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ABSTRACT

This article challenges factor models widely used to explain stock returns. For European firms involved in corporate social responsibility (CSR) actions, we find a risk premium associated with extra-financial ratings priced by the market (that is, environmental, social, and governance [ESG] ratings). This premium is calculated as the excess return of low-rated firms compared to high-rated firms. To describe rated firms' returns, we propose a parsimonious two-factor model that includes both the market factor and this premium. Unlike the CAPM, three-, or five-factor models, our model is validated by the Gibbons, Ross, and Shanken (1989) test. Our results lead to many managerial implications related to portfolio management, asset pricing, and corporate financial and investing decisions.

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G12

Keywords:

Asset pricing

Risk factors

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1. Motivation

How informative are environmental, social, and governance (henceforth ESG) ratings for financial markets? This study aims to shed light on how European financial markets consider ESG ratings as a proxy of firms' corporate social responsibility (henceforth CSR) by showing the existence of an ESG-rating-linked risk premium that proves to be significant in explaining stock returns.

The pressure for corporate accountability is increasing over time. Indeed, investors nowadays are looking not only at the financial performance of a company but also at the way firms meet their social responsibilities. Fatemi and Fooladi (2013) suggest a paradigm shift from the current approach of shareholder wealth maximization to a sustainable value creation framework, within which all social and environmental costs and benefits are explicitly considered. The CSR concept is linked to Bowen's seminal book *Social Responsibilities of the Businessman*, published in 1953, but it remains a topical issue. With the expansion of large corporations and the publication of key articles (Carroll, 1999; Freeman, 1984; among others), the topic has become popular and of interest to professional and academic communities. In 2001, the European Commission defined CSR as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with stakeholders on a voluntary basis." While the number of academic studies on this topic has increased substantially in recent years, no clear consensus has emerged on whether CSR is favorable or detrimental to stock returns or firm value (Chatterji, Durand, Levine, & Touboul, 2016; Orlitzky, Schmidt, & Rynes, 2003; Revelli & Viviani, 2015; van Beurden & Gössling, 2008). In a meta-analysis, Friede, Busch and Bassen (2015) investigate ESG ratings and financial performance using aggregated evidence from 2,200 individual studies. They conclude that the large majority of studies demonstrate a positive

relationship between ESG ratings and corporate financial performance (CFP), and this relationship appears stable over time.

Since the 2000s, the development of CSR and investor demand for information related to CSR practices have generated demand for extra-financial ratings. Essentially, such ratings involve evaluating the ESG policies of companies and then basing a grade on a grid of criteria adapted to each sector. Although CSR and ESG rating are often treated as if they were the same, and both involve the principles that corporations must protect society and the environment, their approach is not the same. CSR is about a company's engagement with its stakeholders and its commitment to socially and environmentally responsible practices. ESG ratings represent the environmental, social, and governance criteria used usually by investors to assess those practices. Investors' increasing awareness of CSR drives firms' orientation to CSR (Hutton, D'Antonio, & Johnsen, 1998) and also the development of ESG rating agencies (Avetisyan & Ferrary, 2013). Extra-financial ratings mainly come from specialized financial or extra-financial rating agencies such as MSCI,[1] Refinitiv,[2] or Vigeo-Eiris.[3] Still, given the complexity of measuring nonfinancial or ESG information, the validity of these ratings has been debated critically (Chatterji, Levine, & Toffel, 2009; Delmas, Etzion, & Nairn-Birch, 2013; among others).

A firm's level of CSR is measured according to several dimensions, including treating employees well, reducing the negative environmental impact of production, and philanthropic

[1] https://www.msci.com/esg-ratings

[2] https://www.refinitiv.com/en/financial-data/company-data/esg-research-data (Thomson Reuters)

[3] http://www.vigeo-eiris.com

activities. Thus, ESG factors cover a wide spectrum of issues that traditionally are not part of financial analysis, yet may have financial relevance. Indeed, many investors recognize that ESG information is vital to understanding corporate purpose, strategy, and management quality. According to *Forbes*,[4] thousands of professionals from around the world held the job title "ESG Analyst" in 2018, which shows that this market segment has nothing more to prove about its legitimacy and importance.

Increasingly, ESG ratings shape the investment decisions of institutional investors. Even as recent studies (Arjaliès & Bansal, 2018; Beunza & Ferraro, 2019) show how difficult it is to include qualitative issues in financial decisions, van Duuren, Plantinga, and Scholtens (2016) find that many conventional fund managers have already incorporated features of responsible investing into the investment process and that ESG information is being used to red-flag and to manage risk. According to the authors, although ESG investing puts strong emphasis on nonfinancial dimensions of corporate performance, in reality it provides a stock selection screen, and they conclude that it is in fact comparable to fundamental investing. Gibson, Glossner, Krueger, Matos, and Steffen (2020) show that investors who have signed the Principles for Responsible Investment[5] hold more than half of institutionally owned equity. Even if institutional investors are not CSR-oriented, empirical studies show that poor CSR can decrease the number of long-term institutional investors holding stock in a firm (Cox, Brammer, & Millington, 2004; Graves & Waddock, 1994; among others).

[4] https://www.forbes.com/sites/georgkell/2018/07/11/the-remarkable-rise-of-esg/#4edbc02d1695

[5] https://www.unpri.org/

Thus, a firm that is not undertaking action towards CSR, and therefore does not have an ESG score, exposes itself to the risk of not being included in the portfolios of responsible investors or environmentally and socially conscious funds. We can also hypothesize that firms with low ESG ratings are seen as riskier than those with good scores. If so, can we identify a risk premium related to the ESG rating level? Can we integrate this premium into a parsimonious asset pricing model to better describe stock returns?

Usually, investors consider financial and accounting information to make their investment decisions. However, socially responsible investing (SRI) aims to change the institutional context for firms by allowing investors to employ negative and positive screens that penalize firms that do not abide by CSR norms while benefiting firms that do (Hockerts & Moir, 2004). This means that a risk premium could reflect not only quantitative fundamentals (such as size, book-to-market ratio, investment, profitability, or momentum) but also the informative content of extra-financial ratings. If prices fully reflect all available information (Fama, 1970), then the ESG score, a proxy for CSR, should also be integrated into them. While most literature focuses on the relationships between corporate social performance (CSP[6]), on the one hand, and a firm's characteristics and financial performance, on the other, our objective is to assess how investors price the quality of extra-financial information.

Our study is related to the asset pricing literature developed over more than 50 years: the Capital Asset Pricing Model (henceforth CAPM) (Black, 1972; Lintner, 1965; Sharpe,

[6] The concepts of CSR and CSP are used interchangeably in empirical research (Barnett, 2007; Wood, 1991).

1964), the three-factor model of Fama and French (1993), the four-factor model (Carhart, 1997; Fama & French, 2012), and Fama and French's five-factor model (2018). Factor models consider size, book-to-market ratio, profitability, and investment as sources of risk that should be priced. Some of the proposed risk premiums are controversial because they have weak historical records, vary significantly over time, weaken after discovery, are concentrated among microcap stocks, or are weak internationally. Recently, Hou, Xue, and Zhang (2015) have identified 437 anomalies; Cochrane (2011) even speaks of a "zoo" of explanatory factors.

Researchers usually identify three general types of risks for a company: business risk, strategic risk, and financial risk. These factors emanate from financial and accounting criteria, and they mainly interest shareholders. Borrowing a term from Gibson et al. (2020), we speak about a fourth risk, "footprint risk," which will affect the other three in the medium or long term, but not necessarily in the short term. Bad environmental practices (groundwater pollution, use of plastic packaging, wasting water, etc.), social practices (summary dismissal, child employment, lack of social protection, etc.), or governance practices (gender inequality, lack of women in management positions, etc.) will immediately induce a low ESG rating even if the economic consequence will appear only on the medium horizon (penalties, lawsuits, etc.). Firms poorly rated on ESG criteria are considered as risky by stakeholders, and investors' confidence in them will slump. Bénabou and Tirole (2010) attest that CSR policies benefit firms in the long term. Fu, Tang, and Yan (2019) suggest that the link between CSP and financial performance has to be interpreted as long-term insurance. In line with Godfrey, Merrill, and Hansen (2009), Fu et al. (2019) conclude that CSR costs ensure that the firm maintains a strong reputation during hard economic times.

Using a European database of 18 countries with available extra-financial ratings, we propose a parsimonious two-factor model to describe ESG-rated firms' stock returns. One of these factors is a risk premium that we dub "bad minus good" (BMG), which represents the excess return of firms that have bad ESG scores with respect to firms that have good ones. We conduct several regressions to test whether the BMG factor significantly affects stock returns.

This paper proceeds as follows: section 2 introduces our database and method. Section 3 summarizes the results of empirical tests. Section 4 concludes and sheds light on the academic and managerial implications of this study.

2. Data

2.1. Database

We study monthly returns in 18 European countries from June 2002 to May 2015 (data are extracted from *Thomson Reuters Datastream*). Financial firms and stocks with negative book-to-market ratios are eliminated from the sample. Then we consider only firms with ESG scores, *in fine* 1,310 firms listed on the Euronext stock exchange.

2.2. ESG scores

ESG rating agencies provide investor-solicited and company-solicited ratings, advising, and consulting services. Driven by an increasing demand for ESG data, the number of these agencies has grown and the industry is consolidating. The academic community considers ESG data as indicators of CSR, and the data most commonly used in empirical

studies are from *KLD Research and Analytics*. In the *Rate the Raters 2019* report,[7] experts identify the four top rating agencies for quality and usefulness of data: *RobecoSAM*, *CDP*, *MSCI,* and *Sustainalytics*. Academic/think tank/NGO respondents in the same study also have positive views of the *RobecoSAM Corporate Sustainability Assessment; Bloomberg ESG Disclosure Scores; CDP Climate, Water, and Forests Scores*; *Thomson Reuters ESG Performance Scores* (a replacement for *ASSET4* scores); and *FTSE Russell's ESG Ratings*.

We use *ASSET4* ratings (replaced by Thomson Reuters ESG Scores) as indicators of CSR. The *ASSET4/ESG* framework allows rating and comparing companies on approximately 700 individual data points. These individual data points are combined into over 250 key performance indicators (KPIs), which are aggregated into 18 categories and thence into four pillars: economic (client loyalty, performance, shareholders' loyalty); environmental (resource reduction, emission reduction, product innovation); social (employment quality, health and safety, training and development, diversity, human rights, community, product responsibility); and corporate-governance (board structure, compensation policy, board functions, shareholders' rights, vision, and strategy). The four pillars are integrated into a single overall score that ranges between 0 and 100%. Indicators, categories, pillars, and overall score are calculated by equally weighting and z-scoring all underlying data points and comparing them against those of all companies in the ASSET4 universe. The resulting percentage is therefore a relative measure of performance, z-scored and normalized. We classify stocks by their overall score rather than focusing, like many empirical researchers, on a single pillar.

[7] https://sustainability.com/wp-content/uploads/2019/02/SA-RateTheRaters-2019-1.pdf

Table 1 gives descriptive statistics for the ESG scores of our sample over the whole period.

Insert Table 1 about here

The number of firms rated doubled between 2002 and 2015, while the average rating increased from 56 in 2002 to 71 in 2015. This improvement is due mainly to the increase of the scores in the lowest quartile (up to the 25^{th} percentile), from 23 in 2002 to 59 in 2015, while the third quartile rose only from 85 in 2002 to 91 in 2015. The box plots in Figure 1 illustrate the distribution of scores, which globally tend to improve.

Insert Figure 1 about here

Subsequently, we independently sort our stocks into three groups with respect to their *ASSET4* extra-financial ratings (good, neutral, and bad) and three groups with respect to each of three criteria: book-to-market ratio (Panel A), investment (Panel B), and operating profitability (Panel C). The book-to-market ratio is obtained by inverting market-to-book value (MTBV). Investment is defined as the annual change in gross property, plant, and equipment plus the annual change in inventories (Total Asset: WC02999) between $(t-2)$ and $(t-1)$, all divided by the lagged book value of total assets of $(t-2)$. Finally, operating profitability is revenues minus cost of goods sold, minus selling, general, and administrative

expenses (EBITDA: WC18198), minus interest expense (WC01251), all divided by book equity (WC05491).[8]

For each of these last three criteria, we then compose nine portfolios, each labeled with two letters (see Figure 2). The first letter describes how the stocks in the portfolio are classified on the given criterion, with coding as follows: book-to-market ratio is high (H), neutral (N), or low (L); investment is conservative (C), neutral (N), or aggressive (A); and operating profitability is robust (R), neutral (N), or weak (W). The second letter corresponds to the ESG rating: good (G), neutral (N), or bad (B). We construct our variables at the end of June in year t, using information from fiscal year-end $(t-1)$ from *Datastream*. The different strategies tested are value-scaled monthly. We report a holding period return from the beginning of June of year t to July of year $(t+1)$. The portfolios are recomposed for each year.

Insert Figure 2 about here

Figure 3 shows that the average *ASSET4* score for a portfolio of the top-scoring stocks (the top 30%) was 91/100 in 2002 and reached 93/100 in 2015, while the average score for a portfolio of the lowest-scoring stocks (the lowest 30%) was rated 15/100 in 2002 and roughly doubled to reach 33/100. Even though the global rating increased between 2002 and 2015, the average score of the bad portfolios in 2015 (33/100) remains far below that of the good ones even in 2002 (91/100). There is thus a consistent difference between "good" and "bad" ESG scores over the entire period.

[8] Terms in parentheses represent the variables extracted from *Datastream*.

Insert Figure 3 about here

2.3. Explanatory variables

Seven independent variables are used in our time series regressions. The market premium ($r_M - r_f$) is the excess return of the European market. The size factor (small-minus-big, or SMB) corresponds to the difference between the average monthly stock returns of three portfolios with small capitalizations (SL, SM, and SH) and three with large capitalizations (BL, BM, and BH). The value factor (high-minus-low, or HML) corresponds to the difference between the average monthly stock returns of the two portfolios with the highest book-to-market ratios (SH and BH) and the two with the lowest ratios (SL and BL). The momentum factor (winners-minus-losers, or WML) is the return of a long strategy on stocks with high past returns (winners) minus the return of a short strategy on firms with low past returns (losers). Every month t, stocks are sorted into three groups according to their cumulative returns between month $t - 12$ and $t - 2$, and the value-weighted returns of the winner and loser portfolios are computed. The momentum factor is thus the spread. The operating-profitability factor (robust-minus-weak, or RMW) corresponds to the difference between the average monthly stock returns of the two most profitable portfolios (SR and BR) and the two least profitable portfolios (SW and BW). In defining operating profitability, we follow Hou, Xue, and Zhang (2015, 2017) and Fama and French (2015, 2018). The investment factor (conservative-minus-aggressive, or CMA) corresponds to the difference between the average monthly returns on portfolios with high asset growth rates, designated aggressive (SA and BA), and portfolios with conservative firms (SC and BC). Like Chen and

Zhang (2010), Hou et al. (2015, 2017), and Fama and French (2018), we define the investment proxy as the annual change in gross property, plant, and equipment plus the annual change in inventories between $t-2$ and $t-1$, all divided by the lagged book value of total assets of $t-2$. Finally, the bad-minus-good factor (BMG) corresponds to the difference between the average monthly stock returns of the two portfolios of stocks with the best extra-financial scores (the top 30%) and the worst scores (the bottom 30%). Figure 4 shows the compounded returns from investments in portfolios with good versus bad ESG grades. Portfolio allocations at the beginning of $t+1$ are based on ratings at the end of t. Those strategies are maintained for one year and the portfolios are then rebalanced.[9] We extract the data for the first six factors ($r_M - r_f$, SMB, HML, WML, RMW, CMA) from Kenneth French's website;[10] only the bad-minus-good factor returns are our calculations.

Insert Figure 4 about here

2.4. Dependent variables

Three sets of portfolios, named "*panels,*" are used as dependent variables. As section 2.2. explains, at the end of each year, stocks are classified into three ESG groups with respect to their extra-financial rating (good, neutral, bad). Stocks are subsequently allocated independently to three book-to-market groups (Panel A), three investment groups (Panel B),

[9] As a robustness check, we construct the BMG portfolio with a breakpoint at 10%, following Kempf and Osthoff (2007). The results are similar.

[10] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/

and three operating profitability groups (Panel C). The intersections of the two sorts produce nine value-weighted portfolios per panel, corresponding to the left-hand-side variables.

2.5. Summary statistics

Table 2 indicates that, on average, firms with the highest monthly excess returns have bad ESG grades. Panel A reports 1.41% and 1.42% average monthly returns for firms with bad scores and high and low book-to-market ratios (B/M), respectively, compared to 0.65% and 0.94% for firms with good ESG grades (see Table 2). High-B/M firms with bad ESG grades are also the riskiest, with a 16.69% average monthly standard deviation, compared to 7.55% for firms with good ratings and high B/M. Moreover, firms with bad scores and low B/M have an average monthly standard deviation of 7.83%, whereas firms with good ratings and low B/M have an average monthly standard deviation of 3.76%. From the descriptive statistics, there is no obvious relationship between average return and B/M classification. However, value stocks seem to be riskier than growth stocks, on average. On average, the group of firms classified as neutral in both ESG score and B/M has the most members, whereas the group with bad ratings and high B/M has the fewest. Firms with good ESG ratings and low B/M seem to have higher average market capitalization. [11]

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[11] Even though bad–ESG firms tend to be smaller than good–ESG firms, the BMG factor does not merely proxy size. Securities rated by the Asset4 agency (1,310 companies) show much higher market capitalizations than those of the full European sample (12,144 stocks). The median capitalization of ESG-rated firms is 37 times that of the full sample in 2002, 51 times in 2007, and 78 times in 2015.

Insert Table 2 about here

For portfolios sorted by investment and ESG rating, the descriptive statistics in panel B of Table 2 show that, again, firms with the highest average returns have bad ratings. Moreover, firms considered to be aggressive always have higher average stock returns than conservative ones. However, aggressive firms are less risky than conservative firms, according to the average standard deviation. Firms with bad ESG ratings exhibit a higher average monthly standard deviation than firms with good ones. Again, on average, the group of firms classified as neutral in both ESG rating and investment has the most members, whereas the group of aggressive companies with good ratings has the fewest. Aggressive firms with good ESG ratings seem to have higher average market capitalization.

Turning to portfolios sorted by profitability and ESG rating, in Panel C, we again see a higher average monthly stock return for firms with bad ESG ratings than for those with good ratings. Indeed, we report 1.28% and 1.23% average monthly returns for firms with bad ratings and with robust and weak profitability, respectively, compared with 0.55% and 0.04% average monthly returns for firms with good ratings. Robust firms seem to have higher average returns and to be less risky (i.e., have lower return standard deviations) than weak ones. Firms with bad ESG ratings have, on average, a higher standard deviation than companies with good grades. On average, there are more robust companies with neutral scores, whereas the group of weak companies with good ESG ratings has the fewest members. Additional descriptive statistics are reported in Table 2, Panel C.

Table 3 reports the Pearson and Spearman correlation matrices of variables' monthly excess returns. The B/M–ESG portfolios appear to have low correlations with all seven independent variables. The bad-minus-good factor appears to be positively correlated with

the market, size, and value factors, but negatively linked to operating profitability, investment, and momentum; however, all of these correlations are low. We also note that the B/M-ESG portfolios have generally positive correlations with the market, value, and bad-minus-good factors, but generally negative correlations with size, operating profitability, investment, and momentum. Similar results appear for portfolios based on investment level and ESG score and for portfolios based on profitability and ESG score.

Insert Table 3 about here

Table 4 reports summary statistics for the factors' monthly returns. The bad-minus-good factor presents the highest average monthly return (1.19%) but also has the highest standard deviation among all the risk factors tested.

Insert Table 4 about here

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3. Results

3.1. Time series regression results for B/M–ESG portfolios

As Panels A of Tables 5, 6, 7, 8, and 9 show, the betas are positive and significant for all portfolios and for all asset pricing models tested; and for portfolios with low B/M, the betas increase when we add risk factors to the one-factor model. In Table 6 (Panel A), the size factor is negative and significant for firms with good ESG ratings, while it is positive and significant for those with bad ratings (except for portfolios with a high B/M ratio).

Insert Table 5 about here

Insert Table 6 about here

Except for firms with bad ESG grades, the value coefficients in Table 6 are positive and significant for value portfolios and negative and significant for growth portfolios. Moreover, as Table 7 (Panel A) shows, the momentum factor is almost always negative, and is significant both for portfolios with high B/M and good ESG ratings and for portfolios with low B/M and bad ratings. In Table 8 (Panel A), similar findings emerge for the operating-profitability and investment factors.

Insert Table 7 about here

Insert Table 8 about here

However, in Table 9 (Panel A), the coefficient on the bad-minus-good factor is positive and significant for portfolios of firms with bad grades, while it is negative and not always significant for portfolios of firms with good grades. This result shows that there exists an ESG premium for companies with bad CSR grades.

Insert Table 9 about here

Table 10 displays the adjusted R-squared for the CAPM, 3FM, 4FM, 5FM, and proposed ESG pricing models. Panel A indicates that the adjusted R-squared values are particularly improved for portfolios of firms with bad grades. For these portfolios, the highest adjusted R-squared values are obtained by the ESG model.

Insert Table 10 about here

3.2.Time series regression results for investment–ESG portfolios

Panels B of Tables 5, 6, 7, 8, and 9 show that the betas are positive and significant for all portfolios and for all asset pricing models tested. Table 6 (Panel B) reports negative and significant size coefficients for firms with good ESG ratings, but positive and significant ones for firms with bad ratings (except for conservative firms).

Except for firms with bad ESG grades, the value coefficients in Table 6 (Panel B) are positive and significant for conservative portfolios and negative and not significant for aggressive portfolios. As Table 7 (Panel B) shows, the momentum factor is negative and significant for conservative portfolios. The results for the operating-profitability and investment factors are similar to those for the momentum factor (see Table 8, Panel B).

The coefficient on the bad-minus-good factor is positive and significant for portfolios of firms with bad grades, while it is negative and not always significant for portfolios of firms with good grades (Table 9, Panel B). Table 10 (Panel B) reports that the adjusted R-squared values are higher for portfolios of firms with bad grades, especially for aggressive and conservative firms.

3.3. Time-series regression results for profitability–ESG portfolios

As Panels C of Tables 5, 6, 7, 8, and 9 show, the betas are positive and significant for all portfolios and for all asset pricing models tested. Except for firms with weak profitability, the size coefficient is negative and significant for firms with good CSR ratings, but positive and significant for firms with bad ratings. The value coefficients in Table 6 are positive and significant for robust portfolios but lose significance when we introduce momentum, investment, and operating profitability (as is shown in Tables 7 and 8). Table 7 shows that the momentum factor is negative and significant for all strategies except for the portfolio of robust firms with good grades; Table 8 shows similar results for the operating-profitability factor. The investment factor always has a negative and significant coefficient except for firms with robust profitability and poor ESG grades.

Finally, the coefficient of the bad-minus-good factor is positive and significant for portfolios of firms with bad grades but negative and significant for portfolios of firms with good grades. Table 10 (Panel C) indicates that the adjusted R-squared values are higher for portfolios of firms with bad grades.

3.4. Results of the Gibbons, Ross, and Shanken (1989) test

Gibbons, Ross, and Shanken (GRS, 1989) introduce a measure to test whether adding factors to a model increases its power to explain expected returns, and Fama and French (2018) show the usefulness of this measure for asset pricing models. The GRS test enables us to test the hypothesis that the intercepts are jointly zero. Table 10 displays values of the GRS statistic for ten different asset pricing models. Each model is a combination of the market premium factor and one or more of the other six factors.

Insert Table 11 about here

Panels A, B, and C of Table 11 report the GRS statistics for portfolios classified by B/M ratio–ESG rating, investment level–ESG rating, and operating profitability–ESG rating, respectively. The models with the lowest GRS statistics all contain the bad-minus-good factor. Moreover, on average, model 8 presents the lowest GRS statistics, with all three below the critical value (1.984, 1.881, and 1.191 for Panels A, B, and C respectively). This result confirms that a parsimonious two-factor model including both the market factor and the ESG premium is sufficient to describe the stock returns of firms screened by extra-financial agencies in Europe.

4. Conclusion

This study sheds light on the existence of a "footprint" risk for ESG-rated firms. Asset managers can use our proposed ESG factor model to measure performance and compute expected return. Using this model also makes it possible to include the CSR dimension in corporate valuation. The most responsible firms will have lower discount factors, which will increase their market values.

4.1. Two contributions to the finance literature

First, we find a significant risk premium priced by the market that is associated with extra-financial ratings. Our regression analysis shows that this premium has a positive and significant coefficient for firms with bad ratings and a negative but not always significant coefficient for firms with good ratings. Second, we propose a parsimonious two-factor model of ESG-rated firms' excess returns. Our model represents a considerable improvement in

adjusted R-squared for firms with bad ratings; moreover, for all portfolios combined (firms with good and those with bad ratings), it passes the GRS (1989) test, yielding a lower GRS statistic than the other models that we tested.

4.2. Several managerial implications

This study demonstrates that investing in firms with poor ESG ratings does yield higher expected returns as compensation for the higher risk. This finding confirms that social norms help shape market outcomes, and corroborates the traditional positive relation between risk and reward for ESG-rated firms in Europe.

Our model also improves the measurement and attribution of performance, which is traditionally measured against a benchmark market index, whether pure or composite. Traditionally, the CAPM is used to measure performance, since alpha is considered an abnormal return, but defining abnormal return remains a challenge. To capture the true abnormal returns, one must also integrate structural risk factors into the asset pricing model. Furthermore, defining the right asset pricing model is important for estimating the cost of equity—a major input in computing the weighted average cost of capital, which in turn enables one to discount the future cash flows generated by a project, measure the value created, or evaluate the profitability of potential investment projects. We specify the most suitable asset pricing model for the particular case of ESG-rated firms in Europe.

Because we focus only on firms engaged in CSR (and for which ESG ratings are available), our paper can be extended in various ways. First, we propose that a risk premium related to ESG rating proxies the firm's CSR. The challenge for future research is to explain how this risk premium is consistent with the relationship between CSR and corporate financial performance. Second, it would be interesting to compare our findings with different

ratings from other extra-financial rating agencies. In addition, testing the CSR asset pricing model on other financial markets and comparing the outcomes would be a natural extension of our study.

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Table 1

Summary statistics of ESG scores, June 2002 to May 2015.

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of rated stocks	568	579	843	996	1000	1048	1082	1112	1133	1157	1163	1169	1185	1174
ASSET4 scores														
Minimum	10.4	10.2	8.9	9.6	10.0	11.7	12.0	16.5	20.3	21.1	22.8	21.1	19.7	17.6
First quartile	22.9	24.9	27.4	30.5	28.0	34.3	36.2	42.5	52.8	51.5	52.6	52.0	51.6	58.8
30th percentile	30.6	32.8	33.7	37.4	34.0	41.5	42.0	51.3	61.3	59.1	61.7	60.3	60.4	68.4
Median	60.7	62.8	66.8	62.5	62.4	68.5	71.6	77.3	81.6	80.5	81.3	80.3	80.1	83.2
Mean	55.5	55.4	57.7	57.6	57.5	60.3	61.6	65.5	69.5	68.9	69.6	69.0	68.6	70.5
70th percentile	83.7	80.7	86.4	83.0	85.8	86.2	87.6	89.2	90.0	89.6	89.8	89.6	89.2	90.2
Third quartile	85.1	84.0	88.5	87.8	88.5	88.9	89.7	91.6	91.2	91.6	91.3	91.0	90.3	91.2
Maximum	98.0	98.1	98.0	98.3	97.9	97.1	97.4	97.1	96.6	96.4	96.8	96.8	96.7	95.9

Note: We have 1,310 individual stocks in the sample over 13 years.

Table 2

Summary statistics for the 27 portfolios' returns, June 2002 to May 2015.

			Panel A *Book-to-market ratio*			Panel B *Investment*			Panel C *Operating profitability*		
			Low	*Neutral*	*High*	*Aggress.*	*Neutral*	*Cons.*	*Weak*	*Neutral*	*Robust*
Mean	ESG	*Good*	0.65	0.56	0.94	0.69	0.23	0.64	0.04	0.29	0.55
		Neutral	1.22	0.54	0.07	1.16	0.69	0.6	-0.11	0.63	1.11
		Bad	1.41	1.2	1.42	1.61	1.58	0.64	1.23	1.13	1.28
Standard deviation	ESG	*Good*	3.76	4.78	7.55	4.92	5.15	6.37	10.54	5.13	3.88
		Neutral	4.61	6.25	8.37	5.81	6.58	7.06	7.36	5.4	6.69
		Bad	7.83	7.96	16.69	7.44	7.17	14.17	15.85	7.78	7.78
Sharpe ratio	ESG	*Good*	0.17	0.12	0.12	0.14	0.04	0.1	0	0.06	0.14
		Neutral	0.26	0.09	0.01	0.2	0.1	0.09	-0.02	0.12	0.17
		Bad	0.18	0.15	0.08	0.22	0.22	0.05	0.08	0.14	0.16
Average number of firms	ESG	*Good*	67.8	111.4	34.2	44.5	127.1	44.7	12.3	96.2	103.9
		Neutral	115.9	147.7	52.8	82.7	164.8	74.2	31.4	137.9	145.8
		Bad	78.5	103.5	52.2	74.7	106.3	59	39.3	108	85.7
Average market cap. (€M.)	ESG	*Good*	698.6	428.9	449.7	829.7	541.3	536.1	1067.4	516.1	642.3
		Neutral	146.6	135.6	145.7	198.7	163.7	110.7	207.6	124.7	175
		Bad	81.9	59	44.9	75.4	45	72.1	82.8	49.8	73.5
Jarque Bera	ESG	*Good*	36.7	4.7	5	6.1	390	26.3	1235.6	5.3	12
		Neutral	6.2	72	24	52.4	68.8	24.6	72.6	24.1	112.7
		Bad	25.4	326.2	4801.8	104.9	59.7	2428.6	5444.4	335.5	171.1

Notes: Stocks are independently sorted into three ASSET4 extra-financial ratings (good, neutral, and bad) and three book-to-market (Panel A), investment (Panel B), and operating profitability (Panel C) groups. This table statistically describes the monthly excess returns of the 27 value-weighted portfolios.

Table 3

Pearson and Spearman correlation matrix of the monthly returns of panels A, B, and C, June 2002 to May 2015.

		Spearman correlation matrix														
		LG	LN	LB	NG	NN	NB	HG	HN	HB	$r_M - r_f$	SMB	HML	WML	RMW	CMA
Pearson correlation matrix	LG		0.67	0.47	0.75	0.63	0.41	0.43	0.49	0.45	0.66	-0.30	0.13	-0.20	-0.16	-0.23
	LN	0.70		0.56	0.78	0.77	0.59	0.51	0.53	0.62	0.74	-0.11	0.30	-0.22	-0.30	-0.13
	LB	0.47	0.51		0.62	0.62	0.51	0.44	0.47	0.56	0.60	0.10	0.29	-0.21	-0.40	-0.06
	NG	0.76	0.76	0.57		0.79	0.52	0.61	0.60	0.61	0.79	-0.20	0.44	-0.33	-0.38	-0.09
	NN	0.69	0.73	0.61	0.77		0.61	0.51	0.65	0.69	0.74	0.01	0.43	-0.29	-0.38	-0.08
	NB	0.40	0.58	0.48	0.47	0.62		0.41	0.46	0.58	0.57	0.17	0.30	-0.23	-0.27	-0.12
	HG	0.47	0.52	0.50	0.67	0.53	0.43		0.58	0.53	0.58	-0.18	0.45	-0.35	-0.48	0.04
	HN	0.54	0.59	0.50	0.63	0.65	0.47	0.65		0.63	0.61	-0.05	0.51	-0.39	-0.48	0.04
	HB	0.38	0.44	0.40	0.48	0.49	0.45	0.47	0.47		0.64	0.04	0.43	-0.26	-0.42	0.04
	$r_M - r_f$	0.72	0.75	0.61	0.80	0.80	0.59	0.61	0.67	0.53		-0.09	0.49	-0.32	-0.45	-0.02
	SMB	-0.28	-0.09	0.09	-0.27	0.03	0.23	-0.17	-0.04	-0.06	-0.10		0.02	0.16	0.02	-0.05
	HML	0.14	0.26	0.31	0.41	0.43	0.35	0.54	0.48	0.31	0.50	0.00		-0.29	-0.63	0.32
	WML	-0.36	-0.32	-0.46	-0.48	-0.48	-0.39	-0.51	-0.54	-0.36	-0.48	0.12	-0.37		0.33	-0.01
	RMW	-0.21	-0.36	-0.46	-0.46	-0.41	-0.37	-0.61	-0.53	-0.30	-0.49	0.06	-0.66	0.50		-0.29
	CMA	-0.37	-0.22	-0.23	-0.19	-0.34	-0.18	-0.07	-0.16	-0.15	-0.22	-0.11	0.26	0.21	-0.21	
	BMG	0.02	0.22	0.56	0.12	0.23	0.53	0.16	0.21	0.66	0.28	0.21	0.19	-0.14	-0.21	-0.05

		AG	AN	AB	NG	NN	NB	CG	CN	CB	$r_M - r_f$	SMB	HML	WML	RMW	CMA
	AG		0.71	0.55	0.76	0.68	0.60	0.56	0.69	0.46	0.69	-0.18	0.34	-0.26	-0.33	-0.11
	AN	0.75		0.61	0.71	0.66	0.60	0.52	0.69	0.47	0.68	-0.01	0.32	-0.22	-0.26	-0.17
	AB	0.52	0.63		0.52	0.53	0.56	0.39	0.59	0.54	0.58	0.22	0.28	-0.11	-0.32	-0.14
	NG	0.79	0.76	0.48		0.72	0.62	0.65	0.69	0.52	0.74	-0.22	0.34	-0.33	-0.34	-0.19
	NN	0.69	0.68	0.53	0.75		0.69	0.61	0.73	0.55	0.75	-0.09	0.44	-0.32	-0.44	-0.11
	NB	0.63	0.63	0.56	0.70	0.74		0.54	0.71	0.61	0.66	0.07	0.36	-0.37	-0.40	-0.01
	CG	0.57	0.43	0.34	0.59	0.59	0.55		0.63	0.51	0.65	-0.19	0.41	-0.34	-0.45	0.06
	CN	0.61	0.60	0.51	0.63	0.73	0.65	0.56		0.61	0.74	-0.06	0.45	-0.42	-0.43	0.03
	CB	0.45	0.44	0.48	0.51	0.51	0.56	0.47	0.50		0.58	-0.01	0.39	-0.33	-0.47	-0.03
	$r_M - r_f$	0.76	0.75	0.60	0.80	0.78	0.71	0.62	0.68	0.55		-0.09	0.49	-0.32	-0.45	-0.02
	SMB	-0.18	0.06	0.26	-0.20	-0.06	0.05	-0.19	-0.05	-0.05	-0.10		0.02	0.16	0.02	-0.05
	HML	0.37	0.30	0.30	0.33	0.39	0.39	0.49	0.44	0.33	0.50	0.00		-0.29	-0.63	0.32
	WML	-0.36	-0.32	-0.27	-0.48	-0.60	-0.57	-0.60	-0.58	-0.48	-0.48	0.12	-0.37		0.33	-0.01
	RMW	-0.39	-0.30	-0.38	-0.39	-0.52	-0.50	-0.50	-0.47	-0.41	-0.49	0.06	-0.66	0.50		-0.29
	CMA	-0.18	-0.36	-0.17	-0.36	-0.28	-0.17	-0.10	-0.14	-0.19	-0.22	-0.11	0.26	0.21	-0.21	
	BMG	0.15	0.23	0.56	0.13	0.21	0.41	0.05	0.25	0.75	0.28	0.21	0.19	-0.14	-0.21	-0.05

		WG	WN	WB	NG	NN	NB	RG	RN	RB	$r_M - r_f$	SMB	HML	WML	RMW	CMA
	WG		0.51	0.40	0.55	0.53	0.32	0.50	0.53	0.48	0.57	-0.11	0.36	-0.29	-0.32	0.05
	WN	0.55		0.52	0.66	0.65	0.47	0.49	0.54	0.58	0.65	0.03	0.57	-0.45	-0.49	0.02
	WB	0.32	0.47		0.57	0.53	0.41	0.48	0.50	0.48	0.57	0.12	0.34	-0.32	-0.42	0.00
	NG	0.54	0.72	0.52		0.80	0.57	0.76	0.72	0.61	0.73	-0.19	0.46	-0.36	-0.49	-0.10
	NN	0.58	0.66	0.46	0.79		0.53	0.72	0.77	0.65	0.71	-0.13	0.40	-0.33	-0.38	-0.10
	NB	0.40	0.55	0.47	0.63	0.63		0.45	0.56	0.60	0.52	0.11	0.32	-0.17	-0.34	-0.10
	RG	0.51	0.52	0.45	0.73	0.77	0.50		0.67	0.51	0.73	-0.25	0.20	-0.21	-0.20	-0.20
	RN	0.61	0.52	0.41	0.64	0.76	0.58	0.67		0.63	0.72	-0.05	0.32	-0.23	-0.31	-0.16
	RB	0.46	0.55	0.28	0.53	0.61	0.59	0.43	0.57		0.65	0.15	0.45	-0.26	-0.42	0.01
	$r_M - r_f$	0.65	0.68	0.51	0.73	0.79	0.61	0.76	0.75	0.61		-0.09	0.49	-0.32	-0.45	-0.02
	SMB	-0.07	0.01	-0.01	-0.19	-0.10	0.18	-0.26	-0.03	0.17	-0.10		0.02	0.16	0.02	-0.05
	HML	0.37	0.61	0.28	0.53	0.36	0.40	0.23	0.28	0.46	0.50	0.00		-0.29	-0.63	0.32
	WML	-0.44	-0.54	-0.40	-0.62	-0.55	-0.43	-0.37	-0.47	-0.39	-0.48	0.12	-0.37		0.33	-0.01
	RMW	-0.42	-0.52	-0.36	-0.54	-0.41	-0.40	-0.25	-0.45	-0.48	-0.49	0.06	-0.66	0.50		-0.29
	CMA	-0.22	-0.11	-0.19	-0.18	-0.29	-0.25	-0.32	-0.29	-0.02	-0.22	-0.11	0.26	0.21	-0.21	
	BMG	0.05	0.26	0.70	0.14	0.21	0.54	0.07	0.21	0.46	0.28	0.21	0.19	-0.14	-0.21	-0.05

Notes: At the end of each year, stocks are classified into three book-to-market groups (low, neutral, and high), three investment groups (conservative, neutral, and aggressive), and three groups based on the operating

profitability ratio (weak, neutral, and robust). Stocks are subsequently allocated independently to three CSR groups with respect to the Asset4 extra-financial rating (good, neutral, and bad). The intersections of the two sorts give 9 value-weighted portfolios. The right-hand-side variables are explanatory variables: the market premium ($\boldsymbol{r_M - r_f}$), the size factor (SMB), the value factor (HML), the momentum factor (WML), the operating profitability factor (RMW), the investment factor (CMA), and the CSR risk factor (BMG). We provide both the Pearson (black figures) and the Spearman (blue figures) correlations. The first letter corresponds to the book-to-market group (L, N, or H). The second corresponds to the CSR grade (G, N, or B). For instance, LG is a value-weighted portfolio comprising the stocks of both the lowest 30% of firms in terms of book-to-market ratio and the highest 30% of firms in terms of CSR score.

Table 4

Summary statistics for monthly factor returns, June 2002 to May 2015.

		$r_M - r_f$	SMB	HML	RMW	CMA	WML	BMG
Descriptive statistics	*Mean (%)*	0.71	0.16	0.21	0.29	0.18	0.80	1.19
	Median (%)	1.00	0.23	0.25	0.37	0.17	1.18	0.40
	Variance	0.32	0.04	0.05	0.02	0.02	0.19	0.72
	Standard deviation (%)	5.68	1.96	2.16	1.55	1.41	4.32	8.50
	Annualized standard deviation (%)	19.66	6.80	7.49	5.38	4.87	14.95	29.45
	Minimum (%)	-22.17	-6.85	-4.60	-5.25	-3.66	-26.15	-17.13
	25th percentile (%)	-2.31	-1.09	-1.01	-0.50	-0.60	-0.39	-3.44
	75th percentile (%)	4.40	1.54	1.42	1.19	0.85	2.52	4.22
	Maximum (%)	13.86	4.99	8.31	6.00	5.54	13.70	60.61
	Kurtosis	1.60	0.64	0.86	1.81	2.40	10.63	16.36
	Skewness	-0.67	-0.34	0.32	-0.28	0.71	-1.79	2.69
	Sharpe ratio	0.13	0.08	0.10	0.19	0.13	0.19	0.14

Notes: This table statistically describes our independent variables. $r_M - r_f$ is the European market premium. Stocks are independently classified into three book-to-market, operating profitability, investment, momentum, and ESG rating groups by using their 30th and 70th percentiles as the breakpoints. HML uses value-weighted portfolios formed from the intersection of the size and book-to-market sorts (2 × 3 = 6 portfolios). An analogous approach is used for operating profitability, momentum, investment, and CSR, yielding RMW, WML, AMC, and BMG, respectively.

Table 5

Time series regressions of monthly excess returns of Panels A, B, and C with the Sharpe-Lintner-Black CAPM, June 2002 to May 2015.

Sharpe-Lintner-Black CAPM (1964)

		Panel A						Panel B						Panel C					
Intercepts																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
ESG Rating	Good	**0.00**		**0.00**		**0.00**		**0.00**		**0.00**		**0.00**		**-0.01**		**0.00**		**0.00**	
		1.45		0.31		0.75		1.05		-1.06		0.05		-1.25		-0.74		0.88	
	Neutral	**0.01**	***	**0.00**		**-0.01**		**0.01**	**	**0.00**		**0.00**		**-0.01**	*	**0.00**		**0.00**	
		3.18		-0.28		-1.24		2.00		0.17		-0.11		-1.69		0.35		1.44	
	Bad	**0.01**		**0.01**		**0.00**		**0.01**	**	**0.01**	**	**0.00**		**0.00**		**0.01**		**0.01**	
		1.31		1.16		0.38		2.20		2.42		-0.41		0.17		1.10		1.27	
Market Premium																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
ESG Rating	Good	**0.48**	***	**0.69**	***	**0.81**	***	**0.62**	***	**0.66**	***	**0.87**	***	**1.03**	***	**0.75**	***	**0.52**	***
		12.78		16.37		9.54		14.55		16.83		9.71		10.62		13.18		14.64	
	Neutral	**0.61**	***	**0.88**	***	**0.99**	***	**0.76**	***	**0.89**	***	**0.92**	***	**0.91**	***	**0.75**	***	**0.86**	***
		13.89		16.61		11.18		13.92		15.29		11.52		11.52		16.02		14.27	
	Bad	**0.94**	***	**0.83**	***	**1.43**	***	**0.78**	***	**0.87**	***	**1.52**	***	**1.46**	***	**0.82**	***	**0.88**	***
		9.45		9.02		7.74		9.35		12.38		8.08		7.42		9.45		9.67	

Notes: At the end of each year, stocks are classified into three CSR groups with respect to their extra-financial ratings (good, neutral, and bad). Stocks are subsequently allocated independently to three book-to-market groups (low to high), three investment groups (conservative to aggressive), and three operating profitability groups (low to high). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to the left-hand-side variables of panels A, B, and C. Those dependent variables are then regressed using the Sharpe-Lintner-Black CAPM. This table presents, for each portfolio, its slope (bold figures) and the corresponding Student t-test results represented by asterisks (∗p <0.1;∗∗p <0.05;∗∗∗p <0.01).

Table 6

Time series regressions of monthly excess returns of Panels A, B, and C with the Fama-French three-factor model, June 2002 to May 2015.

Fama-French three-factor model (1993)

		Panel A						Panel B						Panel C					
Intercepts																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**0.00**	**	**0.00**		**0.00**		**0.00**		**0.00**		**0.00**		**-0.01**		**0.00**		**0.00**	
		2.18		0.70		0.81		1.23		-0.78		0.11		-1.26		-0.70		1.43	
	Neutral	**0.01**	***	**0.00**		**-0.01**		**0.01**	*	**0.00**		**0.00**		**-0.01**	**	**0.00**		**0.00**	
		3.32		-0.54		-1.41		1.85		0.13		-0.21		-2.21		0.40		1.44	
	Bad	**0.01**		**0.00**		**0.00**		**0.01**	*	**0.01**	**	**0.00**		**0.00**		**0.00**		**0.00**	
		1.10		0.75		0.36		1.87		2.20		-0.44		0.10		0.72		0.87	
Market Premium																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**0.56**	***	**0.65**	***	**0.58**	***	**0.61**	***	**0.68**	***	**0.67**	***	**0.98**	***	**0.62**	***	**0.57**	***
		14.4		14.14		6.34		12.45		15.36		6.78		8.65		9.89		14.95	
	Neutral	**0.66**	***	**0.87**	***	**0.84**	***	**0.83**	***	**0.89**	***	**0.83**	***	**0.68**	***	**0.77**	***	**0.94**	***
		13.29		14.36		8.41		13.29		13.07		9.03		8.21		14.05		13.56	
	Bad	**0.96**	***	**0.83**	***	**1.34**	***	**0.84**	***	**0.86**	***	**1.41**	***	**1.42**	***	**0.78**	***	**0.78**	***
		8.46		8.29		6.23		9.41		10.64		6.45		6.22		8.09		7.85	
Small minus Big																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**-0.38**	***	**-0.49**	***	**-0.49**	**	**-0.24**	*	**-0.27**	**	**-0.57**	**	**-0.04**		**-0.39**	**	**-0.34**	***
		-3.87		-4.25		-2.13		-1.96		-2.43		-2.29		-0.16		-2.5		-3.56	
	Neutral	**-0.03**		**0.35**	**	**0.06**		**0.4**	**	**0.05**		**0.03**		**0.25**		**-0.04**		**0.16**	
		-0.24		2.31		0.25		2.56		0.31		0.14		1.21		-0.32		0.94	
	Bad	**0.69**	**	**1.19**	***	**-0.05**		**1.24**	***	**0.41**	**	**-0.01**		**0.31**		**0.91**	***	**0.94**	***
		2.41		4.71		-0.1		5.52		2.05		-0.02		0.54		3.79		3.78	
High minus Low																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**-0.49**	***	**0.08**		**1.11**	***	**0**		**-0.18**		**0.95**	***	**0.27**		**0.62**	***	**-0.34**	***
		-4.87		0.66		4.61		-0.02		-1.52		3.65		0.93		3.83		-3.43	
	Neutral	**-0.31**	**	**0.11**		**0.77**	***	**-0.26**		**0.02**		**0.47**	*	**1.25**	***	**-0.1**		**-0.39**	**
		-2.39		0.7		2.94		-1.62		0.1		1.96		5.74		-0.68		-2.13	
	Bad	**-0.01**		**0.22**		**0.46**		**-0.08**		**0.13**		**0.56**		**0.23**		**0.39**		**0.71**	***
		-0.03		0.82		0.81		-0.32		0.61		0.98		0.38		1.57		2.74	

Notes: At the end of each year, stocks are classified into three CSR groups with respect to their extra-financial ratings (good, neutral, and bad). Stocks are subsequently allocated independently to three book-to-market groups (low to high), three investment groups (conservative to aggressive), and three operating profitability groups (low to high). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to the left-hand-side variables of panels A, B, and C. Those dependent variables are then regressed using the Fama-French three-factor model. This table presents, for each portfolio, its slope (bold figures) and the corresponding Student t-test results represented by asterisks (∗p <0.1;∗∗p <0.05;∗∗∗p <0.01).

Table 7

Time series regressions of monthly excess returns of Panels A, B, and C with the Fama-French-Carhart four-factor model, June 2002 to May 2015.

Fama-French-Carhart four-factor model (1997)

		Panel A						Panel B						Panel C					
Intercepts																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**0.00**	**	**0.00**		**0.01**	*	**0.00**		**0.00**		**0.01**		**0.00**		**0.00**		**0.00**	
		2.35		1.24		1.73		1.10		-0.13		1.59		-0.62		0.81		1.45	
	Neutral	**0.01**	***	**0.00**		**0.00**		**0.01**	*	**0.01**	*	**0.00**		**0.00**		**0.00**		**0.01**	**
		3.06		0.14		-0.36		1.71		1.67		1.13		-1.15		1.55		2.22	
	Bad	**0.01**	**	**0.01**		**0.01**		**0.01**	*	**0.01**	***	**0.01**		**0.01**		**0.01**		**0.01**	
		1.99		1.35		0.77		1.84		3.70		0.55		0.80		1.44		1.29	
Market Premium																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**0.54**	***	**0.62**	***	**0.47**	***	**0.62**	***	**0.64**	***	**0.48**	***	**0.88**	***	**0.49**	***	**0.57**	***
		13.11		12.61		4.91		11.70		13.72		4.96		7.37		8.11		13.81	
	Neutral	**0.67**	***	**0.82**	***	**0.70**	***	**0.83**	***	**0.75**	***	**0.67**	***	**0.56**	***	**0.69**	***	**0.86**	***
		12.56		12.75		6.81		12.46		11.37		7.29		6.61		12.32		11.92	
	Bad	**0.82**	***	**0.75**	***	**1.21**	***	**0.83**	***	**0.71**	***	**1.11**	***	**1.20**	***	**0.68**	***	**0.71**	***
		6.97		7.04		5.28		8.70		8.89		4.96		5.00		6.74		6.78	
Small minus Big																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**-0.37**	***	**-0.47**	***	**-0.42**	*	**-0.24**	**	**-0.25**	**	**-0.46**	**	**0.01**		**-0.32**	**	**-0.34**	***
		-3.77		-4.09		-1.89		-1.97		-2.25		-1.99		0.05		-2.22		-3.50	
	Neutral	**-0.04**		**0.39**	**	**0.15**		**0.40**	**	**0.13**		**0.13**		**0.32**		**0.01**		**0.21**	
		-0.28		2.56		0.62		2.52		0.85		0.60		1.62		0.05		1.23	
	Bad	**0.77**	***	**1.24**	***	**0.02**		**1.24**	***	**0.50**	***	**0.17**		**0.44**		**0.97**	***	**0.98**	***
		2.78		4.96		0.05		5.49		2.68		0.31		0.78		4.10		3.94	
High minus Low																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**-0.51**	***	**0.04**		**0.97**	***	**0.00**		**-0.23**	*	**0.71**	***	**0.16**		**0.47**	***	**-0.35**	***
		-4.95		0.29		4.09		0.04		-1.94		2.95		0.53		3.13		-3.41	
	Neutral	**-0.30**	**	**0.04**		**0.59**	**	**-0.26**		**-0.15**		**0.27**		**1.10**	***	**-0.20**		**-0.48**	***
		-2.26		0.26		2.33		-1.55		-0.90		1.19		5.22		-1.45		-2.67	
	Bad	**-0.18**		**0.11**		**0.30**		**-0.08**		**-0.05**		**0.20**		**-0.04**		**0.27**		**0.63**	**
		-0.62		0.42		0.52		-0.34		-0.27		0.35		-0.07		1.10		2.42	
Winners minus Losers																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**-0.05**		**-0.12**	**	**-0.40**	***	**0.02**		**-0.13**	**	**-0.65**	***	**-0.33**	**	**-0.43**	***	**-0.01**	
		-0.92		-2.06		-3.40		0.29		-2.34		-5.40		-2.27		-5.72		-0.29	
	Neutral	**0.03**		**-0.19**	**	**-0.50**	***	**0.02**		**-0.46**	***	**-0.56**	***	**-0.41**	***	**-0.29**	***	**-0.26**	***
		0.50		-2.44		-3.93		0.26		-5.63		-4.96		-3.97		-4.22		-2.94	
	Bad	**-0.48**	***	**-0.30**	**	**-0.44**		**-0.02**		**-0.51**	***	**-1.01**	***	**-0.76**	***	**-0.34**	***	**-0.22**	*
		-3.33		-2.26		-1.57		-0.15		-5.18		-3.67		-2.58		-2.71		-1.67	

Notes: At the end of each year, stocks are classified into three CSR groups with respect to their extra-financial ratings (good, neutral, and bad). Stocks are subsequently allocated independently to three book-to-market groups (low to high), three investment groups (conservative to aggressive), and three operating profitability groups (low to high). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to

the left-hand-side variables of panels A, B, and C. Those dependent variables are then regressed using the Fama-French-Carhart four-factor model. This table presents, for each portfolio, its slope (bold figures) and the corresponding Student t-test results represented by asterisks (∗p <0.1;∗∗p <0.05;∗∗∗p <0.01).

Table 8

Time series regressions of monthly excess returns of Panels A, B, and C with the Fama-French five-factor model, June 2002 to May 2015.

Fama-French five-factor model (2015)

		Panel A						Panel B						Panel C					
		Intercepts																	
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**0.01**	**	**0.00**		**0.01**	***	**0.00**		**0.00**		**0.01**		**0.00**		**0.00**		**0.00**	
		2.48		1.51		2.67		1.45		0.53		1.21		-0.12		0.80		1.39	
	Neutral	**0.01**	***	**0.00**		**0.00**		**0.01**	**	**0.01**	**	**0.00**		**-0.01**		**0.00**		**0.01**	***
		3.61		0.43		0.08		2.19		2.15		0.68		-1.34		1.32		3.14	
	Bad	**0.02**	***	**0.01**		**0.01**		**0.01**	**	**0.01**	***	**0.01**		**0.01**		**0.01**	*	**0.01**	
		2.82		1.36		0.65		2.53		3.42		0.77		1.09		1.71		1.40	
		Market Premium																	
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**0.50**	***	**0.60**	***	**0.40**	***	**0.59**	***	**0.57**	***	**0.53**	***	**0.80**	***	**0.48**	***	**0.54**	***
		11.46		11.21		3.95		10.25		11.76		4.66		6.20		6.93		12.30	
	Neutral	**0.64**	***	**0.74**	***	**0.67**	***	**0.73**	***	**0.72**	***	**0.74**	***	**0.58**	***	**0.68**	***	**0.80**	***
		10.98		11.03		5.92		10.46		9.80		6.97		6.08		10.89		10.48	
	Bad	**0.74**	***	**0.75**	***	**1.20**	***	**0.79**	***	**0.76**	***	**1.06**	***	**1.11**	***	**0.61**	***	**0.78**	***
		5.91		6.46		4.81		7.69		8.35		4.27		4.25		5.61		6.89	
		Small minus Big																	
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**-0.43**	***	**-0.52**	***	**-0.52**	**	**-0.25**	**	**-0.35**	***	**-0.62**	**	**-0.12**		**-0.45**	***	**-0.39**	***
		-4.46		-4.42		-2.35		-2.01		-3.25		-2.48		-0.43		-2.98		-4.01	
	Neutral	**-0.03**		**0.25**	*	**0.02**		**0.31**	**	**0.00**		**0.02**		**0.20**		**-0.10**		**0.13**	
		-0.22		1.69		0.07		2.03		0.01		0.08		0.94		-0.70		0.80	
	Bad	**0.65**	**	**1.17**	***	**-0.14**		**1.26**	***	**0.42**	**	**-0.13**		**0.20**		**0.83**	***	**1.02**	***
		2.38		4.58		-0.25		5.62		2.13		-0.24		0.35		3.45		4.12	
		High minus Low																	
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**-0.33**	***	**0.04**		**0.65**	**	**-0.01**		**-0.05**		**0.77**	**	**0.18**		**0.57**	***	**-0.17**	
		-2.63		0.24		2.27		-0.06		-0.37		2.38		0.50		2.90		-1.35	
	Neutral	**-0.42**	**	**0.36**	*	**0.49**		**0.01**		**-0.22**		**0.25**		**1.28**	***	**-0.06**		**-0.67**	***
		-2.54		1.87		1.52		0.05		-1.04		0.83		4.67		-0.31		-3.05	
	Bad	**-0.52**		**0.05**		**0.57**		**-0.44**		**-0.27**		**0.16**		**-0.11**		**0.42**		**0.16**	
		-1.47		0.16		0.80		-1.50		-1.06		0.23		-0.14		1.34		0.51	
		Robust minus Weak																	
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**0.03**		**-0.36**	*	**-1.73**	***	**-0.13**		**-0.31**	*	**-1.03**	**	**-1.03**	**	**-0.75**	***	**0.15**	
		0.16		-1.77		-4.54		-0.61		-1.69		-2.38		-2.10		-2.84		0.89	
	Neutral	**-0.33**		**-0.20**		**-1.37**	***	**0.05**		**-1.24**	***	**-0.85**	**	**-0.43**		**-0.37**		**-1.18**	***
		-1.48	**	-0.78		-3.19		0.19		-4.45		-2.10	**	-1.18	**	-1.53		-4.06	
	Bad	**-2.01**	***	**-0.69**		**-0.45**		**-0.91**	**	**-1.22**	***	**-2.41**	**	**-2.11**	**	**-0.76**	*	**-0.98**	**
		-4.22		-1.55		-0.47		-2.33		-3.53		-2.55		-2.12		-1.83		-2.29	
		Conservative minus Aggressive																	
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**-0.47**	***	**-0.31**	*	**-0.74**	**	**-0.14**		**-0.77**	***	**-0.73**	*	**-1.00**	**	**-0.78**	***	**-0.35**	**
		-3.05		-1.66		-2.08		-0.70		-4.53		-1.83		-2.21		-3.19		-2.30	
	Neutral	**-0.07**		**-1.01**	***	**-0.83**	**	**-0.78**	***	**-0.82**	***	**-0.37**		**-0.63**	*	**-0.58**	***	**-0.61**	**
		-0.36		-4.27		-2.09		-3.16		-3.19		-1.00	*	-1.85		-2.65		-2.27	
	Bad	**-0.91**	**	**-0.35**		**-0.91**		**-0.01**		**-0.27**		**-1.78**	**	**-1.59**	*	**-1.01**	***	**0.46**	
		-2.07		-0.87		-1.03		-0.02		-0.84		-2.04		-1.72		-2.63		1.16	

Notes: At the end of each year, stocks are classified into three CSR groups with respect to their extra-financial ratings (good, neutral, and bad). Stocks are subsequently allocated independently to three book-to-market groups (low to high), three investment groups (conservative to aggressive), and three operating profitability groups (low to high). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to the left-hand-side variables of panels A, B, and C. Those dependent variables are then regressed using the Fama-French five-factor model. This table presents, for each portfolio, its slope (bold figures) and the corresponding Student t-test results represented by asterisks ($*p < 0.1; **p < 0.05; ***p < 0.01$).

Table 9

Time series regressions of monthly excess returns of Panels A, B, and C with the ESG model, June 2002 to May 2015.

ESG two-factor model

		Panel A						Panel B						Panel C					
Intercepts																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
ESG Rating	Good	**0**	*	**0**		**0**		**0**		**0**		**0**		**-0.01**		**0**		**0**	
		1.87		0.54		0.77		1.18		-0.86		0.27		-1.01		-0.62		1.2	
	Neutral	**0.01**	***	**0**		**-0.01**		**0.01**	*	**0**		**0**		**-0.01**	*	**0**		**0**	
		3.13		-0.3		-1.27		1.93		0.18		-0.23		-1.81		0.37		1.43	
	Bad	**0**		**0**		**0**		**0.01**	*	**0.01**	**	**-0.02**	**	**-0.01**		**0**		**0**	
		0.72		0.6		-0.58		1.74		2.08		-2.11		-1		0.5		0.81	
Market Premium																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
ESG Rating	Good	**0.51**	***	**0.71**	***	**0.82**	***	**0.63**	***	**0.68**	***	**0.92**	***	**1.09**	***	**0.77**	***	**0.55**	***
		13.69		16.47		9.18		14.35		16.86		10		11		12.98		15.16	
	Neutral	**0.6**	***	**0.88**	***	**0.98**	***	**0.76**	***	**0.89**	***	**0.9**	***	**0.88**	***	**0.76**	***	**0.86**	***
		13.26		15.86		10.6		13.22		14.66		10.76		10.76		15.41		13.68	
	Bad	**0.76**	***	**0.68**	***	**1.01**	***	**0.63**	***	**0.79**	***	**1.01**	***	**0.98**	***	**0.67**	***	**0.76**	***
		8.5		7.96		6.75		8.39		11.36		7.79		6.52		8.45		8.61	
Bad minus Good																			
		Book-to-market ratio						*Investment*						*Operating profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
ESG Rating	Good	**-0.09**	***	**-0.06**	**	**-0.01**		**-0.04**		**-0.05**	*	**-0.13**	**	**-0.15**	**	**-0.04**		**-0.07**	***
		-3.5		-2.07		-0.18		-1.25		-1.95		-2.07		-2.33		-1.11		-2.81	
	Neutral	**0.01**		**0.01**		**0.02**		**0.02**		**0**		**0.06**		**0.06**		**-0.01**		**0**	
		0.18		0.21		0.38		0.45		-0.09		1.15		1.18		-0.24		-0.05	
	Bad	**0.44**	***	**0.37**	***	**0.99**	***	**0.37**	***	**0.19**	***	**1.21**	***	**1.15**	***	**0.36**	***	**0.3**	***
		7.45		6.54		9.91		7.46		4.13		13.9		11.45		6.9		5.05	

Notes: At the end of each year, stocks are classified into three CSR groups with respect to their extra-financial ratings (good, neutral, and bad). Stocks are subsequently allocated independently to three book-to-market groups (low to high), three investment groups (conservative to aggressive), and three operating profitability groups (low to high). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to the left-hand-side variables of panels A, B, and C. Those dependent variables are then regressed using the ESG two-factor model. This table presents, for each portfolio, its slope (bold figures) and the corresponding Student t-test results represented by asterisks (∗p <0.1;∗∗p <0.05;∗∗∗p <0.01).

Table 10

Adjusted coefficient of determination related to the time series regressions of Panels A, B, and C with five asset pricing models, June 2002 to May 2015.

		Panel A			Panel B			Panel C		
Sharpe-Lintner-Black CAPM (1964)										
		Book-to-market ratio			*Investment*			*Operating profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
ESG Rating	Good	0.51	0.63	0.37	0.58	0.65	0.38	0.42	0.53	0.58
	Neutral	0.55	0.64	0.44	0.55	0.60	0.46	0.46	0.62	0.57
	Bad	0.36	0.34	0.28	0.36	0.50	0.29	0.26	0.36	0.37
Fama-French three-factor model (1993)										
		Book-to-market ratio			*Investment*			*Operating profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
ESG Rating	Good	0.61	0.67	0.45	0.58	0.66	0.43	0.42	0.58	0.64
	Neutral	0.56	0.65	0.47	0.57	0.60	0.47	0.56	0.62	0.58
	Bad	0.38	0.42	0.27	0.46	0.50	0.29	0.25	0.42	0.45
Fama-French-Carhart four-factor model (1997)										
		Book-to-market ratio			*Investment*			*Operating profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
ESG Rating	Good	0.61	0.68	0.49	0.58	0.67	0.52	0.43	0.65	0.63
	Neutral	0.56	0.66	0.51	0.57	0.66	0.54	0.60	0.66	0.60
	Bad	0.42	0.44	0.28	0.46	0.58	0.34	0.28	0.44	0.46
Fama-French five-factor model (2015)										
		Book-to-market ratio			*Investment*			*Operating profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
ESG Rating	Good	0.63	0.67	0.51	0.58	0.70	0.45	0.44	0.61	0.65
	Neutral	0.57	0.68	0.50	0.60	0.65	0.48	0.56	0.63	0.62
	Bad	0.44	0.43	0.27	0.47	0.54	0.32	0.27	0.45	0.47
ESG two-factor model										
		Book-to-market ratio			*Investment*			*Operating profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
ESG Rating	Good	0.55	0.65	0.37	0.58	0.65	0.39	0.44	0.53	0.60
	Neutral	0.56	0.64	0.45	0.55	0.60	0.46	0.47	0.63	0.57
	Bad	0.54	0.49	0.56	0.53	0.54	0.69	0.60	0.52	0.47

Notes: An adjusted R^2 is used to indicate how well terms fit a line and creates an adjustment depending on the number of factors in a model. Adding useless variables decreases the adjusted R^2 unlike the standard R^2.

Table 11

GRS test results for Panels A, B, and C, June 2002 to May 2015.

Tested Model	1 CAPM	2 FF3F	3 FFC4F	4 FF5F	5	6	7	8 ESG2F	9	10
$r_M - r_f$	*X*	*X*	*X*	*X*	*X*	*X*	*X*	*X*	*X*	*X*
SMB		*X*	*X*	*X*	*X*	*X*	*X*			
HML		*X*	*X*	*X*						*X*
WML			*X*			*X*			*X*	*X*
RMW				*X*	*X*					
CMA				*X*	*X*		*X*			
BMG						*X*	*X*	*X*	*X*	*X*
GRS: Panel A (BM + ESG)	2.09	2.66	2.124	2.99	2.54	1.63	2.44	1.98	1.56	1.89
GRS: Panel B (INV + ESG)	1.99	1.82	2.256	2.12	2.11	2.19	1.62	1.88	2.18	2.07
GRS: Panel C (OP + ESG)	1.39	1.64	1.84	2.058	1.67	1.60	1.70	1.19	1.62	1.84

Notes: The regressions use, among others, the Sharpe-Lintner-Black (1964) (CAPM), the Fama-French three-factor (1993) (FF3F), the Fama-French-Carhart four-factor (1997) (FFC4F), the Fama-French five-factor (2015) (FF5F), and the ESG two-factor (ESG2F) models on a variety of factors in the three panels (A, B, and C). The GRS statistic tests whether the intercepts in a set of 9 (3x3) regressions are jointly equal to zero.

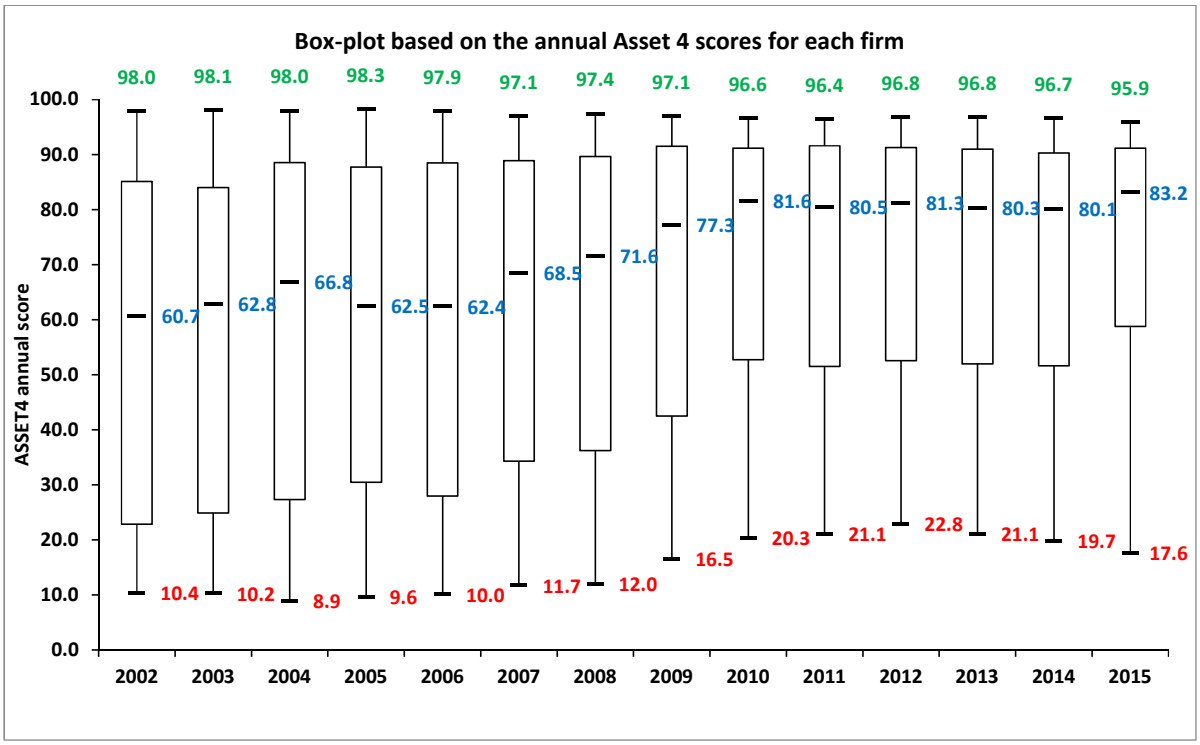

Fig. 1. ESG scores over the period June 2002 to May 2015.

Panel A

ESG score			Book-to-Market: Low 30%	Neutral 40%	High 30%
	Good	30%	LG	NG	HG
	Neutral	40%	LN	NN	HN
	Bad	30%	LB	NB	HB

Panel B

ESG score			Investment: Cons. 30%	Neutral 40%	Aggress. 30%
	Good	30%	CG	NG	AG
	Neutral	40%	CN	NN	AN
	Bad	30%	CB	NB	AB

Panel C

ESG score			Operating profitability: Weak 30%	Neutral 40%	Robust 30%
	Good	30%	WG	NG	RG

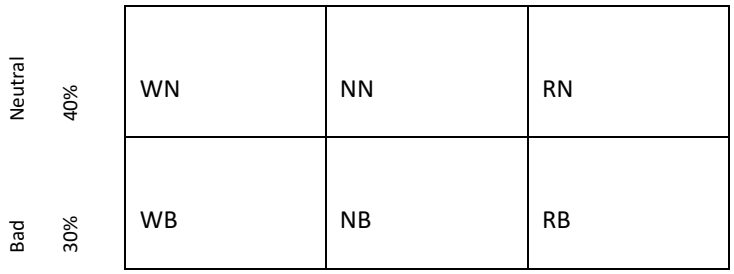

Fig. 2. Portfolio construction.

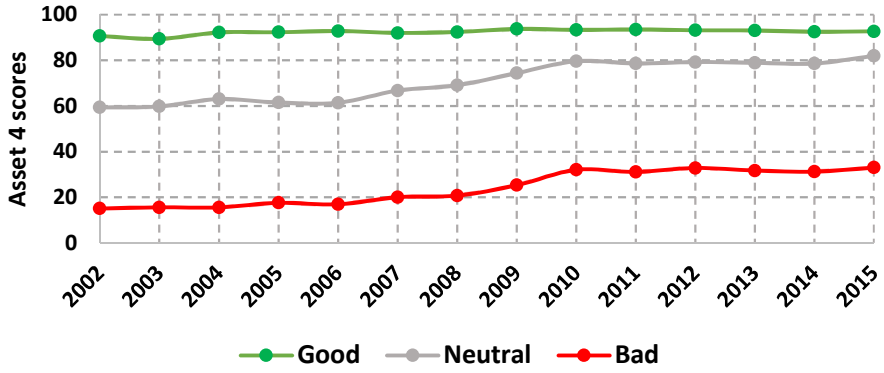

Fig. 3. Average annual ASSET4 scores per portfolio.

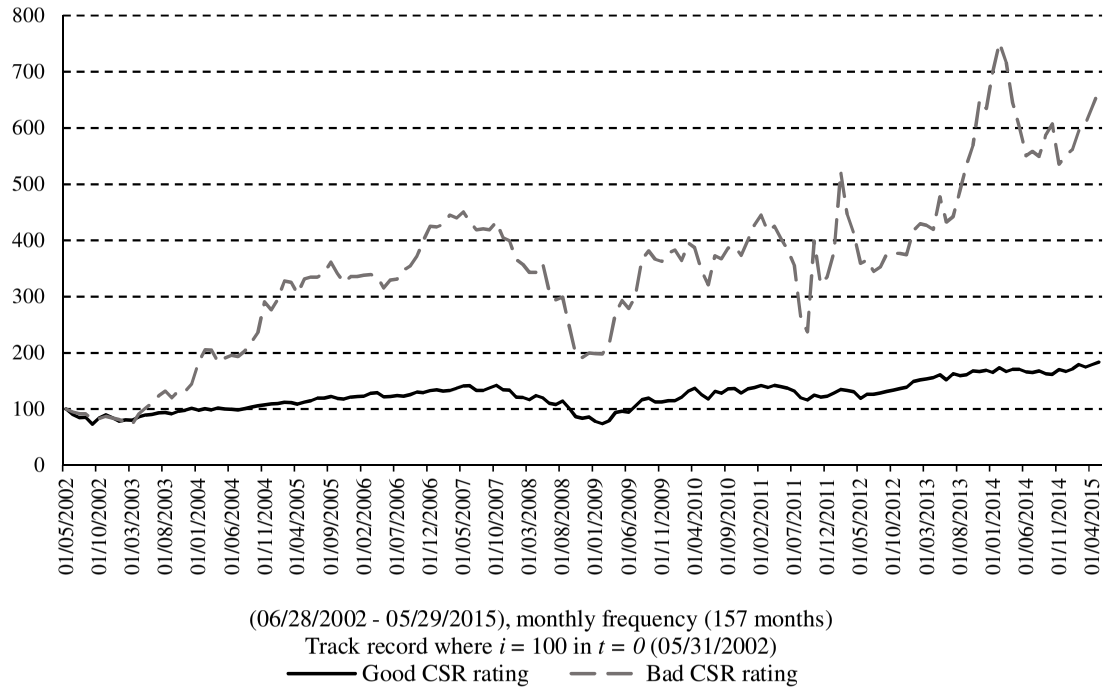

Fig. 4. Track record for portfolios of stocks with good and bad ESG ratings from June 2002 to May 2015.