harvest any valid results within the categorisation of sustainability may be a consequence of several weaknesses. Firstly, the categories might have been too wide as sustainability

obviously has a number of underlying facets. Secondly, the way i chose to measure the three sustainability categories have a debatable internal validity about them. Third, with the given sample size, the neglection of industry-specific context may have played a role.

I would like to give extra comments on the second weakness, as an SDG framework may be a brilliant idea, but perhaps not in the way it was combined with the sustainability pillars. The distribution of observations into the main pillars seem to random, and the internal validity for the measure of the main sustainability pillars fall through.

So, we set out to find universal rules, or universal prioritizations on a highly categorical level. At the very least we set out to find universal rules of prioritizations for companies listed on Oslo Stock Exchange. As you have seen in the analysis, I was not able to find a shred of evidence suggesting any kind of difference between our categories. The results may be consequences of inadequate data, inadequate testing procedures or the small sample size given to answer Q3, however, it leads me to think that the universal rule might be that there is no rule. The materiality analysis seems fitting in the light of our findings, and why shouldn't it be? As I have pointed out, categories are to some degree or in some situations a weakness of the human mind. This might be one of those situations.

The results lead me to believe that materiality matrices and individual assessments is the way to go for sustainability effort prioritization. Even though my human mind prefers a categorical solution, and wishes to confirm sentences like: "Sustainability efforts focused on the social pillar gives an average increase of 2% ROA compared to efforts contributing to the other pillars". However, it would not be true. In other words, contextuality is paramount.

This evaluation of the results falls in line with theoretical approaches which regard the sustainability pillars as interrelated, like Brown et al. (1987) has viewed them for quite some time. Generally speaking, rules of thumb is hard to determine no matter which phenomenon we may study. A ROA of 2% can be incredible for a firm which has gone through a deep economic crisis, whereas others might not be satisfied with 20% because of the context. Relativity, a term most economists should be familiar with, is perhaps the rule of thumb when considering the profitability of sustainability efforts. Do notice that I do not claim that firms always has profitability in the front of their minds when they assess sustainability efforts, but I claim that when profitability is assessed, it may be beneficial to evaluate stakeholder importance and business importance, based on the discussion above and results in chapter 4.

5.2 Implications of the results

Now, as stated in the introduction, I do wish for some practical implications of the results, let's see if we can't derive some from this thesis.

The main implication regarding Q1 are that sustainability effort measurement through textual analysis on company reports proves as a promising avenue for further research. The concept of measuring such efforts through stakeholder communication might be valid on an aggregate level in a context where trust is high. In a Norwegian context, it seems promising, as we find correlations to more renowned measures of sustainability efforts.

For Q2's sake, the alignment of profitability and sustainability efforts proves in the very least that the successful companies prioritize sustainability efforts, at least in their stakeholder communication. Do remember that we are still talking about our population of approx. 190 firms. As sustainability is on the agenda for investors, owners, customers, governments, institutions and other stakeholders, it may be worth prioritizing if your firm is interested in long-term value creation.

Lastly, the most important implication is that context relativity seems to be the key when prioritizing sustainability efforts. This is an implication which supports the current practice among many firms whom report on sustainability, the GRI approach to sustainability reporting, and the theoretical background which describes sustainability as rather complex.

5.3 Limitations and further research

The limitations of this study are well described throughout the thesis. Especially in the validity and reliability section of chapter 3. However, the proxy-approach is a limitation, as there is a gap between the theoretical terms and empirical data collected in this thesis. In addition, the data availability is a huge challenge when it comes to sustainability effort measurements. This is not a surprising realisation, as sustainability as an academic study is quite large and hard to get a definitive grasp on. Sustainability seems to be strongly contextual.

The proxy-approach needs further research to establish its viability as a measure of sustainability efforts. Further research on sustainability effort prioritization should be more focused on the context of the firms. As our discussion shows, contextuality is paramount, and

instead of aiming at defining categories to prioritize sustainability efforts, it may be more viable to focus on industry- or context-specific best efforts.

An ideal data foundation would be variables consisting of costs attributed to different sustainability efforts, projects or investments, or more complex measures of company-specific sustainability efforts aggregated to be comparable. However, such data is difficult to obtain.

Further insight in the factors that drive the most profitable sustainability efforts would be interesting as well. For instance, is public opinion the main factor for sustainability effort profitability? Or is the reduction of costs in production-processes the place to gain most profit? The two examples further prove that context will play a role. However, case-studies could be the approach to opt for in this case.

Further research could also prove viable if it utilizes more causal designs. As Flammer (2015) has shown, it's possible to study sustainability efforts effect on profitability with a causal research design.

6. Conclusion

The research goals of the thesis were split in three. We set out to validate an original approach to measure sustainability efforts in a Norwegian context. We wanted to determine a relationship between sustainability efforts and profitability. And, we had big intentions of finding differences in financial performance due to the prioritization of one of three theoretically founded categories of sustainability. The first goal is still somewhat open for debate. The second goal seems to be confirmed. The third goal however, we find no support for at all.

The proxy-approach has shown itself as a promising measure of sustainability efforts on an aggregate level. However, there must be done more research to validate these results. The fact that the proxy-approach has such a gap between its theoretical concept, and empirical measurement can't be thrown aside by one study which deems it as adequately validated. I deem it as acceptable in this thesis but would rather recommend more complex measures for those that should try to research sustainability efforts. In addition, if more research were to find the same use of this proxy-solution, it could be deemed as a more acceptable approach to sustainability effort operationalisation. As stated, more research is needed.

The relationship between sustainability efforts and profitability, seems to be confirmed. Companies that focus more than others on sustainability efforts in their stakeholder reports have higher return to assets than the rest of the companies in the sample. This insight can also be generalised to OSEAX-listed companies, with a small consideration. The availability-sampling may provide a bias. However, I deem the external validity as good enough to generalise, given that one accepts the proxy-solution to measuring sustainability efforts.

When it comes to the third research goal, the theoretical categorisations prove no rule of thumb at all. Based on the results and discussion in chapter 5, I would rather argue that contextuality, business and stakeholder importance, and materiality is key when it comes to the prioritization of sustainability efforts.

As we have seen, such a categorical approach falls short when it comes to determining some kind of *best effort* for sustainability efforts which yield profitable results. In consequence, this thesis finds support for the use of materiality matrices when it comes to sustainability effort prioritizations. However, I do not claim that such individual assessments of stakeholder and

business importance will yield the highest immediate return in terms of profits, but I argue that it is the best approach for long-term value creation.

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8. Apendices

Appendix 1 – Q1

Research Question 1 – Analysis Supplements

1. Pearson's R (Page Count)

$H1_A$: *Sustainability efforts correlate with Sustainability, ESG or CSR communcation.*

$H1_A: \rho \neq 0$, which gives us the null hypothesis:

$H1_0$: *Sustainability efforts does not correlate with Sustainability, ESG or CSR communcation*

$H1_0: \rho = 0$

Table 1: Pearson's R (Page Count)

Variable		Phrase sum
Phrase sum	Pearsons corr.	1
	Sig.	
	Obs.	551
RobecoSAM Total Sustainability Rank	Pearsons corr.	0.3326*
	Sig.	0.0509
	Obs.	35
RobecoSAM Social Dimension Rank	Pearsons corr.	0.2329
	Sig.	0.1782
	Obs.	35
RobecoSAM Economic Dimension Rank	Pearsons corr.	0.2650
	Sig.	0.1239
	Obs.	35
RobecoSAM Environmental Dimension Rank	Pearsons corr.	0.3490**
	Sig.	0.0399
	Obs.	35
ESG Disclosure Score	Pearsons corr.	0.5138***
	Sig.	0.0000
	Obs.	267
Sustainalytics Rank	Pearsons corr.	0.3569***
	Sig.	0.0055

	Obs.	59
ESG Score	Pearsons corr.	0.4957***
	Sig.	0.0005
	Obs.	46
Environmental Pillar Score	Pearsons corr.	0.5307***
	Sig.	0.0001
	Obs.	46
Social Pillar Score	Pearsons corr.	0.4854***
	Sig.	0.0006
	Obs.	46
Governance Pillar Score	Pearsons corr.	0.2474
	Sig.	0.0974
	Obs.	46
CSR Strategy Score	Pearsons corr.	0.4510***
	Sig.	0.0017
	Obs.	46
Emissions Score	Pearsons corr.	0.4181***
	Sig.	0.0038
	Obs.	46
Innovation Score	Pearsons corr.	0.3632**
	Sig.	0.0131
	Obs.	46
Resource Use Score	Pearsons corr.	0.4646***
	Sig.	0.0011
	Obs.	46

*/**/*** = Significant on 10%/5%/1%-level (Selected output of pairwise correlation)

Null hypothesis rejected for 10 of the 14 correlations. Similar results as the test with the phrase sum variable.

2. Pearson's R (Phrase Sum and Page Count)

	Variable		1	2
1	Phrase sum	Pearsons corr.	1	
		Sig.		
		Obs.	551	
2	Page count	Pearsons corr.	0.6373***	1
		Sig.	0.0000	
		Obs.	551	551

*** = Significant on 1%-level

3. Spearman's ρ (Page Count)

	Variable		1	2	3
1	Page count	Pearsons corr.	1		
		Sig.			
		Obs.			
2	CDP Performance Score	Pearsons corr.	0.2510	1	
		Sig.	0.1810		
		Obs.	30	30	
3	ISS Quality Score	Pearsons corr.	0.0550	0.1106	1
		Sig.	0.6004	0.6621	
		Obs.	93	18	93

*/**/*** = Significant on 10%/5%/1%-level

Appendix 2 – Q2

Research Question 2 – Robustness Tests

1. Alternate OLS 1 (A1):

How this OLS differs from the main regression: Switching dependent variable from ROA to ROE.

$$ROE_{ij} = \beta_0 + \beta_1 * logphrase_{it} + \beta_2 * social\ pillar_{it} + \beta_3 * envrionmental\ pillar_{it} + \beta_4 * economic\ pillar_{it} + \epsilon_{it}$$

Linear regression

Number of obs	=	528
F(4, 125)	=	5.87
Prob > F	=	0.0002
R-squared	=	0.0761
Root MSE	=	9.6248

(Std. Err. adjusted for 126 clusters in companyid)

ROE_AVERAGE	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
logphrase	1.772757	.5339492	3.32	0.001	.7160055	2.829509
Msoc_pillar	.2856613	2.464963	0.12	0.908	-4.592806	5.164129
Menv_pillar	1.04586	1.942041	0.54	0.591	-2.797679	4.889399
Mecon_pillar	.8442259	1.593769	0.53	0.597	-2.310042	3.998493
_cons	-3.407461	1.727854	-1.97	0.051	-6.827099	.0121767

Table 1.1: Alternate Regression 1: ROE as dependent variable.

Conclusion: $H2_0$ rejected. We cannot reject $H2a_0, H2b_0, H2c_0$.

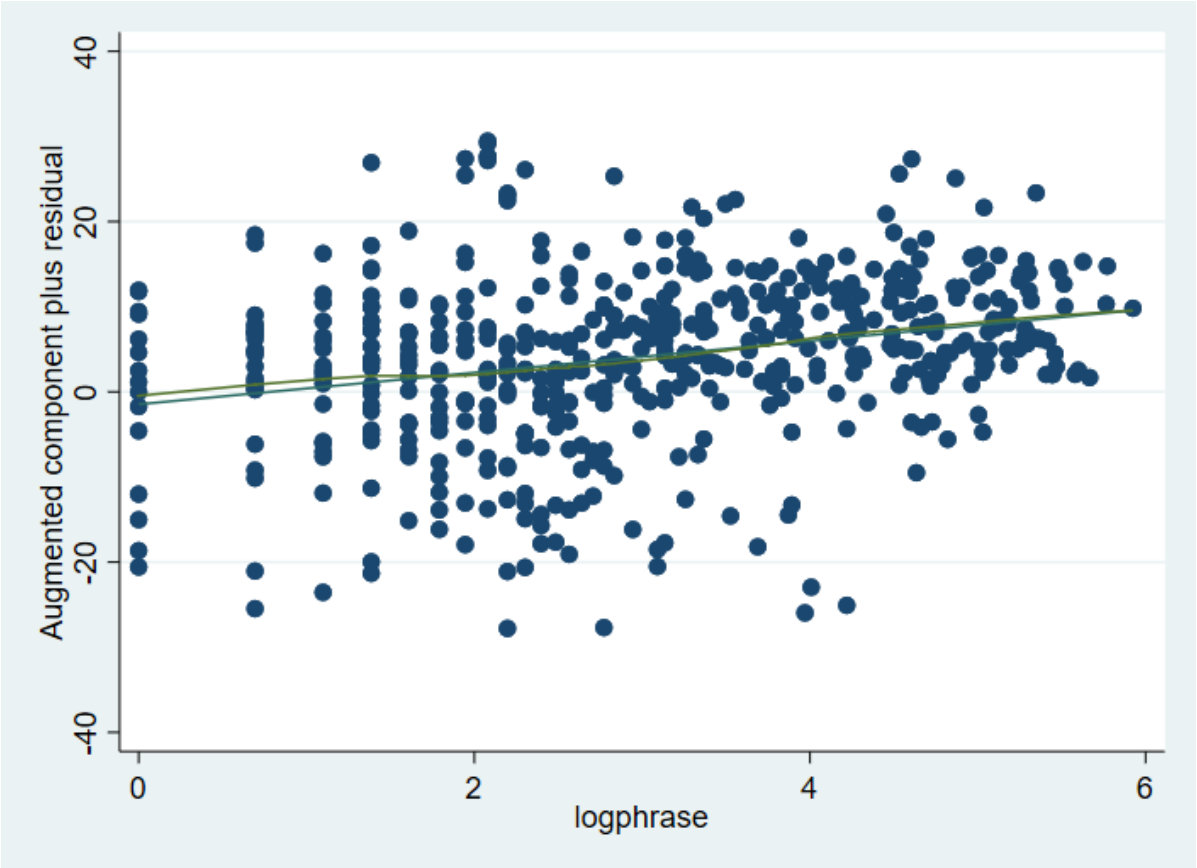

Illustration 1.1: Acpr plot for A1. Linearity assumption satisfied.

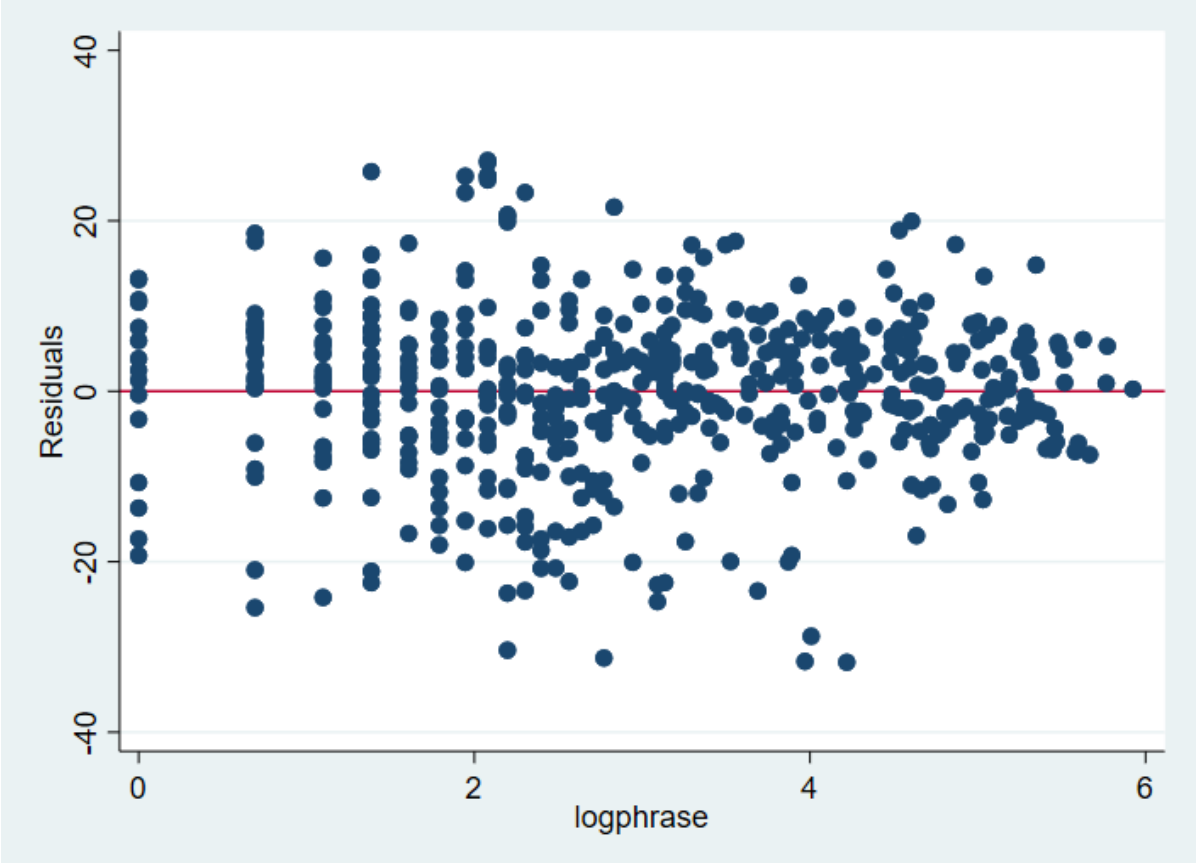

Illustration 1.2: Rvpplot for Homoscedasticity for A1. Homoscedasticity assumed.

Variable	VIF	1/VIF
logphrase	1.67	0.598431
Mecon_pillar	1.36	0.735926
Menv_pillar	1.32	0.757410
Msoc_pillar	1.20	0.832456
Mean VIF	1.39	

Table 1.2: VIF-test for A1. No multicollinearity.

2. Alternative OLS 2 (A2):

How this OLS differs from the main regression: Switching the main independent variable from the natural logarithm of phrase sum, to the natural logarithm of page count-variable from our primary data.

$$ROA_{ij} = \beta_0 + \beta_1 * logpage_{it} + \beta_2 * social\ pillar_{it} + \beta_3 * envrionmental\ pillar_{it} + \beta_4 * economic\ pillar_{it} + \epsilon_{it}$$

Linear regression

Number of obs	=	526
F(4, 125)	=	5.87
Prob > F	=	0.0002
R-squared	=	0.0976
Root MSE	=	8.7239

(Std. Err. adjusted for 126 clusters in companyid)

ROA_AVERAGE	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
logpage	2.186394	.5027861	4.35	0.000	1.191317	3.18147
Msoc_pillar	-.2347835	1.862952	-0.13	0.900	-3.921797	3.45223
Menv_pillar	-.1036981	1.546358	-0.07	0.947	-3.164133	2.956737
Mecon_pillar	-.6565447	1.361687	-0.48	0.631	-3.351492	2.038403
_cons	1.406093	1.158214	1.21	0.227	-.8861561	3.698343

Table 2.1: Alternate Regression 2: logpage as independent variable.

Conclusion: $H2_0$ rejected. We cannot reject $H2a_0, H2b_0, H2c_0$. Note that 2 observations are removed (compared to the main regression) due to extreme values of the logpage-variable.

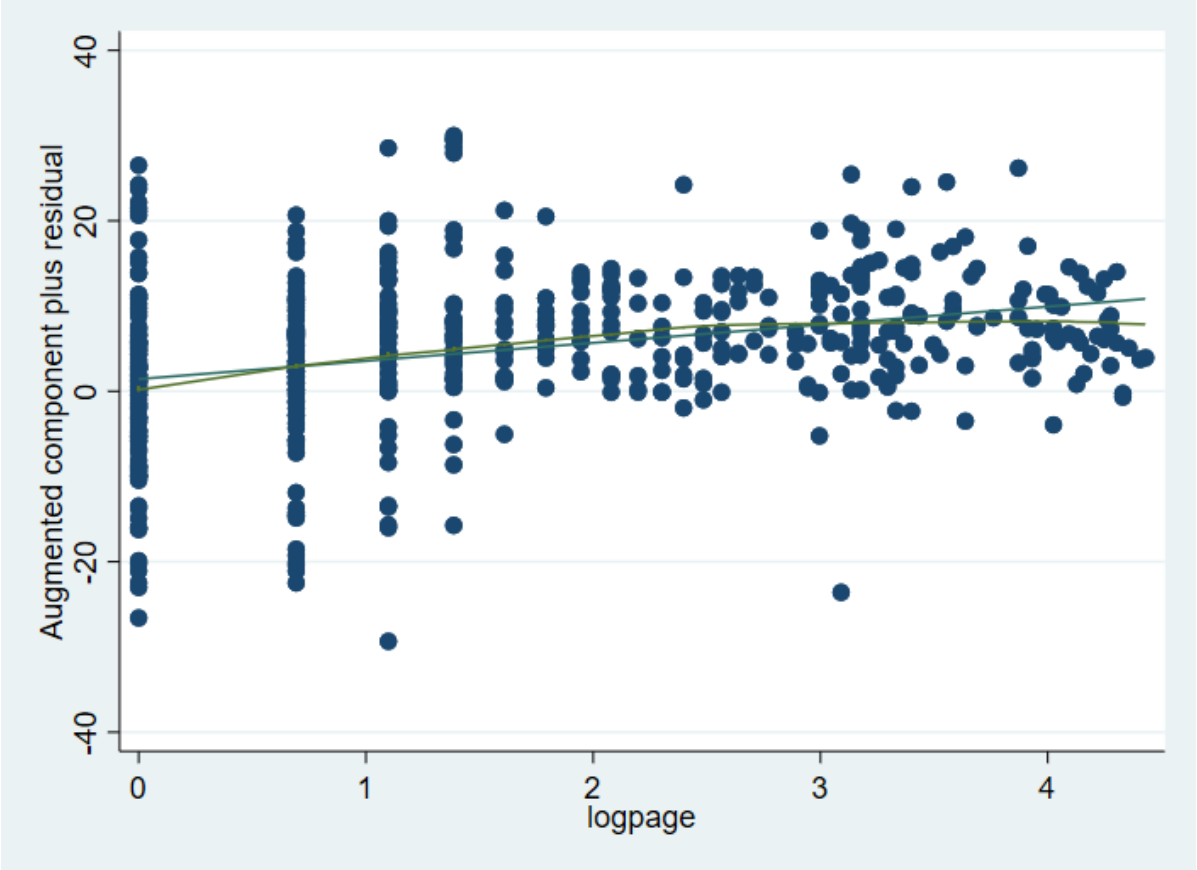

Illustration 2.1: Acpr plot for A2. Linearity assumption satisfied, but note the non-linear tendency.

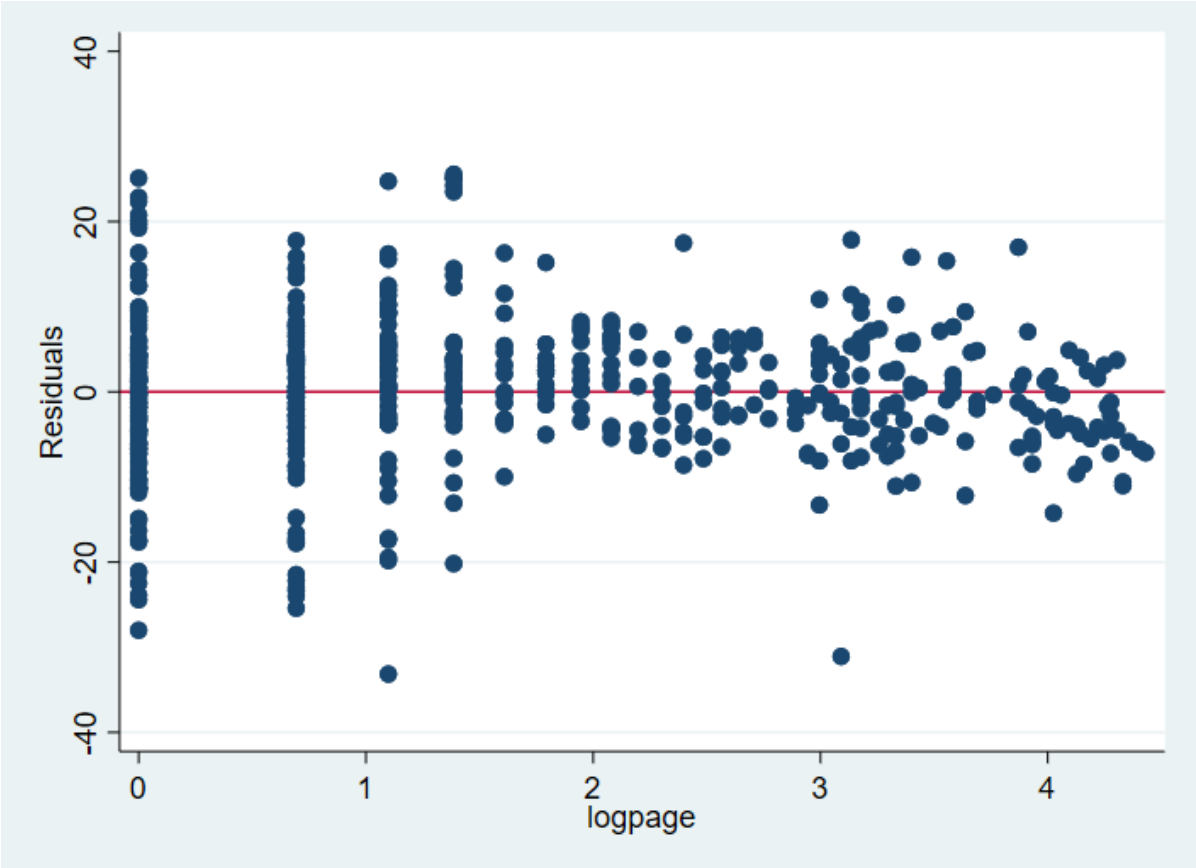

Illustration 2.2: Rvpplot for Homoscedasticity for A2. Homoscedasticity assumed, though with tendencies to heteroscedasticity.

Variable	VIF	1/VIF
logpage	1.58	0.632567
Mecon_pillar	1.30	0.766389
Menv_pillar	1.29	0.773998
Msoc_pillar	1.17	0.853696
Mean VIF	1.34	

Table 2.2: VIF-test for A2. No multicollinearity.

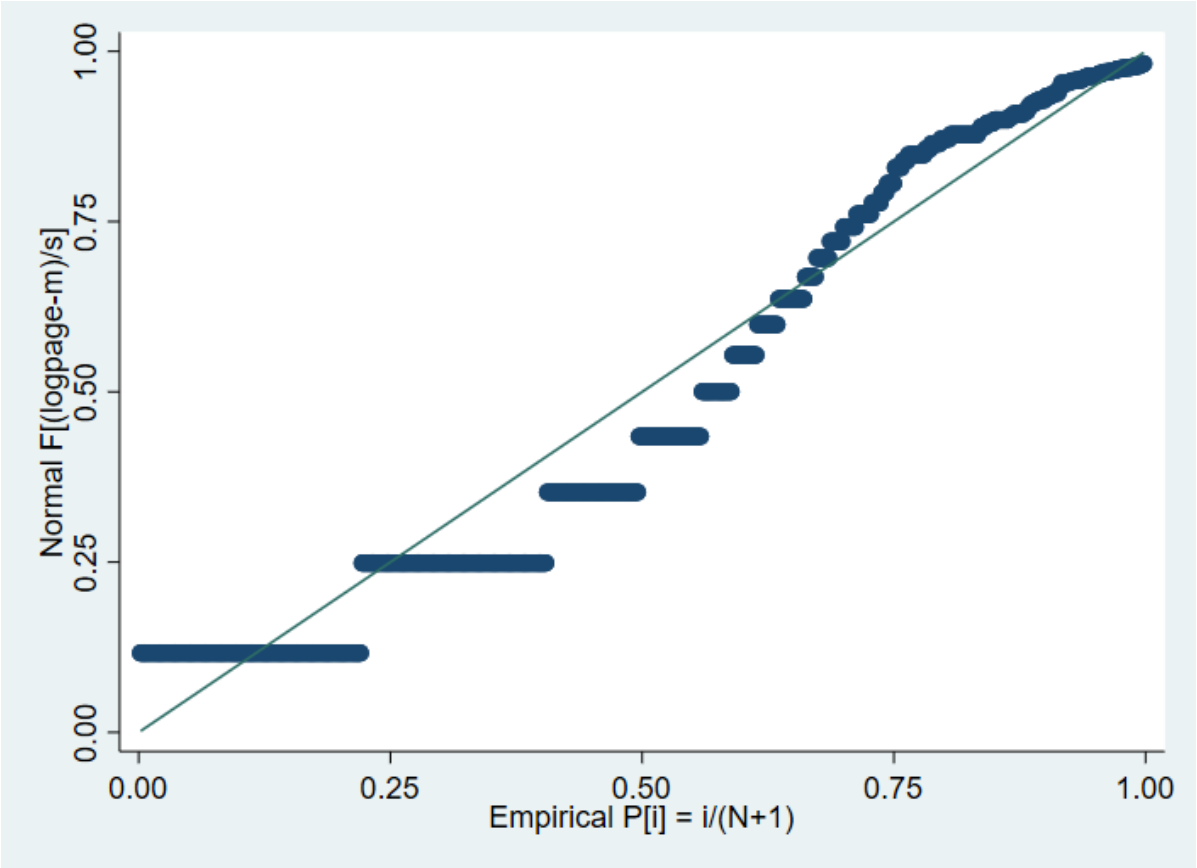

Illustration 2.3: Normal probability plot. Normal distribution in the error term assumed.

3. Alternative OLS 3 (A3):

How this OLS differs from the main regression: Switching dependent variable from ROA to ROE. Switching the main independent variable from the natural logarithm of phrase sum, to the natural logarithm of page count-variable from our primary data.

$$ROE_{ij} = \beta_0 + \beta_1 * logpage_{it} + \beta_2 * social\ pillar_{it} + \beta_3 * envrionmental\ pillar_{it} + \beta_4 * economic\ pillar_{it} + \epsilon_{it}$$

Linear regression

Number of obs	=	526	
F(4, 125)	=	6.03	
Prob > F	=	0.0002	
R-squared	=	0.0905	
Root MSE	=	9.6488	

(Std. Err. adjusted for 126 clusters in companyid)

ROE_AVERAGE	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
logpage	2.141004	.5460264	3.92	0.000	1.06035	3.221658
Msoc_pillar	-.1526083	2.373279	-0.06	0.949	-4.849622	4.544405
Menv_pillar	.6968272	1.706718	0.41	0.684	-2.68098	4.074635
Mecon_pillar	.6892749	1.540806	0.45	0.655	-2.360171	3.738721
_cons	-1.552519	1.267672	-1.22	0.223	-4.061399	.9563618

Table 3.1: Alternate Regression 3: ROE as dependent variable, logpage as independent variable.

Conclusion: $H2_0$ rejected. We cannot reject $H2a_0, H2b_0, H2c_0$. Note that 2 observations are removed (compared to the main regression) due to extreme values of the logpage-variable.

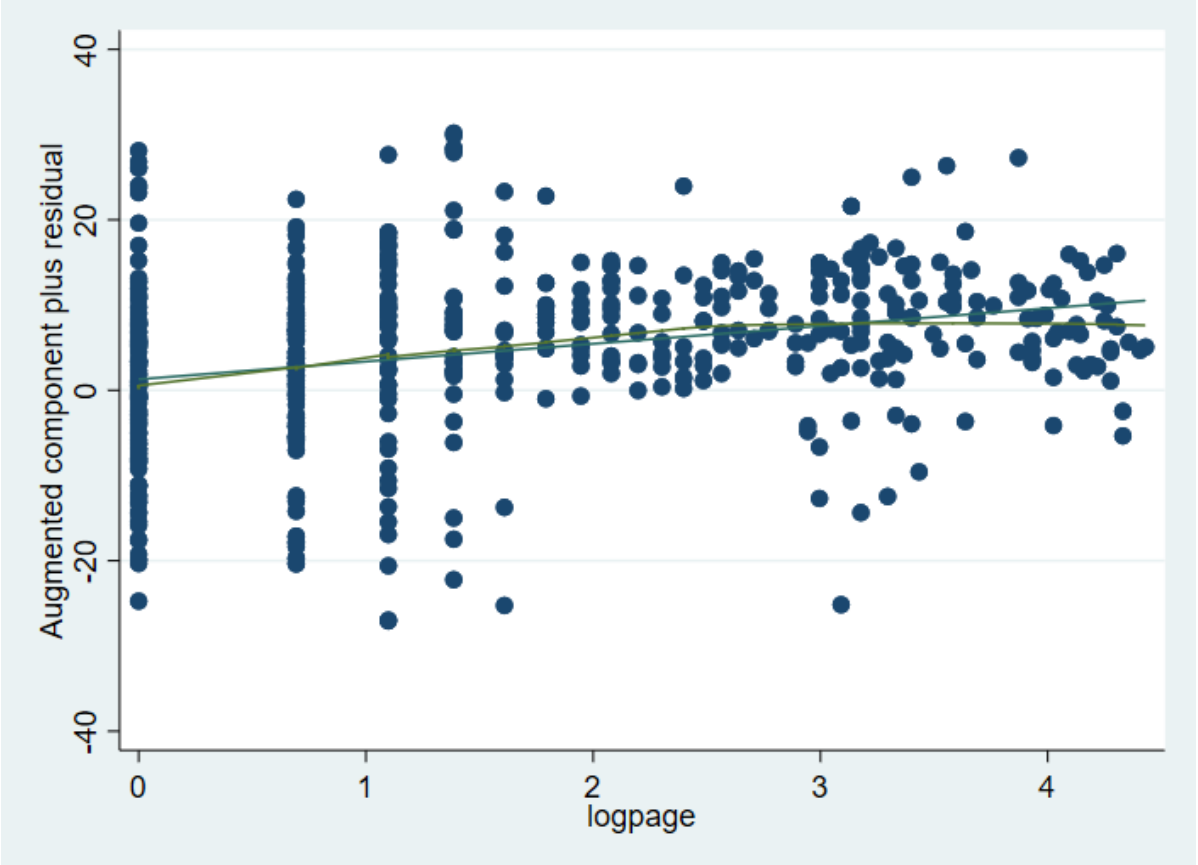

Illustration 3.1: Acpr plot for A3. Linearity assumption satisfied, but note the non-linear tendency.

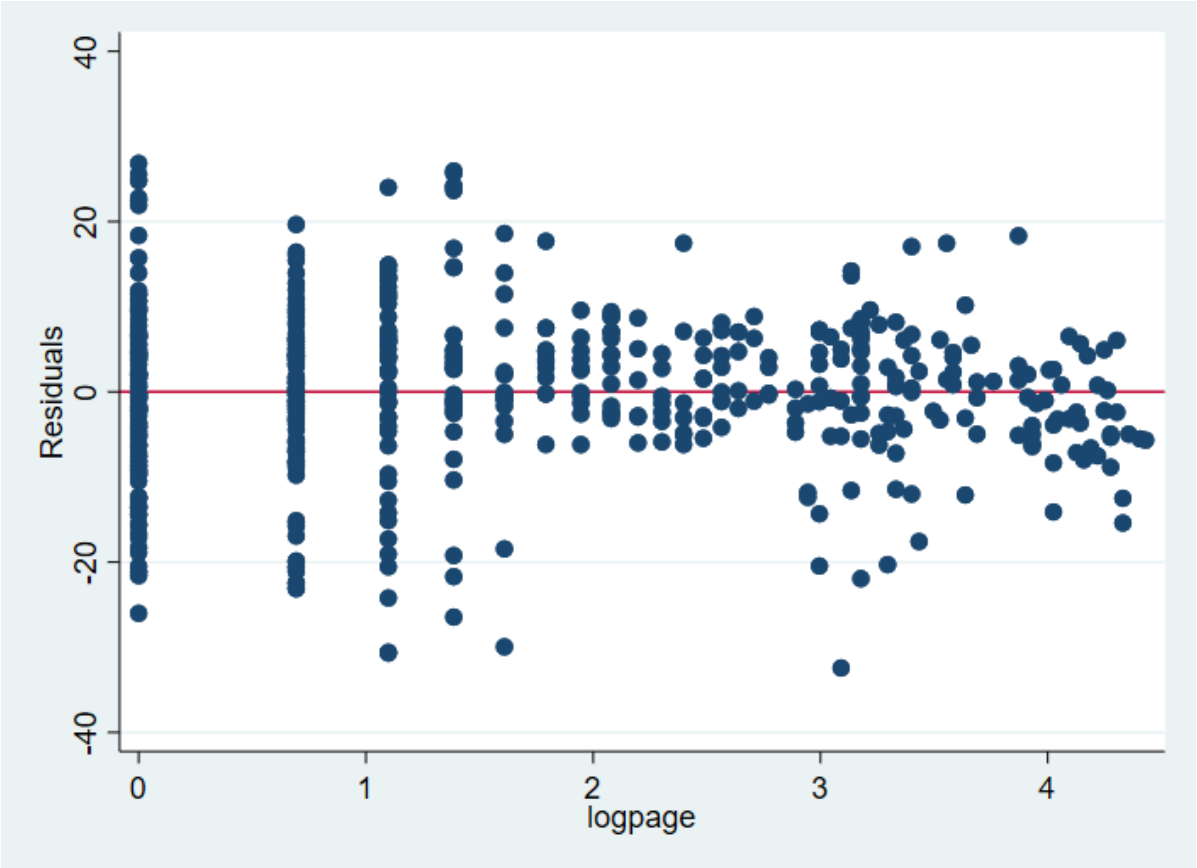

Illustration 3.2: Rvpplot for Homoscedasticity for A3. Homoscedasticity assumed, though with tendencies to heteroscedasticity.

Variable	VIF	1/VIF
logpage	1.58	0.632567
Mecon_pillar	1.30	0.766389
Menv_pillar	1.29	0.773998
Msoc_pillar	1.17	0.853696
Mean VIF	1.34	

Table 3.2: VIF-test for A3. No multicollinearity.

4. Alternative OLS 4 (A4):

How this OLS differs from the main regression: Switching the main independent variable from the natural logarithm of phrase sum, to the ESG Disclosure Score-variable.

$$ROA_{ij} = \beta_0 + \beta_1 * ESGDisclosureScoreH_{it} + \beta_2 * social\ pillar_{it} + \beta_3 * envrionmental\ pillar_{it} + \beta_4 * economic\ pillar_{it} + \epsilon_{it}$$

Linear regression

Number of obs	=	260
F(4, 56)	=	2.51
Prob > F	=	0.0518
R-squared	=	0.0756
Root MSE	=	8.1304

(Std. Err. adjusted for 57 clusters in companyid)

ROA_AVERAGE	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ESGDisclosureScoreH	.1458039	.062075	2.35	0.022	.0214528	.2701551
Msoc_pillar	2.137583	1.811753	1.18	0.243	-1.491793	5.76696
Menv_pillar	1.574093	1.881263	0.84	0.406	-2.194528	5.342715
Mecon_pillar	1.269458	1.248411	1.02	0.314	-1.231409	3.770326
_cons	1.132265	2.247401	0.50	0.616	-3.369821	5.63435

Table 4.1: Alternate Regression 4: ESG Disclosur Score as independent variable.

Conclusion: $H2_0$ rejected. We cannot reject $H2a_0, H2b_0, H2c_0$. Note that the observation count is far lower for ESG Disclosure Score than in our primary regression.

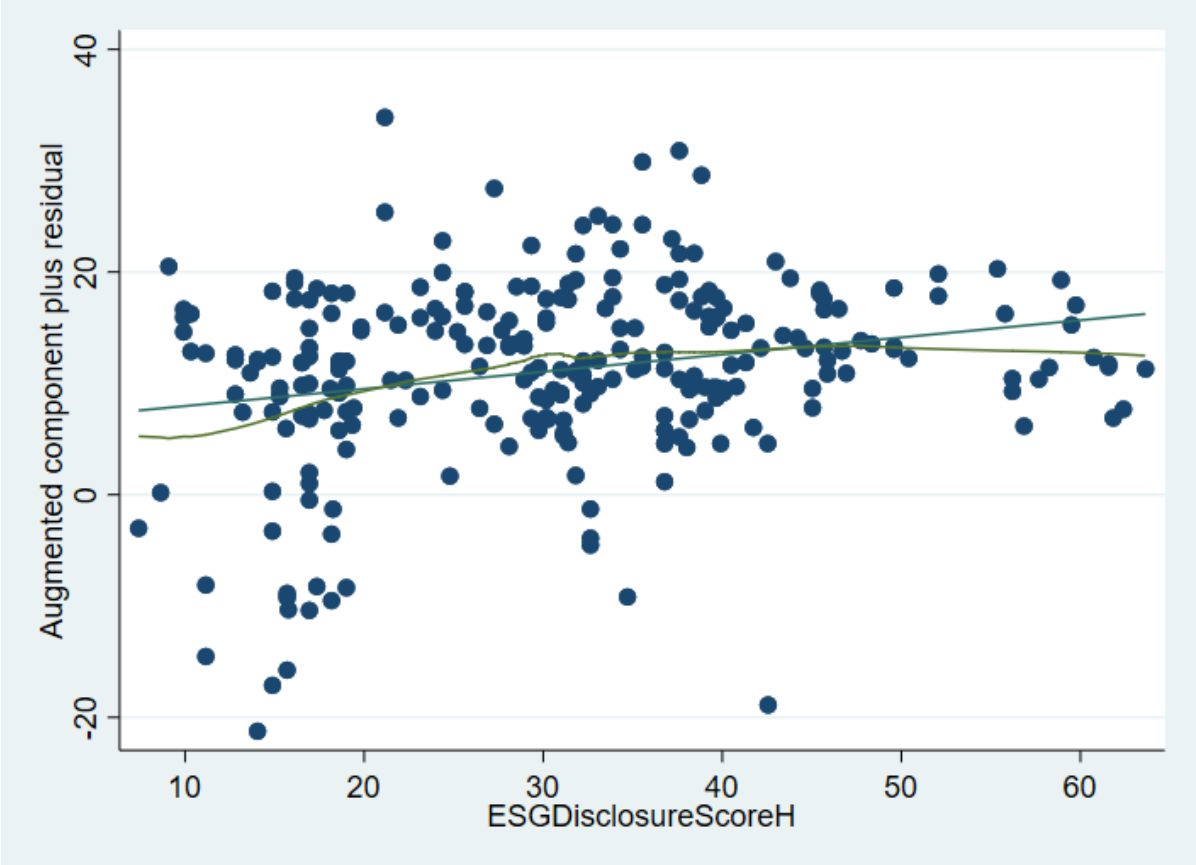

Illustration 4.1: Acpr plot for A2. Linearity assumption satisfied, but note the non-linear tendencies.

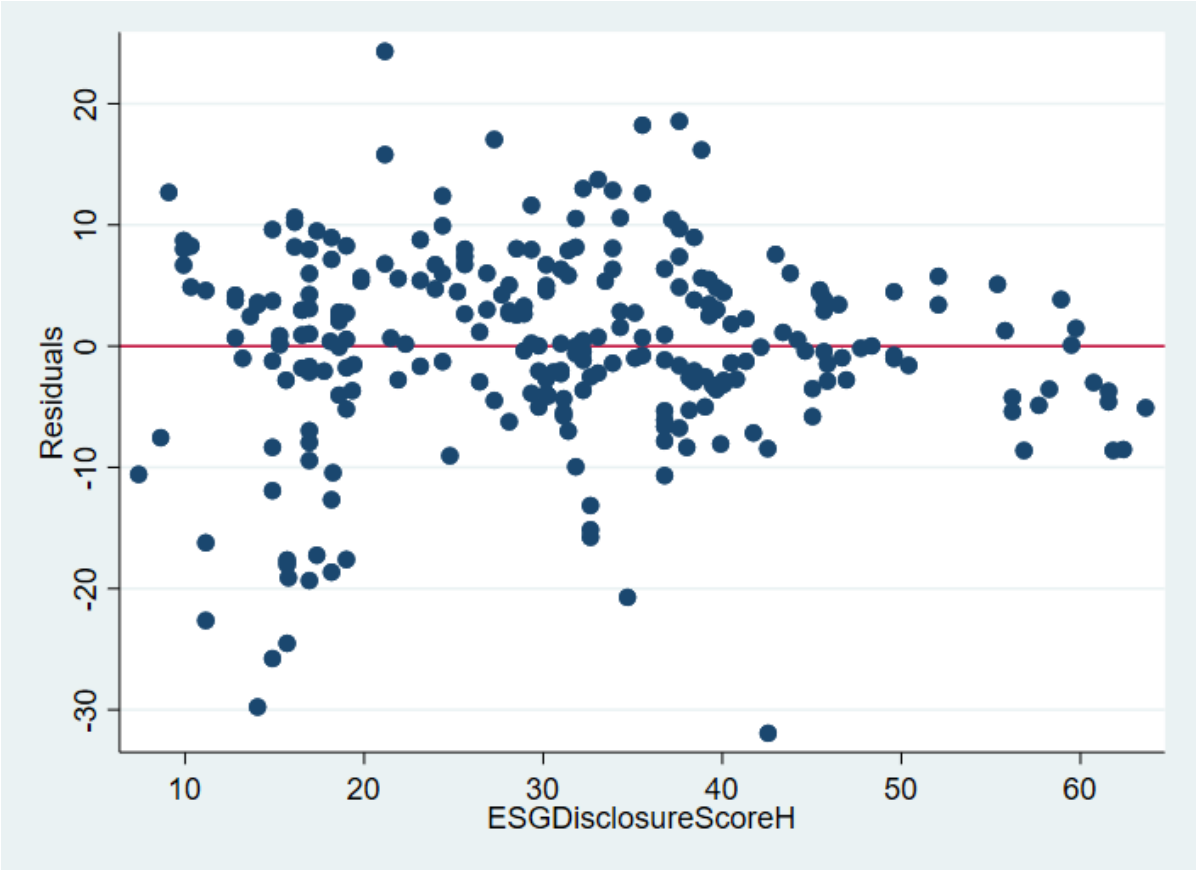

Illustration 4.2: Rvpplot for Homoscedasticity for A2. Homoscedasticity assumed, though with tendencies to heteroscedasticity.

Variable	VIF	1/VIF
ESGDisclos~H	1.24	0.808461
Menv_pillar	1.19	0.843677
Mecon_pillar	1.18	0.844299
Msoc_pillar	1.10	0.910146
Mean VIF	1.18	

Table 4.2: VIF-test for A2. No multicollinearity.

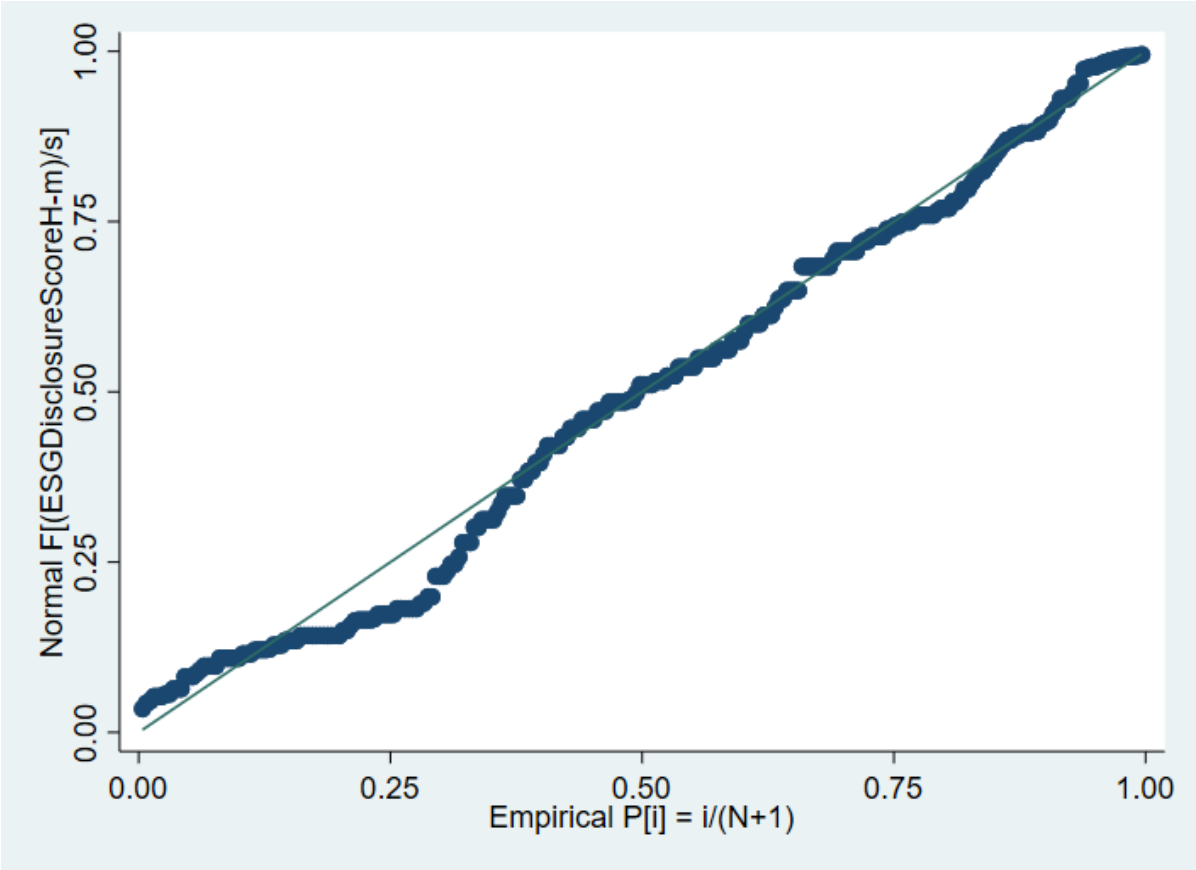

Illustration 4.3: Normal probability plot. Normal distribution in the error term assumed.

5. Alternative OLS 5 (A5):

How this OLS differs from the main regression: Switching the dummy variables of the three sustainability pillars, to only one dummy variable collectively for the pillars.

$$ROA_{ij} = \beta_0 + \beta_1 * logphrase_{it} + \beta_2 * generalpillar_{it} + \epsilon_{it}$$

Linear regression

Number of obs	=	528
F(2, 125)	=	10.26
Prob > F	=	0.0001
R-squared	=	0.0740
Root MSE	=	8.7272

(Std. Err. adjusted for 126 clusters in companyid)

ROA_AVERAGE	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
logphrase	1.710501	.4474405	3.82	0.000	.8249608	2.596041
generalpillar	.120721	1.114733	0.11	0.914	-2.085473	2.326915
_cons	-.2708647	1.561139	-0.17	0.863	-3.360553	2.818824

Table 5.1: Alternate Regression 5: generalpillar as individual dummy.

Conclusion*:* $H1_0$ rejected. We cannot reject the null hypothesis that states that claiming a pillar affects ROA. Note that the observation count is far lower for ESG Disclosure Score than in our primary regression.

Variable	VIF	1/VIF
generalpil~r	1.67	0.599811
logphrase	1.67	0.599811
Mean VIF	1.67	

Table 5.2: VIF-test for A5. No multicollinearity.

Appendix 3 – Q3

Research Question 3 – ANOVA Assumption Supplements

1. Levene's test for normality (2019)

PillarGroups	Summary of ROA_AVERAGE Mean	Std. Dev.	Freq.
1	4.831918	9.7606304	12
2	6.906292	10.180653	22
3	6.4631579	5.6001094	30
Total	6.3096278	8.1345305	64

W0 = 1.6589917 df(2, 61) Pr > F = 0.19880219

W50 = 1.6823763 df(2, 61) Pr > F = 0.19444321

W10 = 1.7007881 df(2, 61) Pr > F = 0.1910807

Table 1.1: Levene's test for normality. The test may be read: We throw away the null hypothesis stating that there is heterogeneity in the variances.

2. Levene's test for normality (2018)

PillarGroups	Summary of ROA_AVERAGE Mean	Std. Dev.	Freq.
1	10.328117	5.5173566	11
2	9.4827051	6.8505233	13
3	5.9736061	5.6111559	12
Total	8.5713256	6.186689	36

W0 = 0.13158925 df(2, 33) Pr > F = 0.87715874

W50 = 0.16140385 df(2, 33) Pr > F = 0.85161603

W10 = 0.13919248 df(2, 33) Pr > F = 0.87056866

Table 2.1: Levene's test for normality. The test may be read: We throw away the null hypothesis stating that there is heterogeneity in the variances.

3. Shapiro-Wilk test for normal distribution (2019)

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
ROA_AVERAGE	12	0.88437	1.932	1.283	0.09972

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
ROA_AVERAGE	22	0.90867	2.314	1.701	0.04449

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
ROA_AVERAGE	30	0.95912	1.299	0.541	0.29411

Table 3.1: Shapiro-Wilks test for normal data. A p-level lower than 0.05 rejects the null hypothesis which states that the data are normally distributed.

4. Shapiro-Wilk test for normal distribution (2018)

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
ROA_AVERAGE	**11**	**0.84127**	**2.570**	**1.841**	**0.03281**

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
ROA_AVERAGE	**13**	**0.91044**	**1.577**	**0.893**	**0.18597**

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
ROA_AVERAGE	**12**	**0.98037**	**0.328**	**-2.173**	**0.98509**

Table 4.1: Shapiro-Wilks test for normal data. A p-level lower than 0.05 rejects the null hypothesis which states that the data are normally distributed.

Appendix 4 – Primary and Secondary Variable Explanation

This appendix explains the primary data extraction variables from the textual analysis of annual and sustainability reports. It also provides definition of the secondary variables gathered from Bloomberg and Eikon, with the reference's own definition. This appendix is created for reliability purposes for this study.

1. Primary data – Textual Analyses

General additional information

A few of the reports (<30) were in Norwegian, these will have equivalent Norwegian search-terms as well as the English ones in terms of the phrase-analysis. All reports are collected through the respective companies' websites.

CSR/ESG/SUS External report

If the company has an external (from the annual report) CSR/ESG/Sustainability-report, this binary variable will be = 1. In the case where a company has such a report, the CSR/ESG-report will be used for the textual analysis. If sustainability reports are presented both independent and integrated with an annual report, the annual report is preferred. Do note that many of our analysed annual reports have substantial integrated sustainability reports in their annual report, and the scope of the various sustainability reports are attempted to be measured by the page count variable. This variable does not identify sustainability efforts by itself but acts as a descriptive variable for our data-gathering in relations to the validity and reliability of the database generation.

$$Has\ an\ external\ CSR/ESG/SUS-report\ =\ 1$$

$$Has\ not\ an\ external\ CSR/ESG/SUS-report\ =\ 0$$

Sustainability Phrase Count

The Sustainability Phrase Count variable will add 1 in value per "Sustainability" or "Sustainable" phrase registered in the text.

Norwegian equivalents: "bærekraft", "bærekraftig"

CSR Phrase Count

The CSR Phrase Count variable will add 1 in value per “CSR”, “Corporate Social Responsibility” or “Coporate responsibility” phrase in the annual report.

Norwegian equivalent: “Samfunnsansvar”.

ESG Phrase Count

The ESG phrase count measures the number of times that “ESG” in reference to ESG as Environmental, Social and Governance reporting is present within the report. In cases where ESG-phrases refer to other contents, the phrase is not counted. As an example, Kongsberg Gruppen ASA had a reference to ESG as “Executive Steering Group”. Each ESG-phrase which clearly refers to such company-specific terms, has been filtered out of the results.

SDG Phrase Count

The SDG Phrase Count variable will add 1 in value per “SDG” or “Sustainable development Goal” phrase in the annual report.

Norwegian equivalents: “Bærekraftsmål”, “Klimamål”

Phrase Count

The phrase count variable is the sum of the Sustainability phrase count, CSR phrase count, ESG phrase count, and SDG phrase count variable. It is the main independent variable and aims to measure sustainability efforts through sustainability or annual reports.

Logpage

The logpage variable is the natural logarithm of the phrase count variable

Sustainability/ESG/CSR Page Count

The sustainability/ESG/CSR page count refers to the number of pages accumulated with substantial Sustainability-, ESG- or CSR-related information. The assessment of pages as substantial depends on the focus of the text. If the content in the text holds information about Sustainability/ESG/CSR-efforts, the pages will count. Namedropping sustainability/ESG/CSR-phrases will therefore not count, as many CEO’s do in their foreword of annual reports. This assessment done during the data gathering is subject to reliability discursions, which you can see under the ‘Reliability’ headline.

Note: When this number is 1 or 2, it usually refers to comments in the Corporate Governance section of the annual report. It’s required by law to comment on CSR for Norwegian companies, and usually consists of a few phrases due to this law requirement.

Logpage

The logpage variable is the natural logarithm of the Sustainabilit/ESG/CSR page count variable.

SDGs Claimed

This variable displays the number of individual Sustainable Development Goals which is explicitly claimed by the company in the specified report.

If SDGs are mentioned in context to concretized efforts towards sustainability, the effort will be classified as a claim to the appropriate SDG. As an example, ABG Sundal Collier claims to help educate children and provide necessary resources for this (2018), without explicitly claiming SDG 4 (Quality Education). Due to the close nature of this effort and SDG 4, we register SDG 4 as an acclaimed SDG in the textual analysis. Do note that there must be an almost explicit link to any SDG for it to be counted. Vague claims of SDGs will not be accounted for, and the variable mostly contains explicit claims of specific SDGs.

SDG Goals 1-17

This headline refers to 17 binary variables which states if the company explicitly claims a specific Sustainable Development Goal. The 17 goals are described in the literature review, and for each of the variables, the registration is accordingly:

$Not\ claimed = 0$

$Claimed = 1$

Main Pillars (Social, Environmental, Economic)

The main pillar variables are generated in chapter 3. They are dummies, which identifies the primary sustainability pillar claimed by the given company in the give year. One observation may only claim one main sustainability pillar per observation. The pillars are referenced to as Msoc_pillar, Menv_pillar, and Mecon_pillar in the descriptive analysis section of the thesis.

General notes on the primary data gathering:

For companies that changed name during the sample period, the prior website or name of the company is used to retrieve annual reports (e.g. Apptix ASA for Carasent ASA prior to 2018).

Hiddn Solutions annual reports are used for Arribatec solutions 2015-2017 due to a merger. Our accounting database holds the financial state of Hiddn (and prior to 2016: Agasti) for the periods prior to the merger in 2018.

2. Secondary Data

The secondary data is gathered from Bloomberg- (2020) and Eikon- (2020) terminals at NHH through Oktober to November 2020. All definitions of the following variables are attributed and referenced to these two sources.

Robeco SAM Total Sustainability Rank

(X6495 – ROBECOSAM_TOTAL_STBLY_RANK on Bloomberg. Bloomberg definition)

The total sustainability percentile rank is converted from the total sustainability score, based on the RobecoSAM Corporate Sustainability Assessment.

A Company's Total Sustainability Score is based on individual question scores and ranges from 0-100. The Total Sustainability Score is based on individual questions that roll up into criteria, which in turn roll up into three dimensions – Economic, Environmental and Social. The types and weighs of individual questions and criteria are adjusted for each industry-specific questionnaire to reflect the materiality of specific sustainability themes within each industry. The Total Sustainability Score can be defined as follows: Total Sustainability Score = (Number of Question points received x question weight x criterion weight).

RobecoSAM is an investment specialist focused exclusively on Sustainability investing. Together with Standard and Poor's (S&P) Dow Jones indices, RobecoSAM publishes the globally recognized Dow Jones Sustainability Indices. RobecoSAM scores are based on the responses to the RobecoSAM Corporate Sustainability Assessment.

RobecoSAM Social Dimension Rank

(X6498 – ROBECOSAM_SOCIAL_DIMENSION_RANK on Bloomberg. Bloomberg definition)

Social dimension percentile rank, converted from the social dimension score, based on the RobecoSAM corporate sustainability assessment.

The Social Dimension comprises on average 5-10 criteria covering material, non-financial themes. These themes include general themes like social reporting, Corporate Citizenship & Philanthropy, Human Capital Development, Talent Attraction & Retention and Business & Human Rights as well as cross-industry themes such as Stakeholder Engagement and Occupational Health & Safety, Individual opportunities. Each criterion can contain between 2-10 questions. Each criterion is worth up to 100 points, and is

assigned a weight (percentage) of the total questionnaire. The criteria within the dimension roll up to the dimension weight.

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RobecoSAM Economic Rank

(X6496 – ROBECOSAM_ECON_DIMENSION_RANK on Bloomberg. Bloomberg definition)

Economic dimension percentile rank, converted from the economic dimension score, based on the RobecoSAM Corporate Sustainability Assessment.

The Economic Dimension comprises on average 6-10 criteria covering material, non-financial themes. These themes include general themes like Corporate Governance, Codes of Business Ethics, Risk & Crisis management as well as cross-industry themes such as Brand Management, Customer Relationship Management, Innovation Management and Tax Strategy. Individual industries also have industry-specific themes that address specific sustainability risks and opportunities. Each criterion can contain between 2-10 questions. Each criterion is worth up to 100 points, and is assigned a weight (percentage) of the total questionnaire. The criteria within the dimension roll up to the dimension weight.

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RobecoSAM Environmental Rank

(X6497 – ROBECOSAM_ENV_DIMENSION_RANK on Bloomberg. Bloomberg definition)

Environmental dimension percentile rank, converted from the environmental dimension score, based on the RobecoSAM Corporate Sustainability Assessment.

The Environmental Dimension comprises on average 4-10 criteria covering material, non-financial themes. These themes include general themes like Environmental Reporting, Environmental Policy & Management and Operational Eco-Efficiency as well as cross-industry themes such as Biodiversity, Product Stewardship and Climate Strategy. Individual industries also have industry-specific themes that address specific sustainability risks and opportunities. Each criterion is worth up to 100 points, and is assigned a weight

(percentage) of the total questionnaire. The criteria within the dimension roll up to the dimension weight.

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CDP Integrated Performance Score

(ES736 – CDP_INTEGRATED_PERFORMANCE_SCORE on Bloomberg. Bloomberg definition)

Reflects the level of company commitment to climate change mitigation, adaption, and transparency. CDP scores companies that respond on-time to the questionnaire sent on behalf of an investor request. Bloomberg converts Carbon Disclosure Project (CDP) letter scores to numerical values as follows:

8 – Score A (>87,5%)

7 – Score A (>75%)

6 – Score B (>62,5%)

5 – Score B (>50%)

4 – Score C (>37,5%)

3 – Score C (>25%)

2 – Score D (>12,5%)

1 – Score D (>0%)

0 – F = Failure to provide sufficient information to CDP to be evaluated for this purpose (0%). Not all companies requested to respond to CDP do so. Companies who are requested to disclose their data and fail to do so, or fail to provide sufficient information to CDP to be evaluated will receive an F.

Additional details can be read on CDPs website. Due to a methodological change to how CDP assesses companies, this score will only be populated for 2015 years and forward. Please see CDP Climate Change Performance Scores (ES634, CDP_PERFORMANCE_SCORE) for historic scores from 2014 and back.

ESG Disclosure Score

(RX317 – ESG_DISCLOSURE_SCORE on Bloomberg. Bloomberg definition) NOTE: The score is for **1 calendar year.**

Proprietary Bloomberg score based on the extent of a company's Environmental, Social and governance (ESG) disclosure. Companies that are not covered by ESG group will have no score and will show N/A. Companies that do not disclose anything will also show N/A. The score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point collected by Bloomberg. Each data point is weighed in terms of importance, with data such as Greenhouse Gas Emissions carrying greater weight than other disclosures. The score is also tailored to different industry sectors. In this way, each company is only evaluated in terms of the data that is relevant to its industry sector. This score measures the amount of ESG data a company reports publicly, and does not measure the company's performance on any data point. (From Bloomberg definition)

ISS Quality Score

(X5876 – ISS_QUALITYSCORE on Bloomberg. Bloomberg definition)

Overall score assigned by Institutional Shareholder Services (ISS) to the company's governance practices. The score ranges from 1 for best to 10 for worst. (From Bloomberg definition)

Sustainalitycs Rank

(X6320 – SUSTAINALYTICS_RANK on Bloomberg. Bloomberg definition)

Overall percentile rank assigned to the company based on its environmental, social and governance (ESG) total score relative to its industry peers. For the top 1% the percentile is 99%; for the bottom 1% the percentile is 1%. This is Sustainalytics most comprehensive percentile rank. Aggregate ESG performance encompasses a company's level of preparedness, disclosure and controversy involvement across all three ESG themes.

Sustainalytics offers broad coverage of major global markets and flexible environmental, social and governance (ESG) research tools designed to be easily incorporated into investment processes and systems. (From Bloomberg definition)

(Data retrieved for the last business day of each year)

ESG Score

(Eikon definition)

Refinitiv ESG Score is an overall company score based on the self-reported information in the environmental, social and corporate governance pillars.

Environmental Pillar Score

(Eikon definition)

The environmental pillar measures a company's impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value.

Social Pillar Score

(Eikon definition)

The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. It is a reflection of the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value.

Governance Pillar Score

(Eikon definition)

The corporate governance pillar measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long term shareholder value.

CSR Strategy Score

(Eikon definition)

CSR strategy category score reflects a company's practices to communicate that it integrates the economic (financial), social and environmental dimensions into its day-to-day decision-making processes.

Emissions Score

(Eikon definition)

Emision category score measures a company's commitment and effectiveness towards reducing environmental emission in the production and operational processes.

Innovation Score

(Based on Eikon definition)

Innovation Score measures the ability and possibility to invest in products and services which benefits the customers or environment.

Resource Use Score

(Eikon definition)

Resource use category score reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management.