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Abstract

This thesis explores the relationship between Environmental, Social, and Governance (ESG) scores and company performance within the S&P 500 and STOXX 600 indexes during the Covid-19 pandemic. We investigated ESG scores and different company attributes using three different OLS regression models on two different time periods. The results from our models reveal a complex correlation between ESG scores and financial performance. Our findings demonstrate a negative relationship between high Bloomberg S pillar scores and cumulative stock returns, implying a potential risk of overinvesting in social incentives. In addition, a positive relationship was proven between Bloomberg E pillar scores and returns in the U.S., suggesting potential benefits from environmental investments. This relationship highlights the market valuation of environmental investments prior to exogenous shocks and how it attracts investors due to a lack of trust in the market. Our research found that moderate ESG-scored portfolios gain better returns, while the immoderate ESG score portfolios showed no correlation. The results further highlight investors' disregard for immoderate ESG-scoring portfolios. Our research offers critical insights into ESG investing behavior under exogenous shocks despite the limitations associated with ESG score standardization.

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1 Introduction

Integrating environmental concerns into finance and economics has become increasingly important in recent years. When making investment decisions, investors and funds now commonly consider Environmental, Social, and Governance (ESG) factors. While regulatory and climate risks are widely recognized as significant risks for ESG investments, there is a third major risk that has received less attention in the literature: the risk of trust (Albuquerque et al., 2020; Engelhardt et al., 2021; Lins et al., 2017). This risk has excellent potential for future research and may become increasingly important in the context of the Covid-19 pandemic and future shocks to financial markets. Our thesis aims to address the risk of trust and study its effect on ESG during the pandemic. We will delve into the crucial role that ESG plays in modern finance and economics and explore how it can be used to mitigate the risk of trust prior to global crises.

We observe the move from prioritizing shareholder value to considering a more comprehensive range of stakeholders in decision-making, primarily because of the increasing relevance of ESG variables, bridging the historical importance of environmental economics to current practices. Maximizing shareholder value has traditionally been seen as a company´s primary purpose. The company has a profit-maximizing tactic if they maximize the shareholders' equity (Friedman, 1963). However, a more modern perspective contends that stakeholders, both inside and outside the corporation, are impacted by environmental, social, and governance factors. Known as the stakeholder theory, it introduces a broader focus of the company to include the stakeholders' perspective, not solely focusing on increased shareholder value (Freeman, 1984). This paradigm shift, which is brought on by the growing significance of ESG variables, signals a period in which businesses may no longer be solely accountable to shareholders but also a wide range of stakeholders. This shift presents an opportunity to explore Freeman's thesis further and suggests an approach toward a more sustainable corporate world.

The world faces urgent social and environmental crises, such as poverty and increasing global warming. Among these, climate change, exacerbated by human activities like industrialization, deforestation, and extensive agriculture,

significantly escalates greenhouse gas concentrations (United Nations, 2023). As a result, there have been extraordinary changes in weather patterns and sea level rise, threatening environmental stability and calling for immediate action. Businesses may embrace accountability in this situation and contribute substantially to resolving these problems. The relevance of green or sustainable investing has increased and is frequently categorized using companies' ESG scores, representing their effects on ESG issues. The UN's Intergovernmental Panel on Climate Change (IPCC) underlines that radical changes are required for a successful response to climate change, including significant reductions in the use of fossil fuels and large energy transitions (United Nations, 2023). Despite a surge in ESG investments (GSIA, 2022), research has yet to establish whether green investing yields abnormal returns conclusively.

The focus on ESG is a relatively new topic in the financial industry and lacks an industry-wide framework for assessing and reporting (Christensen et al., 2021). This gap offers an exciting subject for investigation because the creation of such a framework might improve the effectiveness and legitimacy of ESG investing. The focus on ESG in companies is more significant than before, further enhanced by the recent introduction of the EU taxonomy for sustainable activities and more emphasis on sustainable investments (European Commission, 2022). It is currently estimated that over $35.3 trillion in managed assets are invested using sustainable strategies that involve considering ESG factors in investment analysis and portfolio selection (GSIA, 2022). Understanding the actual effects of ESG on investment performance becomes a subject of great interest, given the vast values involved. Although ESG is a hot topic, the literature contradicts whether shareholders care about ESG and the broader economic impact of one's investments. This contrasting perspective further raises the interest of learning more about ESG's actual function and potential advantages within the financial environment.

This interest is further piqued as we consider how ESG investment links financial success with societal and environmental objectives. The use of ESG as a tool to evaluate how well corporate targets and objectives connect with efforts to enable an efficient low-carbon transition is increasingly important. Investments grounded in ESG factors contribute to sustainable finance by aligning these decisions with societal values and sustainability goals. Incorporating ESG variables into asset

allocation, crucial for financial stability and market efficiency, helps mitigate physical and climate transition risks.

The “E” pillar of ESG ratings, which indicates asset selection connected to the transition to a low-carbon economy, is crucial to this investment mechanism. It embodies lowering carbon emissions, making good use of resources, and promoting renewable energy. This useful approach, however, encounters difficulties because “E” pillar ratings do not yet incorporate forward-looking criteria, such as company policy connected to the environment. It is impossible to overestimate the significance of reliable, consistent statistics for tracking businesses' progress toward a low-carbon economy (OECD, 2020). In ESG ratings, the “S” component stands for the crucially important societal component of business operations. It refers to the connections and reputation the company builds within the various communities in which it conducts business. These social interactions cover topics like diversity and inclusion, labor relations, and other issues (Henisz et al., 2019). The governance aspect of a company is represented by the letter "G" in ESG ratings. This is a representation of the internal practices, checks, and procedures that a business uses to manage itself, make wise judgments, abide by the law, and meet the needs of external stakeholders (Henisz et al., 2019).

On March 11th, 2020, the World Health Organization designated the outbreak of the Covid-19 pandemic, a disease caused by the SARS-CoV-2 virus (WHO, 2022). The disease spread to more than 200 countries, directly affecting public health and the economy (FT Visual & Data Journalism team, 2021). Studying the resilience of firms and the significance of environmental, social, and governance (ESG) factors in managing such problems was made possible by the unique environment this global crisis facilitated. Lockdowns worldwide were compromising people's capacity to trade in industries including airlines, retail, leisure, and hospitality. Numerous other sectors were also facing significant and severe issues. The businesses had to maintain the core principles to endure tough times (Deloitte, 2022).

Our research aims to better understand the practical use of ESG in times of global crisis and determine if firms with strong ESG practices were more resilient during the pandemic. We believe there is a gap in the study of ESG impact in times of crisis. As the results in “normal times” seem contradictory, one may observe a

materialization of ESG risk in times of crisis with a lack of trust in the market. The Covid-19 pandemic is an example of such a crisis, without extensive research available. Hence, we would like to investigate the following research question in our thesis: *"Was there a positive relationship between ESG scores and company performance throughout the Covid-19 pandemic?"*

In many countries, companies in vulnerable industries benefited from regulatory differences and subsidies, enabling them to maintain operations. Considering the varying impacts of the pandemic globally, it is intriguing to compare how U.S and European companies fared. This comparison sheds light on the pandemic's effects in diverse regulatory environments. Given that these markets have seen a lot of comparative ESG research, examining and contrasting them is especially fascinating. We want to improve our comprehension of the connection between ESG factors and corporate success in challenging situations like a global pandemic.

Our research is inspired by that of Engelhardt et al. (2021) but exceeds their research in both spans of geography and time. We also implement different measures and models in our analysis. With our thesis, we can test if the results in Engelhardt et al. (2021) hold for a more extended period and a more widespread cluster of firms. Another interesting study who has inspired our thesis was conducted in 2021 by Bae et al. It looks at the impact of Corporate Social Responsibility (CSR) on business performance during the Covid-19 pandemic. CSR refers to a company's ethical sustainability strategies, while ESG measures a company's comprehensive sustainability through environmental, social, and governance impact. These two concepts are intrinsically linked as CSR establishes the ethical framework and ESG provides the metrics for transparently evaluating and demonstrating a company's adherence to that framework (WorldFavor, 2023). We utilize ESG in our regressions to take advantage of the availability of the scores and metrics. At the same time, we are able to compare our results to literature using CRS as the two are closely related and dependent. Our goal is to assess both the European and American markets during this crisis, in contrast to Bae et al. (2021). This will enable us to examine worldwide differences and similarities as well as the impact of various political governance strategies throughout the pandemic. Our thesis also draws significant influence from the research conducted by Lins et al. (2017), who examined the performance of companies during the financial crisis of

2008/09 and lack of trust in the market. In contrast, our aim is to analyze a more recent, yet similarly impactful, market crash.

If our research question is proven right in our data, the importance of ESG ratings will increase for investors. As the ability to forecast market resilience through ESG ratings could radically alter investment strategies and risk management practices. Proving a positive relationship between ESG and performance through periods of crisis, scores based on ESG factors may serve as predictors of safe investment havens. These findings can be essential for risk-averse investors and institutions like pension funds and diverse investment portfolios. Furthermore, since businesses compete for the attention of informed and socially conscious investors, robust results in our thesis could encourage broader adoption of ESG principles in business operations. In the event of future crises, this might increase market sustainability and stability generally.

2. Literature Review and Theory

In the late 18th century, marked by the rise of interest in social and environmental issues, environmental economics began to take shape. It was during this period that Marquis de Condorcet formulated the paradox of voting, which highlighted the harmful effects of air pollution on neighboring homes (Sandmo, 2014). Throughout the centuries that followed, the economic and financial theory evolved to focus more significantly on one´s investments and environmental issues and create economic policy. However, despite the early focus on environmental issues in the 18th century, their actual impact has yet to be fully realized. The early theory implies that going above and beyond the bare minimum of environmental and social norms in Corporate America during the 1950s may have decreased business value, according to Cheffins (2020).

2.1 ESG and financial markets

Over time, perspectives on ESG-related concerns have shifted, and in recent years, ESG ratings have garnered considerable interest in the finance and investment sectors. ESG ratings measure a company's performance in dealing with environmental, social, and governance risks, and it have been linked to the performance of stocks in different ways. ESG risks encompass a range of issues that can potentially cause financial or reputational damage to a company, making it essential to integrate ESG factors into corporate decision-making and risk management (Gorley, 2022). As evident from subsequent sections of this literature review, there is an ongoing debate regarding the impact of ESG factors on corporate performance. Diverse outcomes observed in multiple studies indicate results that need to be more consistent.

A compilation of over 2,000 empirical research papers on the correlation between ESG variables and financial success is analyzed in a paper by Friede et al. (2015). The authors discover a significant correlation between ESG characteristics and financial performance, indicating that sustainable investing can produce financial gains and positive social and environmental effects. Their research finds that positive ESG impact on Corporate Financial Performance (CFP) appears stable over time. Apart from portfolio-related studies, promising findings are found when considering different ESG investing strategies, geographical areas, and emerging

asset classes like corporate bonds, green real estate, and emerging markets. These various factors all exhibit this distinctly favorable empirical finding, highlighting the potential advantages of ESG integration. Many studies reported good results, and almost 90% display a non-negative relationship between ESG and CFP. The article was published in 2015, before the “green wave” and “environmental hype” in the market, indicating that these factors had an impact prior to these trends. Overall, the paper from Friede et al. (2015) highlights that the business incentives for ESG investing is empirically well-founded.

Another study on this field, done by Pedersen et al. (2021), demonstrates that ESG elements and conventional financial analysis are combined in the framework for sustainable investing. This paper investigates how investing in businesses with excellent ESG ratings in a market dominated by non-rational investors can improve financial results and reduce risk. The investor's portfolio dilemma is addressed using an ESG-efficient frontier. With the help of this, investors can achieve the highest Sharpe ratio for each ESG level, depending on the dominance of different investors in the market. As a result, the study highlights the possible benefits of including ESG factors in investment strategies and emphasizes how different types of investor dominance affect the market profitability of ESG investing.

On the other hand, the study by Barber et al. (2021) challenges the notion that ESG leads to better returns. The study found that impact investing, closely tied to ESG principles, leads to an average of 4.7 percentage points lower internal rates of return (IRRs) than traditional venture capital funds. The authors also discovered that investors accepted lower IRRs for impact funds, indicating a willingness to prioritize social or environmental impact over financial returns. Firms with legal restrictions have a low willingness to pay for ESG, suggesting it may be of little importance to investors. Therefore, firms should carefully consider their constraints before pursuing ESG strategies, as it may not necessarily lead to better returns.

Fisher-Vanden and Thorburn (2011) investigate the connection between shareholder wealth and voluntary corporate environmental initiatives (VCEIs). According to the authors, there is no statistically significant difference between companies that use VCEIs and those that do not regarding their financial performance. The study uses event study methodology to analyze the shareholder wealth effects of two voluntary programs. The first program is the EPA's Climate

Leaders program, which targets reductions in greenhouse gas emissions. Ceres is the second program evaluated and includes more general environmental commitments. The results show that maximizing business profit may conflict with corporate promises to minimize greenhouse gas emissions, especially in companies with weak corporate governance or rapid expansion. However, this study was done in 2011, and since then, a lot has happened in this field of research.

2.2 The Covid-19 pandemic

The Covid-19 pandemic and the subsequent stock market crisis in the first quarter of 2020, provides an opportunity to assess the effects of environmental and social (ES) policies in the U.S. stock market (Albuquerque et al., 2020). The unexpected pandemic caused an exogenous shock in the market resulting from health concerns, ultimately causing a market crash. Businesses with higher ES ratings throughout the pandemic saw higher returns, lower return volatility, and higher operating profit margins. To explain the causal link between ES and corporate value, two theories of ES activities based on investor and consumer preferences have been put forth by the authors. Using a difference-in-differences regression methodology to control time-invariant unobservable firm effects, they demonstrated a significant correlation between a firm's ES policies and performance during the crisis. According to the report, the resilience of ES equities depends on the investor and consumer loyalty, underscoring the significance of ES regulations (Albuquerque et al., 2020).

There has been some previous research on company performance during periods of crisis, and one example is “The Value of Corporate Social Responsibility: During the Financial Crisis” (Lins et al., 2017). This article investigates the performance of 1,673 nonfinancial firms with CSR data from the MSCI ESG Stats database during the financial crisis from August 2008 to March 2009. They found that firms with higher CSR scores had four to seven percentage points higher stock returns during the crisis by conducting regression analyses controlling for various factors and firm characteristics. Companies with higher CSR scores also experienced higher probability, growth, and sales per employee.

Similarly, Engelhardt et al. (2021) investigated the relationship between ESG ratings and stock performance during the Covid-19 crisis using an Ordinary Least

Squares (OLS) regression model with country-fixed effects and dummies for high ESG scores. They looked at 1452 publicly traded European companies from 16 different nations over the "collapse period" (from February 3rd to March 23rd 2020) defined by Fahlenbrach et. Al (2020). According to their research, better ESG-rated companies saw higher abnormal returns, with the social score serving as the primary motivator. ESG scores were favorably correlated with cumulative anomalous stock returns despite having a negligible impact on cumulative raw stock returns. The study also emphasized the significance of ESG performance in nations with low levels of trust, poorer security laws, and lower disclosure requirements, where ESG was determined to be value-creating.

Bae et al. (2021) investigated the relationship between CSR and stock market returns during the pandemic and post-crash recovery. Their research, which included a sizable sample of 1750 U.S. companies and solid CSR data from MSCI ESG Stats and Refinitiv ESG, concluded that CSR had little impact on stock performance during the period of the market crash. They found a weak, positive link between CSR and stock returns when a company's CSR initiatives aligned with its institutional setting. The methodology of this study, which spans a wide range of industries, provides insightful information and is a crucial point of comparison for our study on the function of CSR in crises.

Another study also challenging the idea that CSR increases resilience during times of high market uncertainty is Demers et al. (2021). They restrict their sample to U.S. firms, and the study utilizes multiple regression analysis and logit-based models to examine the relationship between ESG scores from Refinitiv and MSCI and stock price resilience during the Covid-19 crisis. They found that a firm's ESG scores did not have a relationship with its stock performance during the Covid-19 crisis. Instead, the study found that spending on internally created intangible assets was a significant factor in determining returns for both the first quarter of 2020 and the entire year. The study assessed how different elements, such as industry affiliation and market-based risk, affected stock returns using returns regression analysis.

2.3 ESG-scores

When evaluating ESG performance, ESG scores are a widely used metric. It is, therefore, essential to know the limitations of using ESG scores offered by different providers in analyzing the relationship between ESG performance and financial performance.

ESG scores offered by different providers significantly vary, leading to inconsistency in the results of ESG analyses. Christensen et al. (2021) analyzed data between 2004 and 2016 from three of the largest providers of ESG ratings to investors: MSCI, Thomson Reuters, and Sustainalytics. They also utilized ESG disclosure scores from Bloomberg to proxy for the extent of firms' ESG disclosure practices. Their results prove that greater transparency of ESG scores may result in more significant provider disagreements, further complicating the analysis.

Additionally, ESG scores may suffer from rewriting bias, which is proven and explored in a study by Berg et al. (2021). They find widespread changes to the historical ratings, indicating a significant rewriting bias for a key rating provider, Refinitiv ESG (formerly ASSET4). Their analysis of two versions of Refinitiv's ESG scores (2011-2017) revealed substantial retroactive alterations following a methodology change in 2020. Refinitiv acknowledged discrepancies in the significance of various ESG factors across industries in its revised methodology. As a result, the company adjusted its scoring system to reflect a zero value for firms that do not report specified metrics. At first, there was a lack of correlation between ESG ratings and stock returns. The new scores, however, made this association stronger, indicating a concerted industry effort to highlight a stronger correlation between historical performance and ESG scores. These findings sparked doubts about the consistency and integrity of ESG assessments. Refinitiv responded by introducing ESG point-in-time data to offer access to historical scores that had not been altered. This rewriting bias finding highlights the importance of carefully scrutinizing ESG scores in studies and investment decision-making.

Several articles included in this thesis rely on Refinitiv and Bloomberg ESG scores, which may introduce bias in the analysis due to the significant difference between ESG scores from various providers, as found in "Aggregate Confusion" by Berg et al. (2022). This article investigates the divergence of ESG ratings based on six

rating agencies. They document the rating divergence and map the different methodologies onto a common taxonomy of categories. They decompose the divergence into scope, measurement, and weights contributions using this taxonomy. They find that ESG ratings from different providers disagree substantially. The disagreement among ESG scores can lead to various consequences, including difficulties in evaluating ESG performance, reduced incentives for companies to improve their ESG performance, impacts on market pricing, challenges in linking CEO compensation to ESG performance, difficulties for empirical research, and overall uncertainty for decision-makers. These factors must be considered when analyzing ESG scores in the data. Therefore, the limitations of using ESG scores from different providers must be acknowledged when conducting ESG analysis.

2.4 Sustainable investing

ESG and company success have a complex relationship, and several external influences, including consumer preferences, have a crucial impact. According to Choi et al. (2020), when local temperatures are unusually high, inhabitants in the local area pay more attention to climate change, which affects their investment decisions. Their analysis of global data demonstrates a positive correlation between heightened attention towards climate change, as measured by Google search volume, and anomalous high local temperatures. They discover that businesses with greater exposure to global warming have poorer stock returns in times with anomalous high local temperatures, underscoring the significance of considering environmental risks when making sustainable investment decisions.

Another study that adds to the evidence supporting the importance of the field of ESG studies is “Do investors care about carbon risk?” by Bolton and Kacperczyk (2021). The authors find that investors consider carbon risk while making investment decisions. By using an empirical analysis of the cross-section of U.S. stock returns, their research indicates that investors already demand compensation for exposure to the risk of carbon emissions. The demand for compensation leads to companies with higher total CO2 emissions needing to generate higher profits. Bolton and Kacperczyk’s conclusion emphasizes the importance of not-sustainable investors taking environmental hazards risks into account.

A recent study by Bonnefon et al. (2022) aimed to understand investors' moral preferences when choosing stocks with varying ethical features using an experimental auction setting. The findings reveal that investors favor social and ethical factors over financial gains, which points to a growing trend toward sustainable investing. This study disproved the "selfish investor hypothesis" and underlined the importance of matching investments with personal values and beliefs. Assessing how shareholders evaluated a company's ethical behavior showed that participants were willing to pay an extra seven dollars on average to invest in a company that gave more money per share to charity.

An article by Baker et al. (2018) reveals an interesting trend within the sphere of green bonds, bonds designated for environmentally sensitive purposes. The study shows that these bonds are issued at a premium with concentrated ownership, especially when they are externally certified as green. This trend exhibits investors' preference for sustainable investments, which remains despite potentially lower returns. Subsequent to this finding, we delve into the concept of ESG premiums, which suggests investors' readiness to pay more for companies with high ESG scores, indicating alignment with their ethical or sustainable values. Despite possible risks of lower returns due to factors like operational costs or crises, recent research points towards a growing trend in this direction. According to a McKinsey Global survey, 83% of executives and investment professionals predict ESG programs will generate greater shareholder value, influencing their willingness to pay a 10% premium for companies with good ESG records (McKinsey, 2020). The connection between this outlook and the findings by Baker et al. (2018) highlights the growing prioritization of sustainability within investment decisions.

A considerable part of the research on sustainable investing is based on the response of American investors. Because we are investigating the European and the U.S. markets, we believe a broader perspective and comprehension of geographical distinctions is essential. The insights are made possible by looking at multiple markets throughout the same period. According to Edmans et al. (2014), stock returns are positively correlated with employee happiness in nations with highly flexible labor markets. Looking into 30 countries, they conducted a regression analysis to estimate the effect of employee satisfaction on future stock returns. Companies with high employee satisfaction prioritize social and human capital,

which can improve financial performance and correspond with sustainable investing principles.

2.5 Shareholder- & stakeholder- theory:

Shareholder and stakeholder theories are well known and can be utilized to analyze the connection between ESG and financial performance. The stakeholder theory claims that a company should consider the interests of all parties (stakeholders) when making decisions. On the other hand, the shareholder theory claims that a company's duty is to maximize the shareholders' profits. Both ideas will be elaborated on in the following sections.

2.5.1 Shareholder theory

In Capitalism and Freedom, Milton Friedman (1963) presented the shareholder theory and claimed that a company's main duty to the shareholders is to increase their profit and compensate them for their investment. According to shareholder theory, no company should have social commitments to external parties, making it possible for the shareholders to decide how they contribute to society. Considering too many stakeholders' interests results in difficulties for managers in making purposeful decisions for the company (Jensen, 2001). When the company provides the best investment prospects, the shareholder theory supports sustainable investments if those initiatives are the best investments of capital available. (Smith, 2003). As a result, investments in projects that increase ESG factors should only be considered if they also contribute to a premium. However, separation of ownership and control in large enterprises can lead to management that performs unfavorably to the interests of shareholders. Therefore, ESG focus in a large company can lead to managers supporting ESG-related projects because of personal benefits (Fama & Jensen, 1998).

2.5.2 Stakeholder theory

Freeman (1984) initially introduced the Stakeholder theory as a reaction to the shareholder theory. This theory claims that a company should run in a way that profits the stakeholders, which means all involved parties. This includes consumers, suppliers, debtors, employees, the neighborhood, and more. According to the hypothesis, a correctly run company balances all stakeholders' interests, which may lead to more effective management and, ultimately, better outcomes for the organization. Supporters of the stakeholder theory claim that by strengthening stakeholder relationships and implementing effective CSR initiatives, companies

can promote trust, lower management costs, and eventually improve their financial performance (Jamali, 2008). Investments in human relations can also be positive for firm performance and increase stakeholder loyalty, especially the loyalty of employees (Huselid, 1995). However, empirical data show that financial performance and multiobjective value maximization with stakeholder interests have a complicated and variable relationship (Margolis & Walsh, 2003).

2.6 The U.S and European markets

The financial markets in the U.S. and Europe have different structures. While NYSE and Nasdaq are dominating the American financial business, it is also affected by solid regulations (U.S. Securities and Exchange Commission, 2023). Due to the presence of more exchange platforms, like the London Stock Exchange, Euronext, and Deutsche Börse, the European market is more fragmented (Draghi, 2019). The SEC controls the financial markets and is often more responsible for the regulatory environment in the U.S. (U.S. Securities and Exchange Commission, 2023). On the other hand, the EU has a more spread regulations structure, with several institutions responsible for implementing financial regulations in different member countries (European Parliament, 2023). The differences in the regulatory framework can help explain companies' performance during Covid-19.

These different financial structures and regulations can be used as an explanation for the discrepancies between the S&P 500 and the STOXX 600 indexes. First, while the STOXX 600 includes a more diversified group of companies from different European countries (Qontigo, 2023), the S&P 500, a barometer for the American market, primarily comprises large-cap U.S. companies (Reiff, 2023). Given the diversity of responses to the pandemic among European nations, this economic diversification has probably resulted in a wider range of performance within the STOXX 600 index (Pacces & Weimer, 2020).

Second, the influence of currency cannot be disregarded. The STOXX 600, exposed to various currencies, including the Euro, British Pound, and Swiss Franc, experienced shifting exchange rates during the pandemic, in contrast to the S&P 500, which only deals with U.S. dollars. According to a study, Covid-19 policy measures led to unusual returns in the foreign exchange markets, which impacted these rates. Major currencies responded inconsistently to these policies,

complicating the indexes' performance, while minor currencies, also part of STOXX 600's exposure, reacted more strongly. Additionally, in turbulent times, the Euro and Japanese yen strengthened against the U.S. dollar, potentially influencing how these indexes performed in relation to one another (Beckmann & Czudaj, 2022).

Finally, an important difference is the sectoral mix of the indexes. Technology businesses, which have mostly prospered during the pandemic because of the surge in digital services (Scheid, 2021), account for a sizeable portion of the S&P 500 (Reiff, 2023). In contrast, the STOXX 600 had a different composition. Notably, because of their close ties to China, the outbreak's epicenter, STOXX 600 carried a high risk of exposure to businesses severely impacted by the pandemic. A lot of these businesses encountered supply chain interruptions, which led to a reduction in Chinese revenue. Non-consumer-facing industries like mining were particularly affected because Chinese demand decreased. Both issues severely impacted the STOXX 600's significant losses at the time, adding another level of comprehension to how both indexes performed in comparison throughout the outbreak (Thyagaraju & Ponthus, 2020).

In conclusion, differing market structures, regulations, currency exposures, and sectoral compositions can be used to explain the performance differences between the S&P 500 and the STOXX 600 during Covid-19. These differences underscore how the U.S. and European financial markets respond differently to global crises.

2.7 Refinitiv and Bloomberg ESG scores

Bloomberg and Refinitiv both use unique ESG rating matrices. Refinitiv's ESG score methodology is distinguished for its openness and regular application in prior studies. It has existed since 2002 and covers over 10,000 firms, making up 80% of the global market capitalization. Based on comparability, industry-specific relevance, and the availability of ESG data, over 630 ESG parameters are aggregated and distributed among 186 underlying estimations. The three core pillars are then structured using these metrics and divided into ten sub-categories. An increase in the score, which ranges from 0 to 100, indicates better ESG performance. Within this specified range, category scores are calculated and transformed into letter grades from D- to A+. The methodology employed by Refinitiv for ESG factors is based on data, and it is designed to adjust for potential biases related to the industry, firm size, and transparency, with the aim of producing comprehensive and neutral evaluations. Resource use, innovation, and emission are included in the environmental pillar. The social pillar covers community involvement, human rights, product responsibility, and workforce welfare. And as for the governance pillar, it assesses a company's management, shareholder relations, and CSR approach (Refinitiv, 2022).

Bloomberg's ESG scores, on the other hand, are determined using a mix of company-reported data, data from outside sources, and analysis conducted by Bloomberg. The scores range from 0 to 100 and a higher ESG score denotes superior ESG performance. Bloomberg gives estimates based on either a machine-learning innovative model or an industry-implemented model to broaden the range of businesses covered and offer a more comprehensive picture of emissions. This allows them to provide more comprehensive and up-to-date ESG scores than traditional methods that depend solely on company disclosures. Notably, Bloomberg focuses mainly on the quality of disclosure, which affects how the scores are determined and perceived (Berg et al., 2022). Bloomberg ESG scoring system evaluates several parameters and prioritizes various issues within its pillars. The Environmental pillar assesses aspects such as air quality, greenhouse gas (GHG) emissions, climate exposure, and water use. Meanwhile, the social pillar examines factors including business ethics, labor and employment practices, health and safety policies, and operational risk management. Under the governance pillar, two main areas are assessed, board composition and executive compensation. Board

compensation evaluates the relative performance of companies across key areas such as diversity, refreshment, director roles, and independence. While executive compensation measures the relative performance of companies in aspects such as incentive structure, pay for performance, and pay governance (Bloomberg, 2023).

Refinitiv's ESG scores use over 630 parameters within three pillars to correct for biases (Refinitiv, 2022). Berg et al. (2021) found that these scores were significantly altered retrospectively multiple years after release. Therefore, claims about better financial performance during the Covid-19 crisis based on revised scores might not reflect the reality faced by investors at the time, as this can be a result of rewriting bias. Bloomberg's ESG scores differ from Refinitiv as they utilize a combination of company and external data processed through machine-learning algorithms to offer comprehensive emissions insights (Bloomberg, 2023). However, it's important to note that if these algorithms are trained on non-representative data, there is potential for biases to emerge in the resulting ESG scores. Grewal et al. (2020) found in their study using ESG disclosure data from Bloomberg firms, on average, provide only about 18% (median: 13%) of the prescribed SASB disclosure items, pointing to substantial noncompliance or underreporting of vital CSR information. This highlights the fact that regulations and selective non-disclosure can severely impact the credibility of these scores.

Despite their data collection and processing differences, Refinitiv and Bloomberg face similar difficulties regarding ESG grading. The accuracy and completeness of company-reported data is frequently a determining factor in the credibility of scores. The variety of ESG criteria and legal frameworks across companies and nations makes it more challenging to standardize scores. This discrepancy emphasizes the need for careful ESG rating application and the requirement for close attention to the underlying data. Creating a unified ESG category system and standardized reporting strategy could make data more reliable, easing comparisons of ratings. This would assist investors in concentrating on regions with significant rating disparities and assist regulators in understanding the advantages of a comprehensive ESG reporting system.

3 Methodology and Hypothesis

In the earlier sections, we discussed the relevant literature and theoretical frameworks. In the following section, we will present variables, models, and hypotheses that will be used to test our research question: *Was there a positive relationship between ESG scores and company performance throughout the Covid-19 pandemic?* The section is divided into five parts, where the variables are presented in the first part. In the latter two parts, we describe the model structure and hypothesis tests we use further in our thesis. The fourth part contains model validity, and the final part lists the hypothesis we are testing for.

Our hypotheses and methodology are inspired by the work of Engelhardt et al. (2021) and Bae et al. (2021), among others. Englehardt et al. (2021) found significant relations between ESG scores and performance for companies with higher than median ESG scores in each country over the "collapse period". The paper also indicates that the effect is value-enhancing in low-trust countries, countries with poorer security regulations, and where lower disclosure standards prevail. Bae et al. (2021) also found country-specific effects for the U.S. market using states instead of countries. In contrast to these papers, we reach beyond their findings of effects within one country or state to focus on market-wide effects. We know that there is a country/state -effect of ESG in Europe and the U.S., but none of the papers mentioned have thoroughly explored a market-wide ESG effect during the Covid-19 pandemic.

In addition, we intend to conduct a two-year study examining the American and European markets. This will enable us to observe the effects of crises on businesses over time, giving us a more thorough picture of their performance. This strategy expands on the work of Lins et al. (2017) and Engelhardt et al. (2021) but goes further by examining the findings' global applicability over a longer time frame. In essence, research on the roles of CSR and ESG over a wide range of markets and a long period of time promises to expand our knowledge of the importance of these factors in a company's ability to withstand crises.

Our methodology, therefore, reflects inspiration from Englehardt et al. (2021), Bae et al. (2021), Lins et al (2017), Albuquerque et al. (2020), and more. This ensures that our results can be compared to those of the mentioned papers.

3.1 Description of regression variables

This section will present and briefly describe the different variables used in our regression models. These are downloaded from the Bloomberg terminal and are selected with inspiration from previous studies on the field of sustainable investing during period of crisis.

3.1.1 Dependent variable

We choose financial performance in the form of cumulative returns as our dependent variable. To measure financial performance, we used daily closing prices from the Bloomberg terminal over the time span of two years from February 1st, 2020. The use of closing prices to measure financial performance is the best practice and the most used measurement for financial performance in similar literature (Engelhardt et al., 2021; Lins et al., 2017). We have chosen to use raw cumulative returns instead of abnormal returns as the benchmark for the abnormal return will be the same proxy as the benchmark in our data. We also chose not to implement a risk-free rate as the results would be proportionally equal.

3.1.2 Independent variables

As our independent variable, we use different ESG measures depending on the model. The complete ESG score is the first independent variable, denoted ESGR (ESG score from Refinitiv) and ESGB (ESG score from Bloomberg). Our second measurement is also the most used for papers on ESG and involves the different pillar scores for environment, social, and government. The different pillar scores are denoted in the same manner as the ESG score, as ER (environmental pillar score from Refinitiv), SR (social pillar score from Refinitiv), GR (government pillar score from Refinitiv), EB (environmental pillar score from Bloomberg), SB (social pillar score from Bloomberg), and GB (government pillar score from Bloomberg). As for the complete ESG score, the last letter denotes from which database the data is collected. When choosing this approach, we follow the work of Lins et al. (2017), Engelhardt et al. (2021), and Bae et al. (2021).

The last independent variable score is created from an investment point of view. We create three weighted portfolios based on the company's ESG scores. We are using the 33rd percentile and 66th percentile as cut-off values to sort the companies into different portfolios. The companies scoring above the 66th percentile are

weighted and pooled into Portfolio 1. The variable is a dummy variable and is denoted with DR1(dummy variable for highest Refinitiv ESG portfolio), DR2 (dummy variable for second highest Refinitiv ESG portfolio), DR3 (dummy variable for lowest Refinitiv ESG portfolio), DB1 (dummy variable for highest Bloomberg ESG portfolio), DB2 (dummy variable for second highest Bloomberg ESG portfolio), and DB3 (dummy variable for lowest Bloomberg ESG portfolio). This approach is similar to the one of Engelhardt et al. (2021) but differs as our dummies are portfolio-inspired and capture the entire scope of ESG scores.

3.1.3 Control variables

The control variables are inspired by the work of Lins et al. (2017), Engelhardt et al. (2021), Albuquerque et al. (2020), and Bae et al. (2021) and represent standard control variables in this field of research. All variables are shown below with their denotation and brief description.

Table 3.1.1.1 Overview of control variables

Denotation	Control variable	Description
PtB	Price to Book value	The Price-to-Book ratio can assist in identifying overvalued corporations. It is vital to recognize that this metric is not without limitations and its efficacy may vary.
Tot.Ass	Total Assets	Total assets are the aggregate value of all assets owned by an individual, company, or organization as recorded in their books. This measure is frequently employed in debt covenants and net worth evaluations.
MarketCap	Market Capitalization	Market capitalization is the aggregate worth of a company's outstanding stock shares, obtained by multiplying the stock's price by the total number of shares held by investors. This financial metric provides insight into a company's size and market value.

Rev12	Revenue over the last 12 months	Revenue over the last 12 months are measured by taking all revenue accumulated over the last 12 months until February 1st , 2020.
LTDebt	Long Term Debt	Long-term debt refers to the type of financial obligation that has a maturity date exceeding one year.
STDebt	Short Term Debt	Short-term debt refers to the type of financial obligation that has a maturity date not exceeding one year.
Freecash	Free Cash Flow	Free cash flow (FCF) is a financial indicator that indicates the cash generated by a company after adjusting for cash outflows required to maintain its capital assets and support its ongoing operations.
BtS	Book to Share	BtS is a financial ratio that expresses the equity available to a shareholder for each outstanding share. It indicates the firm's minimum equity value and provides a per-share assessment of its financial position.
FinLeverage	Financial Leverage	The amount of borrowed money used in funding.
Vol.360	Volatility over the previous 360 days	The fluctuation of the share price over the last 360 days to measure the previous fluctuation of the share price.
ROE	Return on Equity	Financial performance indicator dividing a company's net income by its shareholders' equity. This metric provides insights into how effectively a company generates profits from the capital invested by its shareholders.
ROA	Return on Assets	Financial ratio that measures profitability in relation to total assets. Used to

		evaluate how effectively a company uses its assets to generate profits.
ROIC	Return on Invested Capital	A financial measure to evaluate the efficiency of capital deployment in profitable investments. The calculation involves dividing the net operating profit after tax by the invested capital.

One of the vital control variables is debt, which should be monitored closely to prevent financial instability during times of crisis. Accumulating too much debt can increase the risk of liquidity issues for companies and lead to defaulting on payments, which can lead to insolvency in the worst case. Previous research has emphasized the need to prioritize avoiding excessive debt before a crisis hits to maintain stability and avoid volatility (Lins et al., 2017). Debt is also crucial, as less debt can lead to further investments in times of crisis, which again can lead to better stock performance (Almeida et al., 2012; Demers et al., 2021; Harford et al., 2014).

3.2 Model structure

All models will be run twice as OLS regressions, first with Bloomberg scores and later with Refinitiv scores. This implies that the variables denoted with an "xR" (Refinitiv) will be run with the denotation "xB" (Bloomberg) as well.

3.2.1 Model 1 - Total ESG score

$$CumRet = \alpha + \boldsymbol{\beta_1 ESGR} + \beta_2 MarketCap + \beta_3 LTDebt + \beta_4 STDebt + \beta_5 Tot.Ass. + \beta_6 FreeCash + \beta_7 BtS + \beta_8 FinLeverage + \beta_9 Rev12 + \beta_{10} PtB + \beta_{11} Vol.360 + \beta_{12} ROE + \beta_{13} ROA + \beta_{14} ROIC + \varepsilon$$

3.2.2 Model 2 – ESG Pillar scores

$$CumRet = \alpha + \boldsymbol{\beta_1 ER} + \boldsymbol{\beta_2 SR} + \boldsymbol{\beta_2 GR} + \beta_4 MarketCap + \beta_5 LTDebt + \beta_6 STDebt + \beta_7 Tot.Ass. + \beta_8 FreeCash + \beta_9 BtS + \beta_{10} FinLeverage + \beta_{11} Rev12 + \beta_{12} PtB + \beta_{13} Vol.360 + \beta_{14} ROE + \beta_{15} ROA + \beta_{16} ROIC + \varepsilon$$

3.2.3 Model 3 – ESG-Portfolio dummies

$$CumRet = \alpha + \boldsymbol{\beta_1 DR1} + \boldsymbol{\beta_2 DR2} + \beta_3 MarketCap + \beta_4 LTDebt + \beta_5 STDebt + \beta_6 Tot.Ass. + \beta_7 FreeCash + \beta_8 BtS + \beta_9 FinLeverage + \beta_{10} Rev12 + \beta_{11} PtB + \beta_{12} Vol.360 + \beta_{13} ROE + \beta_{14} ROA + \beta_{15} ROIC + \varepsilon$$

3.3 Hypothesis tests

We will use two types of hypothesis tests to test the significance level of our regressions. Below we will introduce and explain both tests and their usage in our thesis.

3.3.1 Individual hypothesis test:

The t-test is the most used statistical measurement for hypothesis testing in similar articles to evaluate whether the means of two populations are significantly different. It is a parametric test that assumes the data conforms to a normal distribution and that the variances of the populations are equal. The test employs a test statistic that follows a Student's t-distribution when the null hypothesis is true. The t-test is often applied when the sample size is small, and the population variance is unknown. When the sample size is large, the t-test can be replaced by the z-test, which assumes a normal distribution and a known population variance. In our thesis, we use the t-test to test if our results are significant at 5%, 1%, and 0% significance levels.

The t-test is calculated involving several steps. Firstly, we need to calculate the sample means (x1 and x2) and sample variances ($v1^2$ and $v2^2$) from the two

populations being compared. Secondly, we calculate the pooled variance (v^2) using *formula 3.3.1.1.*

Formula 3.3.1.1. To calculate the pooled variance.

$$v^2 = \frac{(n1 - 1)\, v1^2 + (n2 - 1)\, v2^2}{n1 + n2 - 2}$$

where n1 and n2 are the sample sizes.

Once we have the pooled variance, we can calculate the t-statistic using *formula 3.3.1.2.*

Formula 3.3.1.2. To calculate the T-statistic

$$t = \frac{x1 - x2}{[v^2 (\frac{1}{n1} + \frac{1}{n2})]^{0.5}}$$

We then determine the degrees of freedom (df) using *formula 3.3.1.3.*

Formula 3.3.1.3. To calculate the degrees of freedom.

$$df = n1 + n2 - 2$$

Finally, we look up the critical value of t from a t-distribution table using the significance level and degrees of freedom. If the calculated t-value exceeds the critical value, we reject the null hypothesis; otherwise, we fail to reject the null hypothesis. For our thesis, we will use the t-distribution table provided by UCLA.

We will use a t-test to test all models to ensure that the independent variables are individually significant. For model one, two, four, and five, we will use the t-test as the primary hypothesis test to look for causation for one variable to cumulative returns.

3.3.2 Joint hypothesis test

The F-test assesses the likelihood of the observed or more intense relationship in the regression analysis occurring by chance. In linear regression, where one independent variable is used to predict the dependent variable, the t-test and the F-test produce identical results. However, in multiple regression, the t-test determines the probability of the individual independent variables' relationship with the dependent variable or a more extreme one occurring by chance. The F-test assesses the overall likelihood of the relationship or one more extreme between the dependent variable and all the independent variables occurring by chance.

The F-test compares the variances of two or more populations. It is a parametric test that assumes that the populations are normally distributed and independent of each other. The F-test employs a test statistic that follows an F-distribution when the null hypothesis is true. The null hypothesis is that the variances of the two or more populations are equal, while the alternative hypothesis is that they are not equal. The F-test is often used to analyze variance to compare the variability between groups with the variability within groups. The F-test is also commonly used in regression analysis to test the significance of the overall model fit. To calculate the F-test, we use *formula 3.3.2.1*.

Formula 3.3.2.1. To calculate the F-test statistics

$$Test\ stat = \frac{RRSS - URSS}{URSS} \times \frac{T - k}{m}$$

The critical value of the F-ratio is obtained from an F-distribution table using the degrees of freedom and the significance level. If the test statistic is greater than the critical value, we reject the null hypothesis and conclude that the variances of the two or more populations are unequal. In our thesis, we use this hypothesis test for models containing more than one independent variable. We will use the F-distribution table provided by UCLA to find critical values with three decimal point accuracy.

3.4 Model validity

3.4.1 Omitted variable

The use of an inadequate model can lead to biased and inconsistent estimated coefficients, as well as upwardly biased standard errors due to omitted variable issues. To encounter such an issue, the omitted variable must affect both the dependent variable and at least one independent variable. If we exclude an explanatory variable, the error term captures the variance, which can lead to inaccurate estimations (Brooks, 2019). Our choice of independent and control variables for our thesis is based on fundamental financial theory, economic importance, and previous academic research findings (Albuquerque et al., 2020; Engelhardt et al., 2021). The effect of ESG performance on financial performance is a relatively new area of study, and the proper drivers of these relationships have yet to be fully understood.

3.4.2 Dummy Variable Trap

Our third regression method (Model 3 and 6) demonstrates the principle of incorporating dummy variables to denote distinct portfolios. Specifically, if a regression model is to have different intercepts for *n* portfolios, *n-1* dummy variables should be included in the model along with an intercept. The intercept for the reference or base group is the overall intercept in the model. The coefficient of the dummy variable for a particular portfolio indicates the estimated difference in intercepts between that portfolio and the base portfolio. However, including *n* dummy variables and an intercept can result in a Dummy Variable Trap. To avoid this, an alternative approach is to include *n* dummy variables and exclude an overall intercept. Although incorporating *n* dummies without an overall intercept is sometimes helpful, it has two practical drawbacks. Firstly, testing for differences relative to a base portfolio makes it more cumbersome. Secondly, regression packages usually modify the computation of R-squared when an overall intercept is not included.

For our thesis in Models 3 and 6, we have chosen to exclude dummy variables DR2 and DB2 to avoid the Dummy Variable Trap. This implies that we are using *n-1* dummy variables in our regressions. We exclude Portfolio 2 as our focus is the immoderate portfolios denoted by DR1, DB1, DR3, and DB3.

3.4.3 Reverse causality

The next potential concern regarding the validity of our findings pertains to the issue of reverse causality. This occurs when *x* causes *y*, while *y* also causes *x*. Prior research addressing the impact of ESG performance has employed various approaches to mitigate the risk of reverse causality, as documented in the literature (Brooks, 2019). Reverse causality in our data is dealt with by freezing the attributes from the start of the period and using a portfolio-like model to regress the attributes on the cumulative return at the end of the period. The price-to-book ratio may provide reverse causality in the short run as the price is a factor in both the dependent variable (CumRet) and the control variable (PtB). However, this will not affect our mid to long-run analysis using aggregated cumulative returns.

3.4.4 Measurement error

An error in measuring the independent or dependent variables can cause biased and inconsistent coefficients (Brooks, 2019). Errors in the data sample or inaccurate data reporting can cause this. To the best of our knowledge, there is no evidence of mistreatment of the data sample. However, the main concern is the potential errors in the independent variables, particularly the estimation of ESG scores. The majority of ESG scores are based on voluntary reporting and lack a standardized framework (Berg et al., 2022). Although these issues are currently under global discussion, they are beyond the scope of this thesis. Moreover, our conclusions only apply to the specific Refinitiv ESG measure used in this study. To mitigate potential issues, we also implement the ESG score provided by Bloomberg. However, the possibility of a measurement error in the ESG scores remains in the current state throughout our measurements.

In addition to the ESG scores, the market behavior at the start of the period may have affected our data. Our attributes may result from market reactions right before the Covid-19 pandemic (Choi et al., 2020). It may also suffer from the news about the future pandemic spreading at that point in time. These theoretical effects may affect our attributes before and on February 1st and therefore alter our results. We choose not to investigate the trend of our attributes and information flow in the market as this is outside the scope of our thesis. Therefore, we will trust that the data gathered is reliable as Englehart et al. (2021) use similar timeframe and attributes in their research.

3.4.5 Multicollinearity

Multicollinearity can manifest in two different ways: perfect and near-perfect multicollinearity. Perfect multicollinearity occurs when one or more independent variables are a linear function of another independent variable, rendering coefficient estimation impossible (Brooks, 2014). However, the occurrence of perfect multicollinearity is rare during regression analysis. Near-perfect multicollinearity is a common problem evidenced by high r-squared, significant standard errors of the estimated coefficients, and high sensitivity when adding or dropping variables. Although near multicollinearity yields a model with high explanatory power, the independent coefficients become insignificant. Detecting this issue requires identifying an exceptionally high correlation between the dependent and independent variables. We will control for multicollinearity in our robustness test of our results.

3.4.6 Rewriting bias

Rewriting bias is an ESG-related bias proven by Berg et al. in 2021. The effect of rewriting ESG scores up to five years back in time has been standard for Refinitiv. In addition to the communicated five years rewrite, Berg et al. finds that Refinitiv rewrites ESG scores up to several more years back in time. This rewriting makes ESG scores more relatable to stock returns and will allow Refinitiv to alter the ESG scores so that they appear to predict stock returns. The ESG scores are altered later, more than five years after they were officially released. This bias has only been proven for Refinitiv and may also be common for other ESG firms. Our claims of this are not anchored in facts. However, the increase in ESG awareness and the massive profit in the market for ESG providers increase the incentives for companies like Refinitiv to show a better track record to potential buyers.

3.5 Hypothesis

The use of hypotheses is doubled for our master thesis. We will test all hypotheses 1a to 3a for the entire period in our data set and the collapse period individualy. The control hypotheses 4a to 4c will only be used for the entire control period to check for abnormal trends in a random time period with significant data availability.

3.5.1 Model 1 & 3 hypothesis

3.5.1.1 Hypothesis 1a:

Question: Are higher ESG scores related to better financial performance for firms in the S&P 500 and STOXX 600 indexes during the pandemic period?

H_0: *There is no relationship between ESG score and CumRet.*
H_1: *There is a relationship between ESG score and CumRet.*

3.5.2 Model 2 & 5 hypothesis

3.5.2.1 Hypothesis 2a:

Question: Are higher Environmental scores related to better financial performance for firms in the S&P 500 and STOXX 600 indexes during the pandemic period?

H_0: *There is no relationship between ER / EB and CumRet.*
H_1: *There is a relationship between ER / EB and CumRet.*

3.5.2.2 Hypothesis 2b:

Question: Are higher Social scores related to better financial performance for firms in the S&P 500 and STOXX 600 indexes during the pandemic period?

H_0: *There is no relationship between SR / SB and CumRet.*
H_1: *There is a relationship between SR / SB and CumRet.*

3.5.2.3 Hypothesis 2c:

Question: Are higher Government scores related to better performance for firms in the S&P 500 and STOXX 600 indexes during the pandemic period?

H_0: *There is no relationship between GR / GB and CumRet.*
H_1: *There is a relationship between GR / GB and CumRet.*

3.5.3 Model 3 & 6 hypothesis

3.5.3.1 Hypothesis 3a:

Question: Are higher ESG-rated portfolios related to better performance for firms in the S&P 500 and STOXX 600 indexes during the pandemic period?

H_0: *There is no relationship between DR1, DR2 or DR3/ DB1, DB2, or DB3 and CumRet.*
H_1: *There is a relationship between DR1, DR2 or DR3/ DB1, DB2, or DB3 and CumRet.*

3.5.4 Control period hypothesis

3.5.4.1 Hypothesis 4a:

Question: During the control period, are higher ESG scores related to better performance for firms in the S&P 500 and STOXX 600 indexes?

H_0: *There is no relationship between ESGR / ESGB and CumRet.*
H_1: *There is a relationship between ESGR / ESGB and CumRet.*

3.5.4.2 Hypothesis 4b:

Question: During the control period, are higher Environmental scores related to better financial performance for firms in the S&P 500 and STOXX 600 indexes?

H_0: *There is no relationship between ER / EB and CumRet.*
H_1: *There is a relationship between ER / EB and CumRet.*

3.5.4.3 Hypothesis 4c:

Question: During the control period, are higher Social scores related to better financial performance for firms in the S&P 500 and STOXX 600 indexes?

H_0: *There is no relationship between SR / SB and CumRet.*
H_1: *There is a relationship between SR / SB and CumRet.*

3.5.4.4 Hypothesis 4d:

Question: During the control period, are higher Government scores related to better financial performance for firms in the S&P 500 and STOXX 600 indexes?

H_0: *There is no relationship between GR / GB and CumRet.*
H_1: *There is a relationship between GR / GB and CumRet.*

3.5.4.5 Hypothesis 4e:

Question: During the control period, are higher ESG-rated portfolios related to better financial performance for firms in the S&P 500 and STOXX 600 indexes?

H_0: *There is no relationship between DR1, DR2 or DR3/ DB1, DB2, or DB3 and CumRet.*
H_1: *There is a relationship between DR1, DR2 or DR3/ DB1, DB2, or DB3 and CumRet.*

4 Data

In the following section, we describe the data collection, cleaning process and the descriptive statistics of our sample data. This section comprehensively explains the data sample utilized in our research. This includes a detailed description of the merging and cleaning approach used on the data collected. The section culminates in the descriptive statistics and correlations among the regression variables and ESG correlations.

4.1 Data collection

In our data collecting, we utilized the Refinitiv Eikon database (Refinitiv) and the Bloomberg Terminal (Bloomberg) to obtain the necessary pillar scores and ESG scores for the companies in the S&P500 (Table 4.1.1.1) and STOXX 600 (Table 4.1.1.2) indexes. We employed the Excel add-in feature to filter two distinct data sets, providing the Refinitiv ESG pillar scores and total scores for each company. We also used a template for historical ESG to download the ESG scores and pillar scores from Bloomberg. We ensured that the relevant date for the data retrieval was set to February 1st, 2020, consistent with our selected period.

Next, we utilized the Bloomberg historical data table builder to obtain the attributes for the same set of companies. Specifically, we filtered the relevant companies using pre-saved indexes to ensure historical accuracy and retrieved the control variables from February 1st, 2020. One advantage of using Bloomberg to retrieve the company attributes was that the ticker and company names were consistent with ESG data received from Bloomberg.

The use of Refinitiv and Bloomberg enabled us to retrieve reliable and comprehensive data sets for our analysis. We employed a VBA (Visual Basic Editor) coded function to filter and organize each company's attributes and data, ensuring that the relevant date and companies were consistent for all data collected. Similarly, we used the Bloomberg historical data table builder to retrieve the daily closing prices for the selected companies from February 1st, 2020, to February 1st, 2022, taking advantage of the consistency between the tickers and short names of the attributes, ESG data, and closing prices.

Using the VBA coded function in Excel allowed us to organize and analyze relevant data efficiently and accurately. This ensured that we could generate reliable data for our regression analysis.

4.1.1 Aligning data

A challenge emerged while integrating ESG data from Refinitiv and attributes from Bloomberg into a combined dataset. Specifically, the tickers employed in Refinitiv diverged from those used in Bloomberg, causing misalignment during the data integration process. To overcome this obstacle, we manually reconciled the differing tickers by leveraging the similarities in the "short name" and "ticker" columns for both data providers, resulting in successfully translating the tickers and subsequently combining the Refinitiv ESG data with the attribute data from Bloomberg. To ensure the accuracy of our ticker alignment, we reconstructed the tickers by reverse-engineering the process.

4.1.2 Missing data

Upon consolidating our data sets into two attribute- and two historical closing prices- sheets, we encountered issues with missing data. Particularly, we observed several blank ESG scores and pillar scores, rendering the ESG attributes incomplete. As these attributes play an essential role in our regression analysis, we deemed excluding companies without complete ESG data from both providers necessary. We aimed to ensure that our results accurately reflect the real impact of available information at the time of the investment decision. Therefore, we did not use average values or zeros to deal with missing ESG data, as it was crucial to avoid a higher frequency of average measurements or zeros that could disrupt the clarity of our findings.

Furthermore, we also identified missing observations in the dataset containing closing prices, which could compromise the robustness of our results. We ensured the missing observations were appropriately marked as NAs to mitigate this issue. Furthermore, we manipulated all formulas to exclude NAs as they would have interfered with summaries and portfolio assigning. We followed the established methodology of using log returns and cumulative returns to regress the attributes to the result at the end of our measuring period.

Another challenge we faced was missing attributes. To address this issue, we opted to exclude the specific attribute at one point in time for one company. We believe this would not significantly impact our results as there were few missing attributes. We utilized NAs to ensure that the regression analysis disregarded missing attributes. However, we removed the entire company from the data set for companies with more than five missing attributes, excluding ESG data. This led to fewer companies in the regression basket reducing the total number of companies from 1100 to 860. However, the results stabilized as the attribute dataset became near-balanced.

It's essential to keep selection bias in mind when examining our data. This issue arises when the sample doesn't accurately represent the population being studied, which can lead to inaccurate findings. For instance, our data only includes companies with such good results that they report them. The results may not apply to all similar companies. To prevent selection bias, it's vital to make sure that our data is varied and reflects the population being researched. Reporting bias and selection bias will be the same in our data, as ESG data was majorly optional in 2020.

4.2 Defining the collapse period

To define the end of the collapse period and the start of the low point of the market crash caused by the Covid-19 outburst, we analyzed the lowest values of the companies' cumulative returns. Firstly, we constructed individual low points for each company to track the exogenic shock that marked the start of the Covid-19 pandemic. Secondly, after finding each company's lowest point of cumulative return, we constructed all companies' averages and modes for low points in each market. For our analysis, the average and most common data were near equal for S&P 500 and STOXX 600. For S&P 500, the average low point was in table row 39.27, and the mode was in table row 39. Similarly, for the companies in STOXX 600, the average low point appeared in table row 39.50, and the mode was table row 39. We found the same weighted low point for both data sets to be table row 39, representing cumulative returns on March 23rd, 2020. This date marks the end of the collapse period and the low point of the exogenous shock caused by the Covid-19 pandemic. We also used tradelines and historical data to “observe” the start of the collapse period. We deemed the starting date to be Monday, February

3rd, 2020. Both our start and end date of the collapse period align perfectly with the one defined by Fahlenbrach et al. (2020) and Engelhardt et al. (2021). We choose to include Saturday, February 1st, and Sunday, February 2nd, in order for our data to span exactly two years from the start of the month.

4.3 The preciseness of our data

Our data has proven to be close to a complete data set, as our S&P500 data set has only 0.4 percent missing data, and the STOXX 600 data set has only 0.7 percent missing data. Out of almost 28 000 observations, only 151 observations are missing. The detailed statistics are represented in *Table 4.6.1.1* and *Table 4.6.1.2*.

Table 4.3.1.1 Observation statistics for S&P 500

No. Observations	No. NAs	Total
13 706	56	13 762
99.6%	0.4%	100.0%

Table 4.3.1.2 Observation statistics for STOXX 600

No. Observations	No. NAs	Total
14 094	96	14 190
99.3%	0.7%	100.0%

4.4 Descriptive statistics

4.4.1 Correlation statistics

We created a correlation matrix to control for substantial collinearity in our variables. As we can observe from these, some clusters have higher correlations. These clusters are similar in both matrices and have financial explanations.

The first correlation cluster is the long-term debt (LTDebt), short-term debt (STDebt), and total assets (Tot.Ass.). These variables are naturally correlated as long- and short-term debt are included in total assets. The second correlation cluster includes return on equity (ROE), return on assets (ROA), return on invested capital (ROIC), and Price to Book (PB). All these measure returns and will therefore be naturally correlated as the returns directly affect the price. The third cluster contains

the ESG variables from Bloomberg and Refinitiv. This cluster will be addressed in Chapter 4.4.2.

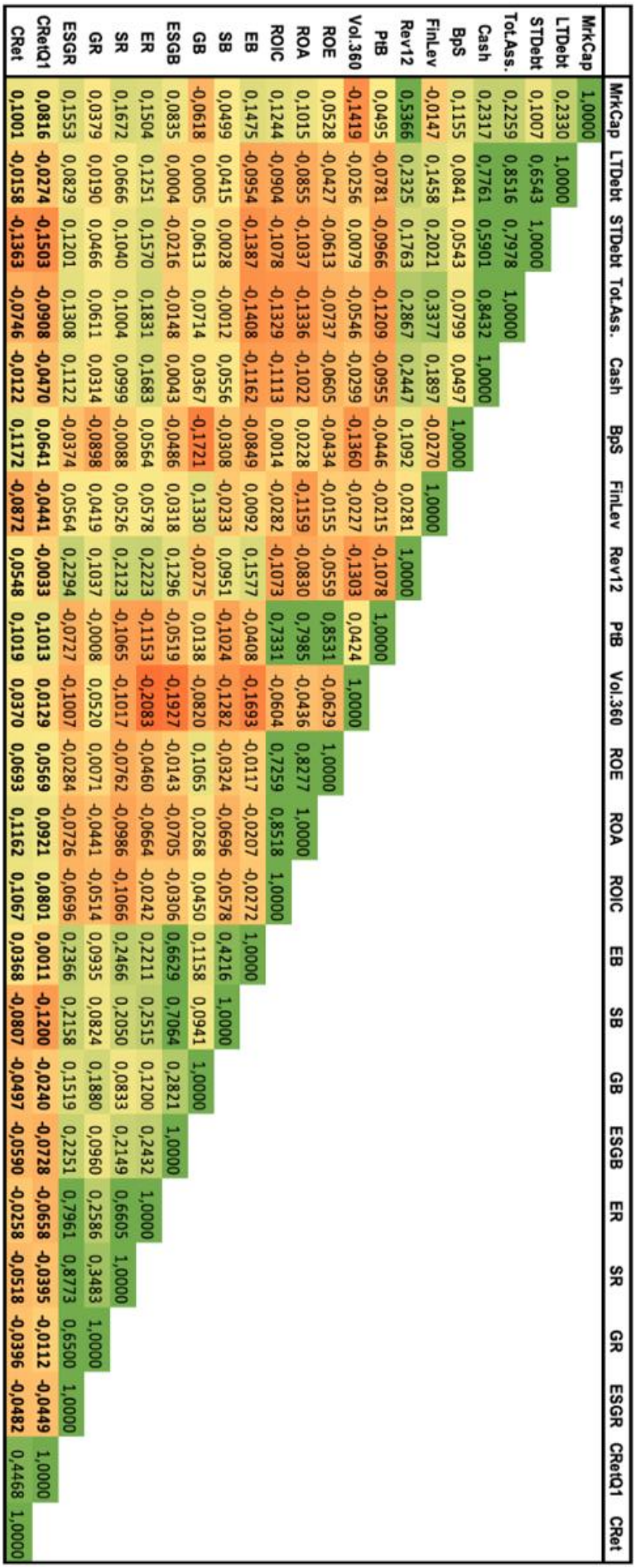
In addition to the clusters mentioned, the correlation between revenue over the last 12 months (Rev12) and market capitalization (MarketCap) is relatively high for both datasets. This correlation also has a financial explanation, as more prominent companies with higher market caps have more substantial revenue income relative to smaller companies. Additionally, both variables are used to determine a company's financial size.

Finally, the correlation between cumulative returns for the collapse period (CretC) and cumulative returns for the entire period (Cret) are bound to be correlated.

Table 4.5.1.1 Variable correlation matrix for S&P 500

	MrkCap	LTDebt	STDebt	Tot.Ass.	Cash	BpS	FinLev	Rev12	PtB	Vol.360	ROE	ROA	ROIC	EB	SB	GB	ESGB	ER	SR	GR	ESGR	CRetQ1	CRet
MrkCap	1,000																						
LTDebt	0,376	1,000																					
STDebt	0,143	0,777	1,000																				
Tot.Ass.	0,260	0,844	0,849	1,000																			
Cash	0,289	0,652	0,626	0,672	1,000																		
BpS	0,103	0,108	0,111	0,180	0,142	1,000																	
FinLev	-0,019	0,029	0,005	0,004	-0,008	-0,041	1,000																
Rev12	0,556	0,478	0,215	0,340	0,283	0,081	0,022	1,000															
PtB	0,033	-0,055	-0,032	-0,059	-0,030	-0,103	-0,011	-0,033	1,000														
Vol.360	-0,067	-0,095	-0,044	-0,081	0,030	-0,051	0,091	-0,044	-0,033	1,000													
ROE	0,103	-0,070	-0,047	-0,087	-0,028	-0,150	0,406	-0,035	0,737	-0,048	1,000												
ROA	0,133	-0,197	-0,119	-0,203	-0,097	-0,105	-0,035	-0,100	0,240	0,062	0,563	1,000											
ROIC	0,066	-0,123	-0,078	-0,117	-0,055	-0,131	-0,017	-0,070	0,174	0,038	0,665	0,686	1,000										
EB	0,227	0,106	-0,018	-0,037	0,007	-0,151	0,031	0,171	0,097	-0,024	0,140	0,080	0,000	1,000									
SB	-0,040	0,017	0,033	-0,014	-0,001	-0,067	0,052	-0,009	-0,045	-0,092	-0,026	-0,112	-0,102	0,404	1,000								
GB	0,090	0,126	0,123	0,133	0,112	-0,061	0,012	0,094	0,006	-0,033	0,058	-0,048	-0,027	0,129	0,078	1,000							
ESGB	0,132	0,107	0,045	0,013	0,038	-0,138	0,049	0,119	0,032	-0,073	0,081	-0,031	-0,063	0,809	0,785	0,424	1,000						
ER	0,149	0,186	0,149	0,134	0,140	-0,124	-0,065	0,151	0,076	-0,125	0,061	-0,019	0,014	0,307	0,232	0,159	0,343	1,000					
SR	0,206	0,128	0,065	0,066	0,092	-0,097	-0,125	0,168	0,075	-0,069	0,052	-0,018	0,006	0,205	0,144	0,179	0,246	0,663	1,000				
GR	0,077	0,026	0,037	0,012	0,028	0,021	0,028	0,068	0,031	-0,022	0,007	-0,098	-0,043	0,115	0,121	0,090	0,156	0,267	0,220	1,000			
ESGR	0,193	0,140	0,095	0,079	0,090	-0,096	-0,088	0,170	0,084	-0,103	0,052	-0,050	-0,004	0,254	0,201	0,186	0,306	0,826	0,849	0,596	1,000		
CRetQ1	0,161	-0,086	-0,078	-0,118	-0,034	0,036	-0,163	0,049	0,111	-0,171	0,181	0,343	0,209	0,123	-0,097	-0,012	0,012	0,022	0,015	-0,040	0,014	1,000	
CRet	0,099	-0,053	-0,011	-0,028	0,065	-0,025	-0,197	0,051	0,037	0,139	0,122	0,209	0,119	0,003	-0,033	-0,046	-0,030	0,040	0,024	0,018	0,033	0,492	1,000

Table 4.5.1.2 Variable correlation matrix for STOXX 600



	MrkCap	LTDebt	STDebt	TotAss.	Cash	BpS	FinLev	Rev12	PtB	Vol.360	ROE	ROA	ROIC	EB	SB	GB	ESGB	ER	SR	GR	ESGR	CRetQ1	CRet
MrkCap	1,0000																						
LTDebt	0,2330	1,0000																					
STDebt	0,1007	0,6543	1,0000																				
TotAss.	0,2259	0,8516	0,7978	1,0000																			
Cash	0,2317	0,7761	0,5901	0,8432	1,0000																		
BpS	0,1155	0,0841	0,0543	0,0799	0,0497	1,0000																	
FinLev	-0,0147	0,1458	0,2021	0,3377	0,1897	-0,0270	1,0000																
Rev12	0,5366	0,2325	0,1763	0,2867	0,2447	0,1092	0,0281	1,0000															
PtB	0,0495	-0,0781	-0,0966	-0,1209	-0,0955	-0,0446	-0,0215	-0,1078	1,0000														
Vol.360	-0,1419	-0,0256	0,0079	-0,0546	-0,0299	-0,1360	-0,0227	-0,1303	0,0424	1,0000													
ROE	0,0528	-0,0427	-0,0613	-0,0737	-0,0605	-0,0434	-0,0155	-0,0559	0,8531	-0,0629	1,0000												
ROA	0,1015	-0,0855	-0,1037	-0,1336	-0,1022	0,0228	-0,1159	-0,0830	0,7985	-0,0436	0,8277	1,0000											
ROIC	0,1244	-0,0904	-0,1078	-0,1329	-0,1113	0,0014	-0,0282	-0,1073	0,7331	-0,0604	0,7259	0,8518	1,0000										
EB	0,1475	-0,0954	-0,1387	-0,1408	-0,1162	-0,0849	0,0092	0,1577	-0,0408	-0,1693	-0,0117	-0,0207	-0,0272	1,0000									
SB	0,0499	0,0415	0,0028	-0,0012	0,0556	-0,0308	-0,0233	0,0951	-0,1024	-0,1282	-0,0324	-0,0696	-0,0578	0,4216	1,0000								
GB	-0,0618	0,0005	0,0613	0,0714	0,0367	-0,1721	0,1330	-0,0275	0,0138	-0,0820	0,1065	0,0268	0,0450	0,1158	0,0941	1,0000							
ESGB	0,0835	0,0004	-0,0216	-0,0148	0,0043	-0,0486	0,0318	0,1296	-0,0519	-0,1927	-0,0143	-0,0705	-0,0306	0,6629	0,7064	0,2821	1,0000						
ER	0,1504	0,1251	0,1570	0,1831	0,1683	0,0564	0,0578	0,2223	-0,1153	-0,2083	-0,0460	-0,0664	-0,0242	0,2211	0,2515	0,1200	0,2432	1,0000					
SR	0,1672	0,0666	0,1040	0,1004	0,0999	-0,0088	0,0526	0,2123	-0,1065	-0,1017	-0,0762	-0,0986	-0,1066	0,2466	0,2050	0,0833	0,2149	0,6605	1,0000				
GR	0,0379	0,0190	0,0466	0,0611	0,0314	-0,0898	0,0419	0,1037	-0,0008	0,0520	0,0071	-0,0441	-0,0514	0,0935	0,0824	0,1880	0,0960	0,2586	0,3483	1,0000			
ESGR	0,1553	0,0829	0,1201	0,1308	0,1122	-0,0374	0,0564	0,2294	-0,0727	-0,1007	-0,0284	-0,0726	-0,0696	0,2366	0,2158	0,1519	0,2251	0,7961	0,8773	0,6500	1,0000		
CRetQ1	0,0816	-0,0274	-0,1503	-0,0908	-0,0470	0,0641	-0,0441	-0,0033	0,1013	0,0129	0,0569	0,0921	0,0801	0,0011	-0,1200	-0,0240	-0,0728	-0,0658	-0,0395	-0,0112	-0,0449	1,0000	
CRet	0,1001	-0,0158	-0,1363	-0,0746	-0,0122	0,1172	-0,0872	0,0548	0,1019	0,0370	0,0693	0,1162	0,1067	0,0368	-0,0807	-0,0497	-0,0590	-0,0258	-0,0518	-0,0396	-0,0482	0,4468	1,0000

4.4.2 ESG correlation

Similar to the complete correlation matrices, the ESG correlation matrices contain natural high-correlation clusters for the scores by the same provider. The most interesting correlations are the ones with the same score for the different providers. For the environment pillar score, the correlation between the Refinitiv-provided score and the Bloomberg-provided score is 0.3073 and 0.2211, which indicates a weak neutral agreement between the two scores. The same effect is observed in the correlation between the ESG scores. The correlation is notably lower for the Social pillar score and the Government pillar score, with the Government pillar score being the lower of the two. Overall, the correlations between the different providers are surprisingly small.

Table 4.5.2.1 ESG correlation matrix for S&P 500

	EB	SB	GB	ESGB	ER	SR	GR	ESGR
EB	1.0000							
SB	0.4037	1.0000						
GB	0.1293	0.0783	1.0000					
ESGB	0.8091	0.7847	0.4240	1.0000				
ER	**0.3073**	0.2316	0.1589	0.3435	1.0000			
SR	0.2048	**0.1440**	0.1786	0.2459	0.6626	1.0000		
GR	0.1149	0.1208	**0.0895**	0.1561	0.2670	0.2198	1.0000	
ESGR	0.2543	0.2006	0.1858	**0.3059**	0.8261	0.8491	0.5959	1.0000

Table 4.5.2.2 ESG correlation matrix for STOXX 600

	EB	SB	GB	ESGB	ER	SR	GR	ESGR
EB	1,0000							
SB	0,4216	1,0000						
GB	0,1158	0,0941	1,0000					
ESGB	0,6629	0,7064	0,2821	1,0000				
ER	**0,2211**	0,2515	0,1200	0,2432	1,0000			
SR	0,2466	**0,2050**	0,0833	0,2149	0,6605	1,0000		
GR	0,0935	0,0824	**0,1880**	0,0960	0,2586	0,3483	1,0000	
ESGR	0,2366	0,2158	0,1519	**0,2251**	0,7961	0,8773	0,6500	1,0000

5 Result and analysis

In this section, we will present the results of our regression models, where we examine the relationship between companies' ESG ratings and their financial performance. Two separate analyses have been conducted, one concentrating on S&P 500 index companies and the other considering STOXX 600 index companies. For each market regression, we first assess how the companies' financial results correlate with their ESG ratings obtained from Refinitiv. After that, we did a matching regression analysis by contrasting the findings with Bloomberg's ESG ratings.

All regressions will be conducted for the entire time period of two years in addition to a control period from February 1st, 2020, until March 24th, 2020 (the collapse period). Establishing preliminary conclusions about our research question is the goal of the primary investigation. We will use the 6 models presented in 5.2 for our analysis.

It's important to remember how the ESG rating matrices utilized by Refinitiv and Bloomberg can affect our findings as we continue our analysis of the regression models. As discussed in Chapter 2.1.4, there are differences in these grading methods, and concerns with noncompliance or underreporting might bias the regression results and potential biases from non-representative data utilized in algorithm training. The necessity for cautious interpretation and application of our regression findings is highlighted by these methodological variations and data accuracy and standardization problems.

The differing characteristics of the S&P 500 and STOXX 600, as mentioned in Chapter 2.2.2 could have a variety of effects on our results. First, different laws and regulations could impact ESG reporting requirements, potentially resulting in various ESG scores. Edmans et al. (2014) found a positive correlation between stock returns and employee happiness in countries that have flexible labor markets. This suggests that the variation in labor market flexibility across European countries could lead to heterogeneous outcomes within the STOXX 600 index. Second, currency fluctuations might have impacted the companies' financial health during the pandemic, adding more uncertainty to our findings. Thirdly, sectoral variations may also have varying pandemic effects, impacting financial performance and ESG

ratings. Therefore, we anticipate differences in how ESG ratings influence financial performance in the European and U.S. markets and expect variations in our results. Understanding this variation is essential to our research as it helps us better comprehend how ESG ratings affect financial performance in the European and U.S. markets.

5.1 Model results

5.1.1 Model 1 – Total ESG scores

In this study, Model 1 which consists of a comprehensive regression analysis based on ESG assessments for the whole test period is used to investigate the relationship between ESG performance and financial results for companies. The analysis aims to determine whether there is a meaningful correlation between ESG performance and the financial constraints for the companies in our sample, which originate from the S&P 500 and STOXX 600 indexes.

Our regression analysis using Refinitiv and Bloomberg's ESG scores as independent variables shows a positive correlation between higher volatility and S&P's cumulative returns (Table 5.2.1.1). On the one hand, this contrasts with the paper from Ramelli and Wagner (2020), which suggest that firms with lower historical volatility perform better. On the other hand, Engelhardt et al. (2021) finds positive effects under certain country characteristics. This discrepancy emphasizes the importance of considering historic volatility when assessing investment returns.

The regression analysis conducted in Model 1 supports the hypotheses put out by Duchin et al. (2010), Almeida et al. (2012), and Harford et al. (2014) by showing significant but economically inconsequential connections, as seen by the rounded zero effect size (Table 5.2.1.1). Regardless of whether we consider Bloomberg's or Refinitiv's ESG scores, the result shows that both long-term and short-term debt has a negative correlation with S&P and STOXX's cumulative returns, respectively. The study also highlights a positive correlation between free cash holdings and cumulative returns, in line with the theory of Lins et al. (2017). However, this correlation is irrelevant due to a rounded zero effect size. These findings are consistent with economic interpretations and support the notion that businesses with less debt and more cash are more resilient and perform better in times of crisis.

A positive relationship between the book-to-share (BtS) ratio and cumulative returns for the STOXX index is also found through the regression, indicating that businesses that maintain an adequate balance sheet ratio typically generate greater returns. We find an effect of 0.0002 for every unit increase in volatility on cumulative returns for both Refinitiv and Bloomberg. This is consistent with the theory of BtS as a financial indicator that measures the equity each shareholder has access to and represents the firm's minimal equity value. It indicates a company's financial health and naturally lower risk profile, which results in higher cumulative returns (Lins et al., 2017).

Table 5.2.1.1 Summary table for Model 1 results

The summary table for reported regression results shows the estimated effect of the variable on the cumulative stock returns. In addition, the table reports the standard deviation of the variable presented between parentheses below the estimation.

Variables	**Model 1 S&P 500**		**Model 1 STOXX 600**	
	Refinitiv	**Bloomberg**	**Refinitiv**	**Bloomberg**
(Intercept)	0.9531 (0.0254) ***	0.9747 (0.0218) ***	0.9684 (0.0519) ***	0.9642 (0.0406) ***
Market Cap	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
LT Debt	0.0000 (0.0000) .	0.0000 (0.0000) .	0.0000 (0.0000)	0.0000 (0.0000)
ST Debt	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000) *
Tot. Ass.	0.0000 (0.0000).	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Free Cash	0.0000 (0.0000) .	0.0000 (0.0000) .	0.0000 (0.0000)	0.0000 (0.0000)
BtS	0.0000 (0.0000)	0.0000 (0.0000)	0.0002 (0.0001) .	0.0002 (0.0001) .
Fin. Leverage	0.0026 (0.0016)	0.0025 (0.0062)	-0.0003 (0.0006)	-0.0003 (0.0006)

Rev. 12	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
PtB	0.0000 (0.0004)	0.0000 (0.0004)	0.0020 (0.0021)	0.0021 (0.0021)
Vol. 360	0.0012 (0.0005) *	0.0011 (0.0005) *	0.0008 (0.0011)	0.0007 (0.0011)
ROE	-0.0003 (0.0002)	-0.0002 (0.0002)	-0.0004 (0.0005)	-0.0004 (0.0005)
ROA	0.0020 (0.0014)	0.0020 (0.0014)	0.0007 (0.0018)	0.0006 (0.0018)
ROIC	0.0009 (0.0009)	0.0007 (0.0009)	0.0000 (0.0012)	0.0002 (0.0012)
ESGR	0.0002 (0.0003)		-0.0003 (0.0006)	
ESGB		-0.0009 (0.0031)		-0.0034 (0.0054)
Adj. R^2	0.07216	0.0704	0.0292	0.02976

Significant codes: 0 = “***” 0.001= “**” 0.01= “*” 0.05= “.”

5.1.2 Model 2 – ESG Pillar scores

In Model 2, we extend our investigation by conducting a pooled regression analysis with separate E (Environmental), S (Social), and G (Governance) pillar scores for the entire testing period. Using this method, we may thoroughly explore the possible effects of specific ESG factors on the financial performance of the companies included in the S&P 500 and STOXX 600 indexes. We compare the results using both Refinitiv and Bloomberg ESG ratings, similar to Model 1.

The companies' financial success in the S&P 500 and STOXX 600 indexes is not significantly correlated with any of the individual E, S, or G pillar scores, according to our Model 2 results. In addition, the results from the joint hypothesis test on E, S, and G pillar scores for both Refinitiv and Bloomberg indicate no significant relationship (Table 5.4.1.2). Due to the lack of relevance, it is possible that the individual ESG dimensions did not directly affect the financial performance of the

organizations throughout the test period. Contradictory to Albuquerque et al. (2020) found that firms with higher environmental and social ratings are associated with higher abnormal stock returns over the crisis period. This is probably due to the methodology, as we tested for a two-year period, while Albuquerque et al. (2020) tested for the first quarter of 2020. It's also important to consider that results connected to the relationship between ESG and corporate financial performance are often ambiguous, inconclusive, or even contradictory (Friede et al., 2015). Our results echo this complexity, possibly influenced by random noise in the data. This noise could be due to short-term market fluctuations, which are driven by a multitude of factors, such as investor sentiment and geopolitical events. It might also result from company-specific events, such as leadership changes or unexpected incidents, which can significantly impact a company's financial performance, irrespective of its ESG scores. These factors may have obscured the underlying impact of ESG aspects on financial success, which accounts for the absence of an obvious relationship that could be identified.

Table 5.1.2.1 Summary table for Model 2 results

The summary table for reported regression results shows the estimated effect of the variable on the cumulative stock returns. In addition, the table reports the standard deviation of the variable presented between parentheses below the estimation.

Variables	**Model 2 S&P 500**		**Model 2 STOXX 600**	
	Refinitiv	**Bloomberg**	**Refinitiv**	**Bloomberg**
(Intercept)	0.9551 (0.0257) ***	0.9933 (0.0280) ***	0.9732 (0.0531) ***	0.9347 (0.05150) ***
Market Cap	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
LT Debt	0.0000 (0.0000) .	0.0000 (0.0000) .	0.0000 (0.0000)	0.0000 (0.0000)
ST Debt	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000) *	0.0000 (0.0000) *
Tot. Ass.	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)

Free Cash	0.0000 (0.0000)	0.0000 (0.0000) .	0.0000 (0.0000)	0.0000 (0.0000)
BtS	0.0000 (0.0000)	0.0000 (0.0000)	0.0002 (0.0001) .	0.0002 (0.0001) *
Fin. Leverage	0.0026 (0.0016)	0.0024 (0.0016)	-0.0003 (0.0006)	-0.0004 (0.0006)
Rev. 12	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
PtB	0.0000 (0.0004)	0.0000 (0.0004)	0.0022 (0.0022)	0.0019 (0.0022)
Vol. 360	0.0012 (0.0005) *	0.0020 (0.0005) *	0.0009 (0.0011)	0.0010 (0.0011)
ROE	-0.0003 (0.0002)	-0.0002 (0.0002)	-0.0004 (0.0011)	-0.0004 (0.0005)
ROA	0.0021 (0.0014)	0.0020 (0.0014)	0.0008 (0.0018)	0.0006 (0.0018)
ROIC	0.0009 (0.0010)	0.0008 (0.0009)	0.0000 (0.0012)	0.0002 (0.0012)
ER	0.0002 (0.0002)		0.0003 (0.0005)	
SR	0.0000 (0.0003)		-0.0005 (0.0007)	
GR	0.0000 (0.0002)		0.0003 (0.0005)	
EB		-0.0013 (0.0022)		0.0051 (0.0044)
SB		0.0017 (0.0021)		-0.0072 (0.0052)
GB		-0.0039 (0.0033)		0.0028 (0.0055)
Adj. R^2	0.06879	0.07055	0.0244	0.03058

Significant codes: 0 = “***” 0.001= “**” 0.01= “*” 0.05= “.”

5.1.3 Model 3 – ESG-Portfolio dummies

For Model 3, we employ an OLS regression with dummy variables to determine the effectiveness of three different ESG portfolios over the two-year test period. D1 denotes the portfolio with the highest ESG-scoring companies, and D3 denotes the portfolio containing companies with the lowest ESG scores. The D1 and D3 represent the portfolios consisting of "immoderate ESG-scoring companies". This research examines whether these portfolios generate abnormal cumulative stock returns for the S&P 500 and Stoxx 600 indexes.

We specifically pay attention to returns throughout the full period, studying how various portfolios generate returns. Two of these are specifically studied, whilst one is disregarded and is therefore represented in the intercept. To ensure no joint significance, we conducted an F-test on D1 and D3 for both Refinitiv and Bloomberg. This resulted in us not being able to reject the null hypothesis with a 90% significant level for both tests. Notably, the P-Value for DR1 and DR3 was close to 90 percent significance, with 2 degrees of freedom, on 0.2054 (Table 5.4.1.2.), in the context of the S&P 500 index. To prevent potential problems connected to the Dummy Variable Trap, it is essential to analyze substantial variations across the portfolios carefully. Our investigation does not produce any conclusive findings in alignment with the cluster of portfolio studies covered by Friede et al. (2015) that shows no significant correlation between ESG characteristics and financial performance. These uncertain findings could have been influenced by the distinct market volatility observed during the Covid-19 pandemic.

Additionally, it is important to consider that the relationship between Covid-19 and financial performance may exhibit different patterns over extended periods. To measure and track long-term effects, one may argue that a two-year period with a generally fragile financial market is insufficient. Therefore, we may not fully capture the nuanced effects and long-term implications of ESG factors on financial performance during Covid-19. On one hand, a longer timeframe would provide a more comprehensive understanding of the relationship between ESG and financial performance during the Covid-19 pandemic. On the other hand, This may result in further noise and disruption of other Covid-19-specific results.

Table 5.1.3.1 Summary table for Model 3 results

The summary table for reported regression results shows the estimated effect of the variable on the cumulative stock returns. In addition, the table reports the standard deviation of the variable presented between parentheses below the estimation.

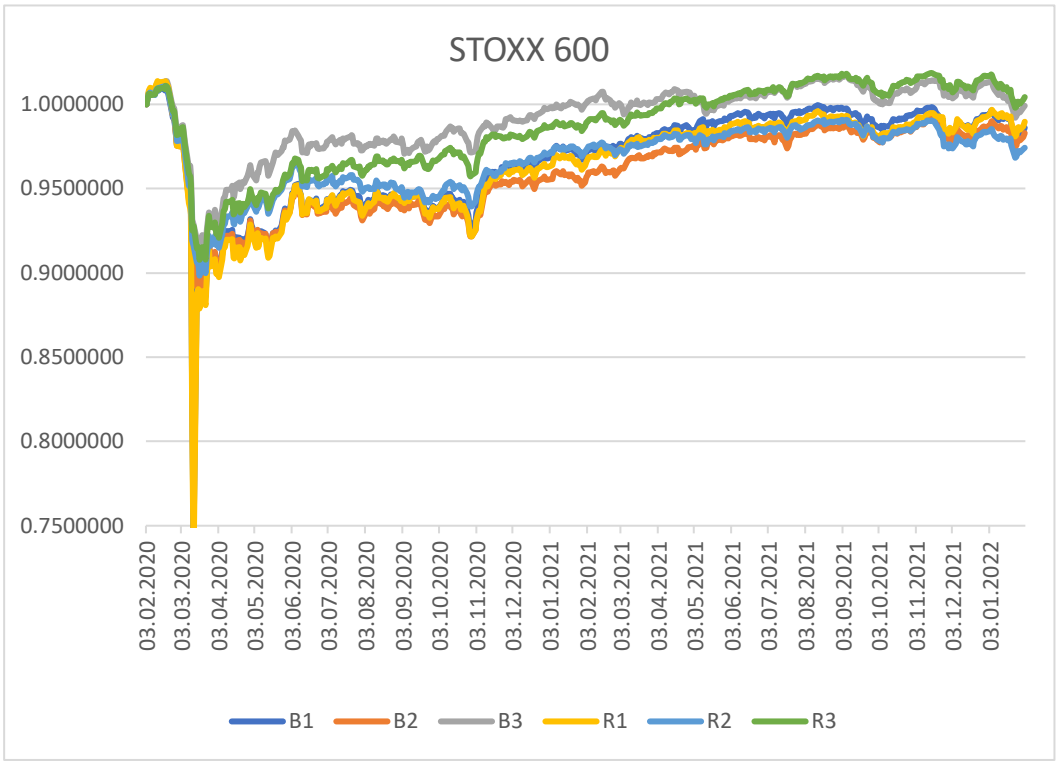
Variables	Model 3 S&P 500		Model 3 STOXX 600	
	Refinitiv	Bloomberg	Refinitiv	Bloomberg
(Intercept)	0.9712 (0.0174) ***	0.9714 (0.0186) ***	0.9338 (0.0341) ***	0.9439 (0.0349) ***
Market Cap	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
LT Debt	0.0000 (0.0000) .	0.0000 (0.0000) .	0.0000 (0.0000)	0.0000 (0.0000)
ST Debt	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000) *	0.0000 (0.0000) *
Tot. Ass.	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Free Cash	0.0000 (0.0000) .	0.0000 (0.0000) .	0.0000 (0.0000)	0.0000 (0.0000)
BtS	0.0000 (0.0000)	0.0000 (0.0000)	0.0002 (0.0001) .	0.0002 (0.0001) .
Fin. Leverage	0.0027 (0.0016)	0.0025 (0.0016)	-0.0002 (0.0006)	-0.0003 (0.0006)
Rev. 12	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
PtB	0.0000 (0.0004)	0.0000 (0.0004)	0.0021 (0.0021)	0.0021 (0.0021)
Vol. 360	0.0013 (0.0005) *	0.0012 (0.0005) *	0.0008 (0.0011)	0.0008 (0.0011)
ROE	-0.0003 (0.0004)	-0.0002 (0.0002)	-0.0004 (0.0005)	-0.0004 (0.0005)
ROA	0.0020 (0.0014)	0.0021 (0.0014)	0.0006 (0.0018)	0.0006 (0.0018)
ROIC	0.0010	0.0007	0.0001	0.0002

	(0.0009)	(0.0009)	(0.0012)	(0.0012)
DR1	0.0016 (0.0095)		0.0201 (0.0197)	
DR3	-0.0141 (0.0095)		0.0270 (0.0202)	
DB1		-0.0029 (0.0098)		0.0077 (0.0196)
DB3		0.0021 (0.0098)		0.0126 (0.0211)
Adj. R^2	0.07546	0.06836	0.03164	0.02632

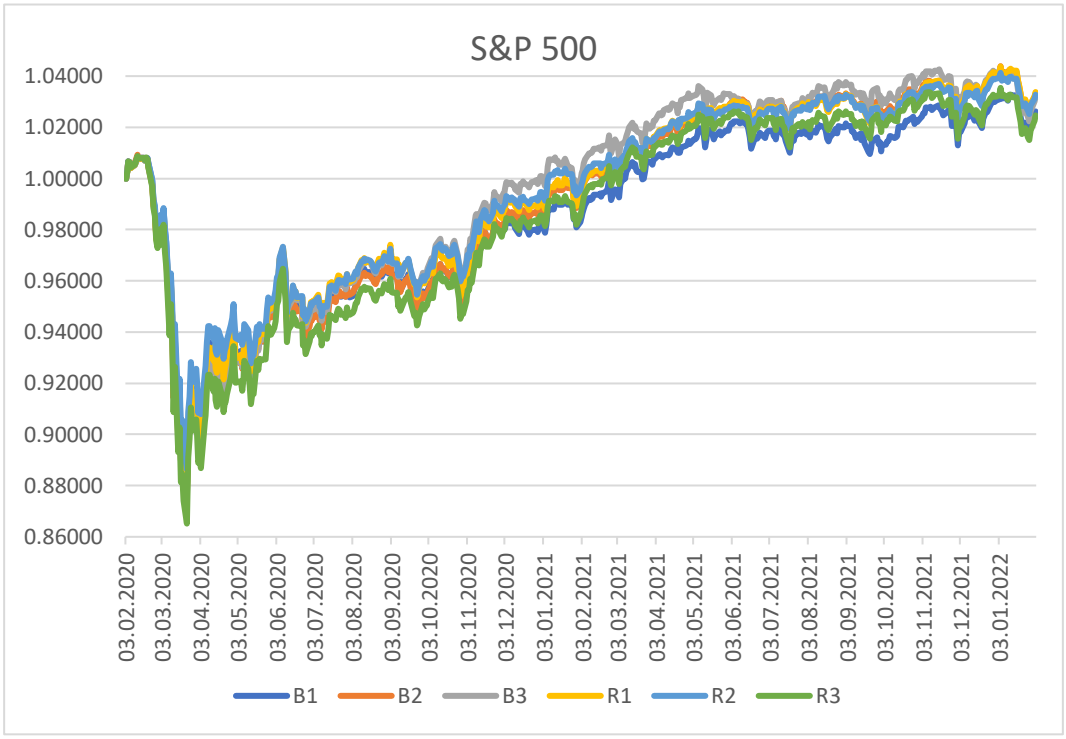
Significant codes: 0 = “***” 0.001= “**” 0.01= “*” 0.05= “.”

In addition to our regressions, we constructed a plot of the portfolio performance during the two-year period (Plot 5.1.3.3 and Plot 5.1.3.4). We found that the portfolios in the STOXX600 data show a trend toward better performance for the portfolios containing companies with the lowest ESG scores. These findings show consistency with a wider economic understanding of ESG-premiums and lower IRR for sustainable companies (Barber et al., 2021; Bonnefon et al., 2022). Based on the plots, we found that B3 and R3, seemingly generate consistently greater returns over the entire period. These portfolios also trend toward resilience to major market falls. Observing the plot, we see an evident relationship that seems is too obvious to be a random coincidence. We believe that a closer examination of these portfolios during the recovery period can lead to further important findings. In contrast, such patterns were not visible in the S&P 500 index (Plot 5.1.3.4).

Plot 5.1.3.3 STOXX 600 cumulative returns per portfolio over the control period



Plot 5.1.3.4 S&P 500 cumulative returns per portfolio over the control period



5.2 Collapse period models

To measure the collapse period, we used the time period from February 1st, 2020, to the weighted lowest point for all the stocks individually. The extensive methodology described in Chapter 4.3 show that the S&P 500 and STOXX 600 collapse period ended on March 23rd, 2020. These findings align with Fahlenbrach et al. (2020) and later Englehart et al. (2021), who also found the collapse period to end on March 23rd, 2020.

5.2.1 Model 4 – Total ESG scores during the collapse period

For Model 4 we utilize an OLS regression to explore the potential relationship between ESG scores and financial performance. We aim to determine whether a significant correlation exists between the ESG performance of the firms in our sample and their financial performance during the collapse period. We run different regressions for the Bloomberg and Refinitiv ESG scores and find no evidence that ESG is correlated to the aggregate cumulative returns over the collapse period. This goes hand in hand with the first regression in Engelhardt et al. (2021) and the results of Bae et al. (2021) and Demers et al. (2021), which find no significant correlation when not including dummy variables and country attributes. The two variables with significant correlation are the price-to-book ratio and the volatility over the previous 360 days (Table 5.2.1.1).

A significant relationship proven in the data is the effect of the price-to-book ratio on cumulative stock returns over the collapse period (Table 5.2.1.1). Our findings complement general financial knowledge of the price-to-book ratio used to represent company resilience. Therefore, this relationship is economically significant. Similar to our results, Engelhardt et. al. (2021), who used traditional resilience in the form of a market-to-book ratio (MtB), also found a correlation between companies´ traditional resilience and abnormal returns.

Our results show that there is a negative correlation of ROE on cumulative returns over the collapse period for the S&P index (Table 5.3.1.1). Our findings contradict the ones of Engelhardt et al. (2021), which state that there is a positive correlation between ROE and Returns during the collapse period in Europe. Our results surprisingly imply that there is no correlation of this sort in our data.

Also, for the S&P 500 index, we find a positive correlation of ROA on stock returns (Table 5.2.1.1). This result is expected as profitable companies with higher returns on assets have a higher stock return during the Covid-19 collapse period (Table 5.3.1.1). ROA is highly correlated with ROE and ROIC (Table 4.5.1.1 and Table 4.5.1.2). It is unusual for ROA and ROE to have significant correlations and opposite effects. In similar papers (Engelhardt et al., 2021; Lins et al., 2017) ROE is the only explanatory factor of this sort. This can lead to omitted variable bias and gives inaccurate results.

Table 5.2.1.1 Summary table for Model 4 results

The summary table for reported regression results shows the estimated effect of the variable on the cumulative stock returns. In addition, the table reports the standard deviation of the variable presented between parentheses below the estimation.

Variables	**Model 4 S&P 500**		**Model 4 STOXX 600**	
	Refinitiv	**Bloomberg**	**Refinitiv**	**Bloomberg**
(Intercept)	0.9172 (0.0265)***	0.9152 (0.0227)***	0.9315 (0.057)***	0.9311 (0.0446)***
MarketCap	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
LTDebt	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
STDebt	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000).	0.0000 (0.0000).
Tot.Ass.	0.0000 (0.0000).	0.0000 (0.0000).	0.0000 (0.0000)	0.0000 (0.0000)
Freecash	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
BtS	0.0002 (0.0001).	0.0002 (0.0001).	0.0001 (0.0001)	0.0001 (0.0001)
FinLeverage	-0.0014 (0.0017)	-0.0014 (0.0017)	0.0000 (0.0006)	0.0000 (0.0006)

Rev12	0.0000 (0.0000).	0.0000 (0.0000).	0.0000 (0.0000)	0.0000 (0.0000)
PtB	0.0012 (0.0004)**	0.0012 (0.0004)**	0.0034 (0.0023)	0.0035 (0.0023)
Vol.360	-0.0027 (0.0005)***	-0.0027 (0.0005)***	-0.0007 (0.0012)	-0.0009 (0.0012)
ROE	-0.0004 (0.0002).	-0.0004 (0.0002).	-0.0005 (0.0005)	-0.0005 (0.0005)
ROA	0.0026 (0.0015).	0.0026 (0.0015).	0.0012 (0.0019)	0.0009 (0.0019)
ROIC	0.0014 (0.001)	0.0014 (0.001)	-0.0009 (0.0013)	-0.0008 (0.0013)
ESGR	0.0000 (0.0003)		-0.0004 (0.0006)	
ESGB		-0.0002 (0.0032)		-0.0063 (0.0059)
Adj. R^2	0.1783	0.1783	0.0089	0.0113

Significant codes: 0 = “***” 0.001= “**” 0.01= “*” 0.05= “.”

5.2.2 Model 5 – ESG Pillar scores during the collapse period

By conducting a pooled OLS regression with separate E, S, and G pillar scores for the collapse period, we extend our investigation from Model 2. This method allows us to explore the possible effects of specific ESG pillars in the collapse period. We compute the results using Refinitiv and Bloomberg ESG pillar scores, similar to Model 2.

In contradiction to Model 2, we find a significant correlation between the Bloomberg S-pillar score and cumulative stock returns in the collapse period for both the S&P 500 and STOXX 600 indexes (Table 5.2.2.1). This correlation may suggest that the individual S-pillar score directly affected the organizations' stock performance through the collapse period. The result is in unison for both markets and implies a negative effect (Table 5.2.2.1). Our findings of a negative effect may be explained by the social premium proven by Bonnefon et al. (2022) and Barber

et al. (2021). In the experiment of Bonnefon et al. (2022), investors were willing to pay a premium for companies that performed better on social aspects. Barber et al. (2021) showed that ESG investors are willing to accept a lower IRR of 4.7 percentage points during a normal market situation for sustainable stocks. These effects may suffer from the risk of trust materializing during a crisis like the Covid-19 pandemic, neutralizing the ESG premiums, and lowering the stock returns. Other studies have proven inconclusive or mixed results (Bae et al., 2021; Demers et al., 2021; Engelhardt et al., 2021; Fisher-Vanden & Thorburn, 2011). These studies may differ from our results as we include more variables in our regressions. This can lead to Fisher-Vanden and Thorburn (2011), Engelhardt et al. (2021), Bae et al. (2021), and Demers et al. (2021) suffering from omitted variable bias.

Our results clearly show a positive correlation between the Bloomberg E-pillar score on the U.S. market in the collapse period (Table 5.3.2.1). This result suggests that companies with a higher score on the environmental pillar have better resilience to the exogenic shock that Covid-19 caused in the market. Our findings are expected and suggest that there are benefits to decreasing emissions and supporting sustainable solutions. Our research aligns with Lins et al.'s (2017) study on the U.S market, which emphasizes the significance of local pollution and environmental investments on market valuation through effects on abnormal returns. It highlights the need for environmental investments prior to exogenous shocks to attract investors who may be hesitant due to a lack of trust market. We can, like Lins et al. (2017) proved in the 2008/09 financial crisis, claim this effect to be economically significant.

We notice that Bloomberg E-, S-, and G- pillar scores are the ones proving to have a correlation with cumulative returns. One explanation for this can be the degree of preciseness in the ESG data. That implies that the ESG scores and pillar scores measure crucial and relevant parts of a company's business. A significant relationship in the Bloomberg ESG scores may indicate a higher degree of preciseness in the Bloomberg ESG score relative to the one of Refinitiv. According to Berg et al.(2022), Refinitiv's ESG score may fail to capture all relevant factors for resilience during a crisis like the Covid-19 pandemic. While Refinitiv scores relatively well in the measurement and weight -factors, it is the second worst in scope preciseness (Table 5.2.2.2). This indicates that Refinitiv does not include the same attributes as other providers when measuring the same score pillar. Therefore,

using Refinitiv's ESG score may not give a complete understanding of a company's resilience and risk management factors prior to a crisis like the Covid-19 pandemic. Our results also reflect this, as the Refinitiv ESG scores do not significantly affect cumulative stock returns.

To ensure our results, we conducted a joint hypothesis test for all pillar scores from the same ESG provider. For the pillar scores provided by Refinitiv, we find no significant results in relation to S&P 500 or STOXX 600 (Table 5.4.1.2). Using the F-test formula provided in Chapter 3.3.2, we obtain a test statistic of 3.168 for the Bloomberg pillar scores joint hypothesis test on cumulative stock returns from the S&P 500 index. Using the F-distribution table provided by UCLA, we find that the critical value for a 97.5 percentage significant level with three degrees of freedom is 3.116. The test statistic exceeds this value, hence rejecting the null hypothesis of the effect of the pillars being jointly significantly different from zero. When we tested for joint significance on the STOXX 600 index, we did not find any significant results.

The most significant correlations for Model 5 are the volatility over the previous 360 days (Vol360) on the cumulative stock returns (Table 5.2.2.1). Our results suggest a negative relationship that leads to a decrease in cumulative stock returns for each unit increase in Vol360. The relationship is present for Refinitiv and Bloomberg in the U.S. market (Table 5.2.2.1). This result contradicts our previous findings in Model 1 and the literature of Engelhardt et. al (2021). At the same time, this result aligns with Ramelli and Wagner (2020), who suggests that firms with lower historical volatility perform better.

Table 5.2.2.1 Summary table for Model 5 results

The summary table for reported regression results shows the estimated effect of the variable on the cumulative stock returns. In addition, the table reports the standard deviation of the variable presented between parentheses below the estimation.

Variables	Model 5 S&P 500		Model 5 STOXX 600	
	Refinitiv	Bloomberg	Refinitiv	Bloomberg
(Intercept)	0.9211 (0.0268)***	0.9291 (0.0288)***	0.9219 (0.0583)***	0.8939 (0.0562)***
MarketCap	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
LTDebt	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
STDebt	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000).	0.0000 (0.0000)
Tot.Ass.	0.0000 (0.0000)*	0.0000 (0.0000).	0.0000 (0.0000)	0.0000 (0.0000)
Freecash	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
BtS	0.0002 (0.0001).	0.0002 (0.0001).	0.0001 (0.0001)	0.0001 (0.0001)
FinLeverage	-0.0014 (0.0017)	-0.001 (0.0017)	0.0000 (0.0006)	0.0000 (0.0006)
Rev12	0.0000 (0.0000).	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
PtB	0.0012 (0.0004)**	0.001 (0.0004)*	0.0031 (0.0024)	0.0034 (0.0024)
Vol.360	-0.0027 (0.0005)***	-0.0029 (0.0005)***	-0.0009 (0.0012)	-0.0009 (0.0012)
ROE	-0.0004 (0.0002).	-0.0004 (0.0002).	-0.0005 (0.0005)	-0.0005 (0.0005)
ROA	0.0026 (0.0015).	0.0025 (0.0014).	0.0011 (0.0019)	0.001 (0.0019)

ROIC	0.0014 (0.001)	0.0012 (0.001)	-0.0007 (0.0014)	-0.0009 (0.0013)
ER	0.0000 (0.0003)		-0.0005 (0.0006)	
SR	0.0000 (0.0003)		-0.0001 (0.0007)	
GR	-0.0001 (0.0002)		0.0003 (0.0006)	
EB		0.006 (0.0022)**		0.0016 (0.0048)
SB		-0.0055 (0.0022)*		-0.013 (0.0057)*
GB		-0.0015 (0.0034)		0.0075 (0.006)
Adj. R^2	0.1742	0.1942	0.0057	0.0247

Significant codes: 0 = “***” 0.001= “**” 0.01= “*” 0.05= “.”

5.2.3 Model 6 – ESG-Portfolio dummies during the collapse period

Similar to Model 3, we employ an OLS regression utilizing portfolio dummy variables in Model 6. The goal is to determine the stock returns gained by three different ESG portfolios during the collapse period from February 1st, 2020, to March 23rd, 2020. We include D1 and D3 as immoderate portfolios and omit D2 as our benchmark portfolio.

The usage of portfolio dummies differs from Engelhardt al. (2021), which utilizes dummies for “High ESG” to control for companies with above median ESG scores in that specific country. This approach suits the European market with different countries but falls short when introduced to in the U.S. market. When assessing multiple markets as large as the European and the U.S., the portfolio approach is more accurate for market regressions as we create a benchmark for performance in dummy variable 2.

Our regression shows that only one of the independent variables is significant on a 5% significant level. This indicates that the portfolio with Refinitiv ESG scores lower than the 33rd percentile performs 1,88% worse than other portfolios for the S&P 500 in the collapse period. Within this context, we conducted a joint hypothesis test using the F-test on D1 and D3 for both Refinitiv and Bloomberg. This test, however, yielded no significant results.

Another notable correlation is the intercept that contains the dummy for portfolio number 2. This is left out of the regression to avoid a Dummy Variable Trap. The intercepts in Model 6 (0.9220 – 0.9135 – 0.9070 – 0.9054) differ relatively from the intercepts of Model 5 (0.9211 – 0.9291 – 0.9219 – 0.8939). This implies that the DR2 for the S&P 500 regression is significant and with a relatively large effect. Dummy variable 2 is our performance benchmark for "moderate ESG-scoring companies" between the 33rd and 66th percentile. To ensure that the DR2 in the S&P 500 regression is significant, we ran two controlling regressions. The results from these regressions confirm that DR2 is significantly affecting stock performance (Table 5.2.3.2 & Table 5.2.3.3). The positive effect of being in the 2nd portfolio is relatively high (0.0188 and 0.0169) and with a high significance (95 percentage significant level and 99 percentage significant level).

In the control regressions, we find no significant results for the 3rd portfolio when omitting the 1st portfolio. Since the results of our regressions on the 3rd portfolio are incomplete, we cannot state that there is a significant relationship between the portfolios consisting of "immoderate ESG-scoring companies". Naturally, we do not find any joint significance in the control regressions.

These results show that being in the 2nd Refinitiv-portfolio in S&P has predictive effects. At the same time, we cannot predict any effects on the performance of companies in the 1st and 3rd portfolios as there is no significance in all regressions. This aligns with Pedersen et al. (2021) ESG frontier, as investing at better than the normative ESG level in a market with irrational investors, has no predictable significant effect. At the same time, these results add to the portfolio literature, which claims that no relationship exists between ESG and returns when portfolio investing (Friede et al., (2015). Our results find precise results for portfolio investing being significant for DR2 on cumulative stock returns for the S&P 500 index.

Table 5.2.3.1 Summary table for Model 6 results

The summary table for reported regression results shows the estimated effect of the variable on the cumulative stock returns. In addition, the table reports the standard deviation of the variable presented between parentheses below the estimation.

Variables	Model 6 S&P 500		Model 6 STOXX 600	
	Refinitiv	Bloomberg	Refinitiv	Bloomberg
(Intercept)	0.9220 (0.0181)***	0.9135 (0.0193)***	0.9070 (0.0375)***	0.9054 (0.0379)***
MarketCap	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
LTDebt	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
STDebt	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000).	0.0000 (0.0000).
Tot.Ass.	0.0000 (0.0000)*	0.0000 (0.0000).	0.0000 (0.0000)	0.0000 (0.0000)
Freecash	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
BtS	0.0002 (0.0001).	0.0002 (0.0001).	0.0001 (0.0001)	0.0001 (0.0001)
FinLeverage	-0.0012 (0.0017)	-0.0014 (0.0017)	0.0000 (0.0006)	0.0000 (0.0006)
Rev12	0.0000 (0.0000)	0.0000 (0.0000).	0.0000 (0.0000)	0.0000 (0.0000)
PtB	0.0012 (0.0004)**	0.0012 (0.0004)**	0.0034 (0.0024)	0.0033 (0.0023)
Vol.360	-0.0027 (0.0005)***	-0.0027 (0.0005)***	-0.0007 (0.0012)	-0.001 (0.0012)
ROE	-0.0005 (0.0002)*	-0.0004 (0.0002).	-0.0005 (0.0005)	-0.0005 (0.0005)
ROA	0.0026 (0.0015).	0.0026 (0.0015).	0.0012 (0.0019)	0.0009 (0.0019)

ROIC	0.0015 (0.001)	0.0014 (0.0010)	-0.0009 (0.0013)	-0.0007 (0.0014)
DR1	-0.0147 (0.0099)		-0.0145 (0.0217)	
DR3	-0.0188 (0.0099).		0.0031 (0.0223)	
DB1		0.0007 (0.0100)		-0.0043 (0.0215)
DB3		0.0012 (0.0102)		0.0247 (0.0231)
Adj. R^2	0.1761	0.1849	0.0065	0.0102

Significant codes: 0 = “***” 0.001= “**” 0.01= “*” 0.05= “.”

5.3 Robustness in our results

We take inspiration from Engelhardt et al. (2021) and Albuquerque et al. (2020) for our robustness test. To ensure the accuracy of our findings, we divided the ESG score into its three components (E, S, and G) and analyzed each score separately, following the methods used in Albuquerque et al. (2020). Furthermore, we conducted tests to see if the results remained consistent when we altered the observation period. For this we used a control period from February 1st, 2017 to February 1st, 2018. In addition, we want to address the potential multicollinearity in our data.

We ran the same models in a control period from February 1st, 2017, to February 1st, 2018, to test for the effects found in the primary analysis. There is no significant relationship between ESG and financial performance in these results. As a benchmark, the control period indicates that the ESG findings in our models are significant for the time period of the Covid-19 pandemic, and especially for the collapse period from February 1st, 2020, until March 23rd, 2020.

The control period shows a similar relationship between Short-Term Debt, Book to Share ratio, and Volatility over the last 360 days, as in our results. These effects are established for the financial market over time. It also underlines the economic

significance of these variables. At the same time, we find no relationship between cumulative stock returns and Long-Term Debt, ROA, ROE, and Free cash. The results indicate that these effects may be due to the unstable times during the collapse period and the recovery period that followed the crash.

The validity of our findings was ensured through rigorous testing for multicollinearity and reverse causality, as well as control period regressions. Given the risk of both near-perfect and perfect multicollinearity, careful examination of the results presented in Table 5.4.1.1 revealed no discernible impact from these types of multicollinearities. Our analysis also included a thorough investigation into the potential consequences associated with multicollinearity. Regarding reverse causality, our regressions were designed to counter possible effects by sampling attributes one day before stock returns, thereby preventing any future returns from affecting our attributes in the current time frame. To further mitigate any potential impact of reverse causality, we could have lagged the returns more than the two non-trading days between February 1st and 3rd. However, this would have disrupted the precision of our results as we wish to determine the effects of attributes measured as close to the collapse as possible.

One major weakness of our results is the dependence on ESG scores that may have been rewritten. Berg et al. (2021) compare ESG scores downloaded on February 9th and March 23rd, 2021. They discover ESG score rewritings between these two downloads, affecting 86% of historical ESG scores. If our testing period is later rewritten, we cannot rely on our results to back our thesis as we cannot assure that the ESG scores used are the ones that investors faced on February 1st, 2020.

Finally, we cannot rule out the possibility of our results suffering from random noise in an "efficiently inefficient" market (Pedersen, 2019). Our thesis fails to count for country-specific differences such as government restriction differences, availability to and reaction to the news, economic help-packages to industry and companies, vulnerability to crashes, and reliance on other countries' economic resilience. All these differences may have affected our results, and we encourage further exploration of these effects. in addition, market reactions and overreactions like automatic buyouts can lead to a harder fall and market overreactions.

6 Conclusion

The objective of this thesis is to contribute to the field of sustainable finance during a crisis period. Our thesis addresses the following research question:

"Was there a positive relationship between ESG scores and company performance throughout the Covid-19 pandemic?"

We conducted the analysis by running OLS regressions on three Models for two different time periods. The first time period was a two years period during the pandemic, while the second period was during the market collapse caused by the outbreak of Covid-19. A model incorporating the total ESG score from Refinitiv and Bloomberg made up the first approach. To find the individual effects of different pillar scores, the second model employed the E-, S-, and G- pillar scores. For the last model, we assigned all companies in each market to three different ESG portfolios based on the company´s total ESG score.

We find three main relationships in our thesis through our model regressions. The first proven relationship in our data is the negative relationship between the Bloomberg S pillar score and cumulative returns throughout the collapse period. This effect appears in both of the markets and contradicts the mixed positive findings of Engelhardt et al. (2021), Bae et al. (2021), and Demers et al. (2021). Our results suggest a negative effect of overinvesting in social incentives as higher social scores have been proven to reduce the cumulative stock returns without any significant long-term effect. This can encourage a restrictive approach to social investing in case of significant risk of loss during future exogenous shocks. We believe that this proves an effect of the materialization of the risk of trust, which neutralizes the effect found by Bonnefon et al. (2022) and Barber et al. (2021).

The second relationship is a significant positive correlation between the Bloomberg E- pillar score and cumulative stock returns during the Covid-19 collapse period. This relationship is only significant in the U.S. market and aligns with the findings of Lins et al. (2017). Our results imply a positive gain from reducing emissions and investing in sustainable solutions. The findings in the U.S. market align with Lins et al. (2017) and highlight the market valuation of local pollution and environmental investments. This relationship underlines the importance of environmental

investments prior to an exogenous shock as it attracts investors due to a lack of trust in the market (Lins et al., 2017).

Finally, our research revealed a significant relationship between cumulative stock returns and the moderate portfolio utilizing the Refinitiv ESG score. This is the benchmark portfolio denoted by DR2. On the one hand, the benchmark portfolio positively correlates with the cumulative stock returns in all tests. On the other hand, the immoderate portfolios have no significant correlation except for one of the regressions. These results add to the covered literature by Friede et al., claiming that no relationship exists between ESG portfolios and cumulative returns (Friede et al., 2015). The results also align with the theory of Pedersen et al. (2021) on ESG portfolios not yielding significant effects in a non-rational market. Our results predict better performance for "moderate ESG-scoring companies" portfolios. In Chapter 5.3.3. we ruled out the possibility of a significant relationship between the two "immoderate" portfolios and the cumulative stock returns. Our results, therefore, imply that investing in a moderate portfolio is the only portfolio that gives better significant returns during an exogenous shock. The effect is likely to occur due to investors fearing the materialization of risk associated with immoderate result companies and choosing to invest in middle-ranged companies instead.

Our thesis contributes to the field of research by addressing the understudied topic of ESG impact in times of crisis. We conclude that all our main findings are important to the field and draw a picture of economically significant effects in our results. Supported by studies conducted across diverse markets, our research not only confirms what is already known but also works as an encouragement for further study in this field.

Despite these insights, we are aware of the limits of our study. The results in this thesis are based on ESG scores that lack standardization, rely on self-reporting, and operates with limited availability. Using ESG data as extensively as we do in our thesis will raise limitations related to selection bias and ESG score disagreements (Berg et al., 2022). Furthermore, the presence of a rewriting bias in the Refinitiv ESG score creates another limitation. As the results from Refinitiv can be subject to some degree of rewriting, it is unclear to what extent our data may have been rewritten. Our thesis leaves room for further research that could involve using

different ESG scores to better understand what factors contribute to resilience during a crisis and hopefully eliminate the effect of rewriting.

For future research, we recommend examining the relationships found in this thesis while controlling for subsidies received, differences in government restrictions, and other national and regional factors that affected companies during the Covid-19 outbreak. In addition, we encourage exploring the differences in recovery of companies after the collapse period to broaden the understanding of the effects of the exogenous shock caused by the Covid-19 outbreak.

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Appendix

Table 2.1.4.1 Measurement matrix Refinitiv and Bloomberg ESG scores

	Refinitiv	**Bloomberg**
E	- Resource use - Emissions - Innovation	- Air Quality - Greenhouse Gas (GHG) - Climate Exposure - Water Use
S	- Workforce - Human rights - Community - Product responsibility	- Business Ethics - Labor & Employment Practices - Health and Safety Policies - Operational Risk Management
G	- Management - Shareholders - Corporate Social Responsibility (CSR) Strategy	Board compensation: - Diversity (gender and age) - Refreshment (entrenchment and balance of tenures) - Director Roles (overboarding of directors, chairman, and CEO) - Independence (independent board leadership and director independence) Executive compensation: - Incentive Structure (long-term vs short-term incentives for CEO and other executives) - Pay for Performance (fixed and variable pay vs retention and value creation) - Pay Governance (compensation committee independence)

Table 4.1.1.3 ESG dataset Stoxx 600

Short Name	EB	SB	GB	ESGB	ER	SR	GR	ESGR
COVESTRO AG	3,48	5,84	5,47	4,61	73,2	71,62	92,49	76,92
A2A SPA	4,42	2,44	6,61	4,36	83,65	83,93	74,28	81,4
ANGLO AMER PLC	4,78	3,09	6,84	4,64	80,26	85,07	83,86	83,08
AALBERTS NV	1,25	0,47	5,44	1,98	61,32	79,65	51,23	65,29
ABB LTD-REG	6,86	3,43	6,92	5,75	97,24	93,45	91,31	94,13
ABRDN PLC	2,51	3,61	7,14	4,31	49,61	85,23	94,25	84,45
ASSOC BRIT FOODS	4,18	1,47	7,93	4,19	83,1	76,41	53,1	72,63
ANHEUSER-BUSCH I	3,47	2,09	4,77	3,24	65,64	52,39	79,84	63,12
ABN AMRO BANK-CV	2,44	1,54	6,07	2,82	90,16	65,35	74,7	72,29
ACCOR SA	3,44	4,99	5,35	0	90,42	96,31	74,6	88,38
CREDIT AGRICOLE	0,61	1,16	6,83	2,16	94,89	73,13	54,41	69,52
ACKERMANS & VAN	0,66	3,85	4,73	2,5	53,21	26,64	31,57	37,79
ACS	0,62	4,24	3,89	2,41	81,2	94,19	31,8	72,86
KONINKLIJKE AHOL	2,62	1,72	7,1	3,18	71,64	86,87	33,15	66,36
ADECCO GROUP AG	2,56	1,46	6,92	3,02	44,88	74,57	92,35	73,56
ADMIRAL GROUP	0	0,86	8,62	2,03	28,29	46,06	82,26	58,17
ADIDAS AG	0,59	2,59	5,88	2,47	87,96	94,93	91,07	92,56
ADYEN NV	0	0,36	4,7	1,2	42,11	34,59	60,32	47,98
AENA SME SA	6,34	4,52	4,82	5,32	70,83	90,4	65,39	77,66
CARL ZEISS ME-BR	0	0,88	3,49	1,49	61,85	83,02	56,77	70,04
AGEAS	0,3	0,72	5,51	1,61	84,11	40,68	90,16	66,26
AIR LIQUIDE SA	2,19	1,36	6,43	2,9	96,97	88,52	73,8	85,76
AIRBUS SE	2,89	2,02	6,32	3,4	96,97	88,52	73,8	85,76
ARKEMA	4,1	3,31	6,21	4,41	90,37	90,38	50,87	81,52
AKER BP ASA	5,06	4,27	5,55	4,97	50,9	70,2	82,79	66,5
ALCON INC	0	1,64	2,62	1,72	27,1	68,75	86,65	68,2
ALFA LAVAL AB	9,36	4,66	5,25	6,29	90,28	76,47	81,84	82,72
ALLREAL HOLD-REG	0	0	0	0	59,52	63,9	50,81	58,05
ALLIANZ SE-REG	4,2	0,87	5,63	3,39	59,52	63,9	50,81	58,05
AMBU A/S-B	0	1,25	5,62	2,25	37,59	62,56	62,23	58,25
AMPLIFON SPA	4,39	3,43	6,01	4,34	53,34	54,61	67,31	58,96
AMADEUS IT GROUP	4,17	4,38	6,27	4,85	36,49	64,2	79,08	59,43
AMS-OSRAM AG	0,04	1,29	4,64	0	36,49	64,2	79,08	59,43
AMUNDI SA	3,4	1,53	5,22	2,85	91,99	77,83	36,94	60,74
ANDRITZ AG	2,09	3,12	5,7	3,36	76,26	76,61	75,92	76,29
ANTOFAGASTA PLC	3,97	5,71	6,05	5,03	58,74	79,66	73,23	70,72
ARGENX SE	0	0,53	5,43	1,7	0	63,47	69,75	49,49
ASM INTL NV	3,91	2,79	7,02	0	61,29	79,15	56,56	67,72
ASML HOLDING NV	5,61	2,75	6,81	0	61,29	79,15	56,56	67,72
ASR NEDERLAND NV	1,25	2,38	4	2,32	90,22	70,73	58,68	68,51
ASSA ABLOY AB-B	5,34	0,91	5,25	3,72	83,1	76,41	53,1	72,63

AROUNDTOWN SA	3,95	5,81	3,77	4,09	54,43	88,6	58,65	68,06
ATLAS COPCO-A	3,51	4,17	4,73	4,06	88,76	92,44	87,21	89,89
ALTEN	0,29	1,77	4,92	1,68	72,52	86,79	79,08	81,24
AUTO TRADER	2,03	1,87	8,25	3,3	20,34	55,69	69,97	57,39
AVIVA PLC	0,81	0,66	7,96	2,32	79,37	57,66	86,35	72,03
ASTRAZENECA PLC	6,86	3,47	8,26	5,25	92,6	96,98	94,67	95,27
JULIUS BAER GROU	1,02	1,28	7,34	2,63	76,66	68,73	76,24	72,57
FASTIGHETS-B SHS	1,51	3,25	3,92	2,54	49,98	40,48	49,6	46,45
BALOISE HOL-REG	0,28	0,36	8,17	1,92	70,38	80,21	82,04	77,05
BANCO BPM SPA	0	1,6	5,64	1,92	76,46	78,68	74,03	76,68
BARCLAYS PLC	0,55	2,75	7,33	3,03	90,97	88,7	68,3	81,69
BARRY CALLEB-REG	1,67	0,88	5,7	2,39	90,97	88,7	68,3	81,69
BASF SE	4,85	2,11	6,32	4,38	95,72	92,33	83,78	91,76
BAYER AG-REG	3,31	2,87	6,57	4,02	83,12	96,88	87,33	90,79
TRITAX BIG BOX R	0,93	0	5,45	2,14	44,54	12,14	14,26	25
BBVA	2,47	4,03	6,61	4,2	76,46	78,68	74,03	76,68
BECHTLE AG	3,36	1,18	3,66	2,47	37,64	75,47	39,63	53,63
BARRATT DEV	1,68	4,79	8,54	4,25	90,97	88,7	68,3	81,69
BELIMO HOLDING-R	2,32	0,91	4,26	2,35	24,74	62,97	59,98	49,05
BEIERSDORF AG	4,92	4,65	4,5	4,87	71,06	60,46	74,42	66,69
BEAZLEY PLC	0,35	0,86	7,37	2,03	23,14	36,42	85,04	54,1
BANK OF IRELAND	0	1,78	7,94	2,41	76,46	78,68	74,03	76,68
BERKELEY GROUP	2,73	6,09	6,85	4,68	86,93	58,31	34,64	61,81
BANKINTER	0,06	4,12	5,09	2,93	76,46	78,68	74,03	76,68
B&M EUROPEAN	1,76	1,6	6,55	2,75	18,91	33,45	58,12	37,63
BMW AG	4,02	2,97	5,77	4,16	83,12	96,88	87,33	90,79
DANONE	4,73	2,67	6,49	4,54	94,23	96,24	93,01	94,79
BNP PARIBAS	1,88	2,02	6,75	3,04	94,23	96,24	93,01	94,79
BUNZL PLC	5,6	2,61	7,4	5,03	23,42	54,04	66,58	49,23
BOLLORE SE	4,76	1,31	5,02	2,9	85,17	85,78	79,46	84,02
BOLIDEN AB	5,17	4,47	5,66	5,05	85,17	85,78	79,46	84,02
BURBERRY GROUP	0,33	2,04	7,06	2,34	62,84	56,72	87,58	69,71
BT GROUP PLC	5,76	0,65	7,72	3,41	77,32	70,73	73,22	72,73
BUREAU VERITAS S	4,35	5,28	5,45	5,14	62,84	56,72	87,58	69,71
BELLWAY PLC	1,3	0	7,86	2,57	24,74	62,97	59,98	49,05
CARREFOUR SA	2,71	2,17	5,18	3,05	83,43	88,2	89,72	88,06
CAIXABANK SA	0,78	2,17	5,82	2,55	83,43	88,2	89,72	88,06
CAPGEMINI SE	3,73	2,05	5,88	3,57	77,48	89,72	44,96	67,31
CARLSBERG-B	3,66	2,06	4,97	3,33	61,85	83,02	56,77	70,04
CASTELLUM AB	4,96	6,19	6,27	5,59	81,55	76,69	88,97	82,23
CLOSE BROS GRP	0	1,37	7,11	2,06	77,66	56,62	87,44	70,75
COMMERZBANK	0,45	4,89	6,98	3,85	91,42	71,38	79,1	77,04
COCA-COLA HBC AG	4,13	2,76	6,75	4,4	83,52	92,89	94,78	90,57
CHRISTIAN DIOR	0,33	2,36	5,36	2,15	81,58	74,18	24,04	61,13

CIE FINANCI-REG	0,33	2,34	5,3	2,13	91,42	71,38	79,1	77,04
CHR HANSEN HOLDI	4,39	1,21	6,55	3,89	81,58	74,18	24,04	61,13
CLARIANT AG-REG	3,52	5,55	5,35	4,53	69,58	88,36	86,92	80,6
CELLNEX TELECOM	1,67	5,32	5,68	3,69	35,16	54,65	72,77	55,49
CNH INDUSTRIAL N	4,03	6,66	6,97	5,82	93	93,98	40,22	78,33
COFINIMMO	2,36	6,78	6,09	4,12	78,93	68,31	84,67	77,57
INMOBILIARIA COL	3,75	6,39	4,89	4,48	86,18	81,7	78,65	82,4
COLOPLAST-B	1,5	2,26	4,83	2,94	71,69	83,67	54,74	71,27
CONTINENTAL AG	3,81	4,36	4,68	4,25	70,93	81,56	86,64	79,17
COMPASS GROUP	1,26	1,34	7,78	0	91,42	71,38	79,1	77,04
DAVIDE CAMPARI-M	2,56	2,31	5,95	3,35	46,57	77,18	72,01	66,81
CRODA INTL.	3,86	2,53	8,28	4,5	91,83	77,8	65,98	80,71
CRH PLC	5,85	3,17	8,59	6	87,8	87,42	93,16	88,95
AXA	0,79	0,82	7,12	2,22	94,89	73,13	54,41	69,52
CREDIT SUISS-REG	0,32	2,05	7,26	2,58	94,89	73,13	54,41	69,52
CONVATEC GROUP P	0	2,6	7,92	3,67	70,93	81,56	86,64	79,17
DANSKE BANK A/S	0,18	1,19	7,11	2,05	90,33	86,42	73,9	84,28
DEUTSCHE BOERSE	6,68	2,81	6,57	4,76	96,03	85,06	80,19	84,89
DEUTSCHE BANK-RG	1,49	2,45	6,34	3,05	96,03	85,06	80,19	84,89
DCC PLC	0,52	0,78	8,18	2,06	40,25	29,82	85,79	47,23
DEMANT A/S	0	1,95	5,08	2,56	36,7	68,03	31,95	49,81
VINCI SA	2,02	0,72	5,65	2,26	87,66	94,39	80,82	89,03
DIAGEO PLC	7,04	7,5	7,82	7,46	87,66	94,39	80,82	89,03
DELIVERY HERO SE	0	1,21	6,06	1,8	34,14	92,87	88,41	82,66
SARTORIUS STEDIM	0	1,82	5,09	2,49	60,17	93,44	72,94	80,5
DIRECT LINE INSU	0	0,86	7,61	1,85	26,7	58,56	77,44	61,86
DERWENT LONDON	3,78	4,23	6,75	4,87	77,88	54,85	49,76	61,86
DNB BANK ASA	1,92	5,8	5,27	4,45	90,75	81,68	43,61	69,28
DECHRA PHARMA	0	0	0	0	45,38	55,3	64,5	55,9
DEUTSCHE POST-RG	4,99	3,93	6,25	4,92	96,03	85,06	80,19	84,89
DSM (KONIN)	2,81	3,06	6,59	3,79	71,64	86,87	33,15	66,36
DSV A/S	2,36	2,93	6,02	3,36	71,47	69,55	70,68	70,53
DASSAULT SYSTEME	2,54	1,15	4,44	2,42	69,18	69,29	21,62	53,83
DEUTSCHE TELEKOM	8,34	2,24	4,94	4,36	96,03	85,06	80,19	84,89
DUFRY AG-REG	0	1,73	6	2,12	41,76	53,81	59,13	53,54
ERSTE GROUP BANK	0	2,66	5,94	2,46	79,37	80,13	80,58	80,18
EDENRED	3,86	2,99	6,36	4,08	71,03	75,29	84,54	77,4
EDF	5,45	3,46	5,58	4,91	76,28	85,21	86,21	82,37
EDP	5,78	2,93	5,74	4,92	81,37	94,15	42,96	75,92
ELEKTA AB-B	3	1,32	5,52	2,69	76,28	85,21	86,21	82,37
ESSILORLUXOTTICA	0	2,51	6,93	3,37	80,46	91,41	88,57	86,05
ENDESA	3,12	4,77	5,02	4,05	80,46	91,41	88,57	86,05
ELIA GROUP SA/NV	0,13	3,06	5,1	2,04	48,92	65	37,96	51,4
ELIS SA	4,95	4,89	6,65	5,41	48,92	65	37,96	51,4

ELISA OYJ	3,29	2,33	6,91	3,67	48,92	65	37,96	51,4
ELECTROLUX AB-B	2	2	5,65	2,78	76,28	85,21	86,21	82,37
MAN GROUP PLC/JE	0,08	1,54	6,59	2,36	43,34	75,33	82,95	74,41
EMS-CHEMIE HLDG	0,26	1,09	4,04	1,3	29,91	46,82	24,62	35,15
BOUYGUES SA	1,43	1,6	5,26	2,28	84,09	88,74	75,63	83,58
ENAGAS SA	7,04	5,01	4,96	5,85	70,42	75,45	69,35	71,87
ENGIE	4,27	1,94	5,9	3,96	70,42	75,45	69,35	71,87
ENI SPA	6,35	5,6	6,41	6,16	72,64	91,08	86,37	83,61
ENTAIN PLC	0	0	6,38	0	69,44	82,79	83,33	79,42
EURONEXT NV	7	2,13	5,72	4,2	42,75	75,54	66,82	66,89
FAURECIA	4,84	2,1	6,56	3,96	53,9	76,42	85,47	68,98
E.ON SE	2,91	3,92	5,66	3,98	53,9	76,42	85,47	68,98
EPIROC AB-A	3,66	5,21	4,49	4,43	67,07	86,93	52,46	70,33
EQUINOR ASA	4,83	4,36	7,44	5,36	76,34	80,49	90,4	81,39
EQT AB	0	0	0	0	56,91	62,62	66,12	63,46
EUROFINS SCIEN	0	2,56	4,2	2,34	42,75	75,54	66,82	66,89
ERICSSON LM-B	6,73	1,94	4,91	0	57,02	77,72	78,09	73,61
ESSITY AKTIEBO-B	1,86	2,38	5,16	3,08	53,36	82,45	63,07	71,59
CTS EVENTIM AG &	0	0	2,94	0	15,37	53,14	32,05	40,43
EVONIK INDUSTRIE	4,93	2,9	6,54	4,73	24,23	45,46	71,41	47,47
EVOLUTION AB	0	0	5,44	0	24,23	45,46	71,41	47,47
EVOTEC SE	0	0	0	0	24,23	45,46	71,41	47,47
EXPERIAN PLC	4,15	1,3	6,5	3,45	55,25	81,53	65,16	69,86
FABEGE AB	0	0	0	0	87,64	78,21	83,27	82,84
FINECOBANK SPA	0,06	2,59	6,94	2,65	78,22	83,51	88,64	84,6
FERROVIAL SA	2,54	2,59	5,08	3,13	78,83	73,17	90,65	79,59
FERGUSON PLC	0	0	7,25	0	78,83	73,17	90,65	79,59
EIFFAGE	0,66	1,71	5,66	2	96,29	81,68	79,5	86,52
FLUGHAFEN ZU-REG	4,14	0,78	3,92	2,78	43,97	27,11	31,53	33,27
FLUTTER ENTER-DI	0	0	7,59	0	43,97	27,11	31,53	33,27
FRESENIUS MEDICA	2,25	1,16	5,38	2,44	34,41	23,7	51,92	33,36
FREENET AG	2,9	1,53	5,55	2,84	34,41	23,7	51,92	33,36
FORTUM OYJ	3,84	2,62	6,45	4,12	0	10,96	4,15	6,29
VALEO	4,06	4,36	6,47	4,75	34,41	23,7	51,92	33,36
FRESENIUS SE & C	2,72	3,05	5,18	3,57	34,41	23,7	51,92	33,36
GENERALI ASSIC	0,95	0,79	6,36	2,15	68,44	71,85	65,72	68,94
GEA GROUP AG	2,18	1,85	6,82	3,24	68,44	71,85	65,72	68,94
GALENICA AG	5,65	2,8	7,37	4,45	56,15	63,79	74,9	65,26
GALP ENERGIA	5,3	5,55	4,56	5,16	56,15	63,79	74,9	65,26
GETLINK SE	4,3	0,61	6,91	3,35	75,21	72,34	72,41	72,85
GETINGE AB-B SHS	0	1,81	4,36	2,29	75,21	72,34	72,41	72,85
FISCHER(GEO)-REG	1,76	3,55	7,47	3,74	85,13	87,76	74,46	83,07
GECINA SA	4,75	8	6,6	5,8	92,78	90,18	83,41	88,98
GIVAUDAN-REG	5,95	1,78	8,15	5,14	73,09	74,37	82,51	75,69

GJENSIDIGE FORSI	0,32	2,47	6,47	2,38	59,76	59,98	75,37	66,1
GLANBIA PLC	1,13	1,1	7,71	2,63	84,64	96,53	96,19	93,72
SOC GENERALE SA	1,33	2,08	6,48	2,84	88,07	94,43	92,74	91,78
GLENCORE PLC	5,65	4,98	7,34	5,82	88,07	94,43	92,74	91,78
GENMAB A/S	0	1,02	6,78	2,35	36,72	78,82	80,79	68,7
GN STORE NORD	1	1,07	5,82	0	40,89	79,39	64,13	67,45
GREGGS PLC	2,18	1,84	7,12	3,12	72,04	78,88	73,1	75,37
HAYS PLC	2,72	2,05	7,91	3,64	39,13	38,18	71,43	49,57
HEIDELBERGCEMENT	5,42	2,53	5,82	4,89	83,27	78,63	84,05	81,87
HELVETIA HOL-REG	0,81	0,59	7,97	2,29	64,12	67,14	73,15	68,2
HENKEL AG -PREF	4,61	2,4	5,04	4,03	56,77	58,88	74,77	61,89
HEXAGON AB-B	0	2,45	4,8	1,82	56,19	63,71	32,73	51,66
HELLOFRESH SE	1,12	1	2,64	1,44	64,12	67,14	73,15	68,2
HIKMA PHARMACEUT	0,49	0,95	7,47	2,54	41,07	74,32	88,86	71,27
HALMA PLC	1,56	0,91	8,04	2,83	51,61	64,64	84,94	65,63
THALES SA	5,29	1,78	6,76	0	71,08	69,34	89,46	74,87
HOLCIM LTD	5,63	4,4	6,9	5,74	71,08	69,34	89,46	74,87
HEXPOL AB	3,12	1,64	4,45	3	56,19	63,71	32,73	51,66
HSBC HOLDINGS PL	1,27	1,88	7,83	2,97	85,91	71,5	90,93	80,57
HISCOX LTD	0,28	0,65	7,58	1,95	24,09	43,88	84,9	57,65
HUHTAMAKI OYJ	2,97	1,75	6,67	3,74	79,36	75,44	89,07	80,09
HUSQVARNA-B SHS	3,82	3,07	4,99	3,93	91,49	85,66	63	81,78
HOWDEN JOINERY G	0	1	8,01	2,01	66,47	41,78	54,3	53,32
IBERDROLA SA	5,12	3,98	5,71	4,95	94,57	91,49	63,96	85,92
INTERMEDIATE CAP	0,64	0,81	7,66	2,28	40,55	39,11	41,84	40,58
INTERNATIONAL DI	6,32	3,2	6,79	5,29	40,55	39,11	41,84	40,58
INFINEON TECH	3,74	2,81	6,32	0	81,32	83,94	81,19	82,41
ITALGAS SPA	2,26	7,32	5,6	4,29	80,76	66,62	91,46	77,99
IG GROUP HOLDING	0	0	7,58	0	11,36	54,87	78,87	59,97
INTERCONTINENTAL	3,56	4,07	7,78	0	40,55	39,11	41,84	40,58
3I GROUP PLC	0,64	3,67	7,76	3,95	79,13	65,01	79,64	73,81
IMPERIAL BRANDS	2,36	3,51	7,66	4,59	78,27	70,11	76,72	74,18
IMCD NV	4,55	1,57	6,66	0	50,87	66,69	59,5	58,81
IMI PLC	1,77	1,69	8,42	3,32	70,83	69,75	66,51	69,19
INCHCAPE PLC	0	0	8,05	0	15,15	36,72	85,64	41,28
INFORMA PLC	7,41	1,54	6,8	3,91	81,32	83,94	81,19	82,41
ING GROEP NV	2,46	1,46	5,58	2,69	83,61	70,19	80,91	75,98
INVESTOR AB-B	0,51	2,15	4,88	2,46	92,66	80,68	53,69	69,77
INTERPUMP SPA	0	1,26	6,61	1,82	93,77	79,31	44,06	71,68
INTESA SANPAOLO	0,39	4,43	6,21	3,46	40,55	39,11	41,84	40,58
ISS A/S	3,51	7,02	6,31	6,03	57,42	80,07	87,52	77,25
INTERTEK GROUP	2,34	1,78	8,16	3,44	40,55	39,11	41,84	40,58
ITV PLC	6,75	1,79	8,42	4,35	49,62	82,25	81,73	77,95
INDITEX	0,59	7,09	6,18	3,95	95,74	96,79	65,31	84,53

JD SPORTS FASHIO	0	1,56	5,33	1,66	53,78	41,61	28,8	39,03
JOHNSON MATTHEY	4,21	2,78	7,52	4,59	68,49	70,95	96,22	75,64
JERONIMO MARTINS	2,41	1,8	5,3	2,8	89,95	92,84	67,54	84,71
KBC GROUP	0,42	2,39	6,15	2,58	90,21	77,47	32,79	63,22
KNORR-BREMSE AG	2,93	2	3,64	2,83	79,31	84,76	68,65	78,31
KESKO OYJ-B	4,55	4,22	4,93	4,5	77,83	79,03	57,85	72,51
KINGFISHER PLC	3,83	3,02	8,47	4,89	35,62	36,54	92,01	52,61
KGHM	2,86	3,02	4,03	3,19	63,3	61,58	35,38	55,75
KION GROUP AG	2,87	4,21	5,05	4	68,64	82,99	88,42	79,63
KINNEVIK AB - B	0,22	1,87	6,24	2,52	35,62	36,54	92,01	52,61
KUEHNE & NAGEL-R	3,23	3,35	3,62	3,37	75,85	70,65	65,65	71,01
KPN (KONIN) NV	2,39	1,97	6,7	3,17	71,64	86,87	33,15	66,36
KINGSPAN GROUP	3,79	3,89	6,05	4,46	35,62	36,54	92,01	52,61
KERRY GROUP-A	3,02	2,55	8,02	4,14	96,55	95,76	56,19	80,76
LAND SECURITIES	5,48	7,32	7,79	6,54	88,17	76,36	82,78	82,86
LEONARDO SPA	3,28	5,4	7,92	5,65	97,68	92,75	77,41	88,95
LEG IMMOBILIEN S	2,93	6,21	6,81	4,64	34,63	71,87	81,57	63,29
LEGAL & GEN GRP	0,04	1,83	8,33	2,34	34,63	71,87	81,57	63,29
DEUTSCHE LUFT-RG	2,01	1,25	4,82	2,24	96,03	85,06	80,19	84,89
KLEPIERRE	4,12	4,23	6,91	5,11	23,65	64,8	17,19	31,52
SIGNIFY NV	2,73	7,43	7,12	5,24	87,94	54,87	85,29	74,06
LINDE PLC	3,01	2,13	6,65	3,61	88,44	93,67	73,61	87,1
LLOYDS BANKING	1,56	2,76	7,45	3,46	84,43	81,77	86,66	83,92
LOGITECH INTER-R	1	2,46	7,57	0	58,05	72,66	76,18	70,27
LPP	0,33	1,86	3,15	1,53	82,41	66,29	50,64	63,38
LONDON STOCK EX	8,5	2,66	8,18	5,48	67,97	86,35	68,73	75,56
LANXESS AG	3,33	3,12	5,85	3,9	88,17	76,36	82,78	82,86
MEDIOBANCA	0,08	3,12	6,13	2,74	96,23	89,74	97,87	93,93
MERCEDES-BENZ GR	1,7	3,27	5,06	2,93	96,23	89,74	97,87	93,93
LVMH MOET HENNE	0,33	3,1	4,56	2,24	88,82	81,64	37,07	70,15
WENDEL	0,22	1,63	6,49	2,43	81,48	91,23	85,32	85,3
MARKS & SPENCER	3,05	2,47	7,73	3,85	92,42	90,92	76,87	87,13
MICHELIN	3,09	4,36	6,12	4,31	91,42	71,38	79,1	77,04
MONDI PLC	5,19	3,07	7,67	5,76	84,23	88,78	60,71	79,9
MONCLER SPA	2,12	1,39	6,86	2,88	84,23	88,78	60,71	79,9
MERCK KGAA	4,96	2,01	5,1	3,23	96,23	89,74	97,87	93,93
MERLIN PROPERTIE	2,63	2,14	6,67	3,89	96,23	89,74	97,87	93,93
MELROSE INDUSTRI	0	1,21	6,27	2,07	48,63	64,12	74,4	61,08
ARCELORMITTAL	2,76	7,36	6,51	4,62	77,78	90,1	73	81,01
MTU AERO ENGINES	4,15	4,55	5,96	4,83	89,75	85,56	79,9	84,72
NEMETSCHEK SE	0	0,65	3,15	1,03	35,13	43,13	71,33	55,07
NESTLE SA-REG	3,96	3,79	7,42	4,85	71,57	67,85	79,58	71,89
NESTE OYJ	5,17	3,65	7,62	5,34	71,57	67,85	79,58	71,89
NEXI SPA	5,3	3,03	0	0	86,03	73,19	83,18	80,42

NATIONAL GRID PL	1,26	2,64	7,68	3,3	39,9	74,74	86,33	62,66
NORSK HYDRO ASA	5,13	5,87	6,45	5,7	73,37	66,92	78,07	71,86
NIBE INDUSTRIE-B	4,82	6,88	3,92	5,11	85,54	74,66	28,73	65,3
NN GROUP	2,3	1,14	6,76	3,01	81,74	75,8	79,16	77,94
NOKIA OYJ	6,21	2,67	6,79	0	90,02	86,89	95,19	90,83
NOVARTIS AG-REG	6,37	1,82	7,37	3,83	81,93	92,99	79,33	86,25
NOVO NORDISK-B	6,41	1,61	5,94	3,32	81,93	92,99	79,33	86,25
NATURGY ENERGY	4,78	5,94	4,91	5,07	39,9	74,74	86,33	62,66
NATWEST GROUP PL	0,09	2,25	7,91	2,68	39,9	74,74	86,33	62,66
NEXT PLC	1,51	3,55	7,91	3,69	86,03	73,19	83,18	80,42
NOVOZYMES-B SHS	3,49	1,22	5,78	3,33	81,93	92,99	79,33	86,25
TELEFONICA DEUTS	4,63	2,6	5,25	3,8	57,02	77,72	78,09	73,61
OCADO GROUP PLC	1,51	0,54	7,26	2,17	26,8	51,95	72,34	51,46
OMV AG	5,13	5,77	5,56	5,42	73,64	83,04	88,92	81,18
L'OREAL	6,16	2,86	5,91	4,88	85,55	94,95	45,13	79,83
ORANGE	6,64	2,47	5,59	4,29	85,55	94,95	45,13	79,83
ORKLA ASA	5,24	2,24	6,21	4,5	97,5	86,7	86	89,62
ORION OYJ-CL B	3,37	2,87	6,57	4,03	77,84	89,97	52,88	75,73
ORSTED A/S	5,14	4,94	6,7	5,49	80,04	58,67	83,94	74,07
PEKAO	0,08	1,37	4,24	1,59	76,46	78,68	74,03	76,68
PARTNERS GROUP J	0,64	4,72	7,47	4,41	77,13	50,95	37,56	48,37
KONINKLIJKE PHIL	4,58	1,54	6,78	3,32	71,64	86,87	33,15	66,36
PHOENIX GROUP HO	0,28	1,99	7,72	2,45	62,1	60,36	68,85	63,99
PANDORA A/S	4,28	1,86	6,98	4,16	59,89	71,71	78,88	71,62
PENNON GRP PLC	0	0	7,63	0	47,83	67,36	72,01	60,05
PRUDENTIAL PLC	0,32	0,81	7,35	2	42,49	63,56	73,66	64,79
PROSUS NV	0	0	0	0	24,26	62,08	68,49	59,79
PRYSMIAN SPA	5,95	1,45	6,34	4,46	55,09	80,3	90,49	74,59
PERSIMMON	0,69	3,35	7,56	3,07	82,94	70,08	68,06	73,4
PEARSON PLC	7,84	1,3	8,59	4,21	82,09	90,96	80,14	85,76
PSP SWISS PR-REG	3,93	3,57	6,32	4,72	32,13	50,16	51,37	44,87
POSTE ITALIANE	4,19	5,09	7,82	5,32	81,52	85,49	67,45	78,97
PUBLICIS GROUPE	6,38	1,62	6,43	3,71	64,81	87,09	85,06	83,52
PUMA SE	1,01	2,31	3,93	2,18	86,06	88,18	76,32	84,39
QIAGEN NV	0	1,06	6,18	2,25	86,67	92,21	76,63	84,73
FERRARI NV	0,05	2,07	5,6	1,7	78,83	73,17	90,65	79,59
RANDSTAD NV	6,77	3,94	6,04	5,08	62,1	81,94	77,08	75,64
ROYAL UNIBREW	1,78	4,22	5,86	3,84	48,78	65,14	68,66	61,15
REMY COINTREAU	4,2	0,97	6,07	3,17	96,51	58,02	30,74	62,7
RECORDATI SPA	4,7	2,19	6,37	3,68	90,32	93,54	74,16	87,81
RED ELECTRICA	1,41	1,87	6,27	2,86	72,33	88,93	64,12	75,68
RELX PLC	6,64	1,58	7,67	4,54	82,05	84,16	96,44	87,79
REPSOL SA	5,72	4,31	5,6	5,28	63,96	69,91	81,5	74,45
EURAZEO SE	0,51	2,44	5,63	2,78	42,75	75,54	66,82	66,89

RHEINMETALL AG	1,62	1,5	4,94	2,52	69,94	84,02	79,81	79,31
PERNOD RICARD SA	4,48	1,78	6,11	3,71	49,02	25,15	23,72	28,08
RIO TINTO PLC	4,61	4,31	7,98	5,27	76,71	92	63,56	79,63
RECKITT BENCKISE	2,7	2,49	7,91	0	90,32	93,54	74,16	87,81
HERMES INTL	0,33	0,94	5,62	1,65	96,8	85,57	81,75	89,44
RIGHTMOVE	2,12	1,64	7,67	3,1	71,05	46,04	84,34	67,24
RENAULT SA	1,41	1,15	6,02	2,34	94,49	79,65	71,59	82,75
ROCHE HLDG-GENUS	6,45	1,27	6,25	3,15	94,61	97,48	91,7	95,04
ROTORK PLC	2,2	0,82	7,79	3,04	62,76	53,5	73,96	62,49
ROLLS-ROYCE HOLD	2,71	3,18	8,32	4,34	74,62	82,01	71,92	76,99
RS GROUP PLC	2,09	1,08	7,88	0	64,75	81,02	52,59	66,37
RENTOKIL INITIAL	1,88	4,2	7,14	4,46	94,49	79,65	71,59	82,75
RUBIS	4,5	2,11	5,59	4,05	65,28	67,75	83,19	70,53
RWE AG	3,6	3,64	5,92	4,2	75	55,93	68,23	66,94
REXEL SA	0	0	7,51	0	63,62	85,25	90,21	79,27
RYANAIR HLDGS	3,37	2,5	6,93	3,72	27,43	45,91	53,78	42,42
SAAB AB-B	2,31	1,95	4,9	2,91	63,82	81,73	56,9	69,44
BANCO SABADELL	0,05	2,27	5,28	2,19	76,46	78,68	74,03	76,68
SAFRAN SA	2,41	2,01	6,49	3,28	58,57	82,28	71,84	70,01
SALMAR ASA	0	0	6,29	0	69,18	36,26	63,9	52,94
SAMPO OYJ-A SHS	0,72	1,77	5,57	2,21	80,85	64,96	41,84	62,43
SANOFI	4,97	4,6	6,73	5,31	76,46	78,68	74,03	76,68
BANCO SANTANDER	0,22	1,77	6,56	2,27	76,46	78,68	74,03	76,68
SANDVIK AB	2,65	4,04	6,47	4,27	75,74	83,97	81,75	80,53
SAP SE	6,68	2,31	5,39	4,37	76,86	96,58	95,7	93,43
SVENSKA CELL-B	0	0	5,33	0	88,78	89,8	74,2	85,59
SCHINDLER HLD-PC	8,3	5,88	7,12	7,19	63,2	54,43	63,34	59,96
SWISSCOM AG-REG	4,42	3,23	6,01	4,25	96,41	64,83	64,27	68,82
SCOR SE	0,06	3,15	5,51	2,1	66,35	52,43	93,99	70,91
SCHRODERS PLC	1,6	1,47	6,89	2,8	63,2	54,43	63,34	59,96
SEB AB-A	0,06	2,77	5	2,36	90,44	76,04	90,95	83,48
SECURITAS AB-B	2,14	3,28	4,72	3,44	13,98	43,8	55,15	42,88
SAGE GROUP	1,72	0,9	7,78	2,75	26,04	26,75	45,2	32,54
SAINT GOBAIN	7,55	5,99	5,79	6,53	91,42	71,38	79,1	77,04
SEGRO PLC	2,88	5,29	7,38	4,68	78,35	81,84	71,19	77,1
SGS SA-REG	7,53	5,7	6,15	6,19	76,45	91,81	84,55	85,76
SVENSKA HAN-A	1,37	3,44	5,11	3,21	88,78	89,8	74,2	85,59
SIEMENS HEALTHIN	1,5	1,26	4,34	2,17	48,53	81,64	57,28	66,57
SIEMENS AG-REG	8,31	6,47	5,45	6,7	48,53	81,64	57,28	66,57
SIG GROUP AG	1,7	1,1	3,37	2,19	87,94	54,87	85,29	74,06
SIKA AG-REG	6,02	4,94	4,64	5,27	83,46	72,57	80,92	78,76
SIMCORP A/S	0	0	0	0	45,67	43,95	86,62	63,93
SEB SA	3	1	5,33	2,55	90,44	76,04	90,95	83,48
SKANSKA AB-B	1,17	0,89	5,2	1,87	90,44	76,04	90,95	83,48

SKF AB- B SHARES	3,69	4,92	5,38	4,54	86,3	84,03	69,82	80,76
SMURFIT KAPPA GR	4,8	1,36	7,34	5,15	79,14	84,87	95,43	85,29
SWISS LIFE H AG	0,06	2,02	6,5	2,08	96,41	64,83	64,27	68,82
SMITHS GRP PLC	1,61	2,53	7,14	3,27	83,07	85,18	75,59	82,15
SMITH & NEPHEW	0	1,18	7,55	2,64	83,07	85,18	75,59	82,15
SWEDISH ORPHAN B	2,11	2,82	5,84	3,64	52,93	47,16	67,44	54,67
SOFINA	0	0	0	0	0	45,89	9,97	15,03
SOLVAY SA-A	3,88	2,19	5,81	3,85	87,27	75,99	87,02	82,93
SONOVA HOLDING A	1,5	1,81	7,65	3,35	75,91	91,69	78,07	84,15
SOPRA STERIA GRO	5,46	1,56	5,32	3,65	77,16	75,43	46,2	62,14
SPIE SA	0,98	1,08	6,67	2,1	87,08	72,99	70,56	77,57
SWISS PRIME -REG	2,76	3,25	3,45	3,07	96,41	64,83	64,27	68,82
SPIRAX-SARCO ENG	0,65	0,98	8,05	2,08	87,08	72,99	70,56	77,57
SWISS RE AG	2,63	2,42	7,07	3,86	96,41	64,83	64,27	68,82
SNAM SPA	1,21	6,25	6,54	3,73	89,14	91,98	94,47	91,75
SARTORIUS AG-PFD	0	2,72	6,46	3,38	60,17	93,44	72,94	80,5
SSE PLC	4,34	5,93	7,3	5,53	77,68	75,43	72,6	75,68
STANDARD CHARTER	1,23	1,39	7,4	2,61	83,32	93,64	84,57	88,89
STOREBRAND ASA	0,39	0,76	6,88	1,93	96,12	90,91	75,58	89,61
STORA ENSO OYJ-R	0	0	6,27	0	96,12	90,91	75,58	89,61
STMICROELECTRONI	4,28	3,04	6,12	0	93,94	94,27	93,88	94,07
STRAUMANN HLDG-R	0	1,24	6,11	2,35	45,04	81,86	57,8	67,04
SCHNEIDER ELECTR	7,21	3,43	6,57	5,78	63,2	54,43	63,34	59,96
SEVERN TRENT	0	0	7,95	0	57,53	77,95	77,65	68,99
SODEXO SA	1,4	2,23	6,61	0	52,93	47,16	67,44	54,67
SWEDBANK AB-A	0,46	2,73	7,53	3,01	52,93	47,16	67,44	54,67
SPECTRIS PLC	2,18	2,45	7,62	3,63	61,05	83,6	80,6	74,05
SYMRISE AG	4,15	2,81	6,09	4,25	55,19	85,04	88,44	73,98
TATE & LYLE	0,53	1,53	7,99	2,5	50,2	62,83	64,87	59,73
TECAN GROUP AG-R	0	0	0	0	32,59	58,05	82,9	57,46
TELEFONICA	4	1,6	5,52	3,16	57,02	77,72	78,09	73,61
TELENOR ASA	2,27	0,86	6,9	2,53	57,02	77,72	78,09	73,61
TELE2 AB-B SHS	1,6	2,47	5,11	2,84	57,02	77,72	78,09	73,61
TELIA CO AB	5,47	1,27	6,25	3,46	57,02	77,72	78,09	73,61
TEMENOS AG-REG	4,92	2,66	6,79	4,44	54,05	89,64	62,62	72,19
TENARIS SA	3,05	4,79	3,03	3,37	75,91	79,63	37,14	66,58
TELEPERFORMANCE	1,66	0,97	5,19	2,23	57,02	77,72	78,09	73,61
TELECOM ITALIA S	2,83	3,81	6,73	4,24	57,02	77,72	78,09	73,61
THYSSENKRUPP AG	4,87	3,31	4,76	4,51	71,8	74,78	87,64	76,89
JUST EAT TAKEAWA	0	0,67	3,79	1,12	17,13	52,02	55,7	48,88
TOMRA SYSTEMS AS	2,64	1,43	5,27	2,93	37,34	56,19	79,77	56,46
TOPDANMARK A/S	0,1	1,06	5,24	1,56	26,11	50,7	45,65	45,4
TRAVIS PERKINS	0	0	7,51	0	54,01	41,76	83,53	60,1
TRELLEBORG-B	1,65	0,9	4,74	2,18	67,57	74,67	56,31	67,01

TRYG A/S	0,32	0,89	5,53	1,69	25,27	59,71	53,06	52,46
TESCO PLC	3,68	1,25	7,54	3,28	73,08	87,21	64,29	77,13
TOTALENERGIES SE	6,09	5,41	6,49	6,01	89,88	91,04	86,79	89,64
TUI AG	5,51	1,25	4,76	0	72,96	80,89	84,32	79,8
TAYLOR WIMPEY PL	2,81	4,61	7,44	4,58	59,77	81,16	77,35	72,99
UBISOFT ENTERTAI	3,13	0,85	5,41	2,41	48,32	65,32	59,3	60,17
UBS GROUP AG	1,96	3,09	7,29	3,92	97,74	85,22	94,92	91,49
UCB SA	7,56	1,49	6,34	3,43	78,72	91,95	81,99	85,86
UNICREDIT SPA	1,29	4,59	6,92	4,09	88,39	95,68	82,29	88,63
UNILEVER PLC	4,86	2,54	8,31	5,07	88,39	95,68	82,29	88,63
UMICORE	3,77	1,63	6,27	3,71	92,43	73,57	49,76	75,71
UPM-KYMMENE OYJ	0	0	6,04	0	87,3	93,6	85,94	88,89
UNIBAIL-RODAMCO-	3,75	3,67	5,59	4,39	88,39	95,68	82,29	88,63
UNITED INTERN-RE	3,92	0,83	2,61	2,02	88,39	95,68	82,29	88,63
UNITE GROUP/THE	2,62	5,99	6,29	4,26	88,39	95,68	82,29	88,63
VAT GROUP AG	0,08	0	3,86	0,89	3,04	36,74	59,83	31,8
VALMET OYJ	2,82	3,83	7,59	4,39	83,65	75,05	79,85	79,15
VICTREX PLC	2,19	1,65	7,46	3,2	32,75	39,62	76,56	45,18
VERBUND AG	5,3	1,82	5,44	4,25	92,18	64,1	54,58	73,66
VEOLIA ENVIRONNE	0	0	5,64	0	74,39	73	58,87	70,25
VIVENDI SE	5,17	1,59	6,92	3,6	81,99	91,63	75,92	84,49
VIRGIN MONEY UK	0	1,62	6,8	2,14	18,17	39,27	85,02	52,7
VONOVIA SE	1,52	6,78	6,44	3,69	90,96	90,78	81,64	87,86
VODAFONE GROUP	2,73	1	7,81	2,92	83,38	82,6	87,42	84,04
VOESTALPINE AG	4,66	4,56	3,83	4,38	68,96	74,35	64,58	70,05
VOLVO AB-B	4,16	2,68	5,22	3,96	95,48	92,41	73,29	88,8
VOLKSWAGEN-PREF	2,31	3,27	4,9	3,22	95,48	92,41	73,29	88,8
VESTAS WIND SYST	2,33	3,84	5,76	3,71	80,26	81,61	75,31	78,94
WEIR GROUP PLC	0,39	2,37	8,39	3,11	76,57	74,61	80,3	76,9
WIENERBERGER AG	4,15	5,17	6,06	5	70,93	54,42	68,08	64,63
WORLDLINE	6,77	2,85	6,12	4,86	81,41	94,66	73,2	82,8
WPP PLC	6,42	1,58	6,83	3,78	65,36	73,89	92,7	79,91
WARTSILA OYJ ABP	3,44	6,46	6,55	5,4	61,08	72,79	41,47	58,31
WHITBREAD PLC	3,85	2,33	8,19	0	78,77	86,04	71,53	79,84
YARA INTL ASA	4,33	3,04	7,3	4,68	76,12	87,74	64,11	77,84
ZALANDO SE	2,74	4,67	6,21	4,33	77,59	77,33	92,81	84,53
ZURICH INSURANCE	0,53	0,94	7,34	2,16	91,38	91,29	86,04	89,2

Table 4.1.1.4 ESG dataset S&P 500

Short Name	EB	SB	GB	ESGB	ER	SR	GR	ESGR
AGILENT TECH INC	1,5	1,8	6,62	3,307	79,78	93,55	83,44	87,61
AMERICAN AIRLINE	4,18	5,11	6,72	5,337	32,13	23,32	75,54	39,4
ADVANCE AUTO PAR	1,09	2,06	7,07	3,407	66,09	72,63	56,83	66,49
APPLE INC	5,65	3,86	6,48	5,33	62,88	77,93	87,11	77
ABBVIE INC	5,97	1,77	7,07	4,937	76,27	84,97	83,48	82,98
AMERISOURCEBERGE	7,1	2,11	7,21	5,473	32,13	23,32	75,54	39,4
ABIOMED INC	0	0,71	5,55	2,087	0	37,56	20,99	25,31
ABBOTT LABS	1,5	2,6	4,25	2,783	76,27	84,97	83,48	82,98
ACCENTURE PLC-A	4,88	2,01	8,43	5,107	77,88	79,39	77,4	78,26
ADOBE INC	5,69	1,11	6,87	4,557	77,75	77,2	78,56	77,91
ANALOG DEVICES	3,3	3,19	5,51	4	83,43	64,79	74,64	73,16
ARCHER-DANIELS	3,11	3,65	7,27	4,677	79,56	84,61	87,46	83,9
AUTOMATIC DATA	2,1	1,7	7,86	3,887	73,72	76,22	88,95	81,76
AUTODESK INC	3,61	1,51	9,04	4,72	73,72	76,22	88,95	81,76
AMEREN CORP	4,17	3,79	7,55	5,17	32,13	23,32	75,54	39,4
AES CORP	2,95	5,39	6,59	4,977	52,23	76,73	96,46	71,25
AFLAC INC	0,04	0,95	6,75	2,58	35,49	54,8	61,92	55,07
AMERICAN INTERNA	0	0,87	7,99	2,953	32,13	23,32	75,54	39,4
ASSURANT INC	0,34	1,07	6,62	2,677	26,15	60,85	79,8	63,8
ARTHUR J GALLAGH	0	0	5,22	1,74	26,34	49,63	68,62	54,12
AKAMAI TECHNOLOG	3,48	1,76	6,93	4,057	62,34	45,14	69,94	59
ALBEMARLE CORP	2,64	5,69	7,34	5,223	46,71	86,61	88,65	71,26
ALIGN TECHNOLOGY	0	0,88	5,34	2,073	28,56	48,72	67,74	52,17
ALASKA AIR GROUP	4,49	4,88	8,55	5,973	36,32	41,27	77,44	49,87
ALLSTATE CORP	0,02	2,22	5,85	2,697	73,74	65,51	80,52	72,61
ALLEGION PLC	0,39	1,45	7,53	3,123	73,74	65,51	80,52	72,61
APPLIED MATERIAL	5,35	4,35	7,52	5,74	62,88	77,93	87,11	77
AMCOR PLC	2	7,22	5,94	5,053	69,35	74,26	82,75	74,49
ADV MICRO DEVICE	6,52	5,62	7,18	6,44	66,09	72,63	56,83	66,49
AMETEK INC	2,04	1,45	7,83	3,773	32,13	23,32	75,54	39,4
AMGEN INC	7,22	0,83	6,77	4,94	77,02	79,89	70,61	76,36
AMERIPRISE FINAN	1,27	3,73	5,88	3,627	32,13	23,32	75,54	39,4
AMERICAN TOWER C	3,07	2,41	4,96	3,48	32,13	23,32	75,54	39,4
AMAZON.COM INC	3,05	2,22	7,03	4,1	88,58	91,14	81,05	86,88
ARISTA NETWORKS	2	1,99	6,3	3,43	65,7	50,99	73,57	63,09
ANSYS INC	3,71	1,17	8,22	4,367	57,34	86,02	43,76	62,48
AON PLC-CLASS A	0	0	6,97	2,323	34,79	67,7	55,34	58,37
AIR PRODS & CHEM	3,39	5,58	7,18	5,383	92,72	80,6	63,82	81,64
AMPHENOL CORP-A	4,01	3,43	5,49	4,31	79,41	55,35	79,49	71,73
APTIV PLC	3,12	6,46	6,38	5,32	56,63	65,92	57,82	60,78
ALEXANDRIA REAL	3,1	7,26	3,28	4,547	70,14	73,57	78,22	73,78

ATMOS ENERGY	0	2,91	6,65	3,187	43,16	35,01	40,2	39,26
ACTIVISION BLIZZ	0	0,56	6,95	2,503	23,22	67,21	72,71	63,65
AVALONBAY COMMUN	3,21	6,94	6,77	5,64	62,2	79,78	87,58	75,69
BROADCOM INC	0	1,43	7,6	3,01	75,03	53,95	57,41	61,07
AVERY DENNISON	4,24	1,42	6,33	3,997	71,72	65,6	29,94	59,39
AMERICAN WATER W	0	0	7,94	2,647	32,13	23,32	75,54	39,4
AMERICAN EXPRESS	6,49	2,08	7,2	5,257	32,13	23,32	75,54	39,4
AUTOZONE INC	0	2,3	5,47	2,59	73,72	76,22	88,95	81,76
BOEING CO/THE	1,79	2,16	5,58	3,177	83,58	93,51	59,66	80,2
BANK OF AMERICA	2,07	3,54	7,76	4,457	88,49	81,08	52,91	68,98
BAXTER INTL INC	3	3,15	6,61	4,253	75,86	81,63	81,1	80,47
BATH & BODY WORK	4,79	1,17	6,13	4,03	63,28	54,9	49,73	54,53
BEST BUY CO INC	4,96	2,82	8,02	5,267	80,25	80,83	57,22	71,67
BECTON DICKINSON	1,5	3,17	7,33	4	77,49	86,85	49,3	71,79
FRANKLIN RES INC	0,05	2,45	6,6	3,033	41,89	62,16	53,07	55,09
BIOGEN INC	8,26	5,89	6,02	6,723	38,73	59,61	40,51	49,25
BANK NY MELLON	0	0	7,08	2,36	88,49	81,08	52,91	68,98
BOOKING HOLDINGS	4,06	1,12	8,17	4,45	47,21	32,06	62,56	45,04
BLACKROCK INC	2,8	6,28	5,86	4,98	73,66	84,25	63,43	73,06
BRISTOL-MYER SQB	7,18	3,39	7,53	6,033	80,88	83,33	78,95	81,42
BROADRIDGE FINL	2,65	1,45	6,51	3,537	75,03	53,95	57,41	61,07
BOSTON SCIENTIFC	0	4,67	7,25	3,973	61,26	91,62	77,83	81,58
BORGWARNER INC	3,69	4,36	6,76	4,937	65,6	49,95	40,6	53,01
BOSTON PROPERTIE	3,89	6,63	7,66	6,06	61,26	91,62	77,83	81,58
CITIGROUP INC	2,05	2,36	8,69	4,367	90,26	72,31	92,2	84,1
CONAGRA BRANDS I	4,44	2,76	6,74	4,647	37,09	47,2	12,46	35,6
CARDINAL HEALTH	4,4	2,2	7,02	4,54	64,46	76,51	84,09	76,12
CATERPILLAR INC	2,92	2,47	6,21	3,867	60,8	78,36	85,86	74,49
CHUBB LTD	0,24	0,58	5,46	2,093	65,71	65,91	79,13	69,21
CBOE GLOBAL MARK	5,12	2,2	7,91	5,077	22,52	59,78	56,61	53,09
CBRE GROUP INC-A	0	0	8,09	2,697	81,99	83,78	92,76	86,14
CROWN CASTLE INC	1,79	3,25	6,32	3,787	70,35	63,19	68,98	67,74
CARNIVAL CORP	0	0	5,69	1,897	64,46	76,51	84,09	76,12
CADENCE DESIGN	3,9	1,74	4,1	3,247	64,1	88,14	89,69	85,52
CDW CORP/DE	3	0,79	7,21	3,667	42,76	79,55	81,38	75,29
CELANESE CORP	4,05	3,27	7,49	4,937	65,79	47,77	76,22	61,28
CF INDUSTRIES HO	2,2	2,88	7,77	4,283	49,14	76,88	94,94	69,94
CITIZENS FINANCI	0,4	2,79	6,44	3,21	90,26	72,31	92,2	84,1
CHURCH & DWIGHT	5,85	2,14	6,66	4,883	65,71	65,91	79,13	69,21
CH ROBINSON	4,68	4,45	5,24	4,79	31,4	50,26	44,68	42,2
CHARTER COMMUN-A	1,69	1,28	6,51	3,16	16,99	60,77	52,78	50,92
CIGNA CORP	5,53	1,26	5,51	4,1	83,65	84,77	61,86	76,08
CINCINNATI FIN	0,2	0,87	5,76	2,277	21,04	53,12	67,29	54,51
COLGATE-PALMOLIV	5,78	2,1	5,72	4,533	94,69	94,47	77,29	90,17

CLOROX CO	4,36	2,27	7,18	4,603	66,02	78,13	65,72	71,91
COMERICA INC	0,79	5,95	5,48	4,073	45,28	64,37	90,57	71,06
COMCAST CORP-A	2,46	0,86	4,84	2,72	45,28	64,37	90,57	71,06
CME GROUP INC	0	3,23	5,43	2,887	21,23	66,21	48,2	51,52
CHIPOTLE MEXICAN	2,12	2,3	5,93	3,45	36,12	76,5	49,59	57,89
CUMMINS INC	5,01	5,3	5,61	5,307	55,74	75,08	78,44	69,31
CMS ENERGY CORP	4,26	4,68	8,49	5,81	38,22	62,62	57,75	51,09
CENTENE CORP	2,81	1,7	4,67	3,06	17,29	24,18	68,28	31,67
CENTERPOINT ENER	4,27	5,12	5,19	4,86	17,29	24,18	68,28	31,67
CAPITAL ONE FINA	5,78	0,94	5,74	4,153	54,06	57,82	75,75	63,73
COOPER COS INC	0	2,56	5,59	2,717	45,36	59,16	65,1	58,98
CONOCOPHILLIPS	5,81	6,31	7,73	6,617	37,09	47,2	12,46	35,6
COSTCO WHOLESALE	1,05	1,08	5,75	2,627	13,11	46,08	72,28	53,63
CAMPBELL SOUP CO	2,97	5,32	7,83	5,373	51,96	66,32	81,93	65,95
COPART INC	0	0	4,85	1,617	0	35,42	38,94	29,99
SALESFORCE INC	6,1	0,78	5,34	4,073	76,19	77,21	53,24	65,98
CISCO SYSTEMS	5,69	2,49	6,12	4,767	71,61	92,87	95,93	89,35
CSX CORP	4,22	1,97	6,9	4,363	72,81	52,47	33,06	53,9
CINTAS CORP	1,05	0,98	6,05	2,693	21,04	53,12	67,29	54,51
COTERRA ENERGY I	5,51	4,52	5,05	5,027	32,53	17,75	56,88	32,06
COGNIZANT TECH-A	1,01	1,08	6,19	2,76	51,41	88,24	43,59	62,46
CORTEVA INC	0,22	1,27	5,85	2,447	52,66	61,5	72,61	61,39
CVS HEALTH CORP	4,59	2,11	6,62	4,44	92,38	92,61	79,45	87,7
CHEVRON CORP	3,86	4,17	8,03	5,353	79,62	86,34	85,84	83,9
DOMINION ENERGY	5,51	3,6	5,55	4,887	82,89	75,88	74,73	78,57
DELTA AIR LI	3,77	5,47	6,52	5,253	74,13	80,63	48,64	69,67
DUPONT DE NEMOUR	5,15	4,75	5,93	5,277	68,97	68,15	54,18	65,35
DEERE & CO	3,04	3,58	4,31	3,643	84,17	78,7	47,26	71,61
DISCOVER FINANCI	0	0,87	7,69	2,853	13,64	29,28	8,8	19,58
DOLLAR GENERAL C	0,65	1,34	7,9	3,297	50,62	69,54	50,66	57,33
QUEST DIAGNOSTIC	0	0	8,26	2,753	62,72	82,23	67,53	73,17
DR HORTON INC	1,08	0	4,63	1,903	35,78	25,2	80,21	42,98
DANAHER CORP	0	1,45	5,2	2,217	64,81	89,01	78,97	81,34
WALT DISNEY CO/T	1,89	1,64	8,36	3,963	57,74	86,35	55,51	71,11
DISH NETWORK-A	1,14	0,27	3,51	1,64	13,64	29,28	8,8	19,58
DIGITAL REALTY	3,31	3,25	7,36	4,64	75,28	61,04	76,1	71,24
DOLLAR TREE INC	0,04	1,39	6,51	2,647	50,62	69,54	50,66	57,33
DOVER CORP	4,84	7,01	7,39	6,413	77,64	43,48	78,79	65,21
DOW INC	4,03	3,52	7,13	4,893	83,94	88,6	53,64	78,92
DARDEN RESTAURAN	0,98	1,81	7,18	3,323	47,89	72,16	45,89	58,01
DTE ENERGY CO	4,16	4,74	5,95	4,95	96,24	70,32	75,78	82,7
DUKE ENERGY CORP	5,18	4,06	7,38	5,54	73,92	70,45	62,35	69,9
DAVITA INC	2,77	0,76	7,01	3,513	74,03	66,97	54,43	63,63
DEVON ENERGY CO	3,8	1,81	7,98	4,53	44,89	75,77	55,64	60,38

DXC TECHNOLOGY C	5,63	1,23	7,01	4,623	76	85,69	64,18	74,39
ELECTRONIC ARTS	0	0,59	5,93	2,173	36,11	51,91	50,12	48,89
EBAY INC	4,17	6,12	8,49	6,26	46,54	64,8	60,65	60,35
ECOLAB INC	4,83	3,6	5,66	4,697	74,87	89,47	56,9	76,39
CONS EDISON INC	2,49	5,72	6,92	5,043	37,09	47,2	12,46	35,6
EQUIFAX INC	1,09	0,79	8,13	3,337	31,58	35,36	80,42	49,6
EDISON INTL	5,94	4,84	8,78	6,52	88,65	79,31	89,15	85,74
ESTEE LAUDER	7,06	1,91	5,28	4,75	87,53	73,93	30,5	66,37
EASTMAN CHEMICAL	3,3	5,69	7,14	5,377	85,95	83,16	74,53	82,33
EMERSON ELEC CO	1,85	6,38	5,87	4,7	78,13	68,66	69,68	72,18
EOG RESOURCES	3,89	3,07	7,14	4,7	44,61	47,3	85,7	55,4
EQUINIX INC	2,33	3,25	4,98	3,52	31,58	35,36	80,42	49,6
EQUITY RESIDENTI	3,11	6,96	4,7	4,923	31,58	35,36	80,42	49,6
EVERSOURCE ENERG	2,93	6,11	8,03	5,69	84,32	78,67	59,38	76,25
ESSEX PROPERTY	3,31	7,86	5,38	5,517	74,1	66,9	79,07	73,52
EATON CORP PLC	6,27	8,17	6,09	6,843	92,4	76,9	32,72	69,61
ENTERGY CORP	4,29	5,44	8,21	5,98	59,55	61,86	46,63	57,07
EVERGY INC	3,62	3,89	7,12	4,877	84,32	78,67	59,38	76,25
EDWARDS LIFE	1,5	4,25	5,86	3,87	63,72	82,48	46,68	66,47
EXELON CORP	5,86	4,18	6,21	5,417	50,78	54,1	63,88	55,13
EXPEDITORS INTL	3,84	1,92	7,87	4,543	59,14	51,38	60,08	56,53
EXPEDIA GROUP IN	0	1,36	4,18	1,847	59,14	51,38	60,08	56,53
EXTRA SPACE STOR	2,42	4,23	6,7	4,45	23,72	59,68	19,4	33,2
FORD MOTOR CO	4,36	3,07	5,36	4,263	93,77	88,73	50,14	81,05
DIAMONDBACK ENER	3,33	2,36	5,96	3,883	43,26	51,64	89,09	57,56
FASTENAL CO	0	0	6,53	2,177	60,58	29,42	26,1	39,12
FORTUNE BRANDS H	0	0	6,52	2,173	93,77	88,73	50,14	81,05
FREEPORT-MCMORAN	4,71	5,11	6,65	5,49	80,25	76,8	93,93	82,22
FEDEX CORP	4,21	1,94	5,97	4,04	77,33	68,26	78,12	74,19
FIRSTENERGY CORP	3,6	6,13	7,01	5,58	63,25	84,04	75,48	73,06
FIDELITY NATIONA	5,16	1,56	7,44	4,72	57,07	93,83	38,23	62,87
FISERV INC	0	0,69	6,22	2,303	0	40,85	53,76	35,58
FIFTH THIRD BANC	0,08	2,89	7,48	3,483	90,1	80,23	72,85	78,99
FLEETCOR TECHNOL	1,51	1,56	4,53	2,533	28,08	35,22	83,03	49,6
FMC CORP	2,58	2,91	3,74	3,077	65,83	63,38	82,34	68,6
FOX CORP - A	0	0,62	4,77	1,797	42,7	83,89	44,23	63,74
FIRST REPUBLIC B	0	2,72	6,65	3,123	63,25	84,04	75,48	73,06
FED REALTY INVS	0,71	0	5,58	2,097	77,33	68,26	78,12	74,19
FORTINET INC	2,88	0,69	6,82	3,463	93,77	88,73	50,14	81,05
FORTIVE CORP	1,9	1,45	6,81	3,387	93,77	88,73	50,14	81,05
GENERAL DYNAMICS	2,71	8,63	7,34	6,227	79,16	71,29	87,59	78,09
GENERAL ELECTRIC	4,21	6,72	7,92	6,283	79,16	71,29	87,59	78,09
GILEAD SCIENCES	6,08	2,56	5,26	4,633	73,56	87,88	88,92	84,95
GENERAL MILLS IN	5,88	3,69	7,9	5,823	79,16	71,29	87,59	78,09

GLOBE LIFE INC	0	1,06	8,56	3,207	13,46	38,19	68,1	46,86
CORNING INC	0	1,73	4,04	1,923	52,66	61,5	72,61	61,39
GENERAL MOTORS C	3,33	6,25	8,01	5,863	79,16	71,29	87,59	78,09
ALPHABET INC-A	4,64	2,42	6,64	4,567	76,93	84,06	72,61	77,77
GENUINE PARTS CO	3,63	3,64	6,69	4,653	79,16	71,29	87,59	78,09
GLOBAL PAYMENTS	1,01	0,69	7,17	2,957	13,46	38,19	68,1	46,86
GOLDMAN SACHS GP	0,68	3,37	7,57	3,873	91,38	81,95	90,42	87,22
WW GRAINGER INC	0	0	6,36	2,12	79,33	79,67	71,23	77,15
HALLIBURTON CO	2,04	4,91	6,77	4,573	87	94,68	85,99	89,77
HASBRO INC	2,92	9,29	7,74	6,65	53,85	96,43	63,94	78,94
HUNTINGTON BANC	0	3,27	6,59	3,287	62,3	65,21	75,25	67,08
HCA HEALTHCARE I	0,69	3,27	6,68	3,547	53,38	64,88	71,51	65,21
HOME DEPOT INC	4,33	3,7	7,44	5,157	90,99	75,39	62,37	73,39
HESS CORP	5,22	3,39	6,56	5,057	75,93	84,92	78,85	80,39
HARTFORD FINL SV	0,39	2,29	8,15	3,61	74,86	80,43	79,04	79,13
HUNTINGTON INGAL	0,43	1,7	6,39	2,84	62,3	65,21	75,25	67,08
HILTON WORLDWIDE	5,46	7,07	7,58	6,703	87,8	76,58	89,13	83,24
HOLOGIC INC	0	2,27	7,91	3,393	70,51	72,55	88,33	77,88
HEWLETT PACKA	1,97	3,65	7,28	4,3	59,19	77,33	92,68	77,4
HORMEL FOODS CRP	3	3,12	6,66	4,26	54,37	90,72	46,91	68,83
HENRY SCHEIN INC	5,9	1,26	4,4	3,853	65,78	70,55	84,6	74,8
HERSHEY CO/THE	5,69	4,78	8,25	6,24	87,84	95,51	44,03	79,86
HUMANA INC	2,46	2,02	6,24	3,573	81,88	92,2	87,25	88,45
HOWMET AEROSPACE	1,4	7,89	4,26	4,517	51,25	70,04	48,95	58,75
IBM	5,53	0,97	7,7	4,733	90,73	84,77	91,92	88,48
INTERCONTINENTAL	1,27	1,67	5,9	2,947	90,73	84,77	91,92	88,48
IDEXX LABS	0	1,45	6,92	2,79	58,16	53,67	46,62	53,2
IDEX CORP	1,77	3,37	6,71	3,95	58,16	53,67	46,62	53,2
INTL FLVR & FRAG	5,59	2,47	7,58	5,213	90,73	84,77	91,92	88,48
ILLUMINA INC	0	5,33	7,54	4,29	63,71	68,59	71,6	67,58
INCYTE CORP	5,73	1,16	6,51	4,467	34,59	42,5	73,8	50,4
INTEL CORP	4,75	2,37	6,64	4,587	90,73	84,77	91,92	88,48
INTUIT INC	4,31	1,11	5,91	3,777	90,73	84,77	91,92	88,48
INTL PAPER CO	1,63	5,24	7,16	4,677	90,73	84,77	91,92	88,48
INTERPUBLIC GRP	3,37	4,35	4,27	3,997	90,73	84,77	91,92	88,48
IQVIA HOLDINGS I	0	0	6,38	2,127	58,53	86,31	46,4	63,65
IRON MOUNTAIN	2,96	5,63	8,07	5,553	82,97	71,59	76,72	77,52
INTUITIVE SURGIC	1,5	1,57	6,08	3,05	90,73	84,77	91,92	88,48
GARTNER INC	0	1,22	5,59	2,27	39,58	59,61	81,56	66,99
ILLINOIS TOOL WO	5,45	6,89	6,35	6,23	63,71	68,59	71,6	67,58
INVESCO LTD	0,8	3,21	6,9	3,637	46,62	72,27	54,6	60,44
JOHNSON CONTROLS	6,89	6,88	7,81	7,193	92,72	97,08	65,94	86,44
JACK HENRY	0,36	0,69	8,35	3,133	0,03	28,05	33,59	26,73
JOHNSON&JOHNSON	7,29	2,85	6,98	5,707	92,72	97,08	65,94	86,44

JUNIPER NETWORKS	1	3,16	6,77	3,643	88,93	80,87	85,54	84,49
KELLOGG CO	4,6	4,96	8,5	6,02	82,5	90,53	73,39	83,75
KEYCORP	1,48	7,12	5,32	4,64	58,11	67,64	61,46	64,05
KEYSIGHT TEC	6,35	6,88	6,57	6,6	58,11	67,64	61,46	64,05
KRAFT HEINZ CO/T	3,47	3,11	4,97	3,85	65,56	68,33	58,75	65,03
KIMCO REALTY	4,17	6,81	5,61	5,53	70,8	78,06	76,98	75,95
KLA CORP	0,74	1,29	5,32	2,45	47,79	64,99	48,05	55,23
KIMBERLY-CLARK	5,03	2,99	5,1	4,373	70,8	78,06	76,98	75,95
KINDER MORGAN IN	4,88	3,1	5,92	4,633	89,53	90,93	80,25	87,5
CARMAX INC	0	0	7,33	2,443	64,46	76,51	84,09	76,12
COCA-COLA CO/THE	5,43	2,32	7,44	5,063	73,35	87,12	66,98	78,05
KROGER CO	4,53	5,86	5,59	5,327	88,88	83,6	59,54	77,76
LOEWS CORP	0	0,5	3,25	1,25	48,14	34,4	49,15	42,13
LEIDOS HOLDINGS	5,69	2,96	7,55	5,4	72,62	91,2	80,99	83,9
LENNAR CORP-A	0,43	0	4,4	1,61	28,15	19,88	24,56	23,87
LABORATORY CP	0	0	5,29	1,763	59,09	83,53	52,76	67,61
L3HARRIS TECHNOL	1,64	2,41	6,64	3,563	58,05	71,68	71,5	68,39
LINDE PLC	5,57	5,65	6,16	5,793	40,53	73,48	51,17	60,16
LKQ CORP	3,16	2,95	6,37	4,16	15,09	26,29	49,96	28,23
ELI LILLY & CO	4,27	3,36	7,3	4,977	85,9	86,53	32,41	69,62
LOCKHEED MARTIN	2,61	4,85	6,38	4,613	83,95	71,68	61,72	71,37
LINCOLN NATL CRP	0,2	0,78	5,5	2,16	40,53	73,48	51,17	60,16
ALLIANT ENERGY	4,38	5,41	8,21	6	73,74	65,51	80,52	72,61
LOWE'S COS INC	1,82	2,61	7,03	3,82	72,93	82,15	76,15	78,08
LAM RESEARCH	4,6	2,35	8,24	5,063	70,65	74,95	61,32	70,07
LUMEN TECHNOLOGI	3,4	1,18	6,99	3,857	51,76	45,89	69,84	53,43
SOUTHWEST AIR	1,73	1,25	4,96	2,647	65,05	65,76	83,91	70
LAS VEGAS SANDS	6,81	4,61	3,54	4,987	79,96	47,93	48,11	56,46
LAMB WESTON	2,97	2,98	7,38	4,443	70,65	74,95	61,32	70,07
LYONDELLBASELL-A	2,98	3,93	6,54	4,483	58,63	53,87	85,29	62,8
LIVE NATION ENTE	0	1,25	4,82	2,023	22,67	44,39	50,42	43,94
MASTERCARD INC-A	7,8	1,44	6,11	5,117	68,73	73,98	70,87	71,41
MID-AMERICA APAR	1,41	7,34	5,52	4,757	59,13	76,09	79,72	70,89
MARRIOTT INTL-A	6,54	5,23	5,3	5,69	38,24	58,58	61,45	57,02
MASCO CORP	0	0	6,28	2,093	68,73	73,98	70,87	71,41
MCDONALDS CORP	3,48	2,02	7,04	4,18	92,4	82,55	58,9	78,2
MICROCHIP TECH	3,62	2,96	3,55	3,377	77,88	97,5	94,61	93,44
MCKESSON CORP	4,85	2,8	5,57	4,407	56,8	59,2	82,19	65,77
MOODY'S CORP	2,25	1,4	7,19	3,613	64,46	65,53	88,39	72,96
MONDELEZ INTER-A	5,76	4,53	6,68	5,657	21,64	47	58,98	42,43
MEDTRONIC PLC	4,58	4,27	6,48	5,11	77,59	89,75	46,59	72,21
METLIFE INC	2,09	2,01	7,15	3,75	55,75	52,83	86,73	62,36
MGM RESORTS INTE	2,31	5,1	5,87	4,427	84,94	50,3	48,35	58,89
MOHAWK INDS	0	0	4,03	1,343	52,85	56,28	48,89	53,16

MCCORMICK-N/V	3,27	1,95	7,03	4,083	89,71	64,59	67,66	72,61
MARKETAXESS	1,51	1,98	6,11	3,2	38,24	58,58	61,45	57,02
MARTIN MAR MTLS	0	0	6,65	2,217	38,24	58,58	61,45	57,02
MARSH & MCLENNAN	0	0	6,53	2,177	38,24	58,58	61,45	57,02
MONSTER BEVERAGE	3,75	0,58	4,67	3	21,64	47	58,98	42,43
ALTRIA GROUP INC	1,67	2,01	7,24	3,64	88,74	93,8	58,41	83,1
MOSAIC CO/THE	4,21	3,97	6,74	4,973	44,74	78,7	95,48	69,01
MARATHON PETROLE	2,84	3,98	4,21	3,677	38,24	58,58	61,45	57,02
MARATHON OIL	4,08	6,75	7,25	6,027	38,24	58,58	61,45	57,02
MORGAN STANLEY	1,6	4,79	6,87	4,42	78,93	73,09	48,19	62,29
MSCI INC	2,45	0,69	6,47	3,203	60,43	60,97	63,27	61,62
MICROSOFT CORP	5,74	1,47	7,9	5,037	77,88	97,5	94,61	93,44
MOTOROLA SOLUTIO	2,42	2,09	6,56	3,69	70,1	92,49	85,27	84,7
M&T BANK CORP	0	1,77	5,86	2,543	66,13	61,33	54,3	59,49
METTLER-TOLEDO	1,5	5,57	4,47	3,847	55,75	52,83	86,73	62,36
MICRON TECH	3,15	4,32	7,72	5,063	77,88	97,5	94,61	93,44
NORWEGIAN CRUISE	0	0	7,58	2,527	43,4	77,14	51,66	58,35
NASDAQ INC	6,72	3,89	7,91	6,173	40,93	84,6	78,11	75,47
NEXTERA ENERGY	5,75	3,23	4,72	4,567	79,1	78,43	83,46	79,97
NEWMONT CORP	6,63	7,79	9,24	7,887	88,03	78,33	99,46	86,93
NETFLIX INC	4,43	2,27	5,83	4,177	47,29	54,6	73,68	58,19
NISOURCE INC	2,39	5,8	7,01	5,067	59,62	53,9	90,77	65,04
NIKE INC -CL B	4,53	3,35	6,32	4,733	79,63	80,67	50,3	71,76
NORTHROP GRUMMAN	3,15	2,31	7,94	4,467	43,4	77,14	51,66	58,35
SERVICENOW INC	2,3	1,35	6,87	3,507	48,34	66,24	42,95	52,98
NRG ENERGY	3,64	2,79	7,24	4,557	80,37	63,47	77,6	74,18
NORFOLK SOUTHERN	4,05	2,4	7,85	4,767	43,4	77,14	51,66	58,35
NETAPP INC	0	1,27	7,87	3,047	47,29	54,6	73,68	58,19
NORTHERN TRUST	0	0	7,18	2,393	43,4	77,14	51,66	58,35
NUCOR CORP	4,62	7,42	7,48	6,507	45,39	59,67	49,97	52,26
NVIDIA CORP	5,68	6,86	5,44	5,993	70,17	82,47	84,81	79,24
NVR INC	0	0	5,17	1,723	11,33	23,75	81,35	34,47
NEWELL BRANDS IN	2,16	4,13	6,96	4,417	88,03	78,33	99,46	86,93
NEWS CORP-CL A	2,62	0,62	6,05	3,097	88,03	78,33	99,46	86,93
REALTY INCOME	1,7	6,22	6,93	4,95	87,6	66,5	77,37	77,92
OLD DOMINION FRT	0,3	1,33	5,39	2,34	23,67	41,02	43,53	35,79
ONEOK INC	4,71	1,91	4,86	3,827	71,51	66,97	71,49	69,71
OMNICOM GROUP	5,48	0,62	7,56	4,553	53,89	56,59	86,33	67,48
ORACLE CORP	5,59	1,43	5,5	4,173	77,9	75,96	33,08	56,39
OCCIDENTAL PETE	5,15	4,91	7,51	5,857	62,8	81,79	60,21	70,16
PARAMOUNT GLOB-B	4,22	1,65	7,28	4,383	70,94	61,42	42,05	59,16
PAYCOM SOFTWARE	0	1,46	6,76	2,74	49,88	55,47	39,39	48,76
PAYCHEX INC	3,68	1,21	5,44	3,443	49,88	55,47	39,39	48,76
PACCAR INC	3,73	1,85	4,59	3,39	84,1	51,86	73,71	69,1

HEALTHPEAK PROPE	4,73	6,58	9,24	6,85	90,43	85,2	93,13	89,72
PUB SERV ENTERP	5,16	3,06	5,47	4,563	72,57	56,97	61,02	64,56
PEPSICO INC	5,59	2,57	6,68	4,947	82,37	91,11	95,6	89,63
PFIZER INC	4,84	1,58	6,5	4,307	75,87	90,09	70,71	80,86
PRINCIPAL FINL	0,2	1,16	7,82	3,06	77,75	75,13	49,28	63,44
PROCTER & GAMBLE	5,82	2,87	8,28	5,657	84,96	79,13	49,26	73,03
PROGRESSIVE CORP	0	0,84	7,69	2,843	84,96	79,13	49,26	73,03
PARKER HANNIFIN	0,74	6,09	6,75	4,527	70,94	61,42	42,05	59,16
PULTEGROUP INC	0,43	0	6,89	2,44	33,16	59,1	68,73	52,87
PACKAGING CORP	3,66	5	6,67	5,11	84,1	51,86	73,71	69,1
PERKINELMER INC	0	1,34	6,7	2,68	68,06	78,11	81,45	77,62
PROLOGIS INC	3,42	5,2	5,22	4,613	84,96	79,13	49,26	73,03
PHILIP MORRIS IN	2,2	4,34	6,22	4,253	94,21	88,17	82,6	88,45
PNC FINANCIAL SE	0,3	2,68	7,16	3,38	57,85	78,58	84,85	77,85
PENTAIR PLC	2,11	3,26	8,1	4,49	68,09	57,81	44,38	57,5
PINNACLE WEST	3,35	4,15	6,05	4,517	72,37	63,94	45,62	62,94
PPG INDS INC	4,23	3,66	6,59	4,827	83,59	75,08	82,49	80,11
PPL CORP	3,42	6,09	5,8	5,103	31,26	67,29	70,23	52,66
PRUDENTL FINL	0	2,24	6,38	2,873	79,59	76,61	74,89	76,32
PUBLIC STORAGE	1,81	6,24	4,74	4,263	72,57	56,97	61,02	64,56
PHILLIPS 66	2,81	3,8	6,6	4,403	94,21	88,17	82,6	88,45
QUANTA SERVICES	0,8	1,2	7,18	3,06	68,41	83,98	49,12	70,07
PIONEER NATURAL	3,98	2,31	6,03	4,107	31,58	50,9	84,92	52,24
PAYPAL HOLDINGS	4,53	1,2	7,99	4,573	49,88	55,47	39,39	48,76
QUALCOMM INC	4,61	2,47	7,24	4,773	68,41	83,98	49,12	70,07
QORVO INC	0	1,62	6,17	2,597	53,12	63,03	63,69	60,11
ROYAL CARIBBEAN	0	0	4,76	1,587	82,15	80,31	93,58	84,7
EVEREST RE GROUP	0,26	7,01	5,7	4,323	84,32	78,67	59,38	76,25
REGENCY CENTERS	2,75	7,59	5,27	5,203	56,38	96,65	33,94	61,91
REGENERON PHARM	6,6	2,15	5,06	4,603	56,38	96,65	33,94	61,91
REGIONS FINANCIA	0	2,6	7,54	3,38	56,38	96,65	33,94	61,91
ROBERT HALF INTL	0	2,6	5,13	2,577	62,95	79,01	84,43	77,06
RAYMOND JAMES	0	1,27	7,06	2,777	51,44	53,74	44,44	49,08
RALPH LAUREN COR	0,33	1,7	5,51	2,513	76,12	68,05	59,44	67,04
RESMED INC	1,5	3,35	5,3	3,383	73,07	80,29	64,02	73,23
ROCKWELL AUTOMAT	6,45	6,86	7,6	6,97	82,02	65,99	38,31	63,59
ROLLINS INC	0	0,81	2,34	1,05	3,05	9,35	27,01	13,8
ROPER TECHNOLOGI	1,01	0,69	7,05	2,917	35,61	54,02	77,39	62,28
ROSS STORES INC	0,33	0,94	6	2,423	50,85	47,35	32,4	42,29
REPUBLIC SVCS	2,71	4,11	7,99	4,937	80,96	61,36	77,6	71,42
RAYTHEON TECHNOL	1,98	1,95	7,88	3,937	51,44	53,74	44,44	49,08
SBA COMM CORP	2,41	3,1	4,87	3,46	67,21	67,46	48,71	61,33
STARBUCKS CORP	2,79	1,48	8,52	4,263	93,62	76,2	49,04	74,42
SCHWAB (CHARLES)	0	1,63	4,56	2,063	16,99	60,77	52,78	50,92

SEALED AIR CORP	1,72	2,8	7,7	4,073	52,56	59,31	76,83	61
SHERWIN-WILLIAMS	4,53	0,75	7,1	4,127	82,14	66,39	90,6	78,05
SVB FINANCIAL GR	0	1,66	8,42	3,36	15,48	43,77	65,41	47,49
JM SMUCKER CO	4,27	1,78	6,82	4,29	61,28	80,64	59,21	69,48
SCHLUMBERGER LTD	2,9	5,73	6,35	4,993	73,29	80,56	87,67	80,18
SNAP-ON INC	0	2,2	4,78	2,327	24,33	43,98	49,23	38,76
SYNOPSYS INC	2,11	1,92	4,14	2,723	71,55	67,6	82,97	75,26
SOUTHERN CO	4,25	4,46	5,17	4,627	65,05	65,76	83,91	70
SIMON PROPERTY	2,4	4,9	3,41	3,57	70,95	67,9	67,07	68,78
S&P GLOBAL INC	5,23	2,57	8,42	5,407	79,16	94,87	83,47	87,35
SEMPRA ENERGY	5,16	6,1	8,31	6,523	73,42	85,11	65,53	75,51
STERIS PLC	0	0,87	6,23	2,367	45,08	76,81	10,26	47,58
STATE ST CORP	0	0	5,82	1,94	93,62	76,2	49,04	74,42
SEAGATE TECHNOLO	2	3,9	6,38	4,093	52,56	59,31	76,83	61
CONSTELLATION-A	1,95	1,61	5,93	3,163	37,09	47,2	12,46	35,6
STANLEY BLACK &	4,4	2,11	6,38	4,297	93,62	76,2	49,04	74,42
SKYWORKS SOLUTIO	2,46	1,29	6,28	3,343	38,97	54,56	56,86	50,3
SYNCHRONY FINANC	5,01	1,47	8,06	4,847	71,55	67,6	82,97	75,26
STRYKER CORP	0	0,47	7,57	2,68	58,04	77,07	83,69	76,26
SYSCO CORP	1,42	1,98	6,44	3,28	79,25	77,81	44,33	68,29
AT&T INC	5,59	1,57	6,12	4,427	83,33	94,56	32,39	75,79
MOLSON COORS-B	4,66	3,9	4,54	4,367	60,09	65,75	50,97	60,41
TRANSDIGM GROUP	1,57	1,55	5,3	2,807	68,86	93,18	72,35	78,93
TE CONNECTIVITY	4,89	2,45	5,94	4,427	63,8	78,24	69,99	70,95
TRUIST FINANCIAL	0	2,61	5,97	2,86	17,95	61,18	68,89	57,73
TELEFLEX INC	0	1,07	5,89	2,32	44,04	83,79	52,6	65,92
TARGET CORP	3,19	1,8	6,74	3,91	97,13	92,41	60,08	82,64
TJX COS INC	0,33	2,06	7,61	3,333	80,52	88,1	30,42	65,86
THERMO FISHER	0	1,97	5,41	2,46	72,38	84,61	47,44	69,21
T-MOBILE US INC	2,75	0,46	5,23	2,813	70,42	64,94	28,95	56,51
TAPESTRY INC	0,33	1,06	8,33	3,24	70,32	78,8	59,81	69,9
T ROWE PRICE GRP	2,27	5,22	7,73	5,073	49,12	75,62	35,93	53,4
TRAVELERS COS IN	0,46	0,87	7,06	2,797	68,86	93,18	72,35	78,93
TRACTOR SUPPLY	2,83	5,56	7,67	5,353	68,86	93,18	72,35	78,93
TYSON FOODS-A	3,34	2,77	6,02	4,043	69,45	69,28	48,27	63,84
TRANE TECHNOLOGI	5,67	2,45	5,63	4,583	68,86	93,18	72,35	78,93
TAKE-TWO INTERAC	0	0,56	5,25	1,937	0	31,14	38,08	29,51
TEXAS INSTRUMENT	4,35	2,36	6,5	4,403	97,35	90,85	63,82	85,85
TEXTRON INC	3,57	2,16	5,05	3,593	97,35	90,85	63,82	85,85
UNITED AIRLINES	4,09	1,34	7,69	4,373	53,74	94,1	79,39	76,06
UDR INC	4,19	7,52	6,73	6,147	59,07	71,9	65,1	64,89
UNIVERSAL HLTH-B	1,3	0,8	3,97	2,023	53,74	94,1	79,39	76,06
ULTA BEAUTY INC	1,02	4,9	8,34	4,753	25,57	56,23	71,77	56,31
UNITEDHEALTH GRP	3,13	1,69	6,53	3,783	53,74	94,1	79,39	76,06

UNION PAC CORP	3,28	2,07	6,78	4,043	53,74	94,1	79,39	76,06
UNITED PARCEL-B	4,8	2,78	6,5	4,693	53,74	94,1	79,39	76,06
UNITED RENTALS	0	0	6,24	2,08	53,74	94,1	79,39	76,06
US BANCORP	0,18	1,97	7,62	3,257	55	61,1	49,37	56
VISA INC-CLASS A	6,72	1,48	7,43	5,21	47,87	75,45	38,83	54,68
VALERO ENERGY	2,16	5,82	7,61	5,197	60,88	69,29	81,09	69,16
VULCAN MATERIALS	0	0	7,67	2,557	54,21	42,84	35,98	45,99
VORNADO RLTY TST	3,93	4,23	3,13	3,763	75,78	61,37	43,14	60,91
VERISK ANALYTI	2,3	1,64	7,37	3,77	73,4	80,62	72,59	77,03
VERISIGN INC	0	1,72	5,49	2,403	73,4	80,62	72,59	77,03
VERTEX PHARM	2,02	1,09	7,18	3,43	73,4	80,62	72,59	77,03
VENTAS INC	4,33	6,59	5,71	5,543	89,83	79,04	85,2	85,08
VERIZON COMMUNIC	5,72	4,66	7,44	5,94	73,4	80,62	72,59	77,03
WABTEC CORP	0,43	2,17	6,36	2,987	53,89	66,51	39,37	56,1
WATERS CORP	3	1,57	6,73	3,767	75,11	71,69	77,57	74,38
WALGREENS BOOTS	5,46	2,4	7,31	5,057	57,74	86,35	55,51	71,11
WESTERN DIGITAL	2	1,55	6,81	3,453	53,89	66,51	39,37	56,1
WEC ENERGY GROUP	5,12	5,27	4,86	5,083	63,79	66,29	52,33	61,74
WELLS FARGO & CO	2,94	2,81	7,91	4,553	86,55	71,48	43,91	68,26
WHIRLPOOL CORP	4,92	9,55	7,08	7,183	90,79	81,77	56,21	78,25
WASTE MANAGEMENT	3,22	4,59	6,46	4,757	69,66	92,23	95,08	87,88
WILLIAMS COS INC	5,86	4,42	7,95	6,077	75,85	60,88	84,19	72,24
WALMART INC	1,89	1,66	7,82	3,79	57,74	86,35	55,51	71,11
WR BERKLEY CORP	0,04	0,76	4,9	1,9	48,79	58,59	60,64	58,11
WESTROCK CO	4,34	4,55	6,61	5,167	53,89	66,51	39,37	56,1
WILLIS TOWERS WA	0	0	7,53	2,51	75,85	60,88	84,19	72,24
WEYERHAEUSER CO	0	0	7,62	2,54	81,63	79,68	76,15	79,27
WYNN RESORTS LTD	4,51	4,33	7,98	5,607	69,26	77,23	84,33	77,21
XCEL ENERGY INC	4,86	5,9	5,71	5,49	87,44	80,94	73,32	81,8
EXXON MOBIL CORP	3,66	5,84	7,29	5,597	82,94	65,98	44,37	66,75
DENTSPLY SIRONA	1,5	1,1	7,3	3,3	68,37	82,47	42,55	65,76
XYLEM INC	6,25	3,09	7,27	5,537	75,45	84,89	88,56	82,71
YUM! BRANDS INC	2,96	3,66	6,79	4,47	88,87	86,97	55,25	78,14
ZIMMER BIOMET HO	1,5	1,75	7,13	3,46	39,97	78,78	52,79	62,94
ZEBRA TECH CORP	0	1,16	4,63	1,93	8,95	61,27	67,25	42,94
ZIONS BANCORP NA	0	2,64	5,5	2,713	37,03	50,11	67,04	54,32
ZOETIS INC	4,57	3,35	6,83	4,917	55,6	77,78	53,82	65,32

Table 4.2.1.1 Descriptive statistics

Table that presents summary statistics of the variables in this thesis.

	Variable	Obs.	Min.	Max.	Ave.	Median	Stdev.
S&P 500	Market Cap	430	5485308928	135425477836	592616787336	2582914457	12390512287
	LT Debt	430	0.00	248759992320	147934290199	6317999872	29307925866
	ST Debt	427	0.00	379882995712	457376135	63500000	25349251494
	Tot. Ass.	430	954929984	243407912960	744440689711	2266746752	20551238259
	Free Cash	430	1895000	161560002560	382910756394	1010000000	12797518873
	BtS	430	-75.08	644.48	33.76	24.48	45.74
	Fin. Leverage	407	1.13	25.70	4.31	3.03	3.70
	Rev. 12	429	0.00	521085984768	261387860644.37	1080000000	47508852835
	PtB	429	0.00	540.45	8.25	3.29	30.15
	Vol. 360	430	13.95	61.20	26.74	25.79	7.58
	ROE	404	-121.88	334.77	23.34	15.88	34.27
	ROA	429	-15.99	34.27	7.24	5.97	6.81
	ROIC	429	-28.71	279.08	12.68	9.72	16.55
	EB	430	0.00	8.26	2.78	2.86	2.10
	SB	430	0.00	9.55	2.88	2.37	2.05
	GB	430	2.34	9.24	6.52	6.65	1.18
	ER	430	0.00	97.35	61.97	65.65	21.83

	SR	430	9.35	97.50	69.13	72.29	17.94
	GR	430	8.80	99.46	65.79	68.45	18.69
STOXX 600	Market Cap	430	1917811456	989999988736	401940636800	1477933312035	78309120535
	LT Debt	426	0	144321098547	257116661234	3418000000	12084398514
	ST Debt	419	0	760132993024	131553754991	7420000000	58025689423
	Tot. Ass.	430	1001890000	396271812608	140325117675	1618970009	42753737380
	Free Cash	426	0,00	398587002880	893649683	9766635	35074624859
	BtS	428	-7,83	1528,22	42,70	17,24	101,16
	Fin. Leverage	427	1,01	260,67	5,75	2,77	13,92
	Rev. 12	430	0,00	431979995136	232777299009	8980499904	39812645452
	PtB	430	0,00	123,79	4,39	2,43	7,89
	Vol. 360	430	10,49	76,38	26,75	25,54	8,05
	ROE	423	-35,65	488,66	18,00	13,14	34,27
	ROA	426	-13,39	193,45	6,22	4,68	11,26
	ROIC	423	-55,17	230,88	9,37	7,60	15,20
	EB	430	0,00	9,36	2,71	2,54	2,18
	SB	430	0,00	8,00	2,56	2,24	1,71
	GB	430	0,00	8,62	6,09	6,27	1,54
	ER	430	0,00	7,46	3,18	3,26	1,59
	SR	430	0,00	97,74	68,53	75,21	22,06
	GR	430	10,96	97,48	73,27	76,45	17,44

Table 5.1.3.2 STOXX 600 cumulative returns per portfolio

B1	B2	B3	R1	R2	R3
0,9862	0,9831	0,9991	0,9897	0,9744	1,0044

Table 5.1.3.4 S&P 500 cumulative returns per portfolio

B1	B2	B3	R1	R2	R3
1,0263	1,0333	1,0319	1,0338	1,0328	1,0246

Table 5.2.2.2 Berg et al. (2022) Overview of average preciseness

Table from Berg et al. (2022) in the preciseness of different matrixes for different ESG providers.

Panel B: Rater Averages

	Scope	Measurement	Weights
KLD	34%	55%	10%
Sustainalytics	28%	60%	12%
Moody's ESG	35%	60%	5%
S&P Global	33%	64%	3%
Refinitiv	29%	64%	7%
MSCI	68%	36%	-4%

Table 5.2.3.2 Summary table for the first Model 6 control regression results

The summary table for reported regression results shows the estimated effect of the variable on the cumulative stock returns. In addition, the table reports the standard deviation of the variable presented between parentheses below the estimation.

Variables	**Model 6 S&P 500**
	Refinitiv
(Intercept)	0,9032 (0,0192)***
MarketCap	0,0000 (0,0000)
LTDebt	0,0000 (0,0000)
STDebt	0,0000 (0,0000)
Tot.Ass.	0,0000 (0,0000)*
Freecash	0,0000 (0,0000)
BtS	0,0002 (0,0001).
FinLeverage	-0,0012 (0,0017)
Rev12	0,0000 (0,0000)
PtB	0,0012 (0,0004)**
Vol.360	-0,0027 (0,0005)***
ROE	-0,0005 (0,0002)*
ROA	0,0026 (0,0015).

ROIC	0,0015 (0,001)
DR1	0,0041 (0,0101)
DR2	0,0188 (0,0099).
Adj. R^2	0.1849

Significant codes: 0 = “***” 0.001= “**” 0.01= “*” 0.05= “.”

Table 5.2.3.3 Summary table for the second Model 6 control regression results

The summary table for reported regression results shows the estimated effect of the variable on the cumulative stock returns. In addition, the table reports the standard deviation of the variable presented between parentheses below the estimation.

Variables	**Model 6 S&P 500**
	Refinitiv
(Intercept)	0,9052 (0,0183)***
MarketCap	0,0000 (0,0000)
LTDebt	0,0000 (0,0000)
STDebt	0,0000 (0,0000)
Tot.Ass.	0,0000 (0,0000)*
Freecash	0,0000 (0,0000)
BtS	0,0002 (0,0001).

FinLeverage	-0,0013 (0,0017)
Rev12	0,0000 (0,0000)
PtB	0,0012 (0,0004)**
Vol.360	-0,0027 (0,0005)***
ROE	-0,0005 (0,0002)*
ROA	0,0026 (0,0015).
ROIC	0,0015 (0,0010)
DR2	0,0169 (0,0085)*
DR3	0,002 (0,0088)
Adj. R^2	0.1846

Significant codes: 0 = “***” 0.001= “**” 0.01= “*” 0.05= “.”

Table 5.3.1.1 Overview of multicollinearity test results

Control factor	Value	Value (similar research)	Conclusion
Unusual relative high R-squared	9,61% (Model 4-6)	7%-8% Engelhardt et. al. (2021)	No traces of multicollinearity in our results
Significant standard errors of the estimated coefficients	Relative normal standard errors (All Models)	Relative normal standard errors Engelhardt et. al. (2021)	No traces of multicollinearity in our results
High sensitivity to dropping variables	Low sensitivity (Model 6)	Low sensitivity Lins et. al. (2017)	No traces of multicollinearity in our results

Table 5.3.1.2 F-test statistics

Index	Model	ESG provider	Test statistic	P-value
S&P 500	Model 2	Refinitiv	0.4826	0.6945
		Bloomberg	0.7216	0.5396
	Model 3	Refinitiv	1.5893	0.2054
		Bloomberg	0.136	0.8729
	Model 5	Refinitiv	0.0442	0.9876
		Bloomberg	3.1679	0.02444*
	Model 6	Refinitiv	2.0379	0.1317
		Bloomberg	0.007	0.993
	Control 1	Refinitiv	2.0379	0.1317
	Control 2	Refinitiv	2.0379	0.1317
STOXX 600	Model 2	Refinitiv	0.2665	0.8495
		Bloomberg	0.8845	0.4495
	Model 3	Refinitiv	0.987	0.374
		Bloomberg	0.187	0.8295
	Model 5	Refinitiv	0.4939	0.6868
		Bloomberg	2.3833	0.06953
	Model 6	Refinitiv	0.8934	0.4104
		Bloomberg	0.3551	0.7014
	Control 1	Refinitiv	0.3551	0.7014
	Control 2	Refinitiv	0.3551	0.7014

Significant codes: 0 = “***” 0.001= “**” 0.01= “*” 0.05= “.”

Output 5.3.1.1 Regression results from control period - STOXX 600

Table 4.4.1.1

Regression results from control period - STOXX 600

Steinbo.K

13/06-23

```
#######################################
## Preparatory steps
# HOusekeeping
rm(list=ls())

## load the required packages
require(data.table)
```

```
## Loading required package: data.table
```

```
require(ggplot2)
```

```
## Loading required package: ggplot2
```

```
library(rmarkdown)
```

```
## Warning: package 'rmarkdown' was built under R version 4.1.2
```

```
library(tinytex)
```

```
## Warning: package 'tinytex' was built under R version 4.1.2
```

```
library(readxl)
```

```
## Warning: package 'readxl' was built under R version 4.1.2
```

```
library(moments)
library(latex2exp)
```

```
## Warning: package 'latex2exp' was built under R version 4.1.2
```

```
# Set working directory
# setwd("~/OneDrive - BI Norwegian Business School (BIEDU)/Master/Data")

#######################################
## Import data from excel file
data <- read_excel("./Master STOXX 600.xlsx")
```

1

```
## New names:
## * `` -> `...39`
## * `` -> `...40`
## * `` -> `...41`
## * `` -> `...42`
## * `` -> `...43`
## * `` -> `...44`
## * `` -> `...45`
## * `` -> `...46`
## * `` -> `...47`
## * `` -> `...48`
## * `` -> `...49`
## * `` -> `...50`
```

```
head(data)
```

```
## # A tibble: 6 x 50
##   Ticker `Short Name`  MrkCap LTDebt STDebt Tot.Ass.   Cash   BpS FinLev   Rev12
##   <chr>  <chr>          <dbl>  <dbl>  <dbl>    <dbl>  <dbl> <dbl>  <dbl>   <dbl>
## 1 1COV ~ COVESTRO AG  6.95e 9 1.70e9 1.49e8  1.16e10 4.22e8 28.5    2.24 1.28e10
## 2 A2A I~ A2A SPA      5.65e 9 3.36e9 8.04e8  1.07e10 1.01e9  1.01   3.41 7.15e 9
## 3 AAL L~ ANGLO AMER ~ 2.49e10 9.78e9 5.78e8  5.48e10 7.13e9 19.1    2.22 2.87e10
## 4 AALB ~ AALBERTS NV  4.37e 9 5.49e8 4.04e8  3.46e 9 4.84e7 15.3    1.98 0
## 5 ABBN ~ ABB LTD-REG  4.88e10 8.53e9 2.20e9  4.46e10 2.58e9  6.20   3.45 2.83e10
## 6 ABDN ~ ABRDN PLC    7.05e 9 6.9 e8 0       1.28e10 1.28e9  3.19   1.69 2.72e 9
## # ... with 40 more variables: PtB <dbl>, Vol.360 <dbl>, ROE <dbl>, ROA <dbl>,
## #   ROIC <dbl>, `Cntry Terrtry Fl Name` <chr>, `Env Scr` <dbl>,
## #   `Soc Scr` <dbl>, `Gov Scr` <dbl>, EB <dbl>, SB <dbl>, GB <dbl>, ESGB <dbl>,
## #   DB1 <dbl>, DB2 <dbl>, DB3 <dbl>, Port <dbl>, ER <dbl>, SR <dbl>, GR <dbl>,
## #   ESGR <dbl>, DR1 <dbl>, DR2 <dbl>, DR3 <dbl>, `Port R` <dbl>, CRetC <dbl>,
## #   CRet <dbl>, `Ticker R` <chr>, ...39 <lgl>, ...40 <chr>, ...41 <dbl>,
## #   ...42 <lgl>, ...43 <chr>, ...44 <dbl>, ...45 <lgl>, ...46 <chr>, ...
```

```
colnames(data) <- c("Ticker", "Short Name", "MarketCap", "LTDebt",
                    "STDebt", "TotAssetsLF", "Freecash", "BtS",
                    "FinLeverage","Rev12","PtB","Vol.360",
                    "ROE","ROA","ROIC","Country","EB2","SB2","GB2","EB","SB",
                    "GB","ESGB","DB1","DB2","DB3", "PortB","ER","SR",
                    "GR","ESGR","DR1","DR2","DR3","PortR","CumRetQ1",
                    "CumRetT","Ticker2")
data          <- as.data.frame(data)

##############################
## Running a pooled regression with ESG score

reg <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+R
summary(reg)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + ESGR, data = data)
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.96990 -0.02938  0.01400  0.06121  0.32858
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.684e-01  5.187e-02  18.670   <2e-16 ***
## MarketCap    6.795e-14  1.139e-13   0.596   0.5514
## LTDebt       1.804e-13  1.285e-13   1.404   0.1614
## STDebt      -5.815e-13  2.801e-13  -2.076   0.0388 *
## TotAssetsLF -3.223e-14  5.941e-14  -0.542   0.5879
## Freecash     1.991e-13  4.019e-13   0.495   0.6207
## BtS          1.983e-04  1.055e-04   1.880   0.0611 .
## FinLeverage -3.301e-04  5.854e-04  -0.564   0.5732
## Rev12        1.979e-13  2.311e-13   0.856   0.3925
## PtB          2.032e-03  2.136e-03   0.951   0.3422
## Vol.360      8.464e-04  1.053e-03   0.804   0.4221
## ROE         -3.729e-04  4.686e-04  -0.796   0.4268
## ROA          7.194e-04  1.755e-03   0.410   0.6822
## ROIC         7.385e-05  1.220e-03   0.061   0.9518
## ESGR        -2.735e-04  5.581e-04  -0.490   0.6245
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.14 on 292 degrees of freedom
##   (125 observations deleted due to missingness)
## Multiple R-squared:  0.07362,    Adjusted R-squared:  0.02921
## F-statistic: 1.658 on 14 and 292 DF,  p-value: 0.06386
```

```
###############

reg3 <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+
summary(reg3)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + ESGB, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.97036 -0.02970  0.01626  0.06159  0.32654
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.642e-01  4.058e-02  23.759   <2e-16 ***
## MarketCap    6.579e-14  1.136e-13   0.579   0.5630
## LTDebt       1.850e-13  1.286e-13   1.439   0.1512
## STDebt      -5.777e-13  2.802e-13  -2.062   0.0401 *
## TotAssetsLF -3.588e-14  5.975e-14  -0.600   0.5487
## Freecash     2.090e-13  4.024e-13   0.519   0.6039
## BtS          1.979e-04  1.054e-04   1.878   0.0613 .
```

```
## FinLeverage -3.096e-04  5.868e-04  -0.528   0.5981
## Rev12        1.932e-13  2.294e-13   0.842   0.4005
## PtB          2.067e-03  2.134e-03   0.969   0.3335
## Vol.360      7.061e-04  1.084e-03   0.651   0.5153
## ROE         -3.693e-04  4.684e-04  -0.788   0.4311
## ROA          5.775e-04  1.773e-03   0.326   0.7449
## ROIC         1.549e-04  1.226e-03   0.126   0.8995
## ESGB        -3.419e-03  5.375e-03  -0.636   0.5253
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.14 on 292 degrees of freedom
##   (125 observations deleted due to missingness)
## Multiple R-squared:  0.07415,    Adjusted R-squared:  0.02976
## F-statistic:  1.67 on 14 and 292 DF,  p-value: 0.06105
```

```
##############################
## Running a pooled regression with ESG portfolio

reg <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+R
summary(reg)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + DR1 + DR3, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.97752 -0.02892  0.01274  0.05988  0.32433
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.338e-01  3.406e-02  27.415   <2e-16 ***
## MarketCap    6.866e-14  1.139e-13   0.603   0.5472
## LTDebt       1.840e-13  1.284e-13   1.433   0.1529
## STDebt      -5.633e-13  2.802e-13  -2.010   0.0453 *
## TotAssetsLF -3.938e-14  5.958e-14  -0.661   0.5091
## Freecash     2.312e-13  4.022e-13   0.575   0.5658
## BtS          2.046e-04  1.052e-04   1.945   0.0527 .
## FinLeverage -2.459e-04  5.883e-04  -0.418   0.6763
## Rev12        1.988e-13  2.304e-13   0.863   0.3889
## PtB          2.066e-03  2.137e-03   0.967   0.3345
## Vol.360      8.334e-04  1.052e-03   0.792   0.4288
## ROE         -3.859e-04  4.685e-04  -0.824   0.4107
## ROA          6.045e-04  1.755e-03   0.344   0.7308
## ROIC         1.175e-04  1.219e-03   0.096   0.9233
## DR1          2.011e-02  1.973e-02   1.019   0.3090
## DR3          2.700e-02  2.024e-02   1.334   0.1833
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1399 on 291 degrees of freedom
```

```
##   (125 observations deleted due to missingness)
## Multiple R-squared:  0.07911,    Adjusted R-squared:  0.03164
## F-statistic: 1.667 on 15 and 291 DF,  p-value: 0.05689
```

```
##############

reg3 <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+
summary(reg3)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + DB1 + DB3, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.97427 -0.02868  0.01444  0.06180  0.32525
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.439e-01  3.458e-02  27.298   <2e-16 ***
## MarketCap    6.656e-14  1.139e-13   0.584   0.5594
## LTDebt       1.783e-13  1.291e-13   1.380   0.1685
## STDebt      -5.816e-13  2.813e-13  -2.068   0.0395 *
## TotAssetsLF -3.325e-14  6.032e-14  -0.551   0.5819
## Freecash     2.273e-13  4.073e-13   0.558   0.5772
## BtS          1.974e-04  1.063e-04   1.857   0.0644 .
## FinLeverage -3.491e-04  5.884e-04  -0.593   0.5535
## Rev12        1.842e-13  2.301e-13   0.800   0.4242
## PtB          2.069e-03  2.141e-03   0.966   0.3348
## Vol.360      7.907e-04  1.078e-03   0.734   0.4638
## ROE         -3.658e-04  4.700e-04  -0.778   0.4371
## ROA          5.998e-04  1.775e-03   0.338   0.7356
## ROIC         1.805e-04  1.234e-03   0.146   0.8838
## DB1          7.660e-03  1.958e-02   0.391   0.6960
## DB3          1.264e-02  2.109e-02   0.599   0.5495
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1402 on 291 degrees of freedom
##   (125 observations deleted due to missingness)
## Multiple R-squared:  0.07405,    Adjusted R-squared:  0.02632
## F-statistic: 1.552 on 15 and 291 DF,  p-value: 0.08664
```

```
##############################
## Running apooled regression with E, s and G

reg <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+R
summary(reg)
```

```
##
## Call:
```

```
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + ER + SR + GR, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.97099 -0.02803  0.01311  0.06456  0.32875
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.732e-01  5.314e-02  18.313   <2e-16 ***
## MarketCap    7.548e-14  1.149e-13   0.657   0.5116
## LTDebt       1.840e-13  1.291e-13   1.426   0.1551
## STDebt      -5.772e-13  2.825e-13  -2.043   0.0419 *
## TotAssetsLF -3.536e-14  6.016e-14  -0.588   0.5571
## Freecash     1.933e-13  4.057e-13   0.476   0.6341
## BtS          1.977e-04  1.058e-04   1.869   0.0627 .
## FinLeverage -2.987e-04  5.897e-04  -0.507   0.6128
## Rev12        1.942e-13  2.315e-13   0.839   0.4023
## PtB          2.248e-03  2.164e-03   1.039   0.2997
## Vol.360      9.511e-04  1.073e-03   0.886   0.3761
## ROE         -3.923e-04  4.700e-04  -0.835   0.4046
## ROA          7.901e-04  1.763e-03   0.448   0.6544
## ROIC        -8.417e-05  1.244e-03  -0.068   0.9461
## ER           2.973e-04  5.179e-04   0.574   0.5663
## SR          -5.099e-04  6.723e-04  -0.758   0.4489
## GR          -1.336e-04  5.380e-04  -0.248   0.8040
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1404 on 290 degrees of freedom
##   (125 observations deleted due to missingness)
## Multiple R-squared:  0.07541,    Adjusted R-squared:  0.0244
## F-statistic: 1.478 on 16 and 290 DF,  p-value: 0.1064
```

```
###############

reg3 <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+
summary(reg3)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + EB + SB + GB, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.98381 -0.02913  0.01200  0.06147  0.31339
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.347e-01  5.150e-02  18.147   <2e-16 ***
## MarketCap    4.684e-14  1.148e-13   0.408   0.6836
```

```
## LTDebt       1.837e-13  1.297e-13   1.416   0.1579
## STDebt      -5.619e-13  2.809e-13  -2.000   0.0464 *
## TotAssetsLF -3.523e-14  6.048e-14  -0.583   0.5606
## Freecash     2.732e-13  4.054e-13   0.674   0.5010
## BtS          2.134e-04  1.068e-04   1.998   0.0466 *
## FinLeverage -4.383e-04  5.925e-04  -0.740   0.4601
## Rev12        1.697e-13  2.312e-13   0.734   0.4635
## PtB          1.939e-03  2.161e-03   0.897   0.3703
## Vol.360      9.717e-04  1.081e-03   0.899   0.3693
## ROE         -3.758e-04  4.763e-04  -0.789   0.4308
## ROA          6.238e-04  1.756e-03   0.355   0.7227
## ROIC         1.723e-04  1.221e-03   0.141   0.8879
## EB           5.095e-03  4.415e-03   1.154   0.2495
## SB          -7.174e-03  5.194e-03  -1.381   0.1682
## GB           2.804e-03  5.461e-03   0.514   0.6080
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1399 on 290 degrees of freedom
##   (125 observations deleted due to missingness)
## Multiple R-squared:  0.08127,    Adjusted R-squared:  0.03058
## F-statistic: 1.603 on 16 and 290 DF,  p-value: 0.06693
```

```
############################
## Generating a pdf file which summarizes code and output
```

Output 5.3.1.2 Regression results from control period – S&P 500

Table 4.4.1.2

Regression results from control period - S&P 500

Steinbo.K

13/06-23

```
#####################################
## Preparatory steps
# HOusekeeping
rm(list=ls())

## load the required packages
require(data.table)
```

```
## Loading required package: data.table
```

```
require(ggplot2)
```

```
## Loading required package: ggplot2
```

```
library(rmarkdown)
```

```
## Warning: package 'rmarkdown' was built under R version 4.1.2
```

```
library(tinytex)
```

```
## Warning: package 'tinytex' was built under R version 4.1.2
```

```
library(readxl)
```

```
## Warning: package 'readxl' was built under R version 4.1.2
```

```
library(moments)
library(latex2exp)
```

```
## Warning: package 'latex2exp' was built under R version 4.1.2
```

```
# Set working directory
# setwd("~/OneDrive - BI Norwegian Business School (BIEDU)/Master/Data")

#####################################
## Import data from excel file
data <- read_excel("./C. Master S&P 500.xlsx")
```

1

```
## New names:
## * `` -> `...36`
## * `` -> `...37`
## * `` -> `...38`
## * `` -> `...39`
## * `` -> `...40`
## * `` -> `...41`
## * `` -> `...42`
## * `` -> `...43`
```

```
head(data)
```

```
## # A tibble: 6 x 43
##   Ticker `Short Name` `Market Cap` `LT Brrwng LF` `ST Brrwng LF` `Tot Assets LF`
##   <chr>  <chr>               <dbl>          <dbl>          <dbl>           <dbl>
## 1 A US ~ AGILENT TEC~  23525402624     1800999936      210000000      8425999872
## 2 ABBV ~ ABBVIE INC   185728630784    33973999616     3820999936     68839997440
## 3 ABC U~ AMERISOURCE~  21695533056     3429934080       12121000     35316469760
## 4 ABT U~ ABBOTT LABS  108230549504    23310000128      715000000     72248000512
## 5 ACN U~ ACCENTURE P~ 103273578496       22226000        2979000     22974152704
## 6 ADBE ~ ADOBE INC     98010931200     1881421056              0     14535556096
## # ... with 37 more variables: `C&CE LF` <dbl>, `Bk Val Per Sh LF` <dbl>,
## #   `Finl Lev LF` <dbl>, `Revenue T12M` <dbl>, `Price per Book` <dbl>,
## #   `Volat:D-360` <dbl>, `ROE LF` <dbl>, `ROA LF` <dbl>, `ROIC LF` <dbl>,
## #   `Cntry Terrtry Fl Name` <chr>, E <dbl>, S <dbl>, G <dbl>, ESG <dbl>,
## #   DB1 <dbl>, DB2 <dbl>, DB3 <dbl>, `Port B` <dbl>, `E R` <dbl>, `S R` <dbl>,
## #   `G R` <dbl>, `ESG R` <dbl>, DR1 <dbl>, DR2 <dbl>, DR3 <dbl>,
## #   `Port R` <dbl>, `CumRet Q1` <dbl>, `CumRet T` <dbl>, `Ticker R` <chr>, ...
```

```
colnames(data) <- c("Ticker", "Short Name", "MarketCap", "LTDebt",
                    "STDebt", "TotAssetsLF", "Freecash", "BtS",
                    "FinLeverage","Rev12","PtB","Vol.360",
                    "ROE","ROA","ROIC","Country","EB","SB",
                    "GB","ESGB","DB1","DB2","DB3", "PortB","ER","SR",
                    "GR","ESGR","DR1","DR2","DR3","PortR","CumRetQ1",
                    "CumRetT")
data          <- as.data.frame(data)

##############################
## Running a pooled regression with ESG score
# Model 1

reg <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+R
summary(reg)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + ESGR, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

```
## -0.44775 -0.03270  0.00259  0.03337  0.32020
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.884e-01  2.167e-02  45.603   <2e-16 ***
## MarketCap   -2.449e-14  4.581e-14  -0.535   0.5933
## LTDebt       3.561e-13  2.592e-13   1.374   0.1704
## STDebt      -1.800e-13  3.093e-13  -0.582   0.5611
## TotAssetsLF -1.279e-14  4.983e-14  -0.257   0.7976
## Freecash     7.839e-14  3.471e-13   0.226   0.8214
## BtS          1.625e-04  1.148e-04   1.416   0.1577
## FinLeverage -1.610e-03  1.344e-03  -1.198   0.2317
## Rev12       -9.497e-15  1.008e-13  -0.094   0.9250
## PtB          3.419e-04  2.243e-04   1.524   0.1283
## Vol.360     -9.128e-04  5.430e-04  -1.681   0.0937 .
## ROE          2.859e-06  8.538e-05   0.033   0.9733
## ROA         -8.559e-04  1.192e-03  -0.718   0.4731
## ROIC         6.250e-04  7.712e-04   0.810   0.4183
## ESGR         2.183e-04  2.373e-04   0.920   0.3583
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06322 on 338 degrees of freedom
##   (60 observations deleted due to missingness)
## Multiple R-squared:  0.03291,    Adjusted R-squared:  -0.007146
## F-statistic: 0.8216 on 14 and 338 DF,  p-value: 0.6455
```

```
###############

reg3 <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+
summary(reg3)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + ESGB, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.44862 -0.03164  0.00343  0.03230  0.32318
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.003e+00  1.730e-02  57.980   <2e-16 ***
## MarketCap   -1.836e-14  4.538e-14  -0.404   0.6861
## LTDebt       3.656e-13  2.613e-13   1.399   0.1627
## STDebt      -1.640e-13  3.093e-13  -0.530   0.5962
## TotAssetsLF -1.614e-14  4.996e-14  -0.323   0.7468
## Freecash     8.518e-14  3.480e-13   0.245   0.8067
## BtS          1.453e-04  1.135e-04   1.280   0.2013
## FinLeverage -1.499e-03  1.341e-03  -1.118   0.2642
## Rev12       -9.293e-16  1.006e-13  -0.009   0.9926
## PtB          3.371e-04  2.245e-04   1.501   0.1342
```

```
## Vol.360     -9.796e-04  5.511e-04  -1.777   0.0764 .
## ROE         -2.594e-06  8.530e-05  -0.030   0.9758
## ROA         -8.164e-04  1.198e-03  -0.681   0.4962
## ROIC         6.057e-04  7.725e-04   0.784   0.4336
## ESGB         2.800e-06  2.049e-03   0.001   0.9989
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0633 on 338 degrees of freedom
##   (60 observations deleted due to missingness)
## Multiple R-squared:  0.03049,    Adjusted R-squared:  -0.009667
## F-statistic: 0.7593 on 14 and 338 DF,  p-value: 0.7132
```

```
##############################
## Model 2
## Running apooled regression with E, s and G

reg <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+R
summary(reg)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + ER + SR + GR, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.44632 -0.03216  0.00225  0.03439  0.31956
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.896e-01  2.237e-02  44.228   <2e-16 ***
## MarketCap   -2.140e-14  4.672e-14  -0.458    0.647
## LTDebt       3.542e-13  2.602e-13   1.361    0.174
## STDebt      -1.884e-13  3.112e-13  -0.605    0.545
## TotAssetsLF -1.121e-14  5.024e-14  -0.223    0.824
## Freecash     8.063e-14  3.502e-13   0.230    0.818
## BtS          1.611e-04  1.150e-04   1.400    0.162
## FinLeverage -1.587e-03  1.347e-03  -1.178    0.239
## Rev12       -1.591e-14  1.033e-13  -0.154    0.878
## PtB          3.398e-04  2.251e-04   1.510    0.132
## Vol.360     -9.188e-04  5.454e-04  -1.685    0.093 .
## ROE          6.287e-07  8.554e-05   0.007    0.994
## ROA         -8.597e-04  1.211e-03  -0.710    0.478
## ROIC         6.519e-04  7.889e-04   0.826    0.409
## ER           9.180e-05  2.018e-04   0.455    0.649
## SR           3.412e-06  2.640e-04   0.013    0.990
## GR           1.074e-04  2.000e-04   0.537    0.592
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0634 on 336 degrees of freedom
##   (60 observations deleted due to missingness)
```

```
## Multiple R-squared:  0.03292,    Adjusted R-squared:  -0.01313
## F-statistic: 0.7148 on 16 and 336 DF,  p-value: 0.779
```

```
##############

reg3 <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+
summary(reg3)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + EB + SB + GB, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.44865 -0.03141  0.00317  0.03366  0.32312
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  9.919e-01  3.212e-02  30.879   <2e-16 ***
## MarketCap   -1.812e-14  4.604e-14  -0.394   0.6941
## LTDebt       3.532e-13  2.630e-13   1.343   0.1802
## STDebt      -1.634e-13  3.108e-13  -0.526   0.5996
## TotAssetsLF -1.464e-14  5.027e-14  -0.291   0.7710
## Freecash     8.156e-14  3.494e-13   0.233   0.8156
## BtS          1.492e-04  1.148e-04   1.299   0.1948
## FinLeverage -1.530e-03  1.351e-03  -1.132   0.2583
## Rev12       -4.487e-15  1.013e-13  -0.044   0.9647
## PtB          3.420e-04  2.269e-04   1.507   0.1327
## Vol.360     -9.558e-04  5.441e-04  -1.757   0.0799 .
## ROE         -1.860e-06  8.567e-05  -0.022   0.9827
## ROA         -8.054e-04  1.199e-03  -0.672   0.5021
## ROIC         6.013e-04  7.842e-04   0.767   0.4438
## EB           1.964e-05  1.892e-03   0.010   0.9917
## SB           1.321e-03  4.042e-03   0.327   0.7441
## GB           5.368e-04  2.077e-03   0.258   0.7962
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06346 on 336 degrees of freedom
##   (60 observations deleted due to missingness)
## Multiple R-squared:  0.03117,    Adjusted R-squared:  -0.01497
## F-statistic: 0.6756 on 16 and 336 DF,  p-value: 0.8181
```

```
##############################
## Running a pooled regression with ESG portfolio
## Model 3

reg <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+R
summary(reg)
```

```
##
```

```
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + DR1 + DR3, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.45189 -0.03063  0.00269  0.03287  0.32043
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.007e+00  1.599e-02  62.967   <2e-16 ***
## MarketCap   -1.777e-14  4.543e-14  -0.391   0.6960
## LTDebt       3.618e-13  2.616e-13   1.383   0.1676
## STDebt      -1.730e-13  3.101e-13  -0.558   0.5773
## TotAssetsLF -1.522e-14  5.008e-14  -0.304   0.7615
## Freecash     8.698e-14  3.482e-13   0.250   0.8029
## BtS          1.425e-04  1.139e-04   1.251   0.2119
## FinLeverage -1.579e-03  1.349e-03  -1.170   0.2427
## Rev12       -5.653e-15  1.009e-13  -0.056   0.9553
## PtB          3.443e-04  2.251e-04   1.530   0.1270
## Vol.360     -9.885e-04  5.496e-04  -1.799   0.0729 .
## ROE         -2.475e-06  8.539e-05  -0.029   0.9769
## ROA         -8.575e-04  1.199e-03  -0.715   0.4751
## ROIC         6.258e-04  7.739e-04   0.809   0.4193
## DR1         -4.370e-03  8.446e-03  -0.517   0.6052
## DR3         -4.526e-03  8.519e-03  -0.531   0.5955
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06335 on 337 degrees of freedom
##   (60 observations deleted due to missingness)
## Multiple R-squared:  0.03156,    Adjusted R-squared:  -0.01155
## F-statistic: 0.7322 on 15 and 337 DF,  p-value: 0.7516
```

```
###############

reg3 <- lm(CumRetT~ MarketCap+LTDebt+STDebt+TotAssetsLF+Freecash+BtS+FinLeverage+Rev12+PtB+Vol.360+ROE+
summary(reg3)
```

```
##
## Call:
## lm(formula = CumRetT ~ MarketCap + LTDebt + STDebt + TotAssetsLF +
##     Freecash + BtS + FinLeverage + Rev12 + PtB + Vol.360 + ROE +
##     ROA + ROIC + DB1 + DB3, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.45189 -0.03063  0.00269  0.03287  0.32043
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.007e+00  1.599e-02  62.967   <2e-16 ***
## MarketCap   -1.777e-14  4.543e-14  -0.391   0.6960
```

```
## LTDebt       3.618e-13  2.616e-13   1.383   0.1676
## STDebt      -1.730e-13  3.101e-13  -0.558   0.5773
## TotAssetsLF -1.522e-14  5.008e-14  -0.304   0.7615
## Freecash     8.698e-14  3.482e-13   0.250   0.8029
## BtS          1.425e-04  1.139e-04   1.251   0.2119
## FinLeverage -1.579e-03  1.349e-03  -1.170   0.2427
## Rev12       -5.653e-15  1.009e-13  -0.056   0.9553
## PtB          3.443e-04  2.251e-04   1.530   0.1270
## Vol.360     -9.885e-04  5.496e-04  -1.799   0.0729 .
## ROE         -2.475e-06  8.539e-05  -0.029   0.9769
## ROA         -8.575e-04  1.199e-03  -0.715   0.4751
## ROIC         6.258e-04  7.739e-04   0.809   0.4193
## DB1         -4.370e-03  8.446e-03  -0.517   0.6052
## DB3         -4.526e-03  8.519e-03  -0.531   0.5955
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06335 on 337 degrees of freedom
##   (60 observations deleted due to missingness)
## Multiple R-squared:  0.03156,    Adjusted R-squared:  -0.01155
## F-statistic: 0.7322 on 15 and 337 DF,  p-value: 0.7516
```

```
##############################
## Generating a pdf file which summarizes your code and your output
```

```
## LTDebt       3.618e-13  2.616e-13   1.383   0.1676
## STDebt      -1.730e-13  3.101e-13  -0.558   0.5773
## TotAssetsLF -1.522e-14  5.008e-14  -0.304   0.7615
## Freecash     8.698e-14  3.482e-13   0.250   0.8029
## BtS          1.425e-04  1.139e-04   1.251   0.2119
## FinLeverage -1.579e-03  1.349e-03  -1.170   0.2427
## Rev12       -5.653e-15  1.009e-13  -0.056   0.9553
## PtB          3.443e-04  2.251e-04   1.530   0.1270
## Vol.360     -9.885e-04  5.496e-04  -1.799   0.0729 .
## ROE         -2.475e-06  8.539e-05  -0.029   0.9769
## ROA         -8.575e-04  1.199e-03  -0.715   0.4751
## ROIC         6.258e-04  7.739e-04   0.809   0.4193
## DB1         -4.370e-03  8.446e-03  -0.517   0.6052
## DB3         -4.526e-03  8.519e-03  -0.531   0.5955
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06335 on 337 degrees of freedom
##   (60 observations deleted due to missingness)
## Multiple R-squared:  0.03156,    Adjusted R-squared:  -0.01155
## F-statistic: 0.7322 on 15 and 337 DF,  p-value: 0.7516
```

```
##############################
## Generating a pdf file which summarizes your code and your output
```