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ESG-SCORE & ABNORMAL RETURNS IN THE EUROPEAN MARKET

Master Thesis

by
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MSc in Business, with Major in Finance

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ABSTRACT

This thesis investigates if investing in European stocks based on Environmental, Social, and Governance (ESG) scores can generate abnormal returns from 2011 to 2021. By performing positive, best-in-class, and negative screening approaches, we construct a long-short strategy going long the 10% top-rated firms and short the 10% bottom-rated firms. Similar to Kempf and Osthoff (2007) and Statman and Glushkov (2008), we employ the Carhart 4-factor model and further extend with a Fama-French 5-factor, including the momentum model. Overall, we find evidence that the long-short strategy achieves negative abnormal return for the positive, best-in-class, and negative screen. Additionally, we find no evidence that high-rated ESG firms yield lower systematic risk.

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1 Introduction

Environmental, social, and governance (ESG) investing is evolving globally, where investors use the investment process to change and improve the behavior of firms' social and environmental issues (Louche and Lydenberg, 2006). According to Global Sustainable Investment Alliance (2021), European sustainable investments value EUR 12.31 billion, representing an 11% increase from 2016 to 2018. Europe is the frontrunner in ESG investing and the green agenda (D'Alfonso, 2020). The upward trend is due to the ongoing climate crisis and reaching the Paris Agreement's goals of net-zero greenhouse gas emissions by 2050 (WRI, 2021). There are mixed results from previous research whether ESG investment strategies generate an abnormal return, the difference between actual return and expected return from the market. Our paper contributes to the growing literature on how ESG investing affects abnormal returns.

The thesis discovers new evidence if trading in European stocks based on ESG-score from 2011 to 2021 generates monthly abnormal returns. We show that a long-short strategy by investing long 10% in the top-rated ESG firms and short 10% in the bottom-rated ESG firms results in a statistically negative relationship between abnormal return and ESG-score. We also study the individual effect by applying the same trading strategy for the individual pillars, E-, S- and G-score, which find the same negative relationship. Our primary weighting is Equally-Weighted portfolios, meaning we assign each stock with an equal value. We illustrate the abnormal return, alpha, using coefficients plots and tables. This result deviates from former research papers due to different time ranges and markets. We suspect that the positive abnormal return does not apply to the European market with increased transparency of ESG investing. Therefore, the potential abnormal return diminishes for the long-short portfolio.

The inspiration for this thesis is from Kempf and Osthoff (2007) and Statman and Glushkov (2008), which find a annualized abnormal return of 8.70% (1992-2004) and 6.12% (1992-2007) in the US market. Similar to these studies, we employ cross-sectional regression using the asset-pricing model, Carhart 4-factor model (1997), to investigate the abnormal return. In addition, we perform a positive, a negative, and a best-in-class screening. Firstly, positive screening includes all companies based on a set of ESG criteria. Secondly, negative screening policy, we exclude all companies in controversial business areas: alcohol, tobacco, gambling, military, firearms, or nuclear power business. Lastly, the BIC screening approach uses the same method as the positive screening but finds the companies with the best ESG criteria in different industries. We assume that the shift in investors' preferences for green stocks, environmentally friendly firms, makes high-rated ESG firms

outperform low-rated ESG firms. The social norms shape investments behavior and implements market outcomes (Merton et al., 1987).

The thesis differs from previous studies where we include a more, conservative asset-pricing model, the Fama-French 5-factor with a momentum (MOM) factor to measure the abnormal return. This model is less available in the literature and contributes to further investigation of the abnormal return as MOM capture the tendency of the stocks during the past 12 months. Our results show more statistical support for the negative relationship between abnormal return and ESG-score when using this model. For instance, if an investor proceeds with the long-short strategy by investing in the $ESG_{High} - ESG_{Low}$ portfolio, it generates a negative abnormal return of -0.6%.

The selected asset-pricing models we use find evidence that low-rated ESG firms outperform high-rated ESG firms. The regression results reveal a pattern where top-rated portfolios consist of profitable firms with high market capitalization for all screens and confirm that larger companies engage more in ESG activities. Nevertheless, we characterize the top-rated portfolios as value stocks, undervalued stocks, and they have a negative tendency toward stock performance. Furthermore, when investigating the data of the top-rated companies, their stock performance is relatively low in volatility and confirms the associated systematic risk, undiversifiable risk. Consequently, this observation verifies why we obtain negative alpha (α) coefficients for the long-short portfolios. Additionally, our thesis supports the Modern Portfolio Theory as the high-rated portfolios limit diversification possibilities.

We discover a positive abnormal return of 0.8% for the long-short strategy using a negative screening approach from 2011 to 2016, when splitting the sample into two equally divided subperiods. For the same subperiod, the positive and best-in-class screening approach yield positive alpha for the high-rated ESG firms. The findings emphasize mispricing for the European financial market. However, the implication of these results is if the abnormal returns originate from mispricing in the wake of growing ESG investing. Lastly, we find evidence from our Value-Weighted portfolios, where we weight the stocks based on the firm's market capitalization and find that top-rated ESG firms examine lower systematic risk than bottom-rated ESG firms. This finding is consistent with Hong and Kacperczyk (2009) who argue that sin stocks have higher expected returns due to social norms, and therefore green stocks have lower systematic risk.

The motivation behind this thesis is to obtain new evidence on ESG investing in the European market. There is limited research on the European market, and we aim

to provide new perspectives on ESG investing and abnormal returns. The European market is one of the regions in the world that experience significant growth in socially responsible investments (SRI). Since 2018 the European Commission, which is responsible for implementing new regulations for the European legislation, has developed a comprehensive policy agenda for sustainable finance and an action plan in the framework of the European green deal (Gonzalez, 2020).

The geographical delimitation in this study will be the European stock market. For instance, the relevant asset universe is the STOXX Europe 600 Index with stock prices from January 1st, 2011, to December 31st, 2021. Additionally, we are not manually computing the market factors as our thesis's primary objective is to investigate the relationship between ESG-scores and abnormal returns, not to test the correctness of the factor models. Instead, we apply the factors for analytical purposes. Moreover, we exclude financial institutions from our dataset due to their form of business models. These firms' business models are based on higher leverage and are more likely to observe distress (Fama and French, 1992). Lastly, we do not consider taxes and dividends in this thesis.

The rest of the paper proceeds as follows. Chapter 2 presents a literature review of relevant papers for our investigation. In Chapter 3, we express our hypothesis and methodology of the thesis. Furthermore, Chapter 4 explains our dataset and its descriptive statistics. Moreover, Chapter 5 validates our hypothesis with various empirical tests and presents a discussion of our findings. Lastly, we conclude in Chapter 6.

2 Literature Review

An extensive literature in finance investigates the relationship between ESG-score and abnormal returns. However, it is difficult to analyze the tradeoff between ESG ratings and performance, mainly due to the multi-dimensionality of ESG. The theory considers ESG investing as an intangible asset, where investors under-react and create a long-term strategy investing in high-rated ESG assets to yield abnormal returns. Bernard and Thomas (1989) perform a post-earnings announcement drift to investigate these under-reaction phenomena and state that the market efficiency theory cannot explain the abnormal returns. Jegadeesh and Titman (1993) provide similar results in implementing a momentum strategy.

Moreover, Fama & French (2007) find that classical asset pricing models fail to explain behavioral biases because of no risk-return relationship of assets. Bollen

(2007) argues that investors incorporate a set of personal and societal values into their utility function, including the standard risk-reward optimization. If investors base their investment decision on behavioral preferences rather than financial performance, the tangency portfolio that maximizes the risk-adjusted return might deviate from the market portfolio and create less reasonable prices. Therefore, the ESG investment strategy can limit diversification possibilities for the investors and shift the efficient frontier to a less attractive risk-return trade-off. Hence, the ESG investors end up with uncompensated risk. Pastor et al. (2020) show that agents' preference for green holdings affects asset prices due to the lower cost of capital in equilibrium. In that sense, greener assets have negative alpha coefficients, and brown assets, non-environmental stocks, have positive alpha coefficients for the capital asset-pricing model (CAPM). Consequently, agents with stronger ESG preferences have portfolios with more green assets and earn a lower expected return. Nevertheless, green assets can outperform brown assets during high ESG performance since it captures shifts in customers' tastes for green products and investors' tastes for green holdings.

Furthermore, there is several empirical evidence that green assets underperform brown assets. The classic paper "The price of sin: The effect of social norms on markets" by Hong and Kacperczyk (2009) states that sin stocks (companies involved in producing alcohol, tobacco, gaming and weapons) have decreasing numbers of institutional owners. The growing demand for SRI makes institutional investors and funds pull out of sin stocks with low ESG ratings. Their study evolves US firms from 1996 to 2006 by creating a negative screening approach with a long position in the sin stocks and a short position in the socially accepted stocks. They use the Carhart 4-factor model to measure the performance, which shows that sin stocks yield higher abnormal returns than accepted stocks. Hong and Kacperczyk (2009) argue that sin stocks have higher expected returns because of the risk of legal action by social norms. Social norms can explain this result as norm-constrained investors discriminate against these companies, thus producing a "neglect" premium in their risk-adjusted return (Hong and Kacperczyk, 2009). Additionally, Merton (1987) argues that sin stocks are cheaper and outperform comparable in similar research. Investing in sin stocks is unethical, and investors associate these stocks with higher repetitional risk. Further, sin stocks have a higher expected return since their price depresses due to limit risk-sharing relative to their fundamental value. In addition, due to neglect of risk sharing, the CAPM no longer holds, thereby idiosyncratic risk and beta matters for pricing.

On the other hand, there is empirical evidence that high ESG performance firms can outperform low ESG performance firms. Auer & Schuhmacher (2016) study

the relationship in the European market from 2004 to 2014, finding that high-rated ESG portfolios perform better than the market. However, the performance of portfolios with the individual pillars, E- and S-scores, did not provide any statistically significant results. Focusing on the E-score, Derwall et al. (2005) find evidence in the data from 1995 to 2003 that a portfolio consisting of the most eco-efficient companies outperforms a less eco-efficient portfolio. The abnormal return claims to be either investor underestimating the benefits of ESG or overestimating its costs, thereby mispricing the value relevance of ESG or compensation for risk (Derwall et al., 2005). In addition, there is evidence that high ESG performance stocks can earn negative abnormal returns by either mispricing or compensation for risk (Derwall and Verwijmeren, 2007).

Further, Kempf and Osthoff (2007) argue that companies have a higher performance with large ESG-rating. They conduct a simple trading strategy on US firms with ESG ratings from 1992 to 2004. The positive screening approach yield a positive abnormal return of up to 6.34% per year. Furthermore, they conduct a "best-in-class" screening approach and apply the Carhart model to avoid industry bias. The highest abnormal returns occur in the best-in-class screening approach; the combination of socially responsible screens and stock with extreme ESG ratings yields 8.70%. Hence, the study confirms that there is a positive relationship between SRI and portfolio performance. Statman and Glushkov (2008) present similar outperformance returns between 1992 and 2007, as they conduct a long-short strategy that yields a positive abnormal return.

Renneboog et al. (2008) investigate whether the results steam from temporary mispricing in the market or the result is a compensation for the additional risk factors. This study argues that the underperformance hypothesis explains that abnormal return occurs when the market misprices the information on CSR in the short run. If it is possible to generate value-relevant information with the ESG screening process, the conventional portfolio manager can then replicate the strategy, and the financial performance should diminish. Therefore, ESG screening can generate value-relevant information unavailable to investors and select securities to generate better risk-adjusted returns than conventional portfolios (Renneboog et al., 2008).

The previous literature finds mixed evidence on how ESG-score can affect portfolio performance. The main reason behind different results may be the various screening methods, choice of markets, and time periods. Another critical factor is the method of measuring ESG. The disclosure process on ESG is voluntary and may produce a selection bias of companies. The firms that choose to report the underlying ESG factors have a better chance of performing well than those not delivering the disclo-

sure. The lack of disclosure of ESG information can generate an information skewness, and the European countries have an advantage due to their high involvement and high sustainability. This thesis connects previous literature with new evidence. Besides, we discuss our methodology's appropriateness and inspiration in Chapter 3.

3 Hypothesis and Methodology

The thesis examines the relationship between abnormal return and ESG performance. The literature in Chapter 2 inspires us to create the following hypothesis and methodology.

3.1 Hypothesis

To investigate the relationship between abnormal return and ESG performance, we examine the risk-adjusted returns of the different portfolios. The literature review shows mixed empirical evidence between abnormal return and ESG performance. As there is a high interest in sustainability in the European market, investors incorporate ESG into their investment decisions. Empirical evidence from Pastor et al. (2020) shows that the increased interest in sustainable assets can affect the price of sustainable stocks. The demand-driven price pressure can result in different performances. In addition, different studies imply that sustainable firms have better long-term prospects with less downside risk. This price pressure indicates that if the market misprices the sustainable stocks in the past, they might experience outperformance over time (Pastor et al., 2020). However, Hong and Kacperczyk (2009) find evidence that sin stocks carry a positive risk premium. Hence, we aim to determine if high ESG-, E-, S-, and G-rated companies outperform low ESG-, E-, S-, and G-rated companies in Europe from 2011 to 2021. Focusing on the positive, best-in-class, and negative screens, we state our main hypothesis as follows:

H_1: The high-rated firms will outperform the low-rated firms

We further use the best-in-class approach to investigate the relationship between abnormal return and ESG-score. There is empirical evidence from both Kempf & Osthoff (2007) and Statman & Gluskhov (2008) that investors can yield a positive abnormal return by adopting the best-in-class approach. This approach can overcome the potential bias of excluding companies focusing on their sector. Therefore, using the best-in-class approach, empirical evidence shows that the investor can generate a slightly higher abnormal return than using the positive and negative screening approach. We state our second hypothesis as:

H_2: The best-in-class screened portfolios will outperform the positive and negative screened portfolios

Additionally, we look at systematic risk exposure to investigate the relationship between abnormal return and ESG performance. Pastor et al. (2020) find evidence that green stocks have a lower cost of capital than sin stocks. Similarly, Merton (1987) argues that sin stocks have a higher expected return since their price depresses due to limited risk-sharing relative to their fundamental value. The previous study by Hong and Kacperczyk (2009) argues that sin stocks have higher expected returns because of the risk of legal action by social norms. Therefore high-rated stocks tend to have low exposure to systematic risk. We present our third hypothesis as:

H_3: The high-rated firms will generate a lower systematic risk exposure than the low-rated firms

3.2 Methodology

This thesis tests abnormal returns of Equal-Weighted zero investment and long portfolios of the top and bottom 10% ESG-rated stocks in Europe from 2011 to 2021. Similar to previous research (Hong and Kacperczyk, 2009; Kempf and Osthoff, 2007; Statman and Glushkov, 2008) we use the Carhart 4-factor model, but our benchmark is the Fama-French 5-factor including MOM factor model. We screen the different portfolios in three different ways; positive, negative, and best-in-class screening approaches (BIC). The portfolios rebalance each year on January 1st with their last year's ESG-score on December 31st. Our analysis holds ESG scores from 2,079 different public companies over ten years (Figure 7). We run a cross-sectional regression because we rebalance the portfolio with last year ESG-score. The cross-sectional regressions allow us to collect data from a large pool of subjects and compare differences between the firms. To test our results, we perform different robustness checks with value-weighted portfolios, change the breaking point of the portfolios, test different sub-periods, and exclude extreme outliers from the sample, and construct a random ESG portfolio.

3.3 Factor Models

To study the ESG performance of European stocks, we form Equally-Weighted portfolios. Equally-Weighted (EW) portfolios value every stock with the same weight regardless of market capitalization. Previous studies use EW as a standard method, such as Kempf & Osthoff (2007) and Statman and Glushkov (2008). However, as a robustness check, we perform Value-Weighted portfolios. Our principal coeffi-

cient is the portfolios' abnormal return, the intercept, α. To measure the portfolio alpha, we adopt two different asset pricing models to estimate risk-adjusting performance: The Carhart 4-factor model and the Fama-French 5-factor including MOM model. To correct the regression coefficients from potential autocorrelation and heteroscedasticity, we estimate the standard errors using Newey and West's (1987) autocorrelation and heteroskedasticity robust standard errors with $\left[4*(\frac{t}{100})^{\frac{2}{9}}\right]$ lags to calculate standard errors (SE) (Brooks, 2014). Moreover, we do not focus on multicollinearity between our independent variables, as it does not affect our interpretation of interest variables (Table 11).

3.3.1 The Carhart 4-factor Model

The Carhart 4-factor model consists of the Fama-French 3-factor model and the momentum factor from Jegadeesh and Titman's (1993) study. Earlier studies consider this model as a conventional performance benchmark and an active management evaluation model (Bodie et al., 2013). The following Carhart 4-factor model is:

$$r_{ESG_{High},t} - r_{ESG_{Low},t} = \hat{\alpha}_0 + \hat{\beta}_{MKT}(r_{MKT,t} - r_{f,t}) + \hat{\beta}_{SMB} r_{SMB,t} + \hat{\beta}_{HML} r_{HML,t} + \hat{\beta}_{MOM} r_{MOM,t} + \hat{u}_t t = 1, ..., T \quad (1)$$

In addition, we have the following long portfolios

$$r_{ESG_{High},t} - r_{f,t} = \hat{\alpha}_0 + \hat{\beta}_{MKT}(r_{MKT,t} - r_{f,t}) + \hat{\beta}_{SMB} r_{SMB,t} + \hat{\beta}_{HML} r_{HML,t} + \hat{\beta}_{MOM} r_{MOM,t} + \hat{u}_t t = 1, ..., T \quad (2)$$

$$r_{ESG_{Low},t} - r_{f,t} = \hat{\alpha}_0 + \hat{\beta}_{MKT}(r_{MKT,t} - r_{f,t}) + \hat{\beta}_{SMB} r_{SMB,t} + \hat{\beta}_{HML} r_{HML,t} + \hat{\beta}_{MOM} r_{MOM,t} + \hat{u}_t t = 1, ..., T \quad (3)$$

We assess the model using a cross-sectional regression of the excess stock return on the four different factors. The independent variable is the excess return of the portfolio in month t. The model has four dependent variables; MKT represents the market portfolio which is the value-weighted return on all the available stock on the market minus a risk-free monthly rate. The size factor, SMB, denotes the average return on three small portfolios minus the average return on three significant portfolios, where the total market value of equity measures the size. The value factor, HML, represents the average return on two value portfolios minus the average return on two growth portfolios, where companies' book-to-market ratio measures the sorting of stock to either value of growth stock. The momentum factor, MOM, represents the return difference between portfolios of stocks with a high and low return over the past twelve months.

3.3.2 The Fama-French 5-factor Including MOM

We aim to explain the abnormal return for our portfolios, assessing the Fama-French 6-factor model. The model consist of Fama-French 5-factor including MOM factor model. Jagadeesh and Titman (1993) find empirical evidence that, on average, winner stocks generate a significant positive abnormal return in a period of three to twelve months. From this evidence, Fama and French (2007) include the MOM in the 5-factor model:

$$r_{ESG_{High},t} - r_{ESG_{Low},t} = \hat{\alpha}_0 + \hat{\beta}_{MKT}(r_{MKT,t} - r_{f,t}) + \hat{\beta}_{SMB} r_{SMB,t} + \hat{\beta}_{HML} r_{HML,t} \\ \hat{\beta}_{RMW} r_{RMW,t} + \hat{\beta}_{CMA} r_{CMA,t} + \hat{\beta}_{MOM} r_{MOM,t} + \hat{u}_t t = 1, ..., T \quad (4)$$

In addition, we have the following long portfolios

$$r_{ESG_{High},t} - r_{f,t} = \hat{\alpha}_0 + \hat{\beta}_{MKT}(r_{MKT,t} - r_{f,t}) + \hat{\beta}_{SMB} r_{SMB,t} + \hat{\beta}_{HML} r_{HML,t} \\ \hat{\beta}_{RMW} r_{RMW,t} + \hat{\beta}_{CMA} r_{CMA,t} + \hat{\beta}_{MOM} r_{MOM,t} + \hat{u}_t t = 1, ..., T \quad (5)$$

$$r_{ESG_{Low},t} - r_{f,t} = \hat{\alpha}_0 + \hat{\beta}_{MKT}(r_{MKT,t} - r_{f,t}) + \hat{\beta}_{SMB} r_{SMB,t} + \hat{\beta}_{HML} r_{HML,t} \\ \hat{\beta}_{RMW} r_{RMW,t} + \hat{\beta}_{CMA} r_{CMA,t} + \hat{\beta}_{MOM} r_{MOM,t} + \hat{u}_t t = 1, ..., T \quad (6)$$

We assess the model using a cross-sectional regression of the excess stock return on the six different factors. For the more conservative asset-pricing model, there are two additional dependent variables. The factor *RMW* denotes the excess returns of highly profitable firms than to low profitable firms. The *CMA* coefficient expresses the excess return of firms conservatively investing than to firms aggressively investing.

3.3.3 ESG Portfolio Construction and Screening Policies

To study the relationship between risk-adjusted returns and ESG-scores, we follow empirical literature constructing one of the most common approaches, ESG portfolios. We construct a theoretical portfolio with 10% long in the highest ESG-rated firms in year t and 10% short in the lowest ESG-rated firms in year t. In addition to the long-short strategy, we also consider both high and low portfolios. The EW portfolios begin of year t, and we hold the portfolios until the end of year t. We use the Refintiv Eikon database, which contains global financial data for analytical purposes. The database provides us with both their estimated ESG-score and stock price, and updates their ESG-score continuously based on verifiable reported data that are publicly available (Refinitiv, 2022). We extract the scores at the end of the year $t-1$. Chapter 4 further discusses Refinitiv Eikon and their ESG methodology.

Since Kempf& Osthoff (2007) base their portfolio selection on the beginning of the year, we rebalance all our portfolios at year $t+1$, January 1st every year, and we do not change them until next year. This rebalancing leads to a time series of monthly returns from January 1st 2011 to December 31st 2021. The time structure is identical for all the screening approaches. To investigate the impact of ESG criteria on performance, we use different screened stock portfolios. We employ positive, negative, and BIC screens. For the BIC, we divide the companies into 10 economic sector classes based on the Refintiv Eikon industry classification: Thomson Reuters Business Classification (TRBC) for the BIC approach (Figure 6). We also apply the last screening method to overcome the possible bias toward some industries.

4 Data

The data section presents the database, the process of cleaning the data. Furthermore, it contains descriptive statistics and performance measures.

4.1 Data Cleaning

In the process of extracting the data from Refinitiv, we first choose the headquarters country in Europe. We further extract the ESG-scores for 2010 to 2020 and the monthly stock prices of the companies between 2011 and 2021. In addition, we follow a similar screening process as Fama and French (1992). We exclude the financial institutions because the leverage level is incomparable to different companies in the industry. For our data collection, we require that ESG-scores and financial data are available for all public companies in the STOXX Europe 600 Index from January 1st, 2011, to December 31st, 2021.

4.2 Databases

Refinitiv Eikon's database provides us with public companies' stock prices and ESG scores. The database is a London Stock Exchange Group business and contains ESG ratings from more than 630 different company-level ESG measures. Refinitiv gathers information from different sources such as annual reports, firm websites, CSR reports, and news. The database provides ESG-scores for more than 10,000 companies worldwide, where around 2,100 are located in Europe (Refinitiv, 2022). The rating agency retrieves ESG data using their terminal, providing the overall ESG-score for the individual company and the stock prices. Refinitiv evaluates the firms' ESG-score considering comparability, impact, data availability, and industry relevance. In that sense, the companies' ESG performance is relative to their sector and country of incorporation. Refinitiv captures the firm's performance within 25

subcategories such as emissions, human rights, and shareholder rights (Refinitiv, 2022). Furthermore, the measurement is split into 10 categories and redeveloped into three pillars, E, S, and G. Finally, the agency constructs the ESG score as the weighted sum of the pillar score using ratings from 0 to 100, where 100 is the best score (Refinitiv, 2021). The remaining subcategories from Refinitiv's ESG scoring approach are illustrated in Table 5.

Refinitiv updates its ESG data continuously for existing companies and newly established companies. Further, Refinitiv includes new controversial events and considers these when evaluating the companies. The scores use publicly available information, and therefore the method could generate bias as the most transparent companies could get a higher ESG-score. The data provider is crucial for our results, as the various ESG-score providers can lead to general inconsistency in data. Since Refinitiv is one of the world's largest financial data providers, it contributes to higher credibility of the platform (Refinitiv, 2021). Despite the limitations of using one data provider, comparing the results with different providers is challenging ore because of the existing inconsistency in the market.

To perform the factor models Carhart 4-factor and Fama-French 5 factor, including the MOM, it is necessary to obtain the different market factors. Corresponding to Kempf & Osthoff (2007), we obtain the explanatory variables from the Kenneth French Data Library (2021). Recalling the limitations of this thesis in Chapter 1, we we do not manually compute the market factors as our thesis's primary objective is to investigate the relationship between ESG-scores and abnormal returns. The focus is not to test the correctness of the factor models. Instead, we apply the factors for analytical purposes. Kenneth French's database has high credibility and uses a significant amount of data from reliable sources. Hence, we consider the market data consistent.

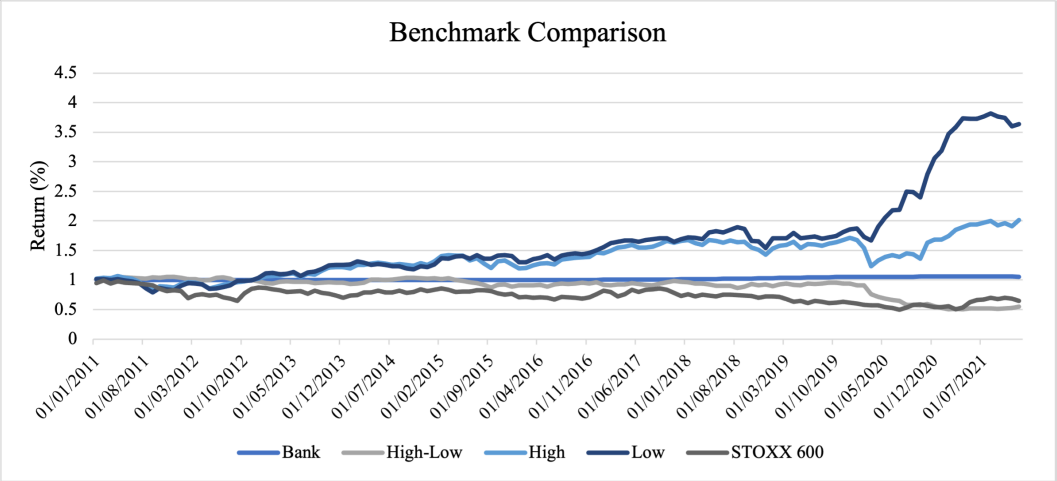
4.3 Descriptive Statistics and Performance Measures

The descriptive statistics in Table 1 consist of the positive screening approach focusing on the ESG, E, S, and G-score portfolios from the period 2011 to 2021. Each score provides an EW long-short strategy and two long portfolios with high-rated and low-rated ESG stocks. The mean of the zero investments is negative, indicating that the high-rated ESG portfolios underperform the low-rated ESG portfolios before adjusting for risk. We use Sharpe Ratio to measure the risk-adjusted returns, which is the average return in excess of our portfolios' risk-free rate per unit of volatility (Bekaert and Hodrick, 2017). We observe a negative Sharpe Ratio of the long-short strategy. The long portfolios perform an economically and statistically

higher Sharpe Ratio for the low-rated ESG stocks than the high-rated ESG stocks. Figure 5 confirms this result as we observe that the long-short portfolios move in the opposite direction of the long portfolios. In addition, the lowest ESG-score portfolios perform on average better than the other portfolios. Figure 1 shows that investing one euro in 2011 in the low-rated ESG portfolio would generate 3.6 euros in 2021, outperforming the other portfolios and STOXX Europe 600. It is worth mentioning that the pandemic could affect the increased return from 2020 to 2021 (Ambros et al., 2021).

Figure 1: Benchmark Comparison

This figure illustrates a visual overview of the return of investing one euro for the positive screen, ESG-portfolios than investing one euro in the STOXX 600 or in the bank. We observe that the low-rated ESG portfolio outperforms the other portfolios.



Accordingly, to understand the relationship between each variable we create a correlation matrix to summarize the dataset. The Correlation matrix, Table 8, shows that the long portfolios have a moderate to high correlation with the market factor. The zero-investment portfolio has a low to moderate correlation to the long portfolios. Further, we report the descriptive statistics and correlations for the negative and BIC screening approaches in Tables 7 & 10 and Tables 6 & 9 in the Appendix.

Table 1: Descriptive Statistic and Performance Measures for Positive Screen

This table presents the descriptive statistics for the positive screen from January 1st, 2011, to December 31st, 2021. We state the total number of observations (N), the minimum value (Min), the maximum value (Max), the mean value (Mean), the standard deviation (Std), the performance measure Sharpe Ratio, the skewness (Skew) and the excess kurtosis (Kurt). The main portfolio of interest is the long-short strategy, long 10% the top-rated and short 10% the bottom-rated in terms of the ESG, E, S, and G-score. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor.

Descriptive Statistic									
Portfolio		N	Min	Max	Mean	Std	Sharpe Ratio	Skew	Kurt
ESG	High	132	-0.199	0.204	0.006	0.044	0.464	-0.274	5.665
	Low	132	-0.111	0.163	0.010	0.044	0.814	0.465	1.690
	High-Low	132	-0.164	0.051	-0.004	0.028	-0.549	-1.631	7.349
E	High	132	-0.207	0.217	0.006	0.048	0.456	-0.215	4.862
	Low	132	-0.196	0.162	0.008	0.046	0.593	-0.500	3.739
	High-Low	132	-0.063	0.070	-0.002	0.024	-0.230	-0.030	0.091
S	High	132	-0.176	0.206	0.007	0.042	0.384	-0.059	5.105
	Low	132	-0.108	0.168	0.010	0.045	0.738	0.390	1.826
	High-Low	132	-0.146	0.050	-0.003	0.029	-0.751	-1.527	5.652
G	High	132	-0.225	0.178	0.005	0.044	0.553	-0.736	6.477
	Low	132	-0.193	0.260	0.011	0.049	0.814	0.639	6.628
	High-Low	132	-0.230	0.045	-0.006	0.026	-0.594	-4.913	41.842
MKT		132	-0.154	0.166	0.007	0.047	0.493	-0.345	1.335
SMB		132	-0.051	0.047	0.002	0.017	0.370	-0.038	0.440
HML		132	-0.113	0.108	-0.003	0.027	-0.404	0.282	3.070
MOM		132	-0.184	0.089	0.008	0.032	0.831	-1.477	9.225
RMW		132	-0.039	0.035	0.004	0.016	0.908	-0.329	-0.166
CMA		132	-0.044	0.030	-0.002	0.014	-0.560	-0.291	0.502

5 Results & Analysis

Our objective in this section is to determine whether the long-short strategy can generate a positive abnormal return, where the alpha is the main coefficient. To measure the abnormal return, we use the Carhart 4-factor model and the Fama-French 5-factor including MOM model, throughout the three approaches. In this section, we analyze the alpha and then interpret the statistically significant factors aligning with the two models.

5.1 Positive Screening Approach Regression Results

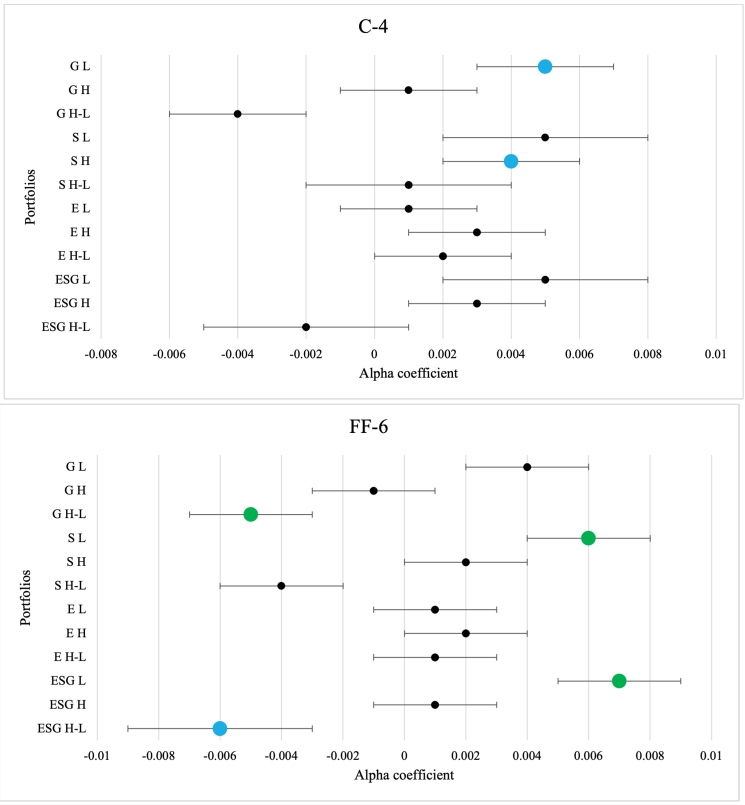
We find evidence that the long-short strategy in the European market generates statistically significant negative abnormal returns. Table 2 presents the results of a Carhart 4-factor and Fama-French 5-factor including MOM model for a positive screen. Correspondingly, we extract the primary coefficient, alpha, and present them in Figure 2. We construct an EW portfolio that consists of long the 10% highest-rated firms and short the 10% lowest-rated firms from 2011 to 2021. It further presents their separate long portfolios. The negative relationship statistically holds for the long-short portfolios $ESG_{High} - ESG_{Low}$, $S_{High} - S_{Low}$, and the $G_{High} - G_{Low}$, while the rest long-short portfolios provide insignificant results. Interestingly, all the long-short portfolios have negative abnormal returns except for the $E_{High} - E_{Low}$ which yield positive abnormal returns in both models. However, the corresponding results are insignificant. The findings are surprising due to the increasing growth of ESG investing, which create demand for high-rated ESG stocks. This observation conflicts with our main hypothesis, H_1, that the high-rated ESG portfolios outperform the low-rated ESG portfolios. However, the Carhart 4-factor model provides a positive abnormal return of 0.4% for the S_{High} portfolio.

Our regression results are consistent with the empirical evidence from Pastor et al. (2020), where investors with stronger ESG preferences earn lower expected returns. The result of non-existing abnormal returns is associated with low market risk and low volatility for these portfolios. When analyzing our dataset, we discover that the top-rated portfolios consist of firms that generate a lower return over time than the bottom-rated portfolios. For instance, the monthly abnormal return of the $ESG_{High} - ESG_{Low}$ portfolio is only statistically significant at a 5% level for the Fama-French 5-factor model including the MOM resulting -0.5%. The performance of the long-short strategy is particularly from ESG_{Low} with a monthly abnormal return of 0.7%, while the return of the high-rated portfolio is not significantly different from zero. The same model provides statistically significant results at 10% and 1% levels for the $S_{High} - S_{Low}$ and $G_{High} - G_{Low}$ portfolios, with a corresponding monthly excess return of -0.4% and -0.5%. Identical to the $ESG_{High} - ESG_{Low}$

portfolio, the low-rated portfolios can explain the performance, and the high-rated portfolios are statistically insignificant. The corresponding monthly abnormal returns of S_{Low} is 0.6% and G_{Low} is 0.4%. Hence the $S_{High} - S_{Low}$ provides the highest monthly abnormal return of the long-short portfolios.

Figure 2: Coefficient Plot Positive Screen

The figure reports the primary coefficient, the estimated alpha, from cross-sectional regression using the Carhart 4-factor and Fama-French 5-factor model including MOM. The EW portfolios are positive screened and based on ESG, E, S, and G scores. We denote the low portfolios (L), high portfolios (H), and long-short strategy (H-L). Lastly, we report the alphas significant at 1% level with the color green, and significant at level 5% with the color blue.



Most surprisingly with our models is the regression results that the Carhart 4-factor provides. The model's explanatory power, R^2, in Table 2 is in line with previous papers such as Statman & Glushkov (2008) and Derwall et al. (2005). Statman & Glushkov (2008) reports the explanatory power of the Carhart 4-factor model long-short strategy to be 0.19, while Derwall et al. (2005) report 0.01. On the contrary, we find insignificant evidence to explain the relationship between abnormal return and ESG performance, unlike previous studies such as Kempf & Osthoff (2007) do. Moreover, our findings show that the Fama-French 5-factor including MOM model, has higher explanatory power for all screening approaches. This finding is significant for the long-short strategy, where R^2 range between 0.196 to 0.515. The model provides evidence of a significant negative relationship between abnormal return and ESG-score. Therefore, our findings can provide further evidence for using the 6-factor model as a measurement for abnormal returns in Europe.

To better understand the coefficient of interest, alpha, we interpret the corresponding factors in Table 2. Our regression results show that the MKT coefficient remains consistent, where the factor is insignificant for the high-low portfolios in both models. These results indicate no evidence that the portfolio outperforms or underperforms the market portfolio. Hence, the MKT cannot explain the abnormal return, and there is no evidence from the positive screening confirming our third hypothesis, H_3, that the high-rated firm will have lower systematic risk compared to the low-rated firms. On the contrary, all the low- and high portfolios show statistically significant results at 1%. The MKT decreases for all the low- and high-rated portfolios when using the more conservative model for regressions, indicating that the market does not take on additional market risk. Accordingly, the models discover performance differences relative to the market portfolio for the low- and high-rated portfolios, similar to Hong and Kacperczyk's (2009) results.

The regression results for the conservative 6-factor model show a pattern for negative SMB coefficients in Table 2, which is statistically significant at the 1% level. The negative factor loading implies that the long-short portfolios consist of large market capitalization firms. Conversely, the SMB factor is positive for the corresponding low-rated portfolios and significant at the 1% level. Accordingly, the low-rated portfolios consist of small market capitalization firms. The evidence is consistent with Halbritter & Dorfleitner (2015), confirming our result that low-rated firms outperform high-rated firms. This observation indicates that larger companies engage more in ESG activities because of the pressure from stakeholders. In addition, larger companies can afford to finance ESG activities because investments require sufficient free cash flow (Drempetic et al., 2020). The study of Fama & French (1992) confirms that small capitalization firms outperform large market capitalization firms. This evidence can support our results as high-rated ESG firms get lower returns because of the limited investment universe and company size. Additionally, using Refinitiv as a data provider, large companies have higher exposure to size bias due to higher resources and data availability (Drempetic et al., 2020).

Investigating the positive HML factor, it is statistically significant at a 1% level for the $ESG_{High} - ESG_{Low}$ and the $S_{High} - S_{Low}$ portfolio. The positive factor loading indicates that long-short portfolios have exposure to value stocks. This finding is not in line with the growth bias in previous SRI research, such as Derwall et al. (2005), where high-rated ESG firms often exclude traditional value sectors with higher environmental risk. The regression results reveal a pattern where high-rated firms are subject to value stocks and low-rated firms are subject to growth stocks. However, neither the high-rated nor the low-rated portfolios are statistically significant in any of the models, except the E_{High} at a 5% level in the 6-factor model.

Subsequently, we study the negative MOM factor in all our portfolios in both models. We discover no evidence that the factor can explain the abnormal return but is statistically significant at a 5% level and lower for all the high-rated portfolios. In contrast to the low-rated portfolios, the high-rated portfolios have a slightly negative loading on the MOM factor, which can explain why we observe negative abnormal returns. Moreover, the estimation of RMW in Table 2 exhibits that the coefficient is statistically significant at a 1% and 5% level for all portfolios, except for G_{Low}. We discover a mixed pattern with negative and positive RMW coefficients for the different portfolios. The ESG_{Low} and S_{Low} portfolios exhibit a negative RMW coefficient, and in addition, negative values for the CMA coefficient. This result illustrates relatively unprofitable firms that invest aggressively and can help explain the significant abnormal return returns associated with higher market risk (Amon et al., 2021). In contradiction, the $ESG_{High} - ESG_{Low}$, $E_{High} - E_{Low}$, $S_{High} - S_{Low}$ and $G_{High} - G_{Low}$ portfolios have positive exposure to the RMW coefficient. The positive loading emphasizes that the portfolios contain profitable companies, and in combination with a statistically significant positive CMA, the firms invest more conservatively.

Overall, the findings contradict with previous studies proposing abnormal returns using an ESG long-short strategy (Derwall et al., 2005; Kempf and Osthoff, 2007; Statman and Glushkov, 2008). This finding applies to the overall ESG-score and each individual pillar. Derwall et al. (2005), Kempf & Osthoff (2007), and Statman & Glushkov (2008) investigate the US market in different time periods before 2007 and this can explain why they obtain an abnormal return. In comparison, their market conditions are completely different regarding available information on ESG-investment and the agencies' methodology. Therefore, the increasing transparency for ESG-scored companies can explain why our results deviate. As a result, the investors cannot exploit the possible abnormal return and obtain the same result as in earlier time periods. Additionally, our results align with the Modern Portfolio Theory, suggesting that the optimal portfolio has the highest expected return and lowest possible risk (Markowitz, 1968). The expected return of the high-rated portfolios is limiting our investment universe due to limited diversification possibilities and shifting the efficient frontier towards a less promising risk-return tradeoff. Hence, the modern portfolio theory can explain why the low-rated firms yield abnormal returns. Similar to Hong and Kacperczyk (2009), we find that low-rated stocks yield higher abnormal returns than high-rated ones. They argue that social norms can explain that norm-constrained investors discriminate against these firms, consequently producing a "neglect" premium in their risk-adjusted return (Kempf and Osthoff, 2007).

Table 2: Regression Result of Equally-Weighted, Positive Screened Portfolios

This Table presents the result from cross-sectional regressions of EW, positive screened portfolios based on ESG, E, S, and G scores. The long-short portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% longer for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December of the previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Equally-Weighted, Positive Screened Portfolios 2011-2021										
Model	Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
C-4	ESG	High-Low	-0.002	0.020	-0.716***	0.316	-0.015			0.274
			(0.003)	(0.067)	(0.211)	(0.228)	(0.073)			
		High	0.003	0.754***	-0.178	0.039	-0.208***			0.806
			(0.002)	(0.056)	(0.181)	(0.088)	(0.0746)			
		Low	0.005	0.733***	0.538***	-0.278	-0.194**			0.678
			(0.003)	(0.063)	(0.151)	(0.186)	(0.089)			
	E	High-Low	0.002	-0.004	-0.884***	0.213***	-0.091*			0.476
			(0.002)	(0.048)	(0.105)	(0.077)	(0.052)			
		High	0.003	0.826***	-0.168	0.051	-0.215***			0.809
			(0.002)	(0.054)	(0.187)	(0.095)	(0.069)			
		Low	0.001	0.830***	0.718***	-0.162**	-0.124*			0.821
			(0.002)	(0.055)	(0.132)	(0.069)	(0.064)			
	S	High-Low	-0.001	-0.049	-0.646***	0.325	0.015			0.211
			(0.003)	(0.074)	(0.204)	(0.225)	(0.076)			
		High	0.004**	0.729***	-0.181	0.064	-0.172*			0.791
			(0.002)	(0.053)	(0.177)	(0.107)	(0.099)			
		Low	0.005*	0.779***	0.465***	-0.260	-0.186**			0.700
			(0.003)	(0.063)	(0.145)	(0.202)	(0.085)			
	G	High-Low	-0.004*	-0.008	-0.555***	0.150	-0.011			0.150
			(0.002)	(0.036)	(0.106)	(0.143)	(0.065)			
		High	0.001	0.783***	0.122	-0.083	-0.189***			0.774
			(0.002)	(0.063)	(0.208)	(0.100)	(0.061)			
		Low	0.005**	0.792***	0.676***	-0.233*	-0.178**			0.648
			(0.002)	(0.069)	(0.222)	(0.123)	(0.069)			
FF-6	ESG	High-Low	-0.006**	0.041	-0.572***	0.730***	-0.041	1.259***	0.418***	0.470
			(0.003)	(0.043)	(0.179)	(0.335)	(0.073)	(0.363)	(0.167)	
		High	0.001	0.741***	-0.144	0.359*	-0.198***	0.616***	-0.042	0.824
			(0.002)	(0.050)	(0.160)	(0.198)	(0.063)	(0.261)	(0.142)	
		Low	0.007***	0.700***	0.428***	-0.370	-0.157	-0.642***	-0.461***	0.707
			(0.002)	(0.062)	(0.148)	(0.242)	(0.099)	(0.199)	(0.225)	
	E	High-Low	0.001	0.021	-0.814***	0.246**	-0.117*	0.384***	0.321*	0.515
			(0.002)	(0.047)	(0.104)	(0.111)	(0.060)	(0.089)	(0.175)	
		High	0.002	0.805***	-0.152	0.385**	-0.197**	0.554***	-0.135	0.821
			(0.002)	(0.053)	(0.1693)	(0.189)	(0.060)	(0.252)	(0.132)	
		Low	0.001	0.785***	0.662***	0.139	-0.080	0.170**	-0.456**	0.829
			(0.002)	(0.050)	(0.132)	(0.180)	(0.074)	(0.216)	(0.232)	
	S	High-Low	-0.004*	-0.012	-0.477***	0.645**	-0.029	1.250***	0.602***	0.419
			(0.002)	(0.051)	(0.167)	(0.323)	(0.056)	(0.346)	(0.192)	
		High	0.002	0.733***	-0.124	0.291	-0.178**	0.591***	0.128	0.810
			(0.002)	(0.050)	(0.147)	(0.195)	(0.085)	(0.212)	(0.149)	
		Low	0.006***	0.744***	0.353**	-0.355	-0.149	-0.658***	-0.473*	0.728
			(0.002)	(0.061)	(0.145)	(0.249)	(0.092)	(0.224)	(0.243)	
	G	High-Low	-0.005***	0.015	-0.475***	0.234	-0.037	0.493***	0.327**	0.196
			(0.002)	(0.036)	(0.110)	(0.163)	(0.070)	(0.148)	(0.161)	
		High	-0.001	0.760***	0.152	0.353*	-0.169***	0.762**	-0.134	0.800
			(0.002)	(0.052)	(0.179)	(0.211)	(0.048)	(0.298)	(0.192)	
		Low	0.004*	0.745***	0.626***	0.118	-0.132*	0.269	-0.461**	0.657
			(0.002)	(0.071)	(0.210)	(0.221)	(0.073)	(0.249)	(0.211)	
Significance level: (***) 1%, (**) 5%, (*) 10%										

5.2 Best-In-Class Screening Approach Regression Results

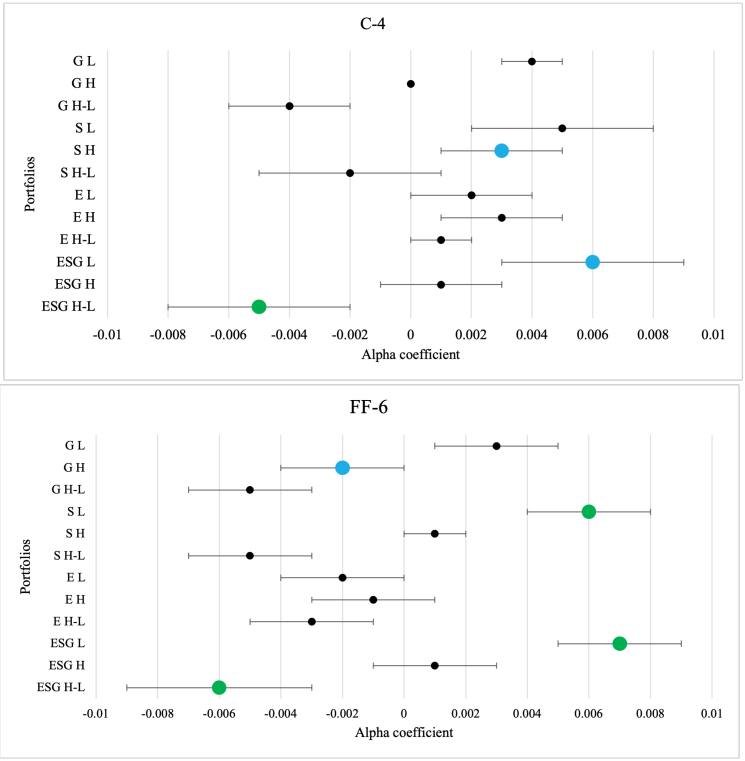
Table 3 in the Appendix presents the results of a Carhart 4-factor and Fama-French 5-factor including MOM for a BIC screened long-short strategy. Accordingly, we report the coefficient of interest, alpha, in Figure 3. The high-low EW portfolios consist of long the 10% highest-rated firms and short the 10% lowest-rated firms from 2011 to 2021. It further presents their separate long portfolios. Similar to the positive screening results, we find evidence that using the BIC approach will generate statistically significant, negative abnormal returns. This result is surprising as both Kempf & Osthoff (2007) and Statman and Glushkov (2008) find evidence that BIC provides the highest abnormal return. These results also conflict with our main hypothesis, H_1, as evidence shows that low-rated portfolios outperform high-rated ones.

In contrast, the Carhart 4-factor model has better explanatory power, increasing from 0.270 to 0.451. These results are interesting because it shows the power of diversification. At this point, the BIC screen consists of a higher number of diversified companies, reducing the selection bias and increasing the explanatory factor in the model. Furthermore, our findings with the 4-factor model obtain different statistically significant results at a 1% level than the positive screen. For instance, the $ESG_{High} - ESG_{Low}$ portfolio obtain a negative alpha of -0.5% and the ESG_{Low} portfolio obtains an abnormal return of 0.6%. This result strengthens our findings for the negative relationship between abnormal returns and investing in high-rated ESG-scored companies. In addition, the BIC screen and the positive screen obtain the same statistically significant result at a 5% level for the S_{Low} portfolio with an abnormal return of 0.3%. We find it surprising that our BIC approach does not align with previous studies which obtain abnormal returns (Kempf and Osthoff, 2007; Statman and Glushkov, 2008)

The regression results from the conservative 6-factor model provide a significant abnormal return for the $ESG_{High} - ESG_{Low}$ and $G_{High} - G_{Low}$ at 1% and 5% level. Identical to the positive screen, the BIC screening, $ESG_{High} - ESG_{Low}$ portfolio has an abnormal return of -0.6%. Contradictory, the corresponding alpha of the ESG_{Low} portfolio is slightly higher, yielding 0.7%, which is significant at the 1% level. Moreover, the $G_{High} - G_{Low}$ portfolio generates an abnormal return of -0.5%, and in contrast to the positive screen, there is no statistically significant proof for the corresponding high-rated and low-rated portfolios. Overall, we find no evidence that the BIC screen deviates from the positive screening approach, which contradicts our second hypothesis, H_2, that the best-in-class screening approach outperforms the other.

Figure 3: Coefficient Plot BIC Screen

The figure reports the primary coefficient, the estimated alpha, from cross-sectional regression using the Carhart 4-factor and Fama-French 5-factor model including MOM. The EW portfolios are positive screened and based on ESG, E, S, and G scores. We denote the low portfolios (L), high portfolios (H), and long-short strategy (H-L). Lastly, we report the alphas significant at 1% level with the color green, and significant at level 5% with the color blue.



In order to interpret the abnormal return in Figure 3, we now seek to investigate the remaining factor coefficients from the asset pricing models in Table 3 in Appendix. We notice that the MKT and SMB obtain the same statistical results as the positive screen. The numbers have minor differences, and the results are almost identical. Similarly, the MKT cannot explain the abnormal return, and the SMB shows that low-rated firms outperform high-rated firms. Corresponding with the insights in Section 5.1, the size bias of larger firms has more possibilities of incorporating heavier ESG investments than small firms due to the requirement for having enough free cash flow (Drempetic et al., 2020). Additionally, we observe the same pattern for the HML factor as high-rated portfolios consist of value stocks and low-rated ones have exposure to growth stocks. These findings are inconsistent with Derwall et al. (2005) conclusion of a growth bias. In contrast to the positive screen, the 4-factor model provides statistically significant results at a 1% level for $ESG_{High} - ESG_{Low}$ portfolio and the corresponding high- and low-rated portfolio. These findings support our previous observation in Section 5.1 and indicate that changing the screen type cannot confirm our third hypothesis, H_3, that the high-rated firms have a lower systematic risk than the low-rated firms.

The regression results from both models show that the MOM factor can statistically explain the abnormal return. Contradictory to the positive screen, the MOM factor is significant at a 1% level for the $ESG_{High} - ESG_{Low}$ portfolio with corresponding high-and low-rated portfolio. Interestingly, the $ESG_{High} - ESG_{Low}$ portfolio exhibits high positive loading on the MOM factor, indicating an upward trend and higher risk. In Appendix, Table 6, the portfolios exhibit negative skewness and high kurtosis, meaning that our data is heavy-tailed relative to a normal distribution. These findings strengthening the observation of a high MOM. Additionally, the ESG_{Low} portfolio yields positive abnormal returns and has exposure to a negative MOM. The results are in line with Kempf & Osthoff (2007), but the observation remains a puzzle. Moreover, the more conservative model's RMW and CMA factor obtain slightly fewer statistical results than the positive screen. Table 3 illustrates that the portfolios $S_{High} - S_{Low}$ and S_{Low} are significant at 1% level for both factors.

Summarizing the results of the BIC screening approach, we find a similar conclusion as in Section 5.1. Regarding the factor loadings of the alpha, we see a notable difference between high and low portfolio. The low-rated firms exhibit statistically significant alphas that outperform the high-rated firms. This result applies to all ESG-score and the individual pillars. Hence, the analysis supports a negative relationship between abnormal return and high ESG-score. The findings align with the observation of increased transparency in the European market and the impossibility for the investor to exploit the abnormal return. Therefore, we suspect that our result differs from earlier studies since the investor can better incorporate the available ESG-information. Accordingly, any empirical evidence finding abnormal return is when the financial market fails to factor the ESG risk into the share price (Derwall et al., 2005). The Derwell et al. (2005) study explain the possibility of mispricing, which is further discussed in Section 5.4.

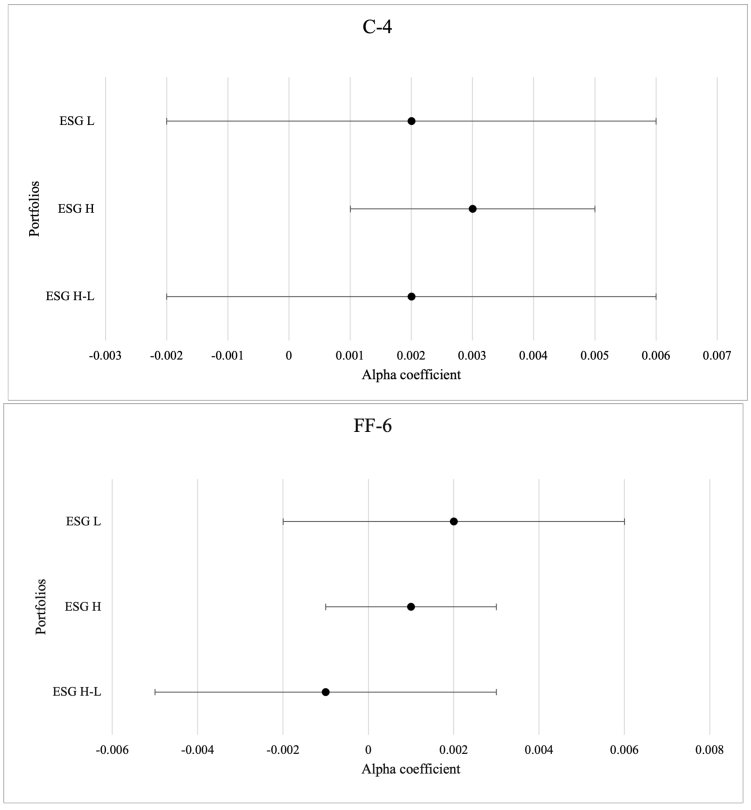
Considering the individual pillars, we find the same pattern as the positive screen, where the E-score portfolios obtain no significant alphas. The observation is inconsistent with Derwall et al. (2005), which discover that the most eco-efficient firms outperform the less eco-efficient firms. In contrast to the results in Table 2, both factor models obtain statistically significant alpha coefficients in the high-low portfolios. Moreover, the observations are consistent with Modern Portfolio Theory (Markowitz, 1968) and how a "neglect" premium can occur in sin stocks' risk-adjusted return. (Hong and Kacperczyk, 2009) studies. Overall, to aim for a positive abnormal return: the long position must be in the low-rated portfolios, and the short position on the high-rated portfolios. Hence the strategy generates a monthly abnormal return of 0.6% for $ESG_{High} - ESG_{Low}$, and 0.5% for $G_{High} - G_{Low}$.

5.3 Negative Screening Approach Regression Results

Table 4 in the Appendix presents the results of a Carhart 4-factor and Fama-French 5-factor including MOM for a negative screened long-short strategy. Consistently, we focus on our coefficient of interest, alpha, and illustrate the result in Figure 4. The EW long-short strategy consists of long the 10% highest-rated firms and short the 10% lowest-rated firms from 2011 to 2021. It further presents their separate long portfolios. In contradiction to the previous screens, we do not examine the E, S, and G-score. Similar to Kempf & Osthoff (2007), the regression results show no statistically significant evidence of abnormal return. On the other side, Hong and Kacperczyk (2009) find evidence that using a negative screening approach yield statistically significant returns due to a "neglect" premium in their risk-adjusted return. However, they use a different investment strategy with a long position in the sin stocks and a short position in the socially acceptable stocks. Contradictory to the positive and BIC screening approach, we exclude 334 companies, reducing our dataset up to 19%. This exclusion could explain why the explanatory power of the factor models is lower than the positive and the BIC screening approach.

Figure 4: Coefficient Plot Negative Screen

The figure reports the primary coefficient, the estimated alpha, from cross-sectional regression using the Carhart 4-factor and Fama-French 5-factor model including MOM. The EW portfolios are positive screened and based on ESG, E, S, and G scores. We denote the low portfolios (L), high portfolios (H), and long-short strategy (H-L). Lastly, we report the alphas significant at 1% level with the color green, and significant at level 5% with the color blue.



We now investigate the other factors in Table 4 to confirm the non-statistical alphas. Expectingly, the MKT factor is not statistically significant for the $ESG_{High} - ESG_{Low}$ portfolio. This result verifies that there is no evidence that the MKT can explain the abnormal return, and we cannot confirm the third hypothesis for any of our screens. Further, the MKT remains statistically significant at a 1% level for the separate high-rated and low-rated portfolios in both models and is consistent with the previous screens. Additionally, the SMB, HML, and MOM show the same findings as in Section 5.1, with minor differences in values. For instance, the SMB factor shows that $ESG_{High} - ESG_{Low}$ and ESG_{Low} portfolios are statistically significant at a 1% level. In accordance with the other screens, the RMW and the CMA loading coefficients are statistically significant at a 1% level. In accordance with the other screens, the positive RMW and the negative CMA coefficients are statistically significant at a 1% level. These observations strengthen the evidence toward the consistency of the portfolios in Sections 5.1 and 5.2.

In summary, the negative screen reports no statistically significant evidence of a relationship between ESG-scores and abnormal returns. All three methodologies we use to investigate the abnormal return show interesting effects, and they have minor differences in the interpretation of the factors. Thereby, the results confirms no positive abnormal return and corroborate the observations.

5.4 Additional Robustness Check

To validate the sensitivity of our estimations, we form value-weighted portfolios, run alternative cut-offs, run different subperiods, exclude outliers from our dataset, and construct a random ESG portfolio. This section uses the Fama-French 5-factor including the MOM model benchmark, as we obtain abnormal returns from the regression model in Sections 5.1, 5.2 and 5.3.

In Sections 3.1, 3.2 and 3.3, we perform EW portfolios, and to verify the result of the weighting method, we construct Value-Weighted (VW) portfolios. This method evolves by weighing the stocks from their market capitalization at the portfolio formation time. We use the Refinitiv Eikon database to obtain the companies' monthly market capitalization. For portfolio formation, we use the same method as in Section 3. The positive screened VW portfolios in Appendix Table 12 report similar negative alphas as the EW portfolios. For instance, $ESG_{High} - ESG_{Low}$ for the conservative model with 6-factors yield -0.5%. In addition, the $S_{High} - S_{Low}$ and $G_{High} - G_{Low}$ yield negative abnormal return of -0.4 % and yield -0.3%. Observing the BIC VW portfolios in Appendix Table 13, we find statistically significant results with negative abnormal returns for the long-short portfolio. In contrast, the VW

$ESG_{High} - ESG_{Low}$ portfolio yield slightly lower abnormal return with -0.7%. The ESG_{Low} portfolio explains the higher positive abnormal return with a performance of 0.8%. Similar to the negative screened EW portfolios, the negative screened VW (Appendix Table 14) generates statistically insignificant abnormal returns for the long-short strategy. Surprisingly, the VW ESG_{High} and ESG_{Low} portfolio exhibit positive 6-factor alpha of 0.4% and 0.7% with a 5% significance level. The finding emphasizes that the VW strategy captures the possible abnormal return.

Further, when investigating the MCAP for the firms, the high-rated portfolios consist of large, capitalized firms, compared to the low-rated firms. For instance, the average value of the S_{high} is 2.628 billion and S_{Low} is 0.236 billion. In contrast to the EW portfolios, the MKT factor can significantly explain the negative abnormal return of the VW long-short portfolios. For instance, this finding holds for all portfolios except the positive screen, VW $ESG_{High} - ESG_{Low}$ and ESG_{Low} portfolios for both models. The negative factor loading of the MKT emphasizes that the high-rated firms have a lower systematic risk than the low-rated firm. This result is in line with Kempf & Osthoff (2007), and provides further evidence for our third hypothesis. Consistent with Merton (1987), we find that low-rated ESG firms have a higher expected return, and the price will deviate because of limited risk-sharing relative to their fundamental value. Therefore high-rated stocks tend to have low exposure to systematic risk. Evaluating the VW screens, all the statistically significant SMB-factors are negative, indicating a negative exposure to the size and value. Further, the BIC screen supports the result in Section 5.2, where MOM is statistically significant at a 1% level with positive factors, representing an upward trend and higher risk.

To validate our results, we now shift the breaking point of our portfolios to 5% and 15% of rated companies. Table 15 in the Appendix illustrates the result from the positive screen and shows that the 6-factor alpha of the $ESG_{High} - ESG_{Low}$ portfolio yield 0% when reducing the breaking point to 5%. This result indicates a neutral relationship between ESG-score and abnormal return. We suspect that this observation is due to the limitation of the diversification possibilities in the portfolios. On the other hand, by reducing the breaking point to 5%, the other long-short portfolio alphas decrease. Further, the $G_{High} - G_{Low}$ portfolio is statistically significant at a 5% level yielding an abnormal return of -0.7%. Considering the BIC screening $ESG_{High} - ESG_{Low}$ portfolio, the alpha decrease to an abnormal return of -1.1% (Table 16 in Appendix). The negative screening approach does not generate abnormal returns in Appendix Table 17. Increasing the breaking point to 15% does not contribute to any more abnormal return, and we observe that more of them decreases their significance level (Table 18, 19 and 20 in Appendix). The results confirm that

low-rated ESG firms perform better than high-rated firms in risk-adjusted returns. High-rated stocks underperform low-rated firms as the long-short portfolios alphas decrease in value by lowering the breaking point from 5% to 10%.

We reestimate the Fama-French 5-factor including MOM model, using two sub-periods. The first sub-period ranges from January 1st, 2011, to December 31st, 2016, and the second sub-period range from January 1st, 2016, to December 31st, 2021. Table 21 and Table 22 in Appendix present the alpha from the 6-factor model using the positive screening approach. In the first sub-period (2011-2016), we find no evidence for the abnormal return of the $ESG_{High} - ESG_{Low}$ portfolio. Interestingly, the results exhibit a positive abnormal return for ESG_{High}, E_{High} and S_{High} which yield 0.6%, 0.6%, and 0.4%. Hence, there is evidence that high-rated firms can obtain a positive abnormal return. However, the high-rated firms do not outperform the low-rate companies as the former yield a higher alpha. Considering the second sub-period (2016-2021), it exhibits a negative abnormal return for $ESG_{High} - ESG_{Low}$, $S_{High} - S_{Low}$ and $G_{High} - G_{Low}$ and thereby do not deviate from the results in Table 2.

Furthermore, we present the corresponding results in Tables 23 and 24 in Appendix, for the BIC approach. We observe that the first sub-period provides evidence of positive abnormal return for the high-rated portfolios. In addition, the second sub-period exhibits that the low-rated firms outperform the high-rated firms, thereby resulting in a negative abnormal return of the zero-investment strategy. Lastly, Table 25 and 26 in the Appendix presents noteworthy results in the negative screening approach. Interestingly, the first sub-period provides evidence of positive alpha for the $ESG_{High} - ESG_{Low}$ portfolio with 0.8%. This result is significant at a 1% level and supports our main hypothesis that high-rated companies outperform low-rated ones. The SMB coefficient explains the abnormal return at a 1% significance level, indicating that the high-rated portfolios have less exposure to small market capitalization firms. Moreover, we have a negative MKT coefficient, indicating that the high-rated portfolios have a lower vulnerability to systematic risk.

Overall, we generalize a pattern between the sub-periods. In the first sub-period (2011-2016), the high-rated ESG, S, and G portfolios exhibit a positive abnormal return and lower systematic risk than the low-rated portfolios in the positive and BIC screen. Conversely, in the second sub-period (2016-2021) the long-short portfolios ESG, S, and G exhibits negative abnormal return and higher systematic risk. These results can indicate that the second sub-period drives our main regression results towards negative abnormal return, where the low-rated portfolios outperform the high-rated portfolios. Hence, the positive abnormal return diminishes over time.

Correspondingly, Zhang (2017) argues that if the investor incorporates ESG risk in the price, then the risk compensation ensures that the high-rated portfolios achieve a negative alpha and the low-rated portfolios achieve a positive alpha. In addition, the positive abnormal return of the high-rated ESG companies disappears in the second sub-period. The efficient market hypothesis can explain why we observe positive abnormal returns in the first sub-period. The theory argues that the capital market can oversee relevant information on these high ESG stocks, implying that the market fails to price the intangible assets that relate to the ESG-score. Over time the market learns how to evaluate the information, and the benefit of ESG investing diminishes as the stock price reflects the information (Fama, 1970).

To study the effect of excluding extreme outliers, we identify three stocks that generate an extreme return in the sample period. We plot the firms' cumulative returns against their respective ESG score in Figure 8 in Appendix to identify possible outliers. The outliers are the companies Sartorius AG, Fortnox AB, and Chemometec A/S. Accordingly, we exclude these companies from our dataset and run new regressions regarding the different screening approaches. Tables 27, 28, and 29 in Appendix show the regression results excluding outliers and exhibit minor changes in the alpha coefficients in the Fama-French 5-factor including MOM model. It is worth mentioning that the 6-factor alpha for the positive screen reduces the significance level from 1% to 10%, indicating that the extreme values have a minor effect on the alpha. Additionally, the positive and BIC screening zero investment portfolios slightly increase their negative abnormal return to -0.5%.

We run a random test on our data to verify the results. First, we construct a portfolio consisting of 10% random ESG-scored firms and run a cross-sectional regression with the same portfolio approach as in Section 3.3. In Table 30, the result obtains a non-statistically significant alpha and confirms that it is impossible to choose random ESG-scored companies and obtain an abnormal return. Overall, we find that our main variable of interest, alpha, is primarily negative for the long-short portfolios and subtracting transaction costs is therefore unnecessary. Further, Derwall et al. (2005) assume roundtrips of transaction costs between 50 and 200 basis points. Accordingly, it will not be appropriate to include transaction costs as it reduces the negative alpha even more.

5.5 Implication of Results

Our analysis emphasizes potential reasons for why our results deviate from previous studies (Derwall et al., 2005; Kempf and Osthoff, 2007; Statman and Glushkov, 2008). Firstly, the studies can use other data providers, affecting the results as the rating methodology varies between the different agency providers. Halbritter & Dorfleitner (2015) point out this implication as they find different results using various databases. Secondly, the studies examine the relationship in different time periods, primarily investigating the US market. Thereby, it is possible that the positive relationship is not present in Europe from 2011 to 2021, and their results are not transferable to the European market. Friede et al. (2015) find that outperformance of high-rated ESG firms only exists, particularly in North America and Emerging Market.

Interestingly, in the first sub-period (2011-2016), we find evidence that the negative screened long-short strategy yields a positive abnormal return. Additionally, we generalize a pattern that the high-rated portfolios yield a positive alpha, and the performance diminishes over time. There is uncertain whether the abnormal returns steam from short-term mispricing or if it is compensation for an additional risk factor. Investors can use ESG strategies to exploit valuable information and generate a better risk-adjusted return (Renneboog et al., 2008). Therefore, the abnormal return occurs as the market fails to identify ESG risk in the short run. Nevertheless, the engagement for ESG implies overpricing of highly rated stocks and lower expected returns. This implication makes it unpredictable whether ESG is a priced factor when investigating abnormal returns.

The long-run returns are uncertain for SRI companies as the regulatory environment and government influence their products and services, affecting their cash flows rapidly. SRI companies carry unique risks resulting in unexpected gains and losses. (Marlowe, 2014). Therefore, when evaluating our results, it does not mean that higher ESG scored companies are unprofitable. On the contrary, one can argue that companies that lead their industry toward higher sustainability reduce their long-term financial risk and are a safer investment (Marlowe, 2014). Hence, the short-term risk can justify the significant abnormal return for the low-rated portfolios.

6 Conclusion

This thesis investigates the relationship between abnormal returns and ESG-scored companies in the European market. Our results show a statistically negative relationship between abnormal return and ESG-score when investing long in the 10% top-rated ESG firms and the short in the 10% bottom-rated ESG firms from 2011 to 2021. This finding also applies to the particular pillars and all screening approaches. We discover that if an investor proceeds with the long-short strategy by investing in the $ESG_{High} - ESG_{Low}$ portfolio, it yields a negative abnormal return of -0.6%. These results argue against previous papers suggesting positive abnormal returns using an ESG investing strategy (Derwall et al., 2005; Kempf and Osthoff, 2007; Statman and Glushkov, 2008). Our deviating results from prior research are due to different markets and time periods. The European market has a high level of transparency about ESG information, and the investor can better incorporate the ESG risk into the share price. This finding is consistent with the growth of ESG investing in the European market.

The results are robust for various cut-offs, value weight method, excluding outliers and constructing a random ESG portfolio. Nevertheless, splitting the sample into two subperiods, the models reveal a decline in the predicted performance of European high-rated ESG firms firms over time. In the first subperiod (2011-2016), we observe a positive abnormal return of 0.8% for the negative screene $ESG_{High} - ESG_{Low}$ portfolio. Additionally, the positive and BIC screen examine statistically significant positive alpha for the ESG_{High}, E_{High} and S_{High} portfolios. The findings imply mispricing where the financial market fails to factor the ESG risk into the share price. Still, the implication of these results is if the abnormal return steams from mispricing in the market as there is an increasing ESG investing. Furthermore, we identify a positive relationship between high ESG-score and systematic risk. The relationship is robust for each subperiod and alternative cut-offs. However, we find empirical support that VW top-rated portfolios have a lower systematic risk than bottom-rated ESG firms.

Europe is the frontrunner in ESG investing, and the market continuously learns how to incorporate ESG risk into the firm's stock price. For further research, one can investigate if the same tendency of pricing ESG-score companies applies to other global markets. Kempf and Osthoff (2007) experience abnormal returns in the American market from 1992 to 2004, and it is interesting to see if the same results apply to today's transparency of ESG information. There is also possible to repeat the same investigation for different ESG-agencies to compare the various portfolio formation. The last suggestion is a more in-debt investigation of the relationship between abnormal return and ESG performance during a crisis and normal times.

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7 Appendix

7.1 Appendix A – Main Results

Table 3: Regression Result of Equally-Weighted, Best-In-Class Screened Portfolios
This table presents the result from cross-sectional regressions of EW, BIC screened portfolios based on ESG, E, S, and G scores. The long-short portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December of the previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Equally-Weighted, BIC Screened Portfolios 10%										
Model	Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
C-4	ESG	High-Low	-0.005***	0.005	-0.675***	0.922***	1.237***			0.451
			(0.003)	(0.050)	(0.181)	(0.290)	(0.391)			
		High	0.001	0.782***	-0.161	0.428***	-0.587***			0.816
			(0.002)	(0.040)	(0.162)	(0.179)	(0.251)			
		Low	0.006**	0.776***	0.514***	-0.494***	-0.685***			0.692
			(0.003)	(0.057)	(0.142)	(0.214)	(0.220)			
	E	High-Low	0.001	-0.005	-0.828***	0.190***	-0.083			0.438
			(0.001)	(0.036)	(0.095)	(0.072)	(0.051)			
		High	0.003	0.813***	-0.199	0.019	-0.232***			0.808
			(0.002)	(0.054)	(0.193)	(0.087)	(0.071)			
		Low	0.002	0.817***	0.629***	-0.170**	-0.148**			0.817
			(0.002)	(0.056)	(0.153)	(0.081)	(0.057)			
	S	High-Low	-0.002	-0.024	-0.619***	0.333	-0.023			0.208
			(0.003)	(0.073)	(0.212)	(0.241)	(0.085)			
		High	0.003**	0.754***	-0.105	0.055	-0.220**			0.802
			(0.002)	(0.050)	(0.176)	(0.104)	(0.099)			
		Low	0.005	0.779***	0.514***	-0.277	-0.1196**			0.694
			(0.003)	(0.061)	(0.141)	(0.199)	(0.084)			
	G	High-Low	-0.004	-0.006	-0.530***	0.150	-0.007			0.137
			(0.002)	(0.035)	(0.010)	(0.148)	(0.068)			
		High	0.000	0.780***	0.148	-0.091	-0.183			0.756
			(0.000)	(0.063)	(0.218)	(0.104)	(0.074)			
		Low	0.004*	0.787***	0.678***	-0.242*	-0.176**			0.645
			(0.001)	(0.069)	(0.215)	(0.122)	(0.070)			
FF-6	ESG	High-Low	-0.006***	0.042	-0.622***	0.708**	1.251***	0.402*	-0.059	0.465
			(0.003)	(0.041)	(0.175)	(0.319)	(0.319)	(0.190)	(0.072)	
		High	0.001	0.750***	-0.172	0.337*	0.578**	-0.058	-0.178***	0.827
			(0.002)	(0.044)	(0.153)	(0.187)	(0.250)	(0.144)	(0.062)	
		Low	0.007***	0.709***	0.450***	-0.370	-0.637***	-0.460***	-0.119	0.708
			(0.002)	(0.060)	(0.144)	(0.240)	(0.198)	(0.267)	(0.097)	
	E	High-Low	-0.003	-0.108**	-0.906***	0.428***	-0.040	0.502***	0.317*	0.527
			(0.002)	(0.043)	(0.081)	(0.145)	(0.055)	(0.144)	(0.186)	
		High	-0.001	0.794***	-0.184	0.304*	-0.216***	0.472**	-0.114	0.817
			(0.002)	(0.051)	(0.175)	(0.170)	(0.063)	(0.236)	(0.125)	
		Low	-0.002	0.779***	0.584***	0.089	-0.111	0.158	-0.380*	0.823
			(0.002)	(0.051)	(0.149)	(0.174)	(0.067)	(0.206)	(0.216)	
	S	High-Low	-0.005*	-0.012	-0.444**	0.684**	-0.067	1.315***	0.607***	0.422
			(0.002)	(0.049)	(0.178)	(0.328)	(0.060)	(0.349)	(0.187)	
		High	0.001	0.751***	-0.053	0.337*	-0.219**	0.643***	0.066	0.821
			(0.001)	(0.048)	(0.148)	(0.195)	(0.086)	(0.227)	(0.156)	
		Low	0.006***	0.738***	0.391***	-0.347	-0.152*	-0.672***	-0.541**	0.725
			(0.002)	(0.058)	(0.141)	(0.250)	(0.087)	(0.224)	(0.254)	
	G	High-Low	-0.005**	-0.013	-0.453***	-0.269	-0.029	0.528***	0.290*	0.185
			(0.002)	(0.036)	(0.101)	(0.165)	(0.067)	(0.154)	(0.155)	
		High	-0.002	0.754***	-0.177	0.369	-0.159**	0.792**	-0.155	0.784
			(0.002)	(0.054)	(0.191)	(0.230)	(0.061)	(0.315)	(0.179)	
		Low	0.003	0.741***	0.630***	0.100	-0.131*	0.264	-0.446**	0.653
			(0.002)	(0.070)	(0.201)	(0.220)	(0.076)	(0.232)	(0.221)	
Significance level: (***) 1%, (**) 5%, (*) 10%										

Table 4: Regression Result of Equally-Weighted, Negative Screened Portfolios

This table shows the result from cross-sectional regressions of EW, negative screened portfolios based on ESG score. The Long-Short portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December the previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Equally-Weighted Negative Screened Portfolios									
Model	Portfolio	Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
C-4	High-Low	0.002	0.039	-0.590***	0.164	-0.020			0.115
		(0.004)	(0.086)	(0.265)	(0.268)	(0.096)			
	High	0.003	0.782***	-0.041	-0.040	-0.206***			0.777
		(0.002)	(0.053)	(0.176)	(0.109)	(0.080)			
	Low	0.001	0.743***	0.549***	-0.204	-0.186*			0.614
		(0.004)	(0.066)	(0.198)	(0.209)	(0.103)			
FF-6	High-Low	-0.001	0.066	-0.413*	0.662	-0.053	1.536***	0.525**	0.330
		(0.004)	(0.060)	(0.226)	(0.413)	(0.078)	(0.504)	(0.255)	
	High	0.001	0.761***	-0.009	0.378**	-0.187*	0.747***	-0.112	0.802
		(0.002)	(0.050)	(0.156)	(0.197)	(0.065)	(0.266)	(0.166)	
	Low	0.002	0.700***	0.404**	-0.284	-0.134	-0.789*	-0.637**	0.654
		(0.004)	(0.066)	(0.181)	(0.312)	(0.106)	(0.335)	(0.313)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 5: Refinitiv's ESG Scoring Methodology

This table illustrates Refinitivs ESG materiality matrix. The matrix shows a detailed overview of the different pillars with their corresponding categories and themes Refinitiv uses to evaluate a firm's ESG-score. Refinitiv, 2022

Refinitiv's ESG scoring approach		
Pillars	Catagories	Themes
Environmental	Emission	Emissions Waste Biodiversity Environmental manager
	Innovation	Product innovation Green revenues, research and development (R&D) and capital expenditures (CapEx)
	Resource use	Water Energy Sustainable packaging Environmental supply chian
Social	Community	Equally important to all industry groups, hence a median weight of five is assigned to all
	Human rights	Human Rights
	Product responsibility	Responsible marketing Product wuality Data privacy
	Workforce	Diversity and inclusion Career development and training Working conditions Health and safety
Governance	CSR strategy	CSR strategy ESG reporting and transparency
	Management	Structure (independence, diversity, committees) Compensation
	Shareholder	Shareholder rights Takeover defencses

Table 6: Descriptive Statistic for Negative Screening Approach

This table presents the descriptive statistics for the negative screen from January 1st, 2011, to December 31st, 2021. We state the total number of observations (N), the minimum value (Min), the maximum value (Max), the mean value (Mean), the standard deviation (Std), the performance measure Sharpe Ratio, the skewness (Skew) and the excess kurtosis (Kurt). The main portfolio of interest is the long-short strategy, long 10% the top-rated and short 10% the bottom-rated in terms of the ESG-score. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor.

Descriptive Statistic for Negative Screening Approach

Portfolio	N	Min	Max	Mean	Std	Sharpe Ratio	Skew	Kurt
Neg H	132	-0.205	0.205	0.007	0.045	0.012	-0.311	5.683
Neg L	132	-0.116	0.175	0.006	0.048	0.011	0.537	1.704
Neg HL	132	-0.191	0.060	0.001	0.033	0.001	-2.031	9.351
MKT	132	-0.154	0.166	0.007	0.047	0.013	-0.345	1.335
SMB	132	-0.051	0.047	0.002	0.017	0.001	-0.038	0.440
HML	132	-0.113	0.108	-0.003	0.027	-0.004	0.282	3.070
MOM	132	-0.184	0.089	0.008	0.032	0.010	-1.477	9.225
RMW	132	-0.039	0.035	0.004	0.016	0.003	-0.329	-0.166
CMA	132	-0.044	0.030	-0.002	0.014	-0.001	-0.291	0.502

Table 7: Descriptive Statistic for Best-in-class Approach

This table presents the descriptive statistics for the BIC screen from January 1st, 2011, to December 31st, 2021. We state the total number of observations (N), the minimum value (Min), the maximum value (Max), the mean value (Mean), the standard deviation (Std), the performance measure Sharpe Ratio, the skewness (Skew) and the excess kurtosis (Kurt). The main portfolio of interest is the long-short strategy, long 10% the top-rated and short 10% the bottom-rated in terms of the ESG-score. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor.

Descriptive Statistic for Best-in-class Approach

Portfolio		N	Min	Max	Mean	Std	Sharpe Ratio	Skew	Kurt
ESG	High	132	-0.194	0.200	0.006	0.043	0.453	-0.271	5.328
	Low	132	-0.105	0.151	0.011	0.044	0.841	0.447	1.585
	High-Low	132	-0.158	0.051	-0.005	0.029	-0.609	-1.507	6.244
E	High	132	-0.207	0.217	0.006	0.047	0.432	-0.215	4.862
	Low	132	-0.196	0.162	0.008	0.046	0.607	-0.500	3.739
	High-Low	132	-0.063	0.070	-0.002	0.024	-0.311	-0.030	0.091
S	High	132	-0.176	0.206	0.007	0.042	0.360	-0.059	5.105
	Low	132	-0.108	0.168	0.010	0.045	0.691	0.390	1.826
	High-Low	132	-0.146	0.050	-0.003	0.029	-0.690	-1.527	5.652
G	High	132	-0.225	0.178	0.005	0.044	0.499	-0.736	6.477
	Low	132	-0.193	0.260	0.011	0.049	0.796	0.639	6.628
	High-Low	132	-0.230	0.045	-0.006	0.026	-0.486	-4.913	41.842
MKT		132	-0.154	0.166	0.007	0.047	0.493	-0.345	1.335
SMB		132	-0.051	0.047	0.002	0.017	0.370	-0.038	0.440
HML		132	-0.113	0.108	-0.003	0.027	-0.404	0.282	3.070
MOM		132	-0.184	0.089	0.008	0.032	0.831	-1.477	9.225
RMW		132	-0.039	0.035	0.004	0.016	0.908	-0.329	-0.166
CMA		132	-0.044	0.030	-0.002	0.014	-0.560	-0.291	0.502

Table 8: Correlation Matrix for Positive Screening Approach

This table presents the correlation matrix using Pearson correlation for the positive screening approach. The main portfolio of interest is the long-short strategy, long 10% the top-rated and short 10% the bottom-rated in terms of the ESG, E, S, and G-score from 2011-2021. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor.

Correlation Matrix for Positive Screening Approach

Portfolio	ESG_H	ESG_L	ESG_HL	E_H	E_L	E_HL	S_H	S_L	S_HL	G_H	G_L	G_HL	MKT	SMB	HML	MOM	RMW	CMA
ESG_ H	1.000	0.791	0.312	0.986	0.874	0.285	0.980	0.793	0.196	0.971	0.821	0.092	0.883	0.005	0.475	-0.525	-0.267	0.048
ESG_L	0.791	1.000	-0.334	0.790	0.889	-0.135	0.785	0.975	-0.379	0.812	0.836	-0.207	0.786	0.267	0.271	-0.391	-0.286	-0.194
ESG_HL	0.312	-0.334	1.000	0.292	-0.034	0.648	0.291	-0.292	0.890	0.235	-0.033	0.464	0.139	-0.408	0.310	-0.202	0.033	0.375
E_H	0.986	0.790	0.292	1.000	0.870	0.319	0.978	0.794	0.189	0.961	0.814	0.090	0.886	0.014	0.476	-0.522	-0.284	0.037
E_L	0.874	0.889	-0.034	0.870	1.000	-0.189	0.860	0.890	-0.135	0.905	0.882	-0.135	0.864	0.330	0.343	-0.414	-0.245	-0.156
E_HL	0.285	-0.135	0.648	0.319	-0.189	1.000	0.295	-0.128	0.637	0.174	-0.074	0.440	0.103	-0.608	0.290	-0.245	-0.095	0.374
S_H	0.980	0.785	0.291	0.978	0.860	0.295	1.000	0.787	0.233	0.950	0.815	0.070	0.876	0.001	0.475	-0.511	-0.267	0.076
S_L	0.793	0.975	-0.292	0.794	0.890	-0.128	0.787	1.000	-0.416	0.807	0.811	-0.167	0.809	0.236	0.290	-0.400	-0.298	-0.180
S_HL	0.196	-0.379	0.890	0.189	-0.135	0.637	0.233	-0.416	1.000	0.128	-0.078	0.367	0.016	-0.372	0.244	-0.122	0.075	0.396
G_H	0.971	0.812	0.235	0.961	0.905	0.174	0.950	0.807	0.128	1.000	0.853	0.083	0.872	0.117	0.403	-0.476	-0.201	-0.035
G_L	0.821	0.836	-0.033	0.814	0.882	-0.074	0.815	0.811	-0.078	0.853	1.000	-0.450	0.765	0.290	0.285	-0.379	-0.189	-0.160
G_HL	0.092	-0.207	0.464	0.090	-0.135	0.440	0.070	-0.167	0.367	0.083	-0.450	1.000	0.031	-0.353	0.145	-0.091	0.018	0.245
MKT	0.883	0.786	0.139	0.886	0.864	0.103	0.876	0.809	0.016	0.872	0.765	0.031	1.000	0.082	0.442	-0.444	-0.320	-0.017
SMB	0.005	0.267	-0.408	0.014	0.330	-0.608	0.001	0.236	-0.372	0.117	0.290	-0.353	0.082	1.000	0.037	-0.037	-0.096	-0.179
HML	0.475	0.271	0.310	0.476	0.343	0.290	0.475	0.290	0.244	0.403	0.285	0.145	0.442	0.037	1.000	-0.619	-0.802	0.657
MOM	-0.525	-0.391	-0.202	-0.522	-0.414	-0.245	-0.511	-0.400	-0.122	-0.476	-0.379	-0.091	-0.444	-0.037	-0.619	1.000	0.476	-0.211
RMW	-0.267	-0.286	0.033	-0.284	-0.245	-0.095	-0.267	-0.298	0.075	-0.201	-0.189	0.018	-0.320	-0.096	-0.802	0.476	1.000	-0.501
CMA	0.048	-0.194	0.375	0.037	-0.156	0.374	0.076	-0.180	0.396	-0.035	-0.160	0.245	-0.017	-0.179	0.657	-0.211	-0.501	1.000

Table 9: Correlation Matrix Negative Screening Approach

This table presents the correlation matrix using Pearson correlation for the negative screening approach. The main portfolio of interest is the long-short strategy, long 10% the top-rated and short 10% the bottom-rated in terms of the ESG-score from 2011-2021. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor.

Correlation Matrix Negative Screening Approach									
Portfolio	H	L	HL	MKT	SMB	HML	MOM	RMW	CMA
H	1.000	0.744	0.281	0.873	0.056	0.429	-0.496	-0.221	-0.002
L	0.744	1.000	-0.431	0.752	0.253	0.293	-0.386	-0.317	-0.175
HL	0.281	-0.431	1.000	0.099	-0.288	0.159	-0.115	0.158	0.249
MKT	0.873	0.752	0.099	1.000	0.082	0.442	-0.444	-0.320	-0.017
SMB	0.056	0.253	-0.288	0.082	1.000	0.037	-0.037	-0.096	-0.179
HML	0.429	0.293	0.159	0.442	0.037	1.000	-0.619	-0.802	0.657
MOM	-0.496	-0.386	-0.115	-0.444	-0.037	-0.619	1.000	0.476	-0.211
RMW	-0.221	-0.317	0.158	-0.320	-0.096	-0.802	0.476	1.000	-0.501
CMA	-0.002	-0.175	0.249	-0.017	-0.179	0.657	-0.211	-0.501	1.000

Table 10: Correlation Matrix Best-In-Class Approach

This table presents the Pearson correlation matrix for the BIC screening approach. The main portfolio of interest is the long-short strategy, long 10% the top-rated and short 10% the bottom-rated in terms of the ESG-score from 2011-2021. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor.

Correlation Matrix Best-In-Class Approach

Portfolio	ESG_L	ESG_S	ESG_LS	E_L	E_S	E_LS	S_L	S_S	S_LS	G_L	G_S	G_LS	MKT	SMB	HML	MOM	RMW	CMA
ESG_ H	1,000	0,786	0,306	0,989	0,881	0,281	0,988	0,790	0,257	0,970	0,815	0,119	0,887	-0,003	0,465	-0,515	-0,264	0,039
ESG_L	0,786	1,000	-0,348	0,793	0,899	-0,151	0,778	0,979	-0,349	0,800	0,830	-0,201	0,787	0,274	0,268	-0,370	-0,288	-0,196
ESG_LH	0,306	-0,348	1,000	0,279	-0,048	0,659	0,300	-0,309	0,927	0,239	-0,043	0,490	0,134	-0,427	0,293	-0,211	0,043	0,361
E_H	0,989	0,793	0,279	1,000	0,875	0,316	0,982	0,798	0,235	0,961	0,807	0,119	0,884	0,002	0,468	-0,525	-0,284	0,032
E_L	0,881	0,899	-0,048	0,875	1,000	-0,184	0,874	0,893	-0,074	0,907	0,877	-0,107	0,869	0,303	0,347	-0,429	-0,247	-0,144
E_LH	0,281	-0,151	0,659	0,316	-0,184	1,000	0,281	-0,129	0,621	0,173	-0,081	0,449	0,091	-0,589	0,269	-0,226	-0,093	0,347
S_H	0,988	0,778	0,300	0,982	0,874	0,281	1,000	0,785	0,282	0,961	0,815	0,104	0,880	0,033	0,484	-0,534	-0,274	0,064
S_L	0,790	0,979	-0,309	0,798	0,893	-0,129	0,785	1,000	-0,373	0,792	0,818	-0,191	0,801	0,252	0,282	-0,398	-0,294	-0,195
S_LH	0,257	-0,349	0,927	0,235	-0,074	0,621	0,282	-0,373	1,000	0,213	-0,046	0,451	0,078	-0,340	0,289	-0,183	0,045	0,397
G_H	0,970	0,800	0,239	0,961	0,907	0,173	0,961	0,792	0,213	1,000	0,850	0,103	0,862	0,126	0,393	-0,466	-0,190	-0,043
G_L	0,815	0,830	-0,043	0,807	0,877	-0,081	0,815	0,818	-0,046	0,850	1,000	-0,436	0,762	0,292	0,280	-0,375	-0,185	-0,163
G_LH	0,119	-0,201	0,490	0,119	-0,107	0,449	0,104	-0,191	0,451	0,103	-0,436	1,000	0,033	-0,336	0,143	-0,087	0,025	0,234
MKT	0,887	0,787	0,134	0,884	0,869	0,091	0,880	0,801	0,078	0,862	0,762	0,033	1,000	0,082	0,442	-0,444	-0,320	-0,017
SMB	-0,003	0,274	-0,427	0,002	0,303	-0,589	0,033	0,252	-0,340	0,126	0,292	-0,336	0,082	1,000	0,037	-0,037	-0,096	-0,179
HML	0,465	0,268	0,293	0,468	0,347	0,269	0,484	0,282	0,289	0,393	0,280	0,143	0,442	0,037	1,000	-0,619	-0,802	0,657
MOM	-0,515	-0,370	-0,211	-0,525	-0,429	-0,226	-0,534	-0,398	-0,183	-0,466	-0,375	-0,087	-0,444	-0,037	-0,619	1,000	0,476	-0,211
RMW	-0,264	-0,288	0,043	-0,284	-0,247	-0,093	-0,274	-0,294	0,045	-0,190	-0,185	0,025	-0,320	-0,096	-0,802	0,476	1,000	-0,501
CMA	0,039	-0,196	0,361	0,032	-0,144	0,347	0,064	-0,195	0,397	-0,043	-0,163	0,234	-0,017	-0,179	0,657	-0,211	-0,501	1,000

Table 11: Correlation Matrix between the Dependent Variables and the Residuals

This table presents the correlation matrix for the dependent variables and the residuals based on the ESG-scored portfolio. The main portfolio of interest is the long-short strategy, long 10% the top-rated and short 10% the bottom-rated in terms of the ESG-score from 2011-2021. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor.

Correlation Matrix between the Dependent Variables and the Residuals						
Portfolio	Corr (MKT, u)	Corr(SMB, u)	Corr (HML, u)	Corr (MOM, u)	Corr(RMW, u)	Corr (CMA, u)
High-Low	-3.455e-17	-4.706e-17	-1.895e-17	3.828e-17	2.110e-17	2.096e-18
High	-2.201e-17	-3.304e-17	-6.453e-17	-3.623e-17	3.852e-17	-2.090e-17
Low	2.546e-17	2.344e-17	-6.346e-17	2.842e-18	3.647e-17	-4.674e-17

Figure 5: Return Performance of Positive Screened Portfolios 2011-2021

This figure plots all the returns from January 2011 to December 2021 for all positively screened portfolios based on ESG, E, S, and G scores. In addition, we included the STOXX Europe 600 as a benchmark. We observe that the long-short portfolios move opposite the purely high and low ESG-rated portfolios. In addition, the portfolios based on the lowest ESG scores perform on average better than the other portfolios.

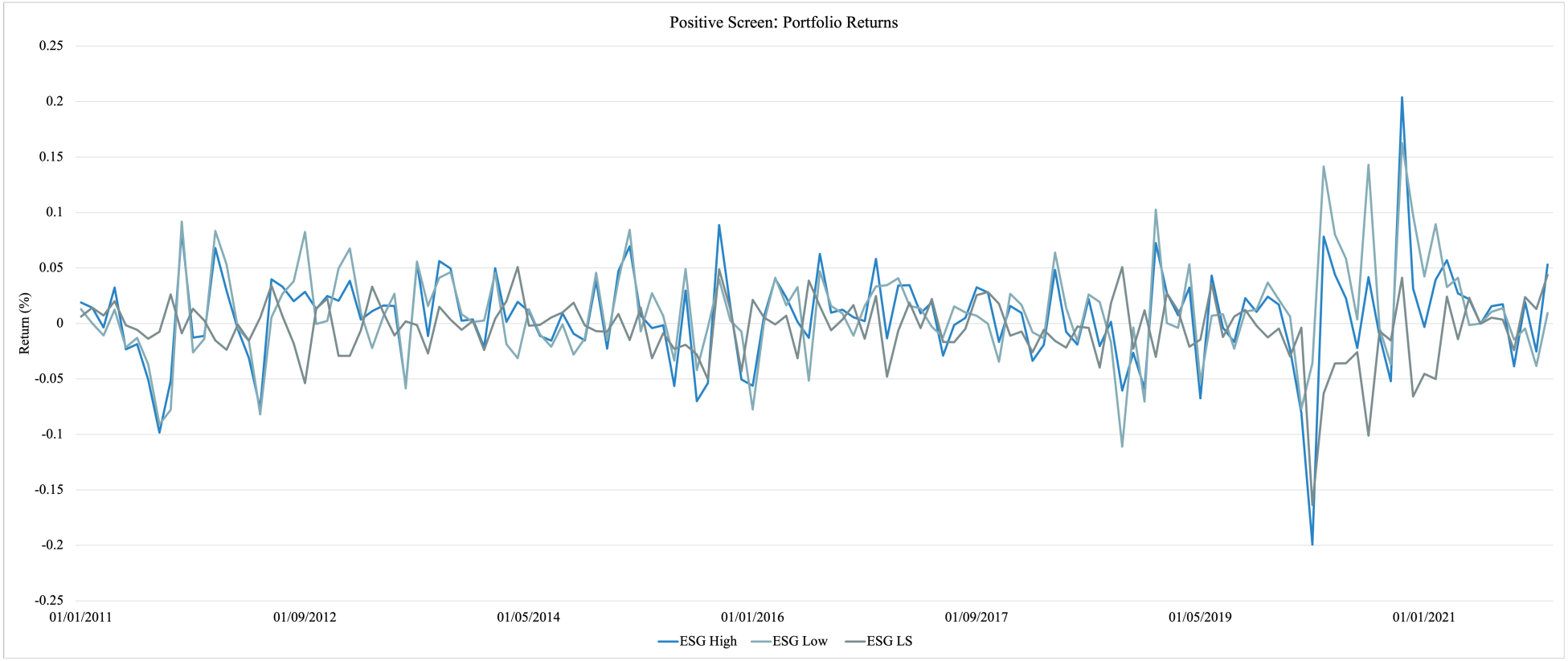


Figure 6: Sub-Industries and Numbers of ESG-scored Companies from 2011-2021

This figure illustrates the increase in the number of companies within the different economic sectors in our portfolios from 2011-2021. We observe that the economic sectors: technology, consumer cyclicals, healthcare, and industrials highly dominate our portfolios.

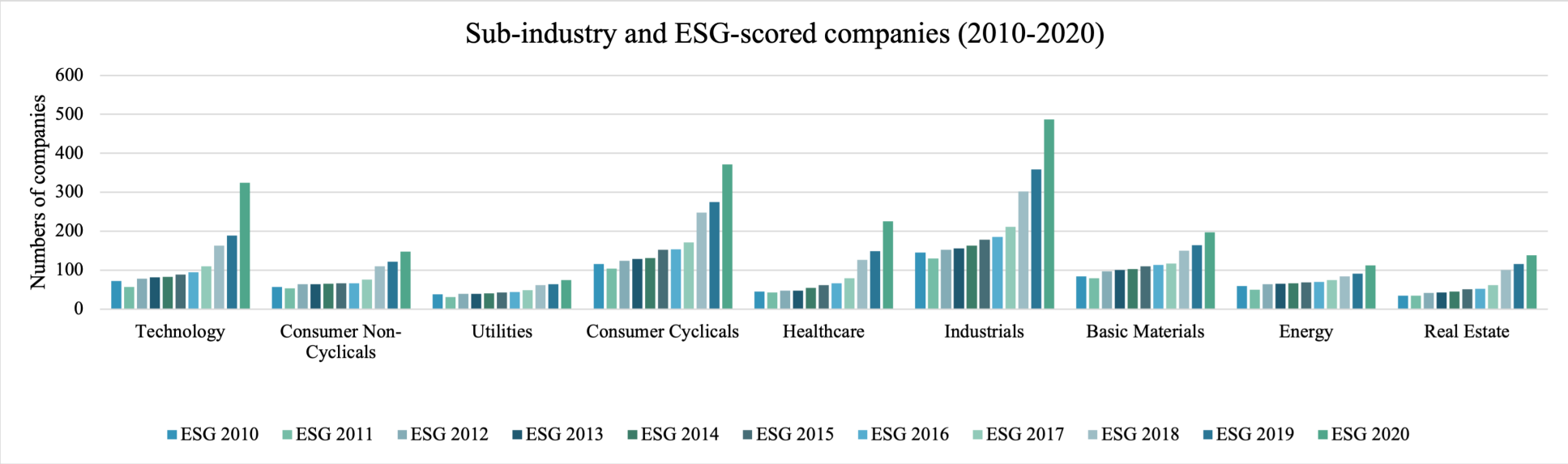


Figure 7: Increased number of ESG-rated companies

This figure illustrates the number of ESG-rated companies in Europe from 2010 to 2020.

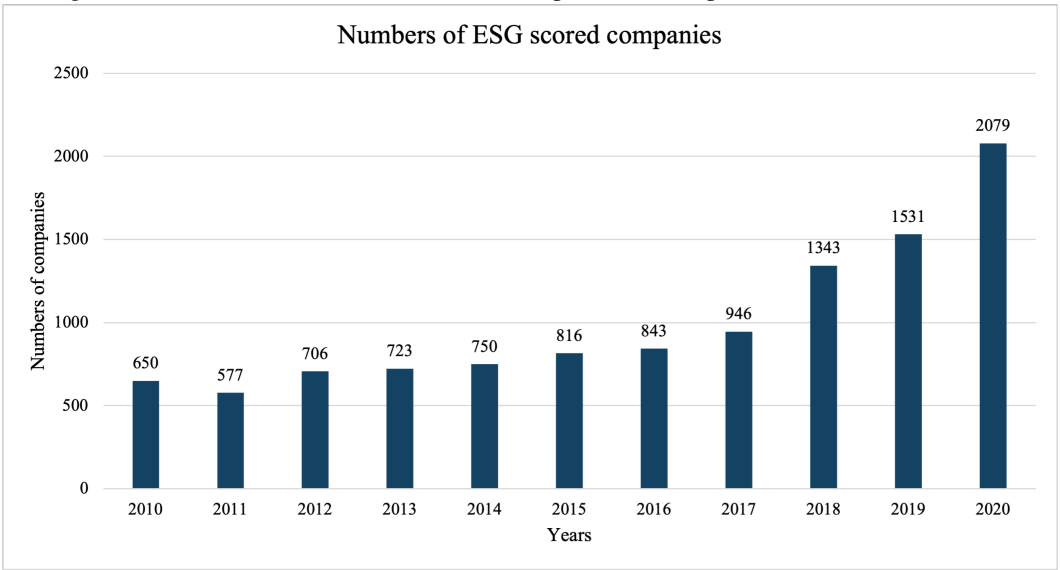
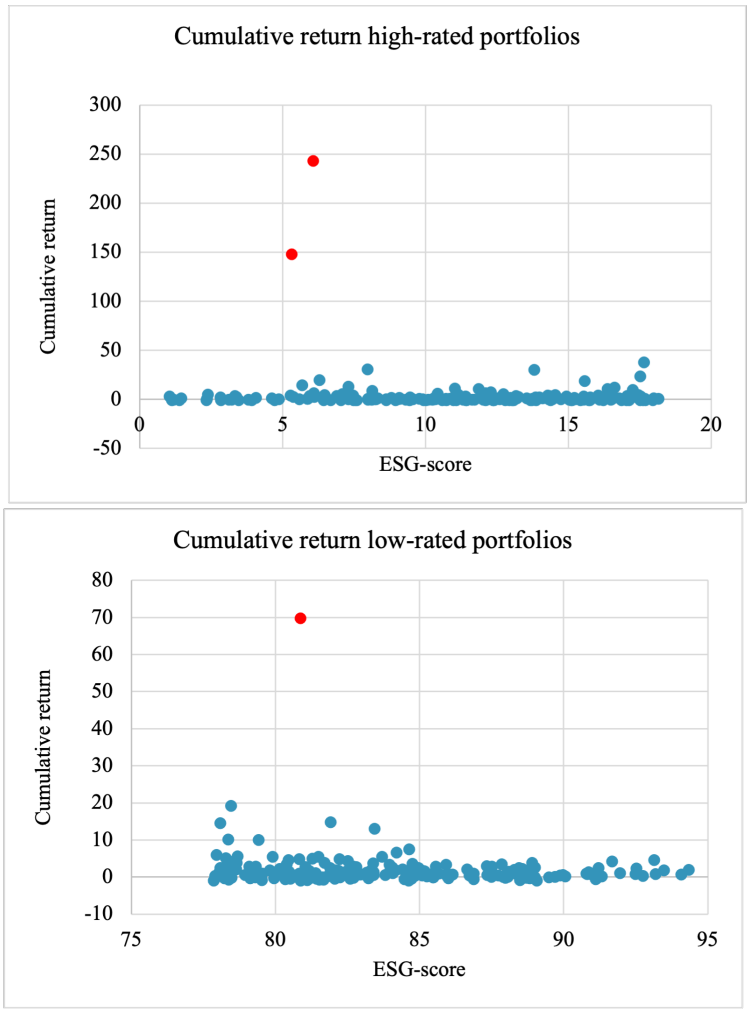


Figure 8: Outliers in the Dataset

This figure presents all the companies including in the high and low-rated portfolios, and their presentative ESG score combined with their cumulative return. We observe three potential outliers in our dataset: Sartorius AG, Fortnox AB, and Chemometec A/S.



7.2 Appendix B – Additional Regression Results

Table 12: Regression Results Value-Weighted, Positive Screened Portfolios
This table shows the result from cross-sectional regressions of VW, positive screened portfolios based on ESG, E, S, and G scores. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Value-Weighted, Positive Screened Portfolios 10%										
Model	Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
C-4	ESG	High-Low	-0.003	0.753***	-0.178	0.038	-0.208***			0.274
			(0.002)	(0.056)	(0.181)	(0.088)	(0.075)			
		High	-0.002	0.020	-0.716***	0.032	-0.015			0.806
			(0.002)	(0.067)	(0.211)	(0.022)	(0.072)			
		Low	0.005	0.733***	0.538***	-0.278	-0.194**			0.678
			(0.003)	(0.062)	(0.151)	(0.186)	(0.089)			
	E	High-Low	-0.002	-0.131***	-0.984***	0.334***	-0.064			0.483
			(0.002)	(0.042)	(0.081)	(0.068)	(0.055)			
		High	0.004**	0.665***	-0.556***	-0.012	-0.066			0.783
			(0.002)	(0.043)	(0.144)	(0.068)	(0.060)			
		Low	0.006***	0.796***	0.428***	-0.347***	-0.131*			0.756
			(0.002)	(0.041)	(0.123)	(0.079)	(0.077)			
	S	High-Low	-0.001	-0.049	-0.646***	0.325	0.015			0.211
			(0.003)	(0.074)	(0.204)	(0.225)	(0.076)			
		High	0.004**	0.729***	-0.181	0.064	-0.172*			0.791
			(0.002)	(0.053)	(0.177)	(0.107)	(0.099)			
		Low	0.005	0.779***	0.465***	-0.260	-0.186**			0.700
			(0.003)	(0.063)	(0.145)	(0.202)	(0.085)			
	G	High-Low	-0.003	-0.200***	-0.706***	0.060	-0.045			0.380
			(0.002)	(0.036)	(0.092)	(0.067)	(0.063)			
		High	0.003	0.653***	-0.444***	-0.102	-0.103			0.739
			(0.002)	(0.059)	(0.158)	(0.076)	(0.081)			
		Low	0.006***	0.853***	0.262	-0.162*	-0.058			0.761
			(0.002)	(0.054)	(0.170)	(0.09)	(0.058)			
FF-6	ESG	High-Low	-0.006**	0.041	-0.572***	0.730**	-0.041	1.259***	0.418**	0.470
			(0.003)	(0.043)	(0.179)	(0.335)	(0.073)	(0.363)	(0.167)	
		High	0.001	0.741***	-0.144	0.359*	-0.198***	0.616**	-0.042	0.834
			(0.002)	(0.050)	(0.160)	(0.198)	(0.063)	(0.261)	(0.142)	
		Low	0.007***	0.700***	0.428***	-0.370	-0.157	-0.642***	-0.461***	0.707
			(0.002)	(0.062)	(0.148)	(0.242)	(0.099)	(0.199)	(0.225)	
	E	High-Low	-0.003	-0.108**	-0.906***	0.428***	-0.040	0.502***	0.317*	0.527
			(0.002)	(0.043)	(0.081)	(0.145)	(0.055)	(0.144)	(0.186)	
		High	0.003	0.659***	-0.525***	0.214	-0.062	0.469**	0.004	0.797
			(0.002)	(0.042)	(0.125)	(0.134)	(0.052)	(0.203)	(0.132)	
		Low	0.006***	0.767***	0.380***	-0.213	-0.102	-0.033	-0.313	0.761
			(0.002)	(0.042)	(0.134)	(0.217)	(0.084)	(0.240)	(0.214)	
	S	High-Low	-0.004*	-0.012	-0.477***	0.645**	-0.029	1.250***	0.602***	0.419
			(0.002)	(0.051)	(0.167)	(0.323)	(0.056)	(0.346)	(0.192)	
		High	-0.002	0.733***	-0.124	0.291	-0.178**	0.591***	0.128	0.810
			(0.002)	(0.050)	(0.147)	(0.195)	(0.085)	(0.212)	(0.149)	
		Low	0.002	0.660***	-0.378***	0.112	-0.112	-0.601**	-0.172*	0.728
			(0.002)	(0.050)	(0.128)	(0.151)	(0.069)	(0.237)	(0.183)	
	G	High-Low	-0.003*	-0.144***	-0.598***	-0.139	-0.103	0.216	0.639***	0.440
			(0.001)	(0.036)	(0.089)	(0.123)	(0.060)	(0.140)	(0.185)	
		High	0.002	0.660***	-0.378	0.112**	-0.112	0.610**	0.173	0.766
			(0.002)	(0.050)	(0.128)	(0.151)	(0.069)	(0.237)	(0.193)	
		Low	0.005**	0.804***	0.219	0.252	-0.001	0.393	-0.465	0.774
			(0.002)	(0.051)	(0.161)	(0.183)	(0.057)	(0.263)	(0.246)	
Significance level: (***) 1%, (**) 5%, (*) 10%										

Table 13: Regression Results Value-Weighted, Best-In-Class Screened Portfolios

This table shows the result from cross-sectional regressions of VW, BIC screened portfolios based on ESG. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced for January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heteroskedasticity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Value-Weighted, BIC Screened Portfolios 10%										
Model	Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
C-4	ESG	High-Low	-0.007***	-0.110*	-0.456***	0.794***	1.114***			0.242
			(0.002)	(0.057)	(0.168)	(0.183)	(0.220)			
		High	0.002	0.654***	-0.514***	0.178	0.495**			0.800
			(0.001)	(0.041)	(0.122)	(0.119)	(0.199)			
		Low	0.009***	0.765***	-0.579	-0.616***	-0.619***			0.593
			(0.002)	(0.053)	(0.187)	(0.189)	(0.203)			
	E	High-Low	-0.003**	-0.144***	-0.921***	0.447***	0.292			0.464
			(0.001)	(0.048)	(0.092)	(0.139)	(0.184)			
		High	0.002*	0.653***	-0.520***	0.185	0.325			0.784
			(0.001)	(0.038)	(0.132)	(0.128)	(0.219)			
		Low	0.005***	0.798***	0.401***	-0.261*	-0.032			0.738
			(0.002)	(0.049)	(0.142)	(0.153)	(0.224)			
	S	High-Low	-0.004***	-0.155**	-0.561***	0.515***	0.647***			0.292
			(0.001)	(0.066)	(0.109)	(0.194)	(0.216)			
		High	0.003**	0.659***	-0.458***	0.111	0.396			0.775
			(0.002)	(0.041)	(0.132)	(0.129)	(0.190)			
		Low	0.007***	0.815***	0.102	-0.404**	-0.250			0.703
			(0.002)	(0.061)	(0.109)	(0.164)	(0.230)			
	G	High-Low	-0.006*	-0.084***	-0.930***	0.036	0.013			0.073
			(0.004)	(0.096)	(0.254)	(0.271)	(0.292)			
		High	0.001	0.678***	-0.452***	0.223*	0.634**			0.762
			(0.002)	(0.046)	(0.144)	(0.134)	(0.247)			
		Low	0.008**	0.763***	0.478*	0.187	0.648*			0.280
			(0.004)	(0.099)	(0.244)	(0.277)	(0.367)			
FF-6	ESG	High-Low	-0.008***	-0.043	-0.377**	0.547**	1.089***	0.587*	0.0148	0.270
			(0.002)	(0.062)	(0.145)	(0.254)	(0.185)	(0.310)	(0.078)	
		High	0.002	0.656***	-0.506***	0.122	0.489**	0.063	-0.042	0.801
			(0.002)	(0.041)	(0.113)	(0.141)	(0.199)	(0.130)	(0.006)	
		Low	0.010***	0.699***	-0.129	-0.424	-0.599***	-0.523	-0.057	0.607
			(0.002)	(0.066)	(0.168)	(0.277)	(0.191)	(0.339)	(0.076)	
	E	High-Low	-0.003	-0.081	-0.838***	0.148***	0.261*	0.623**	-0.039	0.503
			(0.002)	(0.052)	(0.094)	(0.203)	(0.153)	(0.281)	(0.074)	
		High	0.003*	0.647***	-0.511***	0.077	0.314	0.469	-0.110**	0.789
			(0.001)	(0.040)	(0.123)	(0.147)	(0.215)	(0.160)	(0.052)	
		Low	0.006***	0.728***	0.326**	-0.070	0.052	-0.543*	-0.070	0.755
			(0.002)	(0.042)	(0.134)	(0.217)	(0.084)	(0.240)	(0.214)	
	S	High-Low	-0.004***	-0.079	-0.467***	0.204	0.615***	0.697***	-0.010	0.345
			(0.002)	(0.051)	(0.167)	(0.323)	(0.056)	(0.346)	(0.192)	
		High	0.004**	0.658***	-0.450***	0.040	-0.389**	0.069	-0.062	0.776
			(0.002)	(0.045)	(0.121)	(0.145)	(0.187)	(0.142)	(0.053)	
		Low	0.008***	0.738***	0.016	-0.164	-0.226	-0.627**	-0.051	0.726
			(0.002)	(0.050)	(0.113)	(0.182)	(0.204)	(0.283)	(0.055)	
	G	High-Low	-0.003*	-0.144***	-0.598***	-0.139	-0.103	0.216	0.639***	0.440
			(0.001)	(0.036)	(0.089)	(0.123)	(0.060)	(0.140)	(0.185)	
		High	0.002	0.681***	-0.439***	0.131	0.624**	0.107	-0.068	0.764
			(0.002)	(0.049)	(0.137)	(0.166)	(0.244)	(0.178)	(0.067)	
		Low	0.009*	0.732***	0.471	0.064	-0.653	0.025	-0.203	0.079
			(0.005)	(0.069)	(0.324)	(0.174)	(0.261)	(0.598)	(0.196)	

Significance level: (***) 1%, (**) 5%, (*) 10%

Table 14: Regression Results Value-Weighted, Negative Screened Portfolios

This table shows the result from cross-sectional regressions of VW, negative screened portfolios based on ESG. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in the previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Value-Weighted Negative Screened Portfolios									
Model	Portfolio	Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
C-4	High-Low	-0.001	-0.026	-0.544***	0.122	0.004			0.100
		(0.004)	(0.093)	(0.163)	(0.227)	(0.112)			
	High	0.005***	0.659***	-0.045***	-0.081	-0.136**			0.752
		(0.002)	(0.053)	(0.140)	(0.079)	(0.066)			
	Low	0.006*	0.661***	0.094	-0.204	-0.140			0.460
		(0.003)	(0.071)	(0.124)	(0.215)	(0.101)			
FF-6	High-Low	-0.003	0.013	-0.435***	0.435	-0.015	0.956**	0.320	0.160
		(0.004)	(0.071)	(0.160)	(0.346)	(0.097)	(0.369)	(0.371)	
	High	0.004**	0.651***	-0.413***	0.184	-0.131	0.557**	0.011	0.771
		(0.002)	(0.050)	(0.119)	(0.146)	(0.053)	(0.212)	(0.152)	
	Low	0.007**	0.638***	0.022	-0.250	-0.115	-0.399	-0.309	0.470
		(0.003)	(0.062)	(0.138)	(0.346)	(0.09)	(0.338)	(0.454	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 15: Regression Results Alternative Cut-Off (5%), Positive Screened Portfolios

This table shows the result from cross-sectional regressions of EW, positive screened portfolios based on ESG, E, S, and G scores. The High-Low portfolios consist of long the 5% highest-rated ESG firms and short the bottom-rated ESG 5% firms from 2011-2021. The high portfolios are long the 5% highest-rated ESG firms, and the low portfolios are 5% long the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Alternative cut-offs (5 %), Positive Screen									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	0.000**	0.070	-0.406	1.156*	-0.040	2.013***	0.426	0.306
		(0.005)	(0.074)	(0.336)	(0.645)	(0.151)	(0.728)	(0.273)	
	High	0.001	0.723***	-0.297*	0.303*	-0.198***	0.572**	-0.078	0.800
		(0.002)	(0.055)	(0.161)	(0.169)	(0.059)	(0.227)	(0.136)	
	Low	0.001***	0.652***	0.109	-0.854	-0.158	-1.442**	-0.505*	0.454
		(0.005)	(0.077)	(0.284)	(0.550)	(0.169)	(0.566)	(0.298)	
E	High-Low	-0.001	0.074	-0.742***	0.279*	-0.157*	0.443***	0.532*	0.441
		(0.002)	(0.057)	(0.149)	(0.166)	(0.091)	(0.130)	(0.272)	
	High	0.002	0.814***	-0.218	0.380**	-0.216***	0.586**	-0.058	0.808
		(0.002)	(0.055)	(0.178)	(0.190)	(0.071)	(0.231)	(0.161)	
	Low	0.003	0.741***	0.524***	0.101	-0.060	0.142	-0.590***	0.769
		(0.002)	(0.055)	(0.159)	(0.163)	(0.080)	(0.219)	(0.216)	
S	High-Low	-0.009*	-0.020	-0.262	1.041*	-0.034	1.964***	0.656**	0.272
		(0.005)	(0.074)	(0.304)	(0.624)	(0.116)	(0.682)	(0.314)	
	High	0.002	0.711***	-0.242	0.228	-0.198**	0.545***	0.082	0.780
		(0.001)	(0.054)	(0.149)	(0.208)	(0.082)	(0.208)	(0.185)	
	Low	0.011**	0.731***	0.019	-0.813	-0.163	-1.420***	-0.579*	0.514
		(0.005)	(0.075)	(0.257)	(0.513)	(0.146)	(0.540)	(0.314)	
G	High-Low	-0.007**	-0.057	-0.550***	0.544**	0.079	0.859***	0.372	0.104
		(0.003)	(0.059)	(0.187)	(0.245)	(0.109)	(0.248)	(0.230)	
	High	0.003	0.764***	0.220	-0.542**	-0.074	0.979***	-0.129	0.733
		(0.003)	(0.062)	(0.236)	(0.266)	(0.080)	(0.374)	(0.281)	
	Low	-0.004	0.706***	0.770**	-0.002	-0.153	0.119	-0.500*	0.403
		(0.003)	(0.080)	(0.273)	(0.257)	(0.101)	(0.278)	(0.257)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 16: Regression Results Alternative Cut-Off (5%), Best-In-Class Screened Portfolios

This table shows the result from cross-sectional regressions of EW, BIC screened portfolios based on ESG-score. The High-Low portfolios consist of long the 5% highest-rated ESG firms and short the bottom-rated ESG 5% firms from 2011-2021. The high portfolios are long the 5% highest-rated ESG firms, and the low portfolios are 5% long the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heteroskedasticity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Alternative cut-offs (5%), BIC Screen									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.011**	0.077	-0.374	1.274*	2.070***	0.407	-0.055	0.336
		(0.005)	(0.070)	(0.361)	(0.659)	(0.765)	(0.251)	(0.140)	
	High	0.001	0.701***	-0.244	0.481**	-0.729***	0.182	-0.219***	0.792
		(0.002)	(0.061)	(0.169)	(0.192)	(0.063)	(0.240)	(0.176)	
	Low	0.012**	0.624***	0.128	-0.792	-1.340**	-0.589**	-0.165	0.461
		(0.006)	(0.094)	(0.346)	(0.672)	(0.178)	(0.740)	(0.470)	
E	High-Low	0.000	0.064	-0.733***	0.204**	0.229*	0.358*	-0.187**	0.403
		(0.002)	(0.043)	(0.126)	(0.100)	(0.119)	(0.190)	(0.081)	
	High	0.002	0.800***	-0.207	0.384**	0.0491**	-0.061	-0.257***	0.807
		(0.002)	(0.060)	(0.192)	(0.177)	(0.232)	(0.176)	(0.067)	
	Low	0.002	0.736***	0.525***	0.179	0.261	-0.420**	-0.069	0.775
		(0.002)	(0.061)	(0.137)	(0.159)	(0.203)	(0.201)	(0.067)	
S	High-Low	-0.012**	-0.010	-0.317	1.212**	2.001***	0.396	-0.090	0.292
		(0.005)	(0.079)	(0.297)	(0.580)	(0.663)	(0.295)	(0.106)	
	High	0.000	0.722***	-0.204	0.346*	0.588***	-0.033	-0.223	0.790
		(0.002)	(0.055)	(0.151)	(0.187)	(0.209)	(0.163)	(0.794)	
	Low	0.012**	0.712***	0.113	-0.865*	-1.412***	-0.429	-0.133	0.479
		(0.005)	(0.082)	(0.255)	(0.509)	(0.329)	(0.329)	(0.147)	
G	High-Low	-0.010**	0.366***	-1.082***	0.544	0.050	-0.698**	0.272	0.178
		(0.004)	(0.119)	(0.237)	(0.367)	(0.339)	(0.311)	(0.125)	
	High	-0.003	0.736***	0.151	0.592**	1.042***	-0.216	-0.078	0.762
		(0.002)	(0.055)	(0.198)	(0.235)	(0.332)	(0.268)	(0.074)	
	Low	-0.007*	0.370***	1.234***	0.048	0.992***	0.481	-0.351***	0.216
		(0.004)	(0.131)	(0.303)	(0.325)	(0.312)	(0.398)	(0.096)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 17: Regression Results Alternative Cut-Off (5%), Negative Screened Portfolios

This table shows the result from cross-sectional regressions of EW, negative screened portfolios based on ESG, E, S, and G scores. The High-Low portfolios consist of long the 5% highest-rated ESG firms and short the bottom-rated ESG 5% firms from 2011-2021. The high portfolios are long the 5% highest-rated ESG firms, and the low portfolios are 5% long the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in the previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Alternative cut-offs (15%), Positive Screen									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.006	0.139	-0.147	1.114	0.003	2.514***	0.829**	0.257
		(0.007)	(0.09)	(0.410)	(0.788)	(0.162)	(0.905)	(0.371)	
	High	0.002	0.699***	-0.102	0.427**	-0.186***	0.897***	-0.106	0.750
		(0.002)	(0.0616)	(0.169)	(0.192)	(0.063)	(0.240)	(0.176)	
	Low	0.008	0.559***	0.045	-0.687	-0.189	-1.616**	-0.935**	0.372
		(0.006)	(0.094)	(0.346)	(0.672)	(0.178)	(0.740)	(0.470)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 18: Regression Results Alternative Cut-Off (15%), Positive Screened Portfolios

This table shows the result from cross-sectional regressions of EW, positive screened portfolios based on ESG, E, S, and G scores. The High-Low portfolios consist of long the 15% highest-rated ESG firms and short the bottom-rated ESG 15% firms from 2011-2021. The high portfolios are long for the 15% highest-rated ESG firms, and the low portfolios are 15% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Alternative cut-offs (15%), Positive Screen									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.003*	0.023	-0.593***	0.509**	-0.043	0.865***	0.386***	0.516
		(0.002)	(0.033)	(0.132)	(0.192)	(0.043)	(0.225)	(0.136)	
	High	0.001	0.777***	-0.071	0.313	-0.182***	0.571**	0.000	0.825
		(0.002)	(0.054)	(0.164)	(0.196)	(0.068)	(0.254)	(0.142)	
	Low	0.004**	0.746***	0.521***	-0.196	-0.139	-0.294**	-0.386*	0.777
		(0.002)	(0.057)	(0.125)	(0.174)	(0.086)	(0.133)	(0.205)	
E	High-Low	0.001	0.024	-0.690***	0.244**	-0.103**	0.402***	0.342***	0.565
		(0.001)	(0.039)	(0.079)	(0.093)	(0.047)	(0.061)	(0.129)	
	High	0.001	0.782***	-0.108	0.329*	-0.191***	0.541**	-0.124	0.822
		(0.002)	(0.054)	(0.165)	(0.189)	(0.063)	(0.235)	(0.145)	
	Low	0.000	0.757***	0.582***	0.085	-0.087	0.139	-0.466**	0.826
		(0.002)	(0.049)	(0.133)	(0.194)	(0.064)	(0.228)	(0.188)	
S	High-Low	-0.003	0.025	-0.533***	0.389*	-0.078*	0.862***	0.527**	0.444
		(0.002)	(0.038)	(0.116)	(0.215)	(0.042)	(0.236)	(0.159)	
	High	0.001	0.758***	-0.075	0.276	-0.195***	0.502**	0.007	0.834
		(0.002)	(0.042)	(0.145)	(0.180)	(0.066)	(0.204)	(0.133)	
	Low	0.004**	0.732***	0.458***	-0.113	-0.117	-0.360**	-0.520**	0.782
		(0.002)	(0.054)	(0.107)	(0.174)	(0.074)	(0.147)	(0.236)	
G	High-Low	-0.006**	0.050	-0.311**	0.500	-0.008	0.810***	0.374***	0.211
		(0.003)	(0.036)	(0.138)	(0.305)	(0.093)	(0.295)	(0.131)	
	High	0.000	0.746***	0.196	0.348	-0.204***	0.683**	-0.138	0.807
		(0.002)	(0.052)	(0.170)	(0.215)	(0.058)	(0.309)	(0.152)	
	Low	-0.006**	0.695***	0.508***	-0.152	-0.195*	-0.127	-0.512**	0.606
		(0.003)	(0.060)	(0.161)	(0.225)	(0.112)	(0.154)	(0.206)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 19: Regression Results Alternative Cut-Off (15%), Best-In-Class Screened Portfolios

This table shows the result from cross-sectional regressions of EW, BIC screened portfolios based on ESG, E, S, and G scores. The High-Low portfolios consist of long the 15% highest-rated ESG firms and short the bottom-rated ESG 15% firms from 2011-2021. The high portfolios are long for the 15% highest-rated ESG firms, and the low portfolios are 15% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Alternative cut-offs (15%), BIC Screen									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.004*	0.025	-0.621***	0.506*	0.886***	0.395**	-0.097*	0.502
		(0.002)	(0.033)	(0.138)	(0.219)	(0.259)	(0.165)	(0.050)	
	High	0.000	0.760***	-0.111	0.341*	0.580**	-0.075	-0.199***	0.834
		(0.002)	(0.049)	(0.151)	(0.189)	(0.248)	(0.147)	(0.071)	
	Low	0.004**	0.734***	0.511***	-0.165	-0.305**	-0.470**	-0.111	0.777
		(0.002)	(0.053)	(0.115)	(0.179)	(0.1515)	(0.232)	(0.090)	
E	High-Low	0.000	0.026	-0.684***	0.171	0.366***	0.418***	-0.126**	0.540
		(0.001)	(0.032)	(0.075)	(0.112)	(0.129)	(0.145)	(0.050)	
	High	0.000	0.788***	-0.105	0.306*	0.515**	-0.029	-0.214***	0.822
		(0.002)	(0.054)	(0.165)	(0.184)	(0.233)	(0.160)	(0.068)	
	Low	0.000	0.761***	0.577***	0.134	0.148	-0.448**	-0.087	0.832
		(0.002)	(0.052)	(0.127)	(0.168)	(0.219)	(0.205)	(0.057)	
S	High-Low	-0.004*	0.008	-0.561***	0.548**	1.026***	0.441**	-0.060*	0.482
		(0.002)	(0.043)	(0.113)	(0.224)	(0.235)	(0.186)	(0.044)	
	High	0.001	0.749***	-0.082	0.346*	0.569**	-0.044	-0.177**	0.829
		(0.002)	(0.045)	(0.143)	(0.196)	(0.226)	(0.154)	(0.085)	
	Low	0.005**	0.741***	0.479***	-0.202	-0.456***	-0.485*	-0.116	0.780
		(0.002)	(0.057)	(0.110)	(0.183)	(0.149)	(0.257)	(0.075)	
G	High-Low	-0.008**	0.440***	-0.661***	0.306	-0.055	-0.565*	0.162	0.299
		(0.004)	(0.106)	(0.188)	(0.429)	(0.451)	(0.321)	(0.115)	
	High	0.000	0.738***	0.177	0.323	0.628**	-0.186	-0.204	0.812
		(0.002)	(0.050)	(0.168)	(0.223)	(0.311)	(0.144)	(0.055)	
	Low	-0.008**	0.298**	0.838***	0.017	0.683**	0.378	-0.367***	0.286
		(0.003)	(0.125)	(0.199)	(0.324)	(0.289)	(0.360)	(0.100)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 20: Regression Results Alternative Cut-Off (15%), Negative Screened Portfolios

This table shows the result from cross-sectional regressions of EW, negative screened portfolios based on ESG-scores. The High-Low portfolios consist of long the 15% highest-rated ESG firms and short the bottom-rated ESG 15% firms from 2011-2021. The high portfolios are long for the 15% highest-rated ESG firms, and the low portfolios are 15% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Alternative cut-offs (15%), Negative Screen									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	0.000	0.069	-0.440***	0.477***	-0.035	1.043***	0.395**	0.317
		(0.002)	(0.049)	(0.115)	(0.173)	(0.078)	(0.198)	(0.218)	
	High	0.001	0.779***	0.063	0.374*	-0.186***	0.617**	-0.146	0.817
		(0.002)	(0.050)	(0.160)	(0.203)	(0.064)	(0.265)	(0.186)	
	Low	-0.001	0.710***	0.503***	-0.103	-0.150*	-0.425**	-0.542*	0.746
		(0.003)	(0.055)	(0.132)	(0.200)	(0.086)	(0.172)	(0.276)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 21: Regression Results Sub-period 2011-2016, Positive Screened Portfolios

This table shows the result from cross-sectional regressions of EW, positive screened portfolios based on ESG, E, S, and G scores. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2016. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Positive Screen **Sub Period 2011-2016 — Equally-Weighted —**									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	0.000 (0.000)	0.034 (0.050)	-0.760*** (0.125)	0.269 (0.194)	-0.124* (0.051)	0.617*** (0.177)	0.247 (0.234)	0.535
	High	0.006** (0.002)	0.648*** (0.054)	-0.498*** (0.162)	-0.105 (0.130)	-0.019 (0.070)	0.319 (0.216)	-0.106 (0.188)	0.799
	Low	0.006*** (0.002)	0.683*** (0.069)	0.262 (0.187)	-0.374* (0.205)	0.105 (0.058)	-0.937*** (0.137)	-0.353 (0.267)	0.793
E	High-Low	0.002 (0.002)	0.015 (0.075)	-0.901 (0.164)	0.122 (0.181)	-0.146* (0.076)	0.254 (0.220)	0.401 (0.284)	0.488
	High	0.006* (0.003)	0.724*** (0.06)	-0.496** (0.208)	-0.057 (0.187)	-0.033 (0.08)	0.360 (0.296)	-0.171 (0.165)	0.776
	Low	0.004 (0.002)	0.708*** (0.056)	0.405** (0.159)	-0.180 (0.143)	-0.112 (0.093)	-0.614** (0.240)	-0.572** (0.272)	0.808
S	High-Low	-0.001 (0.002)	-0.103 (0.063)	-0.653*** (0.143)	0.275 (0.215)	0.0062 (0.078)	0.640** (0.246)	0.403 (0.299)	0.483
	High	0.004* (0.002)	0.642*** (0.054)	-0.419** (0.189)	0.075 (0.193)	0.069 (0.079)	-0.083 (0.186)	0.109 (0.165)	0.770
	Low	0.005** (0.002)	0.745*** (0.082)	0.233 (0.154)	-0.199 (0.190)	-0.063 (0.072)	-0.724*** (0.226)	-0.293 (0.316)	0.823
G	High-Low	0.000** (0.002)	-0.034 (0.057)	-0.402*** (0.104)	-0.081 (0.155)	-0.131** (0.059)	0.203 (0.180)	0.352 (0.215)	0.299
	High	0.004 (0.002)	0.675*** (0.031)	-0.265** (0.128)	-0.214* (0.118)	-0.060 (0.062)	-0.180 (0.243)	-0.160 (0.250)	0.779
	Low	-0.004* (0.002)	0.641*** (0.071)	0.136 (0.189)	-0.132 (0.183)	0.071 (0.080)	-0.393** (0.163)	-0.512** (0.209)	0.737
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 22: Regression Results Sub-period 2016-2021, Positive Screened Portfolios

This table shows the result from cross-sectional regressions of EW, positive screened portfolios based on ESG, E, S, and G scores. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2016-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Positive Screen **Sub Period 2016-2021 — Equally-Weighted —**									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.008**	0.098	-0.541**	0.979**	-0.121	1.340***	0.395**	0.517
		(0.003)	(0.068)	(0.249)	(0.423)	(0.099)	(0.368)	(0.160)	
	High	0.001**	0.735***	0.106	0.388**	-0.286***	0.678***	0.054	0.879
		(0.002)	(0.045)	(0.124)	(0.187)	(0.074)	(0.230)	(0.218)	
	Low	0.009**	0.636***	0.647***	-0.590*	-0.408***	-0.662**	-0.341	0.696
		(0.003)	(0.095)	(0.168)	(0.306)	(0.095)	(0.270)	(0.289)	
E	High-Low	0.000	-0.086	-0.735***	0.415***	-0.069	0.364***	0.098	0.559
		(0.002)	(0.048)	(0.074)	(0.089)	(0.074)	(0.082)	(0.137)	
	High	0.002*	0.774***	0.119	0.450**	-0.288	0.637	-0.092	0.887
		(0.002)	(0.053)	(0.119)	(0.173)	(0.06)	(0.225)	(0.165)	
	Low	0.002	0.783***	0.850***	0.030	-0.222***	0.260	-0.201	0.875
		(0.002)	(0.062)	(0.099)	(0.185)	(0.073)	(0.216)	(0.242)	
S	High-Low	-0.007*	0.063	-0.488*	0.715*	0.005	1.136**	0.516**	0.433
		(0.003)	(0.077)	(0.258)	(0.425)	(0.087)	(0.376)	(0.185)	
	High	0.002*	0.726***	0.089	0.164	-0.366***	-0.533**	0.179	0.884
		(0.001)	(0.050)	(0.132)	(0.187)	(0.058)	(0.219)	(0.206)	
	Low	0.009**	0.663***	0.577***	-0.549*	-0.371***	-0.603**	-0.337	0.693
		(0.003)	(0.084)	(0.171)	(0.312)	(0.096)	(0.273)	(0.251)	
G	High-Low	-0.007***	0.009	-0.577***	0.501**	0.101	0.736***	0.300	0.228
		(0.003)	(0.033)	(0.194)	(0.162)	(0.089)	(0.092)	(0.189)	
	High	-0.001	0.735***	-0.508**	-0.432**	-0.204**	0.934***	0.099	0.851
		(0.002)	(0.063)	(0.162)	(0.198)	(0.077)	(0.246)	(0.239)	
	Low	-0.006*	0.727***	1.086***	-0.069	-0.306***	0.198	-0.200	0.684
		(0.003)	(0.074)	(0.206)	(0.220)	(0.072)	(0.239)	(0.239)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 23: Regression Results Sub-period 2011-2016, Best-In-Class Screened Portfolios

This table shows the result from cross-sectional regressions of EW, BIC portfolios based on ESG, E, S, and G scores. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2016. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

BIC Screen **Sub Period 2011-2016 — Equally Weighted —**									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.002	-0.013	-0.766***	0.232	0.697	0.335	-0.151**	0.556
		(0.002)	(0.052)	(0.151)	(0.144)	(0.1745)	(0.260)	(0.057)	
	High	0.005**	0.682***	-0.479***	-0.152**	-0.335	-0.107	-0.001	0.806
		(0.002)	(0.042)	(0.178)	(0.131)	(0.218)	(0.176)	(0.071)	
	Low	0.007***	0.695***	0.287	-0.385**	-1.032***	-0.442**	0.152**	0.797
		(0.002)	(0.067)	(0.185)	(0.181)	(0.189)	(0.311)	(0.06)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 24: Regression Results Sub-period 2016-2021, Best-In-Class Screened Portfolios

This table shows the result from cross-sectional regressions of EW, BIC portfolios based on ESG, E, S, and G scores. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2016-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heteroskedasticity robust standard errors.

BIC-Screen **Sub Period 2016-2021 — Equally-Weighted —**									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.008**	-0.077	-0.604**	0.968**	1.270***	0.254	0.085	0.483
		(0.003)	(0.069)	(0.248)	(0.407)	(0.371)	(0.173)	(0.098)	
	High	0.001	0.732***	0.044	0.382**	0.665**	0.027	-0.269	0.881
		(0.002)	(0.044)	(0.125)	(0.181)	(0.228)	(0.221)	(0.068)	
	Low	0.009**	0.655***	0.652***	-0.586*	-0.605**	-0.227	-0.354**	0.687
		(0.004)	(0.092)	(0.165)	(0.301)	(0.269)	(0.335)	(0.085)	
E	High-Low	-0.001	-0.008	-0.759***	0.321***	0.252***	0.077	-0.112	0.512
		(0.001)	(0.046)	(0.078)	(0.105)	(0.088)	(0.160)	(0.080)	
	High	0.001	0.770***	0.069	0.326*	0.506**	-0.077	-0.345***	0.878
		(0.002)	(0.050)	(0.141)	(0.169)	(0.227)	(0.201)	(0.066)	
	Low	0.002	0.778***	0.829***	0.005	0.253	-0.148	-0.233***	0.856
		(0.002)	(0.068)	(0.137)	(0.203)	(0.223)	(0.298)	(0.071)	
S	High-Low	-0.007**	0.079	-0.422	0.807*	1.221***	0.563**	0.005	0.443
		(0.003)	(0.061)	(0.264)	(0.426)	(0.362)	(0.213)	(0.089)	
	High	0.002*	0.753***	0.171	0.260	0.644***	0.210	-0.370***	0.889
		(0.001)	(0.048)	(0.126)	(0.173)	(0.205)	(0.214)	(0.072)	
	Low	0.009***	0.660***	0.593***	-0.547*	-0.577**	-0.353	0.375***	0.685
		(0.003)	(0.084)	(0.180)	(0.321)	(0.288)	(0.323)	(0.082)	
G	High-Low	-0.010**	0.139	-0.858***	0.597***	0.118	-0.793**	0.084	0.140
		(0.004)	(0.057)	(0.104)	(0.217)	(0.209)	(0.365)	(0.128)	
	High	-0.002	0.728***	0.546***	0.407*	0.958***	0.098	-0.230***	0.848
		(0.002)	(0.062)	(0.173)	(0.210)	(0.251)	(0.251)	(0.074)	
	Low	0.008*	0.589***	1.404***	-0.190	0.840**	0.891	-0.314***	0.522
		(0.004)	(0.140)	(0.186)	(0.276)	(0.327)	(0.550)	(0.096)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 25: Regression Results Sub-period 2011-2016, Negative Screened Portfolios
This table shows the result from cross-sectional regressions of EW, negative portfolios based on ESG-scores. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2016. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Negative Screen **Sub Period 2011-2016 — Equally Weighted —**									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	0.008***	-0.101*	-0.812***	-0.003	-0.060	0.329	0.019	0.369
		(0.001)	(0.059)	(0.154)	(0.242)	(0.052)	(0.232)	(0.333)	
	High	0.006**	0.678***	-0.350*	-0.116	0.015	-0.023	-0.336	0.737
		(0.003)	(0.050)	(0.185)	(0.159)	(0.075)	(0.271)	(0.203)	
	Low	-0.002	0.780***	0.461**	-0.113	-0.075	-0.561**	-0.355	0.726
		(0.002)	(0.079)	(0.203)	(0.222)	(0.092)	(0.248)	(0.465)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 26: Regression Results Sub-period 2016-2021, Negative Screened Portfolios
This table shows the result from cross-sectional regressions of EW, negative portfolios based on ESG-scores. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2016-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Negative Screen **Sub Period 2016-2021 — Equally Weighted —**									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.007	-0.160**	-0.301	0.885*	0.070	1.485***	0.453*	0.412
		(0.006)	(0.074)	(0.300)	(0.491)	(0.133)	(0.260)	(0.260)	
	High	0.001	0.754***	0.264**	0.360**	-0.295***	0.772***	0.113	0.883
		(0.002)	(0.050)	(0.126)	(0.175)	(0.064)	(0.192)	(0.192)	
	Low	0.008	0.594***	0.565**	-0.524	-0.366	-0.713*	-0.334	0.608
		(0.005)	(0.093)	(0.223)	(0.398)	(0.130)	(0.379)	(0.367)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 27: Regression Results Excluding Outliers, Positive Screened Portfolios

This table shows the result from cross-sectional regression of EW, positive screen, excluding extreme outliers. We identified Sartorius AG, Fortnox AB, and Chemometec A/S as outliers and excluded them from the portfolios. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Positive Screen
Robustness Check — Excluding Outliers—

Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.005*	0.042	-0.574***	0.729**	-0.043	1.258***	0.407**	0.470
		(0.003)	(0.044)	(0.177)	(0.177)	(0.072)	(0.357)	(0.160)	
	High	0.001	0.741***	-0.145	0.359*	-0.197***	0.618**	-0.040	0.824
		(0.002)	(0.050)	(0.159)	(0.197)	(0.062)	(0.260)	(0.142)	
	Low	0.006***	0.698***	0.428**	-0.369	-0.153	-0.640***	-0.446**	0.706
		(0.002)	(0.061)	(0.147)	(0.238)	(0.096)	(0.193)	(0.222)	
E	High-Low	0.000	0.020	-0.814***	0.246**	-0.117*	0.383***	0.321*	0.514
		(0.002)	(0.047)	(0.104)	(0.110)	(0.060)	(0.089)	(0.175)	
	High	0.001	0.805***	-0.151	0.385**	-0.196***	0.553**	-0.135	0.821
		(0.002)	(0.052)	(0.169)	(0.188)	(0.060)	(0.252)	(0.132)	
	Low	0.001	0.784***	0.662***	0.138	-0.079	0.170	-0.456**	0.829
		(0.002)	(0.049)	(0.131)	(0.179)	(0.074)	(0.221)	(0.215)	
S	High-Low	-0.004*	-0.011	-0.479***	0.651**	-0.032	1.263***	0.602***	0.426
		(0.002)	(0.051)	(0.163)	(0.321)	(0.054)	(0.342)	(0.193)	
	High	0.002	0.734***	-0.121	0.302	-0.176**	0.608**	0.136	0.811
		(0.002)	(0.049)	(0.147)	(0.195)	(0.083)	(0.212)	(0.149)	
	Low	0.006**	0.744***	0.358**	-0.348	-0.144	-0.654***	-0.466*	0.730
		(0.002)	(0.061)	(0.143)	(0.246)	(0.089)	(0.217)	(0.240)	
G	High-Low	-0.005***	0.015	-0.480***	0.218	-0.036	0.474***	0.318*	0.191
		(0.002)	(0.036)	(0.109)	(0.159)	(0.069)	(0.145)	(0.160)	
	High	-0.002	0.759***	0.151	0.352*	-0.168***	0.761*	-0.134	0.799
		(0.002)	(0.051)	(0.179)	(0.211)	(0.047)	(0.298)	(0.191)	
	Low	-0.003*	0.744***	0.632***	0.134	-0.132*	0.287	-0.452	0.655
		(0.002)	(0.071)	(0.211)	(0.220)	(0.072)	(0.256)	(0.209)	

Significance level: (***) 1%, (**) 5%, (*) 10%

Table 28: Regression Results Excluding Outliers, Best-In-Class Screened Portfolios

When excluding extreme outliers, this table shows the result from cross-sectional regression of EW, BIC screen. We identified Sartorius AG, Fortnox AB and Chemometec A/S as outliers and excluded them from the portfolios. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in the previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

BIC Screen **Robustness Check — Excluding Outliers —**									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.005**	0.039	-0.630***	0.705**	1.242***	0.378**	-0.061	0.461
		(0.002)	(0.041)	(0.173)	(0.315)	(0.342)	(0.187)	(0.071)	
	High	0.001	0.750***	-0.173	0.337*	-0.579**	-0.056	-0.177	0.827
		(0.002)	(0.043)	(0.152)	(0.187)	(0.249)	(0.144)	(0.061)	
	Low	0.006**	0.711***	0.456**	-0.367	-0.662***	-0.435	-0.115	0.707
		(0.002)	(0.059)	(0.144)	(0.232)	(0.191)	(0.263)	(0.095)	
E	High-Low	0.000	0.0150	-0.770***	0.221**	-0.102*	0.316***	0.263	0.467
		(0.001)	(0.039)	(0.098)	(0.100)	(0.054)	(0.092)	(0.171)	
	High	0.001	0.794***	-0.184	0.304*	-0.216***	0.471**	-0.114	0.817
		(0.002)	(0.051)	(0.169)	(0.175)	(0.063)	(0.235)	(0.125)	
	Low	0.001	0.779***	0.585***	0.083	-0.113	0.155	-0.377**	0.823
		(0.002)	(0.051)	(0.149)	(0.176)	(0.068)	(0.207)	(0.217)	
S	High-Low	-0.004*	0.012	-0.444**	0.684**	-0.067	1.315***	0.607***	0.422
		(0.002)	(0.049)	(0.178)	(0.328)	(0.060)	(0.349)	(0.187)	
	High	0.002	0.751***	-0.053	0.337*	-0.219**	0.643***	0.066	0.821
		(0.002)	(0.048)	(0.148)	(0.195)	(0.086)	(0.227)	(0.156)	
	Low	0.006***	0.738***	0.391***	-0.346	-0.152*	-0.672***	-0.541**	0.725
		(0.002)	(0.058)	(0.140)	(0.250)	(0.087)	(0.224)	(0.254)	
G	High-Low	-0.005**	0.015	-0.447***	0.265	-0.033	0.526***	0.280*	0.180
		(0.002)	(0.035)	(0.101)	(0.162)	(0.067)	(0.153)	(0.155)	
	High	-0.002	0.754***	0.177	0.369	-0.159**	0.792**	-0.155	0.784
		(0.002)	(0.054)	(0.190)	(0.230)	(0.061)	(0.315)	(0.179)	
	Low	0.003	0.738***	-0.625***	0.103	-0.126**	0.265	-0.436**	0.650
		(0.002)	(0.070)	(0.200)	(0.218)	(0.075)	(0.230)	(0.219)	
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 29: Regression Results Excluding Outliers, Negative Screened Portfolios

This table shows the result from cross-sectional regression of EW, negative screen, excluding extreme outliers. We identified Sartorius AG, Fortnox AB and Chemometec A/S as outliers and excluded them from the portfolios. The High-Low portfolios consist of long the 10% highest-rated ESG firms and short the bottom-rated ESG 10% firms from 2011-2021. The high portfolios are long for the 10% highest-rated ESG firms, and the low portfolios are 10% long for the bottom-rated ESG firms. The portfolio composition is rebalanced in January each year based on the ESG score from December in the previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Negative Screen **Robustness Check — Excluding Outliers —**									
Portfolio		Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
ESG	High-Low	-0.001 (0.004)	0.068 (0.059)	-0.408* (0.225)	0.655 (0.407)	-0.058 (0.076)	1.533*** (0.498)	0.515** (0.253)	0.329
	High	0.000 (0.002)	0.760*** (0.049)	-0.001 (0.156)	0.337* (0.197)	-0.187*** (0.064)	-0.747*** (0.266)	-0.112 (0.166)	0.802
	Low	-0.001 (0.003)	0.692*** (0.066)	0.399** (0.179)	-0.277 (0.207)	-0.129 (0.103)	-0.786** (0.307)	-0.628* (0.334)	0.652
Significance level: (***) 1%, (**) 5%, (*) 10%									

Table 30: Regression Results Randomness Test for Positive Screen

This table shows the result from cross-sectional regressions for a randomness test of portolio construction based on ESG-scores. Where the portfolios consist of 10% the firms from 2011-2021, who have a ESG-score. Consequently, The portfolio composition is rebalanced in January each year based on the ESG score from December in the previous year. Additionally, we have the Fama-French factors, including momentum: MKT is the excess market return, SMB is the small-minus-big factor, HML is the high-minus-low factor, and MOM is the momentum factor, RMA is the robust-minus-weak factor, and CMA is the conservative-minus-aggressive factor. The standard errors are adjusted for serial correlation and heterogeneity by using Newey West's (1987) autocorrelation and heteroskedasticity robust standard errors.

Randomness Test for Positive Screen								
Model	Alpha	MKT	SMB	HML	MOM	RMW	CMA	R^2
C-4	0.002 (0.002)	0.813*** (0.055)	0.312** (0.142)	-0.020 (0.095)	-0.147*** (0.056)			0.813
FF-6	0.001 (0.002)	0.786*** (0.567)	0.294** (0.139)	0.223 (0.155)	-0.122** (0.566)	0.265 (0.222)	-0.239 (0,160)	0.817
Significance level: (***) 1%, (**) 5%, (*) 10%								