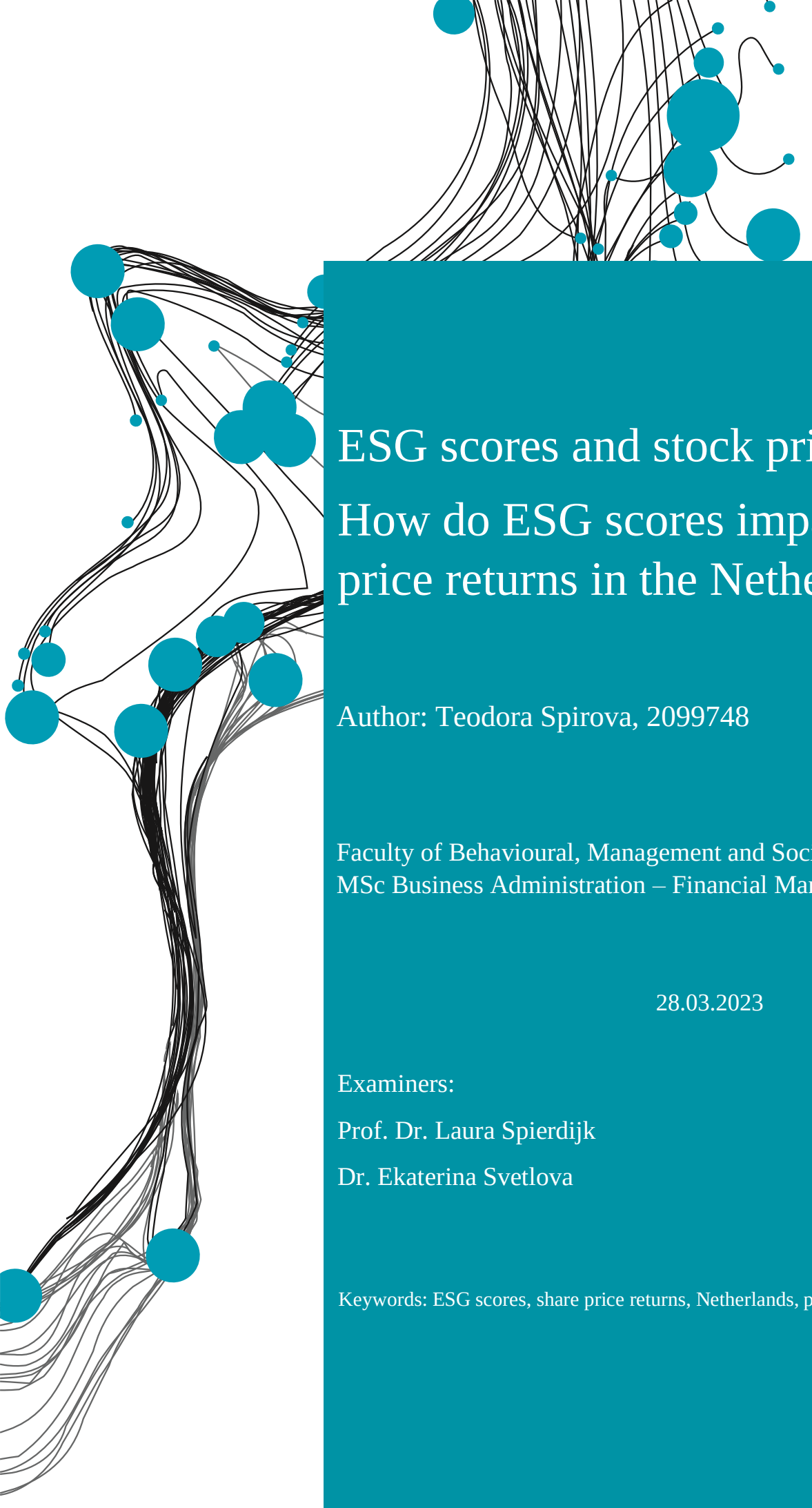

ESG scores and stock price returns: How do ESG scores impact stock price returns in the Netherlands

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ABSTRACT

The growing interest in sustainable business practices has fostered the rise of attention paid to environmental, social and governance (ESG) scores companies receive. The spark in interest has led to a large body of literature on the impact of the scores on companies' financial performance, share prices and returns, with mixed results across regions, countries, and industries. Therefore, this thesis aims to find the impact social, environmental, and governance scores have on expected share price returns in the Netherlands. To answer the research question, ESG and financial data from Refinitiv Eikon is collected for a sample of 44 companies listed on Euronext Amsterdam, over the period between 2018 to 2020. The analysis is done by using panel data regressions with fixed time and firm effects, with robust standard errors and a Wald test. The results indicate, when not accounting for the risk, social and ESG scores negatively affect expected share price returns. Meanwhile, environmental and governance scores seem to have a positive impact on the expected returns. Thus, this thesis informs investors about the impact ESG scores have on the returns they may receive. It further informs investors about the dangers and consequences of the tilting of ESG reporting. Lastly, it informs companies about how their investments and performance in environmental, social, and governance activities impact their cashflows and their public perception.

Table of Contents

1. INTRODUCTION

Over the past few years, there has been a growing interest in environmental, social and governance (ESG) criteria worldwide from both academia and policy. For instance, Google Scholar results for the keyword "ESG" has grown over the past few years, from 8720 results in 2015, 9520 in 2016, to 16400 in 2020, and 22100 results in 2021. Moreover, 96% of the policies regarding ESG have been developed since 2000 (PRI, 2021). [1] PRI (2021) found that until August 2021, 159 policy instruments have been created or updated. [2] The number is higher compared to the full year in 2020 (PRI, 2021).[3]

For example, in the European Union, the EU ESG benchmarks and the Green Bond Standard proposal are among the instruments (European Commission, 2018; EU Technical Expert Group, 2019).[4] In the USA, recently the US Securities and Exchange Commission submitted a proposal to require companies to provide audited financial statements with climate-related expenses and impact metrics and greenhouse emission reports, amongst others (Vallette and Grey, 2022).

Research has focused on several aspects of ESG effects on, for example, performance (Landi and Sciarelli, 2019), risk, returns and diversification (Verheyden et al., 2016), ESG integration (Cappucci, 2018), and investment models (van Duuren et al., 2016). Amongst the areas of interest, is the effects ESG has on stock prices or firm valuations (Bennani et al., 2018; Chen et al., 2020). Studies have covered the effects worldwide (Bennani et al., 2018), or in particular countries, such as Italy (Cordazzo et al., 2020), Spain (Reverte, 2016), Korea (Yoon et al., 2018), the USA (Chen et al., 2020), and Brazil (de Azevedo et al., 2016).

In the Netherlands, the effects of ESG on stock prices have not yet been studied, despite the growing interest in ESG initiatives by both companies and policymakers.

Thus, this study aims to explore the effects of ESG ratings on stock price returns in the Netherlands. Moreover, it will investigate the impact environmental, social and governance scores separately and together have on stock prices. Therefore, the research question to be answered is: *What is the impact of ESG scores on the expected stock price returns of companies in the Netherlands?*

The results from this study will contribute to the literature focusing on share price returns and the impact of non-financial information on investments in the Netherlands. Moreover, it will extend on research done by Park and Jang (2021) considering the ESG impact on pricing across different countries. It will provide further evidence of the effect that non-financial data has on stock price returns and the intangible factors affecting returns (Cordazzo et al., 2020; Reverte, 2016). For practitioners, it will show how their returns will be impacted when investing with ESG considerations. Additionally, it will inform investors and companies alike of the impact that ESG may have on the returns their investors receive (Murata and Hamori, 2021).

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[1] PRI. (2022). Regulation database. Retrieved on 26.06.2022 from https://www.unpri.org/policy/regulation-database
[2] PRI. (2022). Regulation database. Retrieved on 26.06.2022 from https://www.unpri.org/policy/regulation-database
[3] PRI. (2022). Regulation database. Retrieved on 26.06.2022 from https://www.unpri.org/policy/regulation-database
[4] European Commission. (2018). Commission legislative proposals on sustainable finance. Retrieved on 26.06.2022 from https://finance.ec.europa.eu/publications/commission-legislative-proposals-sustainable-finance en; EU Technical Expert Group on Sustainable Finance. (2019). *Report on EU Green Bond Standard*. (June), 1–79. Retrieved on 26.06.2022 from https://ec.europa.eu/info/publications/sustainable-finance-teg-green-bond-standard_en

The study will be structured as follows: firstly, an introduction to the topic will be given, followed by a theoretical framework, outlining the relevant literature on which the hypotheses are built. Further, the sample, methodology and research design used will be specified (including information about the sample, its size and descriptive statistics), and the results will be reported. Lastly, the conclusion will summarize the main findings, limitations and future research, and their significance and impact.

2. LITERATURE AND HYPOTHESES

2.1 ESG worldwide

Worldwide, there are growing concerns over climate change, governance practices and social issues (Gillan et al., 2021). Gillan et al. (2021) note that there is increasing concern about the impact of corporations on social welfare. Corporate initiatives in this area are frequently referred to as Environmental, Social, and Governance (ESG) (Gullian et al., 2021). In the early 1990s, less than 20 companies incorporated ESG in their reporting, with the number growing to 8 400 in 2014 (Kotsantonis et al., 2016).

Additionally, the disclosure of corporate actions on such non-financial information is growing due to the increase in interest in ESG investing (Eccles and Stroehle, 2018). There are over 3000 institutional investors and service providers that have signed on to the Principles of Responsible Investment (PRI), a commitment to incorporate ESG or CSR issues into their investment analysis and decision-making processes (Gullian et al., 2021). Moreover, regulators have also pushed for increased ESG disclosure (Kotsantonis et al., 2016). For instance, the European Union's directive on non-financial reporting in 2014 was one of the most recent key developments (Kotsantonis et al., 2016).

There are over 100 entities collecting, analysing, and rating the ESG performance of companies (Eccles and Stroehle, 2018). They all use different data collection methods, and further use data to create their unique indicators due to the lack of transparency and differences in history, establishment, ownership, and company purpose amongst the different organisations (Eccles and Stroehle, 2018). Consequently, there is a lack of consistency in the definitions of ESG and different scoring criteria are used across the world (Berg et al., 2022).

For instance, Refinitiv (2022) considers resource use, emissions, and innovations to derive the score for the environmental scores, workforce, human rights, community, and product responsibility for social scores, and management, shareholders, and corporate social responsibility (CSR) strategy for governance scores.[5] Additionally, they consider an ESG controversies score to create the overall score for each company (Refinitiv, 2022).[6]

Refinitiv uses a scoring system between 0 and 100 (Refinitiv, 2022).[7] Companies with poor ESG performance and insufficient degree of transparency when disclosing practices belong to the

[5] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 26.06.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[6] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 26.06.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[7] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 26.06.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

first quartile and receive scores between 0 and 25 (Refinitiv, 2022).[8] Companies with satisfactory ESG performance and moderate transparency receive scores above 25 and below 50 and belong to the second quartile (Refinitiv, 2022).[9] Scores above 50 to 75 place companies in the third quartile and are received by companies with good ESG performance and above-average transparency, while scores above 75 to 100 indicate that the company has excellent ESG performance and high levels of transparency when sharing practices with the public and place companies in the fourth quartile (Refinitiv, 2022).[10] Thus, companies which score above 50 are considered to be transparent and have high performance, while the ones which score below 50 are lacking some transparency and have lower performance.

Meanwhile, MSCI considers climate change, natural capital, pollution and waste, environmental opportunities to create the environmental scores, human capital, product liability, stakeholder opposition, social opportunities for social and corporate governance and corporate behaviour for deriving governance scores.[11] Companies may receive ratings of AAA or AA and be considered leaders, A, BBB or BB to be considered average and if they receive B or CCC rating, they are considered laggards (MSCI, n.d.).[12]

S&P Global uses different criteria in its system. The environmental scores comprise greenhouse gas emissions, waste and pollution, water, and land use. The social scores are based on workforce and diversity, safety management, customer engagement and communities, while the governance scores are based on structure and oversight, core and values, transparency and reporting, and financial and operational risks (S&P Global, n.d.).[13] The companies received scores from 0 to 100, the lowest and highest scores, respectively (S&P Global, n.d.).[14]

Additionally, Bloomberg looks into air quality, climate change water and energy management, materials and waste, health and safety, audit risk and oversight, compensation, diversity, board independence structure and tenure, and shareholders' rights to derive the ESG scores (Bloomberg, n.d.).[15] Lastly, Sustainalytics considers the business model, financial strength, geography, and incident history.[16]

Berg et al. (2022) when studying the divergence of ESG scores amongst different rating agencies, found that measurement, scope, and weight contribute to the divergence of the scores, with 56%, 38% and 6% respectively.

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[8] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 26.06.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[9] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 26.06.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[10] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 26.06.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores methodology.pdf

[11] MSCI. (n.d.). ESG Ratings. Retrieved on 26.06.2022 from https://www.msci.com/our-solutions/esg-investing/esg-ratings

[12] MSCI. (n.d.). ESG Ratings. Retrieved on 26.06.2022 from https://www.msci.com/our-solutions/esg-investing/esg-ratings

[13] S&P Global. (n.d.). ESG Evaluation. Retrieved on 26.06.2022 from https://www.spglobal.com/_assets/documents/ratings/esg/esg_evaluation_brochure_digital.pdf

[14] S&P Global. (n.d.). ESG Evaluation. Retrieved on 26.06.2022 from https://www.spglobal.com/_assets/documents/ratings/esg/esg_evaluation_brochure_digital.pdf

[15] Bloomberg. (n.d.). Global Environmental, Social & Governance – ESG Data. Retrieved on 26.06.2022 from https://www.bloomberg.com/professional/dataset/global-environmental-social-governance-data/

[16] Sustainalytics. (n.d.). ESG Risk Ratings. Retrieved on 26.06.2022 from https://www.sustainalytics.com/esg-data

The divergence of the scores across the agencies creates difficulties when evaluating the EGS performance of companies, portfolios, and funds, as well as linking CEO compensation to the performance of the firm's ESG scores (Berg et al., 2022). Additionally, ex-post post pricing of companies' ESG performance by markets is less likely, while also tarnishes the incentives for companies to improve ratings (Berg et al., 2022).

Consequently, Berg et al. (2022) conclude that ESG disagreements lead to differences in results when choosing data from one agency over another. Thus, they advise researchers to, amongst others, use several ratings, focus on subcategories, or use one in which the data can be independently verified. Therefore, to avoid any of the pitfalls specified by Berg et al. (2022) when choosing one rating system over another, the ESG scores which will be used for the analysis will be collected from an independently verifiable source as explained in section III. Data.

2.2 ESG, share pricing and returns

The impact ESG scores have on share pricing and share returns and their determinants have been extensively studied (Avramov et al., 2021; Gao et al.; Chen et al., 2020; Schramade, 2016). The literature has identified several perspectives and mechanisms through which the impact has been observed, amongst which are the investor sentiment, discount cash flow model and the capital asset pricing model.

In the following sections, the impact of ESG scores on share pricing and returns will be presented according to previous findings on the mechanisms and their determinants, starting with the behavioural finance and investor sentiment, discounted cash flow and finally capital-asset pricing model.

2.2.1 Behavioural finance and investor sentiment

Following behavioural finance theory, investor sentiment is instrumental when it comes to asset pricing, risk management and investment decisions (Gao et al., 2022). Investor sentiment has been defined as the perception of future cash flows and investment risk that is not supported by the current information (Baker and Wurgler, 2007). For example, Cordeiro and Tewari (2015) found that better-ranked companies are rewarded with higher share prices by investors who predict higher future cash flows because of more favourable responses from important stakeholders including environmentally concerned clients, staff members, NGOs, and regulators.

Simultaneously, Bams and Kroft (2022) note that investors tend to increase holdings when companies promise to improve sustainable performance due to information asymmetries, while investors who are socially responsible reduce holdings when the performance is improved, and firms face fewer controversies.

Consequently, Haritha and Rishad (2020) note that the behaviour of investors is mirrored in share prices as well as in the fluctuations in the market. Moreover, the sentiment makes the predisposition for investors to become optimistic or pessimistic when speculating prices, as opposed to basing their decisions on fundamental factors such as firm size (Baker and Wurgler, 2006).

In that light, when an investor receives positive ESG news, they react positively to them, by increasing or decreasing (in case of positive or negative news, respectively) the industry-adjusted stock return over the days before, after and the day the news was released (Serafeim and Yoon, 2021). Moreover, the market reactions to positive news are weaker to firms with high ESG performance (Serafeim and Yoon, 2021). Serafeim and Yoon (2021) state that the reason behind

the weaker reaction may lie in the positive news being reflected in the price already. Therefore, bad news has been found to reflect more in the volatility of stock prices (Sabbaghi, 2022).

Since there is a misalignment between the rating agencies (Berg et al., 2022), investors react more strongly when the different agencies provide alike information about the performance of companies because the lack of disagreement between the agencies leads to stronger expectations about future news (Serafeim and Yoon, 2021).

Besides the impact that investor sentiment has on share pricing when investing with considerations on ESGs, the sentiment has an impact on returns. Wang et al. (2021) find a negative relationship between investor sentiment and returns on a global level. Thus, the higher the investor sentiment, the lower the returns. Moreover, investor sentiment has a negative impact on stock return volatility (Jiang and Jin, 2021). When investor sentiment is high, and investors are more optimistic, and therefore tend to invest more based on that confidence and noise; thus, the risk and returns become mismatched, the risk becomes underestimated and portfolios suboptimal (Jiang and Jin, 2021; Gao et al., 2022).

To summarise, investor sentiment may account for and explain, at least partially, the impact of environmental, social and governance scores on share prices and returns.

2.2.2 Discounted cash flow

Discounted cash flow or DCF is frequently used to estimate the value of the investment based on the time value of money, by considering the cashflows and cost of capital or the discount rate (Visconti, 2021; Giese, 2019; Tharavanij, 2021). The formula is as follows:

$$DCF = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \cdots + \frac{CF_n}{(1+r)^n}$$

where CF refer to the cashflows at time 1,2 until n, n is the time until the cash flow occurs, r is the discount rate and DCF is the discounted cash flow.

The impact of environmental, social and governance scores may impact both the cash flows and the discount factor, thus impacting the valuation (Visconti, 2021; Tharavanij, 2021). Furthermore, the discount factor is influenced by the cost of capital (Chouaibi et al., 2021; Mülbert and Sajnovits, 2020; Piechocka-Kałużna et al., 2021; Tharavanij, 2021). Therefore, the impact of ESG scores on the cash flows and discount factor may impact how investors value companies and their share prices, and, therefore, the returns they may expect.

Thus, previous studies have called for integrating ESG metrics into the discounted cash flow model through the cash flows and the cost of capital and discount rate to improve its accuracy when predicting the value of the investment (e.g., Chen et al., 2020; Schramade, 2016). The need for the modified DCF models results from the identified effect of ESG scores on firms' cash flows, cost of capital and discount factor, presented in the following sections.

2.2.2.1 ESG scores, cash flows, future cash flows and earnings

When considering the standard cash-flow firm model, ESG decreases both the cost of capital and the incidence of tail risk, leading to improved firm valuation (Gregory, 2022). Additionally, Gregory (2022) concludes that although ESG initiatives are advantageous to the company, the majority of the cash flow advantages accrue to the creditors of developed market companies. These advantages are mostly the result of businesses' excessive expenditure on initiatives that signal their integration of economic (financial), social, and environmental considerations into daily decision-making (Gregory, 2022). Excessive spending on a firm's ability

to use less material, energy, or water, or to adhere to human rights conventions, results in more cash flow to shareholders since such investments improve the supply chain management (Gregory, 2022). However, this is offset by excessive spending on emissions reduction, a firm's ability to lower environmental costs, and expanding opportunities to develop new environmental markets (Gregory, 2022). Christ et al. (2022) note that ESGs shape the cost of debt, and therefore influence cash flows and the risk profile of companies. The reason why ESGs shape the cost of debt is that through altering the cash flow characteristics and, as a result, the firm's risk profile

Moreover, corporate sustainability has been found to be positively related to future cash flows, and firms with higher sustainability performance have higher operating cash flows and earnings in the future (Jia and Li, 2022). Wirianata et al. (2021) found that only earnings variables had a significant effect on the company's future cash flows when considering corporate governance as moderation. When considering the quality of sustainability reporting, the innate earnings quality, the earnings from the business model, production, and competitive environment (Francis et al., 2008), are more pronounced (Rezaee and Tuo, 2019).

Lastly, future cash flow predictions are improved by environment-related activities (Lee and Kim, 2021). When companies advertised their efforts to mitigate their negative environmental impact, their cash flows became more predictable because, by advertising, the firms can display a favourable social image and awareness, thus improving their reputation, and sending signals to shareholders (Lee and Kim, 2021).

To summarise, companies that engage in ESG activities have higher expected future cash flows, earnings, and operating cash flows in the future, and higher innate earnings.

2.2.2.2 ESG scores and cost of capital

The cost of capital has been found to influence the discount factor (Mülbert and Sajnovits, 2020; Tharavanij, 2021). Thus, any impact that ESG scores may have on the cost of capital will be reflected in the discount factor, and consequently, on the discounted cash flows.

Mülbert and Sajnovits (2020) note that the ESG scores impact the discount factor due to their influence on the cost of capital; therefore, impacting the result when the discount cash flow model is used. Visconti (2021) notes that the disclosure of ESG compliance reduces information asymmetries and consequently potentially decreases the cost of capital.

When studying the impact of ESGs on the cost of capital in the tech sector globally, Nazir et al. (2022) found that the ESG scores influence the cost of capital, and both the cost of debt and the cost of equity. Visconti (2021) confirms that the cost of debt and the cost of equity are both lower for firms which disclose their sustainability performance (Ng & Rezaee, 2012).

Eliwa et al. (2021) note that ESG disclosure and performance and the cost of debt have a negative relationship, and ESG practices help mitigate agency conflicts between the debtholders and shareholders. Chouaibi et al. (2021) found that companies will be able to reduce the cost of equity capital when taking social interests into account. Moreover, companies that become aligned with sustainable practices will give investors incentives to invest in them (Chouaibi et al., 2021). Piechocka-Kałużna et al. (2021) confirm that ESGs and the weighted average cost of capital, cost of equity and cost of debt have negative correlations.

The responsible ESG actions taken by companies allow them to access financing at a lower cost (Decourt, 2022). Consequently, investment opportunities are expanded (Decourt, 2022). As they offer less risk to investors, the capital they can access becomes cheaper, leading to greater capacity for investment and value for cash generation (Decourt, 2022).

Ramirez et al. (2022) found that in Latin America, firms with high ESG scores had a lower cost of capital, and sustainable companies have higher valuations and lower risk. The reasons behind the lower cost of capital may be the investors' interest in sustainable firms, restricted access to private equity with a high cost of capital for firms that are not sustainable and lowered systemic risk due to market regulation (Ramirez et al., 2022).

To sum up, environmental, social and governance scores have been found to impact the cost of capital of companies, in particular, they lower the cost of debt and cost of equity and offer less risk.

2.2.2.3 ESG scores and discount factor

If the information provided by ESGs is valuable to investors, the markets will adjust to incorporate it (Cornell, 2021). Therefore, companies with high ESG scores will face decreased discount rates, while the ones with low ESGs will face higher discount rates (Cornell, 2021). The reason behind the falling discount rates lies within investor preferences (Cornell, 2021; Fama and French, 2007). When variables other than future consumption are considered in the utility functions for investors, prices differ from what traditional risk and return models often forecast, under the assumption of market equilibrium (Fama and French, 2005). Thus, the expected return from investing in greener companies will be lower if a portion of investors prefers to do so (Cornell, 2021; Fama and French, 2005). The size of the effect will depend on how much money investors have to invest (Cornell, 2020; Fama and French, 2005).

An example of this effect has been previously provided with stocks of companies which are producing alcohol, tobacco or gaming, or "sin" stocks (Hong and Kacperczyk, 2009; Cornell, 2020). In their case, sin stocks have higher average returns than otherwise comparable stocks and are less frequently held by institutional investors, since institutional investors have numerous clients with a diverse set of criteria and risk appetites. Therefore, Hong and Kacperczyk, (2009) conclude that investors need to be rewarded for the reputational cost associated with holding "sin" stocks by way of a higher expected return.

Since ESG is a relatively novel concept, it is possible that the market is currently adjusting to incorporate ESG considerations (Cornell, 2020). Thus, as long as the market is adjusting and the ESG information is valuable to investors, the discount rates for highly rated companies will fall (Cornell, 2020). Consequently, Cornell (2021) concludes that during the adjustment, the stocks rated with high ESG scores will outperform the ones with low ESG scores, and when the equilibrium of prices is reached, the stocks with high ESG scores will have a higher value.

At the same time, Mülbert and Sajnovits (2020) note that it is possible that the ESG factors impact the discount rate by affecting the cost of capital, because of the systemic risk transmission channel. The financial instrument's beta establishes an issuer's cost of capital based on the assumptions used in line with the capital asset pricing model (Mülbert and Sajnovits, 2020). Companies should be less vulnerable to systematic market shocks if they have a strong ESG profile, which would reduce their exposure to systematic risk (Mülbert and Sajnovits, 2020). According to the capital asset pricing model, which uses beta as a gauge of a company's exposure to systematic risk, reduced systematic risk lowers expected return and, thus, lowers the cost of capital (Mülbert and Sajnovits, 2020). Lower systematic risk leads to a higher fundamental value for the shares in issue, assuming that the anticipated cash flows do not alter, since the cost of capital equates to the share discount factor (Mülbert and Sajnovits, 2020). Thus, companies should be less vulnerable to systematic market shocks if they have a positive ESG profile because this will expose them to less systematic risk (Mülbert and Sajnovits, 2020).

Based on CAPM, the issuer's cost of capital is shaped by the beta of the financial instrument and the beta is a measure of the systematic risk exposure of a company; thus, lower systematic risk would bring forward reduced expected return and cost of capital (Mülbert and Sajnovits, 2020). Further, Mulbert and Sjanovits (2020) conclude that as the cost of capital corresponds to the discount factor if the predicted cash flows remain constant, the lower systematic risk will result in higher fundamental share value.

Zakhmatov et al. (2022) studied ESG and discount rates for business valuations and found that the β coefficient, premium for the risk of investing in a specific company, cost of interest-bearing debt, and corporate tax rate are influenced by ESG. In particular, Zakhmatov et al. (2022) found that the β is influenced by the investors' attitudes towards changes in the industry. In addition, the premium for the risk of investing in a specific company is impacted by the specific activities and practices of the company. For example, the company's quality of corporate governance or risks relating to business prospects and legislation (Zakhmatov et al., 2022). Furthermore, the cost of interest-bearing debt is lower since the debt financing rate for companies due to access to preferential loans or green bonds when having implemented ESG practices), while the corporate tax rate may be lower due to government subsidies and support for companies with ESG practices (Zakhmatov et al.; 2022).

In summary, companies with high ESG scores face a lower discount factor in comparison to companies with low scores, due to the lower exposure to systematic risk, lower expected returns, and the impact that ESG scores have on the cost of capital.

2.2.3 Capital Asset Pricing Model

The Capital Asset Pricing Model or CAPM is a model for calculating the expected rate of return on an investment (Brealy et al., 2020). The formula for calculating CAPM is:

$$r - r_f = \beta_i(r_m - r_f)$$

where $r - r_f$ is the expected risk premium on a stock, r_f is the risk-free rate, β_i represents the stock beta or measure of the market risk of the stock, and r_m is the expected market return (Brealy et al., 2020).

Thus, any impact that the environmental, social, and governance scores may have on the risk of the stock, will be reflected in the stock's risk premium. Avramov et al. (2022) have found that the disagreement between the scoring systems increases the perceived market risk and market premium since investors receive conflicting information. In addition, previous studies on the volatility of stocks found that sufficient disclosures and performance of environmental, social and governance practices decrease the stock volatility and stock's beta (Albuquerque, et al., 2020; Kumar et al., 2016). Therefore, studies have aimed at incorporating ESG factors in the CAPM model by modifying, for example, the effective beta based on the environmental, social and governance uncertainty of the firm (Avramov et al., 2021). The next section will cover the impact of ESG scores on risk and volatility.

2.2.3.1 ESG scores impact on risk and volatility

Similar to how ESG disclosure reduces information asymmetries and decreases the cost of capital, it increases the informational efficiency of stock markets and decreases the idiosyncratic risk of firms (He et al., 2022).

Companies which have strong ESG performance have been found to have elevated risk control and compliance across the company itself as well as their supply chains (Giese et al., 2019).

Consequently, it is uncommon for them to suffer from major incidents which impact the company's stock price, such as fraud (Giese et al., 2019). The lesser exposure to severe incidents causes firms to have less tail risk and stock-specific downside risk in the stock price (Giese et al., 2019). The high ESG scores contribute to companies having lesser systematic risk since they are at a lesser risk of stock market shocks (Giese et al., 2019). Moreover, Murata and Hamori (2021) found that companies which disclose their ESG lowers future stock price crash risk, especially in Europe and Japan, while the disclosure did not have predictive power when the analysis was done on companies in the United States.

When considering crisis periods, Broadstock et al. (2021) found that companies that have high ESG scores have higher resilience. The resilience may stem from the interpretation of the scores as a signal of risk mitigation and future performance (Broadstock et al., 2021).

Sassen et al. (2016) considered social and environmental scores separately to find their impact on a firm's risk and established that high social performance leads to lower total, systematic and idiosyncratic risk, while environmental lowers only idiosyncratic risk. When studying credit ratings, find that the effect of ESG is positive, with social scores contributing the most (Sassen et al., 2016). The environmental factors had a negative effect, possibly due to the substitute effect. Under the substitute effect, firms with high ratings lower their environmental investments (Sassen et al., 2016).

Overall, companies which have sufficient transparency and performance, and consequently high ESG scores, have less volatile share prices, are less risky, and present efficient investment channels (Kumar et al., 2016). However, following previous studies by, for example, Jizi et al. (2016), La Torre et al. (2020) and Bae et al. (2021), the impact of risk will not be included in the hypotheses and regressions.

2.2.4 Environmental scores

Environmental scores reflect the actions of companies regarding their impact on the environment, through emissions, resource use and innovation; specifically, environmental scores comprise the companies' transparency and performance considering their emissions, waste, biodiversity, environmental management systems, product innovation, green revenues, research and development and capital expenditures, water, energy, sustainable packaging, and environmental supply chain.[17]

Cioli et al. (2021) found that investors react positively to announcements of green bonds. A corporation that issues green bonds not only obtains a new source of financing but also invests in its environmental standards (Cioli et al., 2021). It might cut operational costs by, for example, implementing energy-saving measures (Cioli et al., 2021). Nakai et al. (2013) state that a sustainability index inclusion leads to positive and significant effects on share prices.

More specifically, El Ghoul et al. (2018) found that companies with higher levels of corporate environmental responsibility have lower cost of equity, and consequently, improving environmental responsibility reduces the equity financing costs for companies. When considering the earnings of firms, better environmental, specifically carbon, performance has a positive effect on real earnings management and a negative effect on accrual-based earnings management (El Ghoul et al., 2018).

[17] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 07.02.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

Since there is evidence suggesting that environmental scores have a positive impact on investors' reactions, share prices, real earnings management, and lower operational costs and cost of equity (Cioli et al., 2021; El Ghoul et al., 2018; Nakai et al., 2013), environmental scores may impact share price returns. It is noteworthy, that it is possible that risk and volatility play a role in the expected returns; however, due to limited readily available data on investment risk and following previous studies (Jizi et al., 2016; La Torre et al., 2020; and Bae et al.; 2021), all of the hypotheses and tests do not control for risk.

Thus, the first null and alternative hypotheses are:

H_0^1*: Environmental scores have a positive impact on the expected share price returns in the Netherlands between 2018 and 2020 without controlling for risk.*

H_1^1*: Environmental scores do not have a positive impact on the expected share price returns in the Netherlands between 2018 and 2020 without controlling for risk.*

2.2.5 Social scores

Social scores assess companies' impact on society, based on their considerations for the workforce, human rights, community, and product responsibility; in particular, social scores incorporate companies' performance and transparency of their practices regarding human rights, community, expansible marketing, product quality, data privacy, diversity and inclusion, career development and training, working conditions and health and safety.[18]

According to von Arx and Ziegler (2014), the financial markets, particularly the US stock market, have rewarded investments in stocks of corporations that have a high intensity of environmental and social activities when compared to other enterprises in the industry.

When companies have higher compliance in social activities, they face a lower cost of equity and cost of debt (Bhuiyan and Nguyen, 2020). Moreover, social responsibility improves and mitigates firm-specific risk, and therefore, improves cashflows (Gregory et al., 2014). Jarjir et al. (2022) note that the most socially responsible firms face lower discount factors, while socially responsible firms face higher earnings quality (Rezaee et al., 2020).

Thus, the second null and alternative hypotheses are:

H_0^2*: Social scores have a positive impact on the expected share price returns in the Netherlands between 2018 and 2020 without controlling for risk.*

H_1^2*: Social scores do not have a positive impact on the expected share price returns in the Netherlands between 2018 and 2020 without controlling for risk.*

2.2.6 Governance scores

The governance scores cover their CSR strategy, ESG reporting and transparency, structure, compensation, shareholder rights and takeover defences; thus, depicting companies' corporate governance practices based on their management, shareholders, and CSR strategy.[19]

Good corporate governance has been found to lower crash risk and lead to higher stock returns (Hunjra et al., 2020; Mohamed and Elewa, 2016). Kurniaty et al. (2019) find that the better the corporate governance, the higher the corporate value. Moreover, Feng and Huang (2020) have

[18] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 07.02.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[19] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 07.02.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

found that corporate governance mechanisms are effective in managing earning manipulation by managers, and higher levels of corporate governance led to lower earnings management and higher earnings quality (Jiang et al., 2008). Havlinova and Kukacka (2021) show that CSR has a positive and significant impact on the stock market performance of firms.

However, Wiryakusuma (2019) found that corporate governance does not affect stock price returns. In addition, Kyere and Ausloos (2021) find varying results depending on which corporate governance mechanisms are considered. Bae et al. (2021), find no evidence that CSR affected stock price returns during the Covid-19 crisis and the post-crisis period, across industries.

As most studies found a positive impact of corporate governance on financial performance and returns, the third null and alternative hypotheses are formed:

H_0^3*: Governance scores have a positive impact on the expected share price returns in the Netherlands between 2018 and 2020 without controlling for risk.*

H_1^3*: Governance scores do not have a positive impact on the expected share price returns in the Netherlands between 2018 and 2020 without controlling for risk.*

2.2.7 ESG scores

The ESG score a company receives reflects the composite score of their performance and transparency along the environmental, social and governance pillars.[20] Literature is split on whether ESG scores impact risks and returns, and lead to high share prices (Cornell, 2020) and evidence across countries suggests diverse results (De Azevedo et al., 2016; Cordazzo et al., 2020; Reverte, 2016; Yoon et al., 2018).

For instance, Serafeim and Yoon (2021) found that positive ESG scores, measured by high values on the MSCI ESG Ratings, lead to a positive reaction in the market, in terms of future stock returns and performance. La Torre et al. (2020) note that in sectors such as energy and utilities, ESG investments and communication positively impact returns. Fulfilling sustainability requirements has been found to increase market performance (Schramade, 2016). Kotsantonis et al. (2016) note that ESG factors have a material effect on the financial performance of companies and concerns could arise amongst conventional investors that firms with high ESG ratings may provide competitive returns to shareholders. De Azevedo et al. (2016) note that in Brazil, companies with sustainable practices had higher returns, while globally, such observation was not made. Moreover, La Torre et al. (2020) suggest that the returns for companies with high ESG scores vary across companies, possibly depending on their field and investments. A similar observation has been made by Reverte (2016), noting that firms with CSR disclosures in environmentally sensitive industries are awarded higher share prices.

Additionally, increases in the ESG rating are associated with small or insignificant positive returns, while a decrease in the rating has a significant negative effect on returns (Shanaev and Ghimire, 2022).

According to Chen et al. (2020), stocks with more positive ESG beta attract more investors and achieve higher abnormal returns in the United States. There is empirical evidence from Brazil which suggests that the returns of sustainable companies are greater than others (de Azevedo et al., 2016). Additionally, evidence from Korea suggests that CSR practices positively and significantly impacted the market (Yoon et al., 2018), meanwhile in Japan, there was no market reaction 100 days after brands announced ESG (Mitsuyama and Shimizutani, 2015). In summary,

[20] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 07.02.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

research (e.g., Schramade, 2016; Chen et al., 2020; Yoon et al., 2018) has established a link between the ESG scores of companies and the performance and returns they achieve.

Thus, to tie the three previously stated hypotheses together, and check whether in the Netherlands the overall ESG score has an impact on expected stock price returns, the last null and alternative hypotheses are formed:

H_0^4: *ESG scores have a positive impact on the expected share price returns in the Netherlands between 2018 and 2020 without controlling for risk.*

H_1^4: *ESG scores do not have a positive impact on the expected share price returns in the Netherlands between 2018 and 2020 without controlling for risk.*

3. DATA

3.1 Sample

To answer the research question, this thesis will rely on the ESG data provided by Refinitiv Eikon since the Refinitiv ESG scores are based on verifiable data provided by companies in the public domain (Refinitiv, 2022).[21] Moreover, they use over 630 data points per company, considering industry-specific ones which mitigate the industry bias which is present when agencies are not adjusting the scores for company-specific risks (Doyle, 2018; Sipiczki, 2022). Additionally, their methodology is transparent and available for downloading (Refinitiv, 2022).[22] Lastly, Refinitiv Eikon provides a unique combination of financial data and ESG scores being available in the same place.

Using independently verifiable data and a scoring system which scores companies based on prior ESG performance, such as Refinitiv Eikon, helps mitigate the issues indicated by Berg et al. (2022). Additionally, Refinitiv considers industry benchmarks when calculating the ESG scores to account for industry-specific developments regarding the ESGs (Refinitiv, 2022).[23] For this study, companies with scores below 50 will be considered as having low scores, as Refinitiv (2022) considers their performance unsatisfactory and above 50 as high, as firms with scores above 50 are more transparent than average and have good ESG performance.[24]

Currently, on Euronext Stock Exchange Amsterdam, there are 186 listed entities (Euronext Amsterdam, 2022).[25] Firms belonging to the financial sector are excluded since their book values are different compared to other industries due to the lower inventory stock and fixed capital, such as property, plant, and equipment (Reverte, 2016; Yoon et al., 2018). The lower inventory stock

[21] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 15.12.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[22] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 15.12.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[23] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 15.12.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[24] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 15.12.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[25] Euronext. (2022). Stocks Amsterdam. Retrieved on 05.12.2022 from https://live.euronext.com/en/markets/amsterdam/equities/list

and fixed capital may impact, for example, the book value per share of the companies and therefore lead to statistical biases (Yoon et al., 2018). Without the financial sector, the sample is 121.

From them, 67 companies have their ESG information publicly available and Refinitiv Eikon has the scores of 67 firms available. To ensure that the sample is large enough and the most recently available data is used, the ESG scores before 2018 were filtered out. For the majority of the companies, the ESG scores for 2021 and 2022 have not been made available yet. Therefore, the last year from which data will be retrieved is 2020. One company was delisted in the summer of 2022 and Eikon removed the financial data associated with it. Companies which report in a currency other than the Euro are excluded from the sample for consistency and accuracy. Of the 66 companies which have ESG data and financial data available on Refinitiv Eikon, 12 trade in currencies other than the Euro.

Thus, the final sample consists of 44 companies, operating in basic materials (3 companies or 6.8%), health care (3 companies or 6.8%), consumer staples (8 companies or 18.2%), consumer discretionary (4 companies or 9.1%), utilities (1 company or 2.3%), industrials (12 or 27.3%), telecommunications (1 company or 2.3%), energy (1 company or 2.3%), real estate (6 companies or 13.6%) and technology (5 companies or 11.4%).

Following the examples of Yoon et al. (2018), Cordazzo et al. (2020), and Izzo and di Donato (2012), the data will be analysed annually. The reason for the annual frequency is due to the ESG scores being reported once a year based on the reports from the companies.

As aforementioned, companies that have not disclosed their ESG scores will be omitted. Omitting such companies may lead to selection bias (non-response or missing data bias) (Hernán, 2004). To cope with selection bias, Mummolo and Peterson (2018) note that using fixed effects regression model is commonly used.

Therefore, the final data set consists of a panel with 44 companies (n=44), observed over three years (T=3). Consequently, the regression will include panel effects, specifically, time and firm fixed effects (α_i and γ_t respectively). For instance, the firm fixed effects would capture any variability that may arise due to differences within the firms, as some are considered to be more sensitive to environmental, social or governance actions and there may be other unobservable factors that may play a role which cannot be otherwise accounted for. Time fixed effects are taken into consideration as there may be unobservable changes that happen over time, such as changes in regulation.

3.2 Variables

To answer the research question and test the four hypotheses, regression analysis will be used. Across the literature, several studies (e.g., von Arx and Ziegler, 2014; Jizi et al., 2016; Havlinova and Kukacka, 2021; Reverte, 2016; Mohamed and Elewa, 2016; Yoon et al., 2018) have used regression analysis for similar studies.

The independent variables are the social, governance and environmental scores (Yoon et al., 2018), as the focus of the study is on the impact, they have on the stock price returns of companies. Thus, the company expected stock price return is the dependent variable, expressed as the relative changes in share price between period t and t-1, or in a formula: $(P_t-P_{t-1})/P_{t-1}$.

The control variables frequently chosen are book value per share (Havlinova and Kukacka, 2021; Yoon et al., 2018), size- expressed by the natural logarithm of total assets (Havlinova and Kukacka, 2021; Hunjra et al., 2020; Cordazzo et al., 2020; Lee and Kim, 2021), earnings per share (Derrien et al., 2021; Yoon et al., 2018; Hunjra et al., 2020), profitability, expressed by the return on assets and return on equity (Jizi et al., 2016; Cordazzo et al., 2020; Lee and Kim, 2021), and

leverage as expressed by long term debt to assets (Jizi et al., 2016; Cordazzo et al., 2020). An overview of all variables used can be seen in Appendix A.

Due to the sample size of 44 companies, including all control variables would bring forward model overfitting issues (Babyak, 2004). Babyak (2004) suggests several strategies for how to avoid overfitting, namely, collecting more data, and combining predictors and shrinkage and penalization. Thus, to avoid overfitting in the four regressions, this thesis will follow one of the suggested strategies for combining predictors, where the correlation coefficients between variables are considered and the variables which correlate highly with each other are not included together (Babyak, 2004). Thus, in Tables 1 and 2, it can be observed that size is significantly correlated with leverage, with a correlation coefficient of 0.34 and p-value of 0.001. Moreover, business value per share and earnings per share are highly correlated (r=0.51, p-value=0.02). In addition, the return on assets and earnings per share are significantly correlated (r=0.51, p-value=0.00). The environmental, social and governance scores and ESG scores all correlate highly and significantly with each other; however, they will be included in different regressions separately. Moreover, from the descriptive statistics presented in table 5, it can be observed that 17 companies are missing ROA values due to a lack of income disclosure; thus, ROA will not be included as a measure of profitability and control variable. Consequently, to test the hypotheses, fixed effects regression will be used and only one independent variable will be tested at a time, with the control variables EPS, ROE and leverage as indicated in table 3: Overview of variables.

Table 1. Pearson correlation matrix

	Stock price returns	Environmental score	Social score	Governance score	ESG score	Size	BVPS	EPS	ROA	ROE	Leverage
Stock price returns	1	-0.0438	-0.1199	-0.0214	-0.0531	0.0861	0.1522	0.3951	0.2603	-0.0942	-0.1699
Environmental score	-0.0438	1	0.6090	0.6972	0.8986	0.5923	0.1061	0.2587	0.1167	0.1185	0.2610
Social score	-0.1199	0.6090	1	0.5508	0.8088	0.5570	-0.1488	0.0991	0.2191	0.0969	0.1504
Governance score	-0.0214	0.6972	0.5508	1	0.8666	0.5443	0.1369	0.1472	0.1639	0.1053	0.2228
ESG score	-0.0531	0.8986	0.8088	0.8666	1	0.6656	0.0773	0.2221	0.1822	0.1190	0.2426
Size	0.0861	0.5923	0.5570	0.5443	0.6656	1	0.2712	0.2572	0.0284	-0.0467	0.3394
BVPS	0.1522	0.1061	-0.1488	0.1369	0.0773	0.2712	1	0.5047	0.0254	-0.2187	-0.0262
EPS	0.3951	0.2587	0.0991	0.1472	0.2221	0.2572	0.5047	1	0.5097	-0.0874	0.0777
ROA	0.2603	0.1167	0.2191	0.1639	0.1822	0.0284	0.0254	0.5097	1	0.1216	0.0004
ROE	-0.0942	0.1185	0.0969	0.1053	0.1190	-0.0467	-0.2187	-0.0874	0.1216	1	-0.0311
Leverage	-0.1699	0.2610	0.1504	0.2228	0.2426	0.3394	-0.0262	0.0777	0.0004	-0.0311	1

Table 2. Correlation matrix p-values

	Stock price returns	Environmental score	Social score	Governance score	ESG score	Size	BVPS	EPS	ROA	ROE	Leverage
Stock price returns		0.6851	0.2660	0.8433	0.6235	0.4250	0.1570	0.0001	0.0143	0.3828	0.1135
Environmental score	0.6851		0	0	0	0	0.3254	0.0150	0.2789	0.2714	0.0140
Social score	0.2660	0		0	0	0	0.1665	0.3585	0.0403	0.3693	0.1620
Governance score	0.8433	0	0		0	0	0.2035	0.1711	0.1270	0.3288	0.0369
ESG score	0.6235	0	0	0		0	0.4741	0.0375	0.0894	0.2696	0.0227
Size	0.4250	0	0	0	0		0.0106	0.0155	0.7930	0.6657	0.0012
BVPS	0.1570	0.3254	0.1665	0.2035	0.4741	0.0106		0	0.8140	0.0407	0.8087
EPS	0.0001	0.0150	0.3585	0.1711	0.0375	0.0155	0		0	0.4180	0.4716
ROA	0.0143	0.2789	0.0403	0.1270	0.0894	0.7930	0.8140	0		0.2589	0.9971
ROE	0.3828	0.2714	0.3693	0.3288	0.2696	0.6657	0.0407	0.4180	0.2589		0.7737
Leverage	0.1135	0.0140	0.1620	0.0369	0.0227	0.0012	0.8087	0.4716	0.9971	0.7737	

Table 3: Overview of variables.

	Variable	Meaning	Expected sign	Source
Dependent variable	R (expected stock price returns)	Relative change in the share price of a company to find the returns		
Independent variable	ESG score	Total ESG score as assigned by Refinitiv	+	Refinitiv (2022).[26]
Independent variable	Environmental score	Environmental score derived from resource use, emissions, and innovations for each firm	+	Refinitiv (2022).[27]
Independent variable	Social score	Social score derived by the workforce, human rights, community, and product responsibility for each firm	+	Refinitiv (2022).[28]
Independent variable	Governance score	Governance score derived from management, shareholders, and corporate social responsibility (CSR) strategy for each firm	+	Refinitiv (2022).[29]
Control variable	EPS (earnings per share)	Net profit divided by the common outstanding shares to indicate how much a company earns per share	+	Derrien et al. (2021); Yoon et al. (2018); Hunjra et al. (2020).
Control variable	ROE (return on equity)	Net income divided by shareholders' equity to indicate profitability	+	Cordazzo et al. (2020).
Control variable	Leverage (long-term debt to assets)	Long-term debt divided by the total assets to indicate the percentage of assets financed with long-term debt, to measure leverage	-	Jizi et al. (2016); Cordazzo et al. (2020).

[26] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 15.12.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[27] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 15.12.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[28] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 15.12.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

[29] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 15.12.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

3.3 Descriptive statistics

Table 4 shows the descriptive statistics of the sample. The stock price returns in the Netherlands between 2018 and 2020 range between -2 and 1, with the mean returns being -0.06 and a standard deviation of 0.43. Following the scatterplot in figure 1, there is one company whose returns an outlier -2. Such dramatic decline in returns may be observed, for example, when there is a decline in profitability, size, and value (Fama and French, 2014). The negative mean returns, as well as the low median of 0.0257, can be explained by the crisis that occurred as a result of Covid-19 (Fasanya et al., 2022; Tan et al., 2022).

The environmental scores ranged between 0 to 97.82 and the median environmental score is 61.34. From figure 2, it can be seen that several companies obtained scores of 0 or nearly 0. The mean environmental score is 58.44 and the standard deviation is 25.21. The large standard deviation signifies is a large variation between companies in their environmental practices. Such differences have been found to occur due to the sensitivity of some industries, such as oil, mining, or chemicals, to the environment (Reverte, 2016).

The social scores minimum and maximum are 29.13 and 96.32, respectively. Thus, from figure 3, it can be seen that no company scores in the lowest quadrant according to Refinitive's system and all companies provide at least some disclosure and sufficient practices along the social dimension. This may be a result of regulations in the European Union and the Netherlands on working conditions, human rights, and product responsibility. The median was 72.80, and the mean was 69.84, placing the majority of the companies as having good social performance and disclosure. Furthermore, the variability between the social scores across companies is lesser compared to the environmental scores, with a standard deviation of 16.21.

The minimum governance score received by a company is 3.40, while the maximum was 97.62. From the scatterplot in figure 4, the minimum score seems to be an outlier. The median governance score is 59.23 and the mean of 58.66 indicate that most companies sufficiently disclose their governance practices, and their governance practices are deemed to be of sufficient quality following Refinitiv's system. The variation between the governance scores is relatively high, based on the standard deviation of 20.79. Such a standard deviation can be explained by differences in disclosures, management structure, compensation, shareholders' rights, and takeover defences between companies (Refinitiv, 2022).[30]

Overall, the ESG scores ranged between 17.80 and 93.31 and the median and mean ESG scores are 64.69 and 63.61. The scatterplot in figure 5, does not show any outliers. Thus, in the Netherlands, between 2018 and 2020, the majority of companies showed satisfying ESG performance and disclosure, with only two cases of insufficient performance and disclosure following figure 5. The standard deviation of 17.25 signifies variation between companies.

From the control variables, EPS ranges between -7.39 and 12.92. The median EPS is 1.76 and the mean is 2.01. The low EPS mean, and median can be explained by the decreased earnings of companies during the crisis period covered (Landier and Thesmar, 2020). At the same time, the standard deviation of 2.57, signifies a relatively low variation between companies, as the lowered earnings impacted the majority of industries.

The minimum ROE observed in the sample is -0.49% and the maximum of 8.16%. A negative or low ROE during crisis periods is expected as the net incomes of companies decline.

[30] Refinitiv. (2022). Refinitiv ESG company scores. Retrieved on 27.01.2022 from https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

The median ROE is 0.12% and the mean is 0.2344%, with a standard deviation is 0.8261%. Positive mean and median ROE show that the mean and median are not driven by the period of economic downturn. The positive, despite low, ROE signifies that most companies did not incur major losses during the 2018-2020 period.

The leverage, measured by long-term debt to assets, has a median of 0.25, a mean of 0.49 and a standard deviation of 2.30. The large spread of leverage between the companies may be explained by the reluctance of some to use debt and the lesser reliance on debt during crisis periods. The same holds when considering the minimum and maximum leverages observed of 0 and 26.18, respectively. It is noteworthy that there are 5 missing EPS values and 2 missing ROE values.

Table 1 presents the correlations between stock price returns, environmental, social, governance, ESG scores and EPS, ROE, and leverage. The variables which correlate highly with each other, such as environmental, social, governance scores and ESG scores, will not be included in the same regressions. All the correlations between variables which will be included in the same regressions are below 0.4.

Table 4. Descriptive statistics

	Stock price returns	Environmental score	Social score	Governance score	ESG score	EPS	ROE	Leverage
Minimum	-2.0000	0.0000	29.1300	3.4000	17.8000	-7.3900	-0.4900	0.0000
Median	0.0257	61.3400	72.8000	59.2300	64.6900	1.7600	0.1200	0.2487
Mean	-0.0549	58.4400	69.8400	58.6600	63.6100	2.0130	0.2344	0.4884
Standard deviation	0.4246	25.2135	16.8583	20.7912	17.2455	2.5694	0.8261	2.2993
Maximum	1.0000	97.8200	96.3200	97.6200	93.3100	12.9200	8.1600	26.1800
NA's						5.0000	2.0000	

Descriptive statistics of the independent variable Stock price returns, the dependent variables Environmental score, Social score, Governance score and ESG score, and control variables EPS earnings per share, ROE return on equity as a measure of profitability and Leverage measured by long-term debt to assets.

Figure 1. Scatterplot of stock price returns across companies

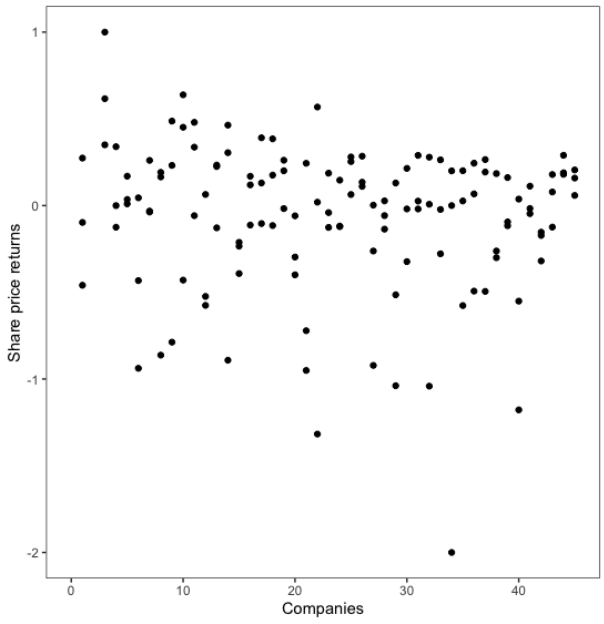


Figure 2. Scatterplot of environmental scores across companies

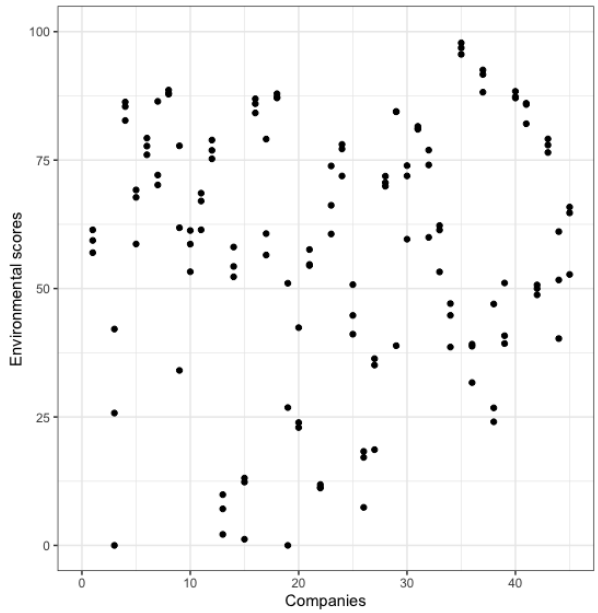


Figure 3. Scatterplot of social scores across companies

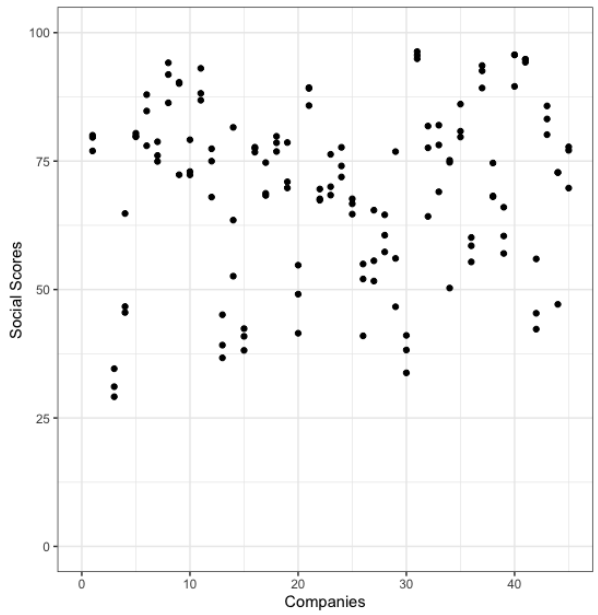


Figure 4. Scatterplot of governance scores across companies

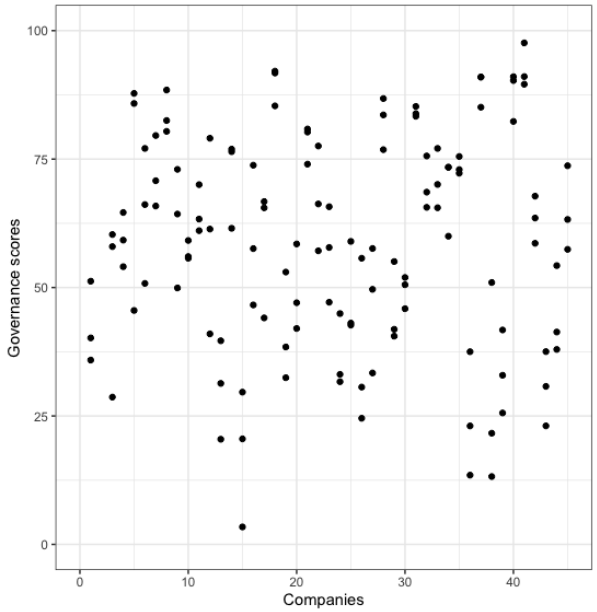
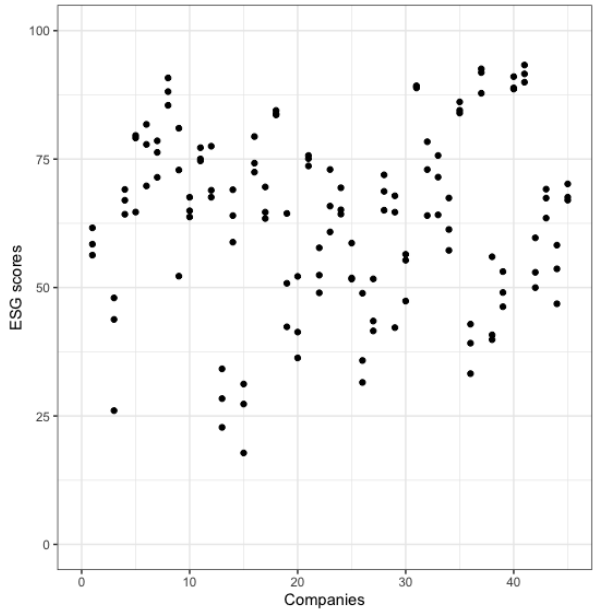


Figure 5. Scatterplot of ESG scores across companies



4. METHODOLOGY

4.1 Empirical framework

The study aims to determine the impact of environmental, social and governance goals on expected share price returns in the Netherlands. Since the environmental, social, governance and ESG scores are tested separately, the analysis will be conducted four times, once with each independent variable. Therefore, the regression equations that will be used to test the hypotheses are:

$$(i) \quad R_{it} = \alpha_i + \gamma_t + \beta_1 EnvironmentalScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Leverage_{it} + \varepsilon_{it}$$

$$(ii) \quad R_{it} = \alpha_i + \gamma_t + \beta_1 SocialScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Leverage_{it} + \varepsilon_{it}$$

$$(iii) \quad R_{it} = \alpha_i + \gamma_t + \beta_1 GovernanceScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Leverage_{it} + \varepsilon_{it}$$

$$(iv) \quad R_{it} = \alpha_i + \gamma_t + \beta_1 ESGScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Leverage_{it} + \varepsilon_{it}$$

where EPS_{it} is earnings per share for a company i at time t, and return on $equity_{it}$ for a company i at time t are used to estimate the profitability, whereas to calculate the leverage, the long-term debt to $assets_{it}$ for a company i at time t is used. The independent variable is Environmental Score $_{it}$ for a company i at time t for regression (i), $SocialScore_{it}$ for (ii), for regression (iii) is $GovernanceScore_{it}$ and finally $ESGScores_{it}$ for regression (iv). Moreover, α_i represents the firm specific fixed effects for a company i, whereas γ_t time specific effects for time t. The error term, ε_{it}, is added to explain the differences between the observed values and the theoretical value of the model. The dependent variable, R_{it}, represents the expected stock price returns, expressed by the relative change in the share price of a company i at time t and the share price of a company i at time t-1, or $R_t=(P_t-P_{t-1})/P_{t-1}$.

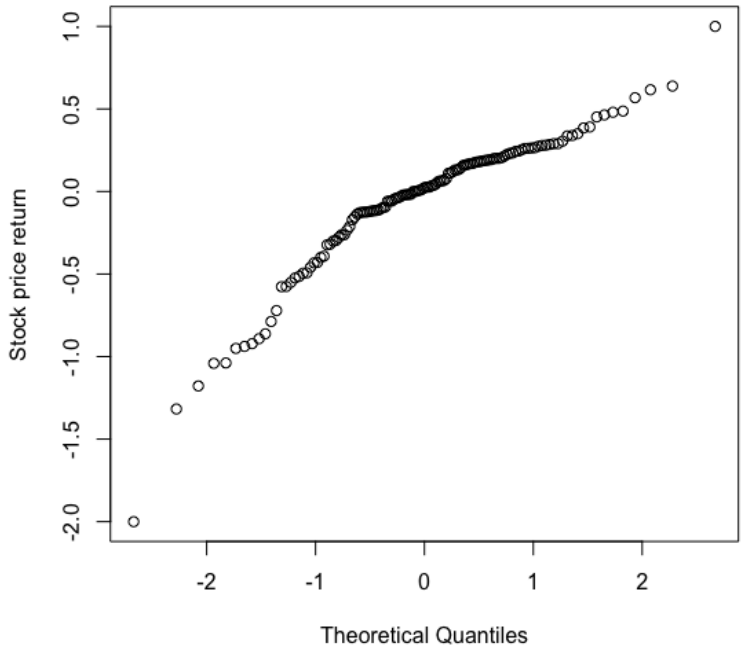
The financial and non-financial data collected comprise a panel of 44 companies and observations of the companies' ESG and financial data spreading over 3 years. Thus, panel data regressions are appropriate. Previously, panel data regressions have been used in similar studies by La Torre et al. (2020), Reverte (2016), Havlinova and Kukachka (2021) and Wirianata (2021). The panel data allows for studying the impact of ESG scores on expected share price returns over a period covering several years (T=3) (La Torre et al., 2020).

In addition, the regressions will be run using time and firm fixed effects. The time and firm fixed effects allow the estimation of the coefficients in the panel regression and remove the effects of variables which are unobserved and whose parameters are not known (Cheng and Ai, 2020). The time fixed effects, for example, may remove the impact of the introduction of a new policy; while the firm fixed effects may remove the impact of characteristics that are specific to a particular firm. Such models are commonly used in social sciences and economics (Cheng and Ai, 2020). Fixed firm and time effects have been used in studies on ESG's impact on risk (Sassen et al., 2016), sentiment and volatility (Jiang and Jin, 2021; Gao et al., 2022), the resiliency of social and environmental stocks (Albuquerque, et al., 2020), and stock market returns (Do and Kim, 2020).

Moreover, robust standard errors and a Wald test will be used to test the coefficients. The robust standard error helps mitigate biases which arise due to serial correlation in the error processes and heteroscedasticity of variances, and its effects do not diminish with increases in time

series (Kézdi, 2004). The Wald test is used to test the variable coefficients and allows for testing the significance of parameters (variables) in a model, without the need for normal distribution. The share price returns do now have a normal distribution following figure 6; thus, the Wald test is appropriate. Wu (2022) has previously used the Wald test to study green bonds pricing, Zhang and Yang (2023) to uncover the impact of environmental disclosure on price efficiency, Gungor and Lunger (2020) to research stock return predictability and Dhasmana et al. (2023) to study investor sentiment's influence on ESG stocks performance.

Figure 6. Q-Q plot of stock price returns across companies



The Wald test is two-tailed; however, since the sign of coefficients of the environmental, social and governance scores are of interest and the hypotheses are directional, the p-values of the Wald test need to be one-tailed. Therefore, to find the one-tailed p-values, the p-values of the two-tailed Wald test will be divided by two in case the coefficient is negative, and if the coefficient is positive, then the one-tailed p-value is calculated by 1- (p-value/2) (De Veaux et al., 2016).

Thus, the null and alternative hypotheses of the model coefficients for all four regressions are formulated as follows:

$$H_0^k: \beta_1 > 0$$

$$H_1^k: \beta_1 \leq 0$$

where k= 1, 2, 3, 4 refer to the hypotheses for the impact of environmental, social, governance and ESG scores on expected share price returns respectively, from section 2.2.

Under H_0, the coefficient of environmental, social, governance, or ESG score, for each of the four hypotheses respectively, is positive, as specified in section 2.2. Under the alternative hypothesis, H_1, the coefficients are not positive. The significance level α is 0.05; thus, a one-tailed p-value below 0.05 will result in the hypothesis being rejected.

4.2 Endogeneity issues

In general, endogeneity problems arise due to omitted variables, reverse causality, and measurement error (Dranove, 2012). Omitting a variable leads to the omitted variable bias. One way of managing the bias of omitting control variables that only depend on either firm or time is by adding fixed effects (Dranove, 2012; Hill et al., 2021). The regression equations include the time and firm fixed effects, γ_t and α_i respectively.

Endogeneity due to measurement error may arise since ratios such as return on equity will be used, and they are subject to their own measurement challenges (Hill et al., 2021). Reverse causality or simultaneity may cause endogeneity issues since events in the past (at time t-1) may impact the result at time t, as is the case with firm performance (Hill et al., 2021).

In addition, endogeneity may arise from simultaneity (Schultz et al., 2010). Simultaneity arises when a variable affects another variable simultaneously, thus the two variables are co-determined (Schultz et al., 2010). Lastly, there may be dynamic endogeneity, where the value of a variable may be affected by its value in the previous time period (Li et al., 2021).

To mitigate possible endogeneity issues, this study will use fixed effects in the analysis, both firm and time specific, and will rely on measures over time to predict the expected share price returns. Therefore, no endogeneity issues stemming from omitted variables that depend on only time or only firms are expected to arise when conducting the analysis. However, reverse causality, measurement error, simultaneity and dynamic endogeneity remain possible sources of endogeneity (Li et al., 2021).

5. RESULTS

5.1 Environmental scores

The fixed effects panel data regression covering the impact of the environmental returns can be seen in table 5, under regression (i).

Based on regression (i), from the fixed effects panel data regression and one-sided Wald test, the environmental scores have a coefficient of -0.01, and a p-value of 0.14. Their impact on the share price returns in the Netherlands between 2018 and 2020, therefore, is not significant. Furthermore, the one-sided Wald test's p-value is 0.07, and at a significance level of 0.05, there is not enough evidence to reject the null hypothesis that environmental scores have a positive impact on share price returns.

The results are in line with the findings of Nakai et al. (2013) and von Arx and Ziegler (2014). Arx and Ziegler (2014) found that investors who invested in companies with high environmental and social performance were awarded more compared to the ones who invested in companies with low performance. The reasons behind the positive impact of environmental scores on returns may lie in the reduction of financing costs, as such companies have access to, for example, government support (El Ghoul et al., 2018; Zakhmatov et al., 2022).

However, Engelhardt et al. (2021) find that companies with high environmental and social scores face lower share price returns and volatility in European countries during Covid-19. There is evidence that the impact of environmental scores may depend on the industry in which a company operates (Reverte, 2016). For example, for industries which are energy-intensive or extract materials, the environmental scores have a greater impact (Reverte, 2016). Environmentally sensitive industries would comprise mining, gas, oil, forestry, chemicals, paper, metals, and utilities (Reverte, 2016). These industries represent 11.4% of the sample; thus, it is

possible that for the environmental scores, the scores of companies belonging to the aforementioned industries may influence the results.

5.2 Social scores

In table 5 regression (ii), it can be observed that the social scores significantly and negatively impact the share prices in the Netherlands between 2018 and 2020, with a coefficient of -0.02. Surprisingly, the coefficient for social scores is negative, indicating that social responsibility has a negative impact on expected share price returns. Furthermore, at a significance level of 0.05, the one-sided Wald test with a p-value of below 0.01, there is enough evidence for the null hypothesis that social scores have a positive impact on expected share price returns to be rejected. Thus, there is evidence in favour of the alternative hypothesis that the impact of the social scores on expected share price returns is negative.

This result is contradicting previous studies done by, for example, von Arx and Ziegler (2014) and Havlinova and Kukacka (2021). Both studies have found that socially responsible organizations have better stock market performance compared to companies which do not engage in socially responsible activities.

However, good stock market performance does not necessarily mean higher returns for investors. In times of crisis, volatility soars and stocks with high environmental and social scores have been found to have lower volatility compared to ones with low scores and present a less risky investment. In addition, high volatility leads to low stock returns (Bae et al., 2007; Banchit et al., 2016; Albuquerque, et al.; 2020). Thus, the negative impact social scores have on share price returns may stem from the low risk and volatility of the stocks.

5.3 Governance scores

The impact of the governance scores is tested using regression (iii) and the results can be observed in section Regression (iii) in table 5.

The governance scores do not significantly impact the share price returns in the Netherlands between 2018 and 2020. The coefficient for governance score is -0.01 and the one-sided Wald test shows a p-value of 0.08, at a significance level of 0.05. Thus, following the one-sided Wald test result, there is not enough evidence to reject the null hypothesis that governance scores have a positive impact on share price returns.

The results are in line with the findings of Hunjra et al. (2020), and Mohamed and Elewa (2016). Both studies have found a positive relationship between governance scores and share price returns (Hunjra et al., 2020; Mohamed and Elewa, 2016). The positive impact of governance scores may be explained by the lower risk of firms with good governance practices and the quality of earnings and earnings management that result from it (Hunjra et al., 2020; Mohamed and Elewa, 2016; Feng and Huang, 2020; Jiang et al., 2008).

However, they contradict studies done by Wiryakusuma (2019) and Engelhardt et al. (2021) who found that the governance scores do not have an effect on share price returns and the ESG impact on share price returns is predominantly driven by social and environmental scores. Such lack of effect of governance scores on share prices may be explained by the stock returns being impacted by other factors, for example, supply and demand, over the governance scores (Wiryakusuma, 2019).

5.4 ESG Scores

The impact of the ESG scores is assessed using regression (iv) and the results are shown in table 5. Following the table, the ESG scores' coefficient is -0.01 and the one-sided Wald test's p-value is below 0.01, at a significance level of 0.05, indicating that there is enough evidence to reject the null hypothesis that the environmental scores have a positive impact on share price returns. Thus, the results from regression (iv) are in favour of the alternative hypothesis that ESG scores have a negative impact on share price returns.

This finding contradicts the results reported by De Azevedo et al. (2016) and Serafeim and Yoon (2021). They found that while in Brazil, the environmental, social and governance scores significantly and positively impacted share prices, while globally the significance diminished. Similarly, states that globally, ESG scores do not significantly impact share prices (De Azevedo et al., 2016). Meanwhile, Serafeim and Yoon reported a positive effect of ESG scores on future stock returns.

Nonetheless, the results are in line with the suggestions by Cornell (2021), that companies which have high ESG scores have lower returns and higher share prices. The lower returns may signify that a company is possibly overinvesting in activities that increase its scores, lowering the amount of cash available for its investors (Gregory, 2022). Alternatively, the lower returns may be a result of the lower risk of companies which have sophisticated risk management and consequently have high scores (Giese et al., 2019).

5.5 Control variables

Earnings per share (EPS) have been found to positively impact firm value, the value relevance of ESG data and a negative impact on stock crash risk (Yoon et al., 2018; Hunjra et al., 2020; Cordazzo et al., 2020; Reverte, 2016; Zaman et al., 2021). However, when studying the impact of EPS on share price returns, Sausan et al. (2020) and Hikmah et al. (2022) find that the impact of EPS is not significant. Similarly, following table 5, while the coefficient for EPS is positive for all four regressions, it does not have a significant impact on the share price returns in this sample, regardless of which independent variable is considered.

Previous studies conducted by Hunjra et al. (2020) found that return on equity (ROE) has a negative impact on stock crash risk and a positive and not significant impact on returns (Hikmah et al., 2022; Zaman et al., 2021). This is supported by the results presented in table 7. When environmental, social and ESG scores are considered, the ROE is found to be significant only at 0.1 level, while it lacks significance when governance scores are considered. The lack of significance may be explained by investors considering other factors, such as firm size when considering the profitability of a company (Hikmah et al., 2022).

The leverage has been found to negatively affect share price returns (Jizi et al., 2016). The negative impact may arise due to leverage being negatively correlated to returns, when not controlling for excess leverage. When firms are over-levered, they face an increased risk of financial distress and higher stock volatility (Caskey et al., 2012; Huang and Ye, 2021). Huang and Ye (2021) find that sufficient environmental and social performance and transparency lower the aforementioned risks during times of crisis. Following table 5, the results are partially in line with previous findings by Jizi et al., (2016). The leverage significantly and negatively impacts the share price returns when social and ESG scores are considered at a significance level of 0.05 and at 0.1 when environmental and governance scores are considered.

Table 5. Regression Results

	Regression (i)		Regression (ii)		Regression (iii)		Regression (iv)	
	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)
Environmental score	-0.0063	0.1427						
Social score			-0.0159	0.0088***				
Governance score					-0.0045	0.1677		
ESG score							-0.0156	0.0094***
EPS	0.0272	0.7232	0.0303	0.6736	0.0280	0.6982	0.0211	0.7731
ROE	1.2004	0.0967*	1.1005	0.0658*	1.1532	0.1138	1.2822	0.0759*
Leverage	-0.0314	0.0537*	-0.0351	0.0243**	-0.0305	0.0487*	-0.0332	0.0327**
R-squared	0.1538		0.2027		0.1447		0.1936	
Wald test								
χ^2	2.3		7.4		2.0		7.3	
df	1		1		1		1	
	two-sided	one-sided	two-sided	one-sided	two-sided	one-sided	two-sided	one-sided
P(> χ^2)	0.1300	0.065*	0.0064***	0.0032***	0.1600	0.0800*	0.0068***	0.0034***

This table reports the results from the regressions (i), (ii), (iii), and (iv) from section III. The variables are defined in section III. The regressions are run using the panel data of companies traded on Euronext Amsterdam which report in Euros between 2018-2020 with available ESG data for the period. The environmental, social, governance and ESG scores are sourced from Refinitiv Eikon. All four regressions contain time and firm fixed effects. The Wald test tests hypotheses H_0^k: $\beta_1 > 0$ and H_1^k: $\beta_1 \leq 0$, where k= 1,2,3 and 4, for each of the hypotheses for environmental, social, governance and ESG scores, respectively. Thus, the one-tailed p-values are reported. For a negative estimate of β_1, the p-value reported is (two-tailed p-value)/ 2, while for a positive β_1 estimate it is (1-(two-tailed p-value))/2. The regressions are run using robust standard errors and the Wald test. The significance level of 0.1, denoted by *, 0.05 by ** and 0.01 by ***.

5.6 Robustness checks

Havlinova and Kukacka (2021), Hunjra et al. (2020); Cordazzo et al. (2020) and Lee and Kim (2021) have controlled for size and have found a positive impact of ESG scores on share prices. Therefore, the regressions are repeated by substituting leverage with size. The control variables become size, EPS, and ROE and with the sample of N=44 and T=3, the analysis is repeated with time and fixed effects. With the use of the same sample and the same number of variables, overfitting and omitted variable bias are not a concern. The regression equations can be seen in Appendix B.

Thus, when considering size instead of leverage as a control variable, the negative impact of social scores remains as observed in Appendix B, in table B1, regression (ii-a). Moreover, the impact of ESG scores also remains negative following the one-sided Wald test results from regression (iv-a). Thus, when using size as a control, instead of leverage, In addition, the results from the one-sided Wald tests for regressions (i-a) and (iii-a), testing environmental scores and governance scores, do not present evidence to reject the null hypotheses.

Studies by Reverte (2016) and Cordazzo et al. (2020) employ a modified version of the Ohlson model (1995), considering the BVPS and EPS as control variables. The number of variables is lower for the Ohlson model regressions; thus, overfitting is not a concern. The analysis employs time and fixed effects and the same sample of 44 companies over 3 years period. The

regression models and the results can be seen in Appendix C, in table C1. Following the one-sided Wald test for regressions (ii-b) and (iii-b), the social scores and ESG scores impact on expected share price returns remains negative and significant at α=0.05. The results are also confirming the lack of evidence to reject the null hypotheses for environmental and governance scores.

Lastly, the results do not change when outliers are removed. The upper and lower 2.5% of observations are removed to remove the outliers, while not risking overfitting. The social and ESG scores remain negative and significant at a 0.05 significance level and environmental and governance are not significant following the result from the one-sided Wald test. The results can be seen in table D1 in Appendix D.

To summarise, the results are robust and do not change when using size as a control, BVPS and EPS as controls and removing outliers.

5.7 Model fit

Across all four regression models, the R-squared values, presented in table 5, range between 0.14 and 0.20. An R-squared below 0.4 is generally seen as low, indicating that the independent variables do not sufficiently explain the dependent variable. Due to the limited sample size, adding additional independent variables may lead to model overfitting (Babyak, 2004). At the same time, in similar studies with larger sample sizes and using share prices as a dependent variable, the variables have shown an R-squared of about 0.4. Meanwhile, studies which used share price returns as a dependent variable frequently report an R-squared of between 15% to 25% for full samples (Callen et al., 2013) and 0.04% to 30% for subsamples (Thomas, 2001). Such low R-squared values are expected since stock price returns are difficult to predict following financial data and may depend on numerous other macroeconomic factors, such as the inflation rate (Fasanya et al., 2022). In addition, a study by Kumbure et al. (2022) has shown that EPS, ROE, and debt to total assets (the measure for leverage) are frequently used predictors in research on share prices.

6. CONCLUSION

6.1 Conclusion

This study explores the impact of environmental, social and governance scores of companies on the stock price returns in the Netherlands by answering the research question: *What is the impact of ESG scores on the expected stock price returns of companies in the Netherlands?*

The results indicate that the social and ESG scores have a negative impact on expected share price returns. While uncovering the reasons behind the impact is beyond the scope of this study, previous literature has provided some explanations and evidence from different perspectives.

Following the behavioural finance and investor sentiment literature, the negative impact social and ESG scores have on expected returns may be explained by the findings of Bams and Kroft (2022) that investors reduce their stakes when social performance improves and businesses encounter fewer controversies, socially conscious investors cut their stakes.

However, while investing in ESG activities may, for example, improve supply chain efficiency, over-investing may lead to omitting valuable opportunities to expand emerging environmental markets (Gregory, 2022). Thus, the cashflows may become negatively impacted, leading to lower valuations following the discounted cash flow model (Gregory, 2022; Visconti, 2021; Tharavanij, 2021).

When considering the capital asset pricing model and the risk and volatility of share prices, the negative impact social and ESG scores have on the returns may occur as a result of the lower volatility and risk due to the strong risk management practices in firms (Giese et al., 2019). In addition, greater social performance reduces overall, systemic, and idiosyncratic risk (Sassen et al., 2016).

On the other hand, the results present evidence in favour of the null hypotheses that environmental and governance scores have a positive impact on expected share price returns. Previous literature gives some insight into the reasons behind the positive impact.

From the investor sentiment perspective, the possible positive impact may be explained by investors' expectations for higher cashflows in the future (Jia and Li, 2022), as a company which portrays sufficient disclosure and performance of their ESG activities may be viewed favourably by the public (Cordeiro and Tewari, 2015).

Furthermore, from the discount cash flow model, increases in the cash flows, due to, for example, lesser use of materials, and decreases in the discount factor, due to lower cost of capital as financing is available at a lower cost, would result in higher valuation (Gregory, 2022; Decourt, 2022). Consequently, the environmental and governance scores may have a positive impact on the expected returns.

Lastly, based on the capital asset pricing model, environmental scores have previously been found to decrease only idiosyncratic risk (Sassen et al., 2016), while the evidence on governance is mixed. As higher risk leads to higher expected return, it is possible that the environmental and governance scores' positive impact may be explained by the lesser lowering of risk when compared to social and ESG scores.

Therefore, the evidence in favour of the positive impact of environmental and governance scores on expected returns may be explained by positive news about the company's ESG activities shaping investors' sentiment, leading to higher expected cashflows, lower discount factor due to, for example, opening opportunities for financing (such as preferential loans) or through the impact on the cost of capital, by mitigating agency conflicts and reducing information asymmetries (Decourt, 2022; Eliwa et al., 2021; Visconti, 2021; Zakhmatov et al., 2022), impacting the valuation based on DCF and having a slight impact on the risk of the firms.

Thus, the theoretical contributions of this study lie within the exploration of the impact of non-financial data on share price returns for companies in the Netherlands, the impact of the environmental, social and governance scores individually and collectively, and adds to the mixed evidence of ESG scores impact on expected returns. For investors, it brings forward how their returns may be impacted by the scores of the companies in which they invest; while it informs companies on how their environmental, social and governance performance impacts their share price returns. Finally, future research may address the role of investment risk, a longer time frame and different scoring systems.

6.2 Limitations and future research

This thesis is not without limitations. It is noteworthy that relying on Refinitiv Eikon for ESG data will bring forward limitations to the results. The analysis relies on ESG data from Refinitiv Eikon as a single source of data. The different ESG rating agencies comprise scores using various parameters. For instance, Refinitiv Eikon does not consider, for example, natural capital, product liability, safety management, or customer values when calculating the ESG scores as some of the other organisations do. Therefore, using data from a different organization may lead to different results in the analysis. The sample size considered is relatively small and not all variables

used in previous studies could be included at once without risking overfitting. Using a larger sample may alter the results. Moreover, using data between 2018 and 2020 includes a period of a financial crisis; therefore, the economic downturn may impact the results. In addition, the R-squared of the regressions is small; however, adding more variables, such as macroeconomic factors which impact share prices, to improve the fit of the model would have brought overfitting issues. Lastly, this thesis does not take investment risk into account. Leverage provides information about the risk profile of the company; however, it does not capture investment risk. If, for instance, Sharpe's ratio was considered as a control variable, the investment risk would have been incorporated. However, data about Sharpe's ratio of the whole sample throughout 2018-2020 is not readily available.

Therefore, future research may cover the investment risk as an independent variable to understand the effect environmental, social and governance scores have on investment risk. Moreover, research covering the ESG scores' impact on returns over a longer period of time may provide more insights for policymakers and investors. Additionally, studies using ESG scores from another organisation may provide a better insight into how different criteria impact the share price returns. Lastly, studying the impact of environmental, social and governance scores on returns and stock performance across different industries may bring additional insights as the impact of the scores may depend on the sensitivity of the industry.

6.3 Practical implications

It informs investors about the impact ESG scores may have on their returns. When investing in companies with high performance on environmental, social and governance activities, investors may expect lower returns and, following the findings of Giese et al. (2019), less risk and volatility. Thus, portfolio managers interested in incorporating ESGs in the portfolios of clients may need to consider the expected returns of ESG stock and their risk profiles, as investing in stocks with, for example, high ESG scores, would mean lower expected returns and possibly lower risk.

In addition, it may serve as a warning about the potential of the tilting of the reporting of ESGs. Since, following the results, environmental and governance scores seem to have a positive impact on expected returns, it is possible that companies may participate in inflating their ratings, by, for example increasingly advertising their efforts and promises, making investors optimistic about future news and positive responses from the public about future ESG initiatives (Bams and Kroft, 2022; Cordeiro and Tewari, 2015; Lee and Kim, 2021). In turn, the over-optimism may lead to the creation of suboptimal portfolios (Gao et al., 2022; Jiang and Jin, 2022).

Lastly, for companies, it provides insight into how their performance in environmental, social and governance practices may impact their cashflows and their perception across the public (Gregory, 2022). It may serve as a caution to companies to weigh the benefits of ESG and costs regarding their investments, as while some investments may improve their scores, they lower the amount of cash the company has for other investments (Gregory, 2022).

7. APPENDICES

Appendix A: Variables used in literature

Table Appendix 1: Overview of the impact of ESG scores on factors and channels which affect the share price returns.

Impact of ESG Scores	Factors	Source
Increase in cash flows, future cash flows and earnings	Decrease cost of capital, the incidence of tail risk;	Gregory (2022).
	New environmental market opportunities;	Gregory (2022).
	Higher operating cashflows and earnings in the future;	Jia and Li (2022); Wirianata et al. (2021).
	Improved innate earnings quality;	Rezaee and Tuo (2019).
	Disclosures increments and penalties;	Ding and Shahzad (2022).
	Favourable responses from stakeholders;	Cordeiro and Tewari (2015).
	Improved predictions of cash flows.	Lee and Kim (2021).
Lower discount factor	Higher prices and lower expected returns;	Cornell (2021); Cornell (2020).
	Lower cost of capital;	Mülbert and Sajnovits (2020).
	Lower systemic risk;	Mülbert and Sajnovits (2020); Ramirez et al. (2022).
	Impact on β coefficient, the premium for the risk of investing in a specific company, cost of interest-bearing debt, and corporate tax rate.	Zakhmatov et al. (2022).
Lower cost of capital	Reduce information asymmetries;	Visconti (2021).
	Lower cost of debt and cost of equity;	Nazir et al. (2022); Visconti (2021); Ng and Rezaee (2012); Piechocka-Kałużna et al. (2021); Ramirez et al. (2022).
	Mitigate agency conflicts;	Eliwa et al. (2021).
	Reduce the cost of equity capital;	Chouaibi et al. (2021).
	Financing at a lower cost is available.	Decourt (2022).

Appendix B: Size as a control

The regressions used to repeat the tests using size as a control variable are:

$$\textit{(i-a)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 EnvironmentalScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Size_{it} + \varepsilon_{it}$$

$$\textit{(ii-a)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 SocialScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Size_{it} + \varepsilon_{it}$$

$$\textit{(iii-a)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 GovernanceScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Size_{it} + \varepsilon_{it}$$

$$\textit{(iv-a)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 ESGScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Size_{it} + \varepsilon_{it}$$

where EPS_{it} is earnings per share for a company i at time t, and return on $equity_{it}$ for a company i at time t are used to estimate the profitability, whereas to calculate the size, the natural logarithm of total $assets_{it}$ for a company i at time t is used. The independent variable is $EnvironmentalScore_{it}$ for a company i at time t in regression (i-a), $SocialScore_{it}$ in (ii-a), $GovernanceScore_{it}$ in (iii-a) and $ESGScore_{it}$ in (iv-a). Moreover, α_i represents the firm specific fixed effects for a company i, whereas γ_t time specific effects for time t. The error term, ε_{it}, is added to explain the differences between the observed values and the theoretical value of the model. The dependent variable, R_{it}, represents the expected stock price returns, expressed by the relative change in the share price of a company i at time t and the share price of a company i at time t-1, or $R_t=(P_t-P_{t-1})/P_{t-1}$.

Moreover, the null and alternative hypotheses of the regression coefficients for all four regressions are formulated as follows:

$$H_0^k: \beta_1 > 0$$

$$H_1^k: \beta_1 \leq 0,$$

where k= 1,2,3 and 4, refer to each of the hypotheses for environmental, social, governance and ESG scores, respectively. Under H_0^k, the coefficient of the scores are hypothesised to be positive; while under H_1^k, the coefficients are hypothesised not to be positive.

Appendix Table B1. Controlling for Size

	Regression (i-a)		Regression (ii-a)		Regression (iii-a)		Regression (iv-a)	
	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)
Environmental score	-0.0046	0.3526						
Social score			-0.0146	0.0361**				
Governance score					-0.0032	0.4418		
ESG score							-0.0136	0.0672*
Size	0.0072	0.9072	-0.0008	0.9895	0.0058	0.9254	-0.0158	0.8038
EPS	0.1004	0.1067	0.1034	0.0884*	0.0997	0.0978*	0.1012	0.0970*
ROE	-0.0087	0.5824	0.0088	0.5926	-0.0201	0.2000	0.0004	0.9784
R-squared	0.1031		0.1500		0.0978		0.1364	
Wald test								
χ^2	0.9		4.7		0.62		3.6	
df	1		1		1		1	
	two-sided	one-sided	two-sided	one-sided	two-sided	one-sided	two-sided	one-sided
P(> χ^2)	0.3400	0.1700	0.0300**	0.0150**	0.4300	0.2150	0.059*	0.0295**

This table reports the results from the regressions (i-a), (ii-a), (iii-a), and (iv-a). The regressions are run using the panel data of companies traded on Euronext Amsterdam which report in Euros between 2018-2020 with available ESG data for the period. The environmental, social, governance and ESG scores are sourced from Refinitiv Eikon. All four regressions contain time and firm fixed effects. The Wald test tests hypotheses H_0^k: $\beta_1 > 0$ and H_1^k: $\beta_1 \leq 0$, where k= 1,2,3 and 4, for each of the hypotheses for environmental, social, governance and ESG scores, respectively. Thus, the one-tailed p-values are reported. For a negative estimate of β_1, the p-value reported is (two-tailed p-value)/ 2, while for a positive β_1 estimate it is (1-(two-tailed p-value))/2. The regressions are run using robust standard errors and the Wald test. The significance level of 0.1, denoted by *, 0.05 by ** and 0.01 by ***.

Appendix C: Ohlson Model (1995)

The regressions used to repeat the tests using size as a control variable are:

$$\textit{(i-b)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 EnvironmentalScore_{it} + \beta_2 BVPS_{it} + \beta_3 EPS_{it} + \varepsilon_{it}$$

$$\textit{(ii-b)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 SocialScore_{it} + \beta_2 BVPS_{it} + \beta_3 EPS_{it} + \varepsilon_{it}$$

$$\textit{(iii-b)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 GovernanceScore_{it} + \beta_2 BVPS_{it} + \beta_3 EPS_{it} + \varepsilon_{it}$$

$$\textit{(iv-b)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 ESGScore_{it} + \beta_2 BVPS_{it} + \beta_3 EPS_{it} + \varepsilon_{it}$$

where EPS_{it} is earnings per share for a company i at time t, and return on equity$_{it}$ for a company i at time t are used to estimate the profitability, $BVPS_{it}$ is the book value per share for a company i at time t is used. The independent variable is EnvironmentalScore $_{it}$ for a company i at time t in regression (i-b), $SocialScore_{it}$ in (ii-b), $GovernanceScore_{it}$ in (iii-b) and $ESGScore_{it}$ in (iv-b). Moreover, α_i represents the firm specific fixed effects for a company i, whereas γ_t time specific effects for time t. The error term, ε_{it}, is added to explain the differences between the observed values and the theoretical value of the model. The dependent variable, R_{it}, represents the expected stock price returns, expressed by the relative change in the share price of a company i at time t and the share price of a company i at time t-1, or $R_t=(P_t-P_{t-1})/P_{t-1}$.

Moreover, the null and alternative hypotheses of the regression coefficients for all four regressions are formulated as follows:

$$H_0^k: \beta_1 > 0$$

$$H_1^k: \beta_1 \leq 0,$$

where k= 1,2,3 and 4, refer to each of the hypotheses for environmental, social, governance and ESG scores, respectively. Under H_0^k, the coefficient of the scores are hypothesised to be positive; while under H_1^k, the coefficients are hypothesised not to be positive.

Appendix Table C1. Controlling for BVPS and EPS

	Regression (i-b)		Regression (ii-b)		Regression (iii-b)		Regression (iv-b)	
	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)
Environmental score	-0.0060	0.2909						
Social score			-0.0128	0.1008				
Governance score					-0.0040	0.3045		
ESG score							-0.0146	0.0628*
BVPS	0.0009	0.8402	0.0011	0.8264	0.0014	0.7551	-0.0002	0.9727
EPS	0.0958	0.0439**	0.1012	0.0279**	0.0960	0.0399**	0.1028	0.0263**
R-squared	0.1415		0.1655		0.1357		0.1738	
Wald test								
χ^2	1.2		2.8		1.1		3.7	
df	1		1		1		1	
P(> χ^2)	two-sided	one-sided	two-sided	one-sided	two-sided	one-sided	two-sided	one-sided
	0.2800	0.1400	0.0930*	0.0465**	0.3000	0.1500	0.0560*	0.0280**

This table reports the results from the regressions (i-b), (ii-b), (iii-b), and (iv-b). The regressions are run using the panel data of companies traded on Euronext Amsterdam which report in Euros between 2018-2020 with available ESG data for the period. The environmental, social, governance and ESG scores are sourced from Refinitiv Eikon. All four regressions contain time and firm fixed effects. The Wald test tests hypotheses H_0^k: $\beta_1 > 0$ and H_1^k: $\beta_1 \leq 0$, where k= 1,2,3 and 4, for each of the hypotheses for environmental, social, governance and ESG scores, respectively. Thus, the one-tailed p-values are reported. For a negative estimate of β_1, the p-value reported is (two-tailed p-value)/ 2, while for a positive β_1 estimate it is (1-(two-tailed p-value))/2. The regressions are run using robust standard errors and the Wald test. The significance level of 0.1, denoted by *, 0.05 by ** and 0.01 by ***.

Appendix D: Removing outliers

The regressions used to repeat the tests by removing the outliers (upper and lower 2.5% of values) are:

$$\textit{(i-c)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 EnvironmentalScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Leverage_{it} + \varepsilon_{it}$$

$$\textit{(ii-c)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 SocialScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Leverage_{it} + \varepsilon_{it}$$

$$\textit{(iii-c)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 GovernanceScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Leverage_{it} + \varepsilon_{it}$$

$$\textit{(iv-c)}\ R_{it} = \alpha_i + \gamma_t + \beta_1 ESGScore_{it} + \beta_2 EPS_{it} + \beta_3 ROE_{it} + \beta_4 Leverage_{it} + \varepsilon_{it}$$

where EPS_{it} is earnings per share for a company i at time t, and return on $equity_{it}$ for a company i at time t are used to estimate the profitability, whereas to calculate the leverage, the long-term debt to $assets_{it}$ for a company i at time t is used. The independent variable is Environmental $Score_{it}$ for a company i at time t for regression (i-c), $SocialScore_{it}$ for (ii-c), for regression (iii-c) is $GovernanceScore_{it}$ and finally $ESGScores_{it}$ for regression (iv-c). Moreover, α_i represents the firm specific fixed effects for a company i, whereas γ_t time specific effects for time t. The error term, ε_{it}, is added to explain the differences between the observed values and the theoretical value of the model. The dependent variable, R_{it}, represents the expected stock price returns, expressed by the relative change in the share price of a company i at time t and the share price of a company i at time t-1, or $R_t=(P_t-P_{t-1})/P_{t-1}$.

Moreover, the null and alternative hypotheses of the regression coefficients for all four regressions are formulated as follows:

$$H_0^k: \beta_1 > 0$$

$$H_1^k: \beta_1 \leq 0,$$

where k= 1,2,3 and 4, refer to each of the hypotheses for environmental, social, governance and ESG scores, respectively. Under H_0^k, the coefficient of the scores are hypothesised to be positive; while under H_1^k, the coefficients are hypothesised not to be positive.

Appendix Table D1. Removed outliers

	Regression (i-c)		Regression (ii-c)		Regression (iii-c)		Regression (iv-c)	
	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)
Environmental score	-0.0074	0.1131						
Social score			-0.0159	0.0105**				
Governance score					-0.0052	0.1760		
ESG score							-0.0179	0.0081***
EPS	0.0418	0.6015	0.0397	0.6110	0.0391	0.6138	0.0396	0.5935
ROE	1.0551	0.1468	0.9649	0.1062	1.0186	0.1725	1.0788	0.1144
Leverage	-0.0287	0.0877*	-0.0333	0.0449**	-0.0283	0.0837*	-0.0299	0.0557*
R-squared	0.1597		0.20388		0.1471		0.2062	
Wald test								
χ^2	2.7		7.2		1.9		7.7	
df	1		1		1		1	
	two-sided	one-sided	two-sided	one-sided	two-sided	one-sided	two-sided	one-sided
P(> χ^2)	0.1000	0.0500*	0.0075***	0.0038***	0.1600	0.0800*	0.0055***	0.0028***

This table reports the results from the regressions (i-c), (ii-c), (iii-c), and (iv-c). The regressions are run using the panel data of companies traded on Euronext Amsterdam which report in Euros between 2018-2020 with available ESG data for the period. The environmental, social, governance and ESG scores are sourced from Refinitiv Eikon. All four regressions contain time and firm fixed effects. The regressions are run using robust standard errors and the Wald test. The Wald test tests hypotheses H_0: $\beta_1 > 0$ and H_1: $\beta_1 \leq 0$. Thus, the one-tailed p-values are reported. For a negative estimate of β_1, the p-value reported is (two-tailed p-value)/ 2, while for a positive β_1 estimate it is (1-(two-tailed p-value))/2. The regressions are run using robust standard errors and the Wald test. The significance level of 0.1, denoted by *, 0.05 by ** and 0.01 by ***.

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