
# Socially Responsible Investment (SRI)
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# Does Being Social Pay Off?

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Dissertation written under the supervision of José Afonso Faias

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**Abstract**
Considering social aspects into the investment decision has become of increasing importance for financial institutions. This dissertation applies multiple screening methodologies with the aim of reflecting the profile of a social investor to identify whether an ethical investment approach is compatible with achieving superior financial performance. For the positive screening methods, the dissertation applies the Thomson Reuters ESG score and its sub-components as an indicator for corporate social performance. The S&P 500 index serves as the investment universe, and its constituents are categorized into deciles, and value-weighted portfolios are created upon them. The lowest- and highest-rated portfolios are analysed. The negative screen excludes companies involved in controversial business areas from the investment universe. Their cumulative returns are compared to the index performance over the investment period from 2003 until 2018, while controlling for the influence of the Carhart four-factors. The analysis reveals that socially responsible portfolios result in negative Alphas, indicating that ethical goals cannot be achieved without hurting the financial performance. Ethical companies show a substantially higher market capitalization, resulting in negative SMB factors which contribute to the underperformance of the social portfolios. Sin Stocks do majorly drive the abnormal returns of the low-rated portfolio, and their exclusion eliminates its outperformance to the index. The goal of creating a social investment strategy providing abnormal returns was not reached.

**Title:** Socially Responsible Investment (SRI) – Does Being Social Pay Off?
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**Abstrato**
O investimento socialmente responsável tornou-se de importância crescente para as instituições financeiras. Esta dissertação aplica múltiplas metodologias de triagem com o objetivo de refletir o perfil de um investidor socialmente responsável para identificar se uma abordagem de investimento ético é compatível com um melhor desempenho financeiro. Para efeitos de triagem positiva, a dissertação aplica a pontuação ESG da Thomson Reuters e seus subcomponentes como um indicador para o desempenho social corporativo. O índice S&P 500 serve como universo de investimento e seus constituintes são categorizados em decis. Através dos decis, os portfólios com ponderação de valor são criados sendo os de classificação mais baixa e mais alta analisados. O filtro negativo exclui as empresas envolvidas em áreas de negócios controversas. Os seus retornos cumulativos são comparados com o desempenho do índice durante o período de investimento de 2003 até 2018. As variáveis de controlo são as quatro que compõem o modelo de Carhart. A análise revela que portfólios com títulos de empresas socialmente responsáveis resultam em alfas negativos, indicando que objetivos éticos não podem ser alcançados sem prejudicar o desempenho financeiro. Empresas com ações eticamente responsáveis mostram uma capitalização de mercado substancialmente superior, resultando em fatores SMB negativos que contribuem para o mau desempenho das carteiras das mesmas. A presença das "Sin Stocks" impulsionam os retornos anormais do portfólio de baixa classificação ética, e a sua exclusão elimina o desempenho superior ao índice. O objetivo de criar uma estratégia de investimento social que obtenha retornos anormais não foi alcançado.

**Título:** Investimento socialmente responsável – Vale a pena investir?
**Autor:** Roman Schilin
**Palavras-chaves:** Investimento socialmente responsável, estratégia investimento, responsabilidade social corporativa, Sin Stock

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## List of Abbreviations

| | |
|---|---|
| SRI | Socially Responsible Investing |
| ESG | Environmental, Social and Governance |
| ENV | Environmental |
| SOC | Social |
| GOV | Governance |
| CSR | Corporate Social Responsibility |
| CFP | Corporate Financial Performance |
| MktRF | Market minus the risk-free rate |
| SMB | Small-Minus-Big |
| HML | High-Minus-Low |
| GMO | Genetically-Modified Organic |

# 1. Introduction

Socially Responsible Investment (SRI) has become an uprising topic in the financial sector. The CFA institute describes this phenomenon as a paradigm shift in investment companies towards the idea of "purposeful capitalism". In a related report analyzing the future trends shaping the investment industry, a conducted survey revealed that 72% of firms expect an increasing future commitment to Environmental, Social and Governance (ESG) manners in the next 5-10 years (CFA Institute, 2019). With this re-allocation of resources, companies seem to follow the demands set by their investors. By 2018, "$11.6 trillion of all professionally managed assets - one $1 out of every $4 invested in the United States – were under ESG investment strategies, a sharp increase from 2010, when the amount was just close to $3 trillion" (Connaker and Madsbjerg, 2019). Alongside the increasing awareness of investors for social responsibility, companies have also been diligent in improving their footprint to environment and society. In observing the development of the Thomson Reuters ESG classification of S&P 500 constituents over the last 15 years, one can identify a general score improvement from the first to the last value recorded on the individual company (Appendix A).

With this development in mind, while also considering the general well performance of financial markets over the same time frame (except for the subprime crisis in 2008), it raises the question whether investors actually associate with social endeavors the opportunity of creating additional investment value. This study applies multiple screening methodologies with the aim of defining the security selection process of a social investor and, based on these investor profiles, derive conclusions to the following research questions:

a) Does an ethical investor have to give up on financial return?
b) Is there an investment strategy considering social responsibility aspects which can achieve abnormal returns?

Previous studies discussing on the subject matter featured limitations in terms of comparativeness through the multi-dimensionality issue when defining corporate social responsibility (CSR) and the means to measure a company's performance within this field. The purpose of this dissertation is to explore the opportunity of achieving abnormal returns by investing under social aspects. The multi-dimensionality issue for the definition of CSR was resolved by applying a multitude of strategies, ranging from positive screening, which selects the invested stocks based on its performance in Environmental, Social and Governance aspects, to negative screening filtering the investment scope by controlling for controversial business areas. This empirical study is a progression on the research conducted by Kempf & Osthoff

(2007), which investigated the same spectrum of social investment strategies upon their profitability, but on a different time frame (1991-2004) and applying a different social indicator (KLD score). This work employs the Thomson Reuters ESG score as a benchmark for social performance and reviews the financial relationship between CSR and financial performance for a more recent period (2003-2018). Additionally, several robustness tests were applied to control for investment weights or industry effects, and potential performance drivers were analyzed.

Throughout all positive-screening strategies, the high-rated portfolios have produced a significant negative Alpha, likewise the investment universe upon which the negative screen was applied. The social-investment models produce an underperformance after controlling for the Carhart-Factors, delivering a conclusion to the first research question by affirming that a social investor has to give up on financial return. Furthermore, after applying several robustness tests and controlling for industries and controversial business areas, no investment approach favoring social performance was able to deliver abnormal returns, negating the second research question. These findings hold true for all robustness tests applied.

The increased dispersion of returns between high- and low-rated portfolios after eliminating industry effects has shown that the performances can be explained to a certain extent by the reduced size of firms included in the lower bucket. On the one hand, the negative small-minus-big (SMB) factors for the $10^{th}$ deciles in the positive screening approach implies that the sizeable average capitalization of constituents has a negative effect on the returns. On the other hand, the increased positive skewness of the average firm value distribution in the $1^{st}$ ESG-decile (Figure 5) implicates that it provides much more potential to exploit undervaluation. Next to the undervaluation advantage, analysis have shown that the sin-stocks, which had performed respectively over the investment period, where able to contribute much more to the socially irresponsible portfolio. Their exclusion diminished its performance slightly, however not sufficiently for the ethical stocks to provide competitive returns and thus enable the investor to perform a profitable buy high, sell low strategy as suggested by Kempf & Osthoff (2007).

This thesis is structured in the following manner: Section 2 provides a theoretical introduction into the reasoning behind the potential value creation of social performance. Section 3 further elucidates the composition of the ESG score and provides information on other necessary data used. Section 4 elaborates on the methodology behind the different social investment strategies applied in this research. Section 5 presents the results of the different strategies and the applied robustness tests, while providing further in-depth analysis on the performance drivers. Section 6 summarizes the findings, while discussing potential limitations of the applied methodologies and providing recommendation for further research fields.

## 2. Literature Review

Under the rational choice theory, investors allocate their resources in a manner to maximize their utility (Simon 1955). If one is to believe classic economic theory, an investor's utility is maximized by achieving the highest financial return for a given level of risk, while other moments can be neglected in portfolio formation Samuelson (1970). Thus, a firm´s responsibility should lie solely in maximizing shareholder value, i.e. managers should pursue a single-value objective function where maximizing profit is in the best interest of investors Friedman (1970).

However, further economic literature introduces social welfare resources into the value creation function (labor hours, labor capital) and investigates whether companies yet give additional value back to the society. In every scenario where "the value of output exceeds the value of inputs – the profit maximization leads to an efficient social outcome" Jensen (2000) , as consumer surplus is created. Though, the work also raises the concern of long-term implications of company decisions on future cash flows, which are not reflected in the short-term horizons on financial markets. Thus, it suggests an enlightened value maximization principle where managers approach value creation as long-term tradeoff of stakeholder interests.

Empirical evidence for a relationship between corporate social responsibility (CSR) and corporate financial performance (CFP) has been subject to intensive academic research. The conventional view persists that investing in CSR represents additional costs for the company, which deteriorates their profitability (Alexander and Buchholz 1978), which is backed by empirical results presented by Baird et al. (2012) who observed a negative relationship between CSR and CFP. Contradicting views suggest that companies with a general well social performance can leverage positively on social investments in regard to financial performance, implying that investing in CSR can payoff given a certain level of stakeholder commitment which can result in positive financial results (Barnett and Salomon, 2012).

Galant and Cadez (2017) specify several limitations of previous research as an explanation for the absent conclusive evidence in this subject matter. On the one hand, as also underlined by Baird et al. (2012), the definition of CSR is of multi-dimensionality. Hence, different interpretations lead to deviations in research methodologies, which proposes a major difficulty in comparing the different studies performed on the relationship of CSR and CFP. The lacking comparativeness of the studies prevents the identification of omitted variables playing a potential role in their relationship, providing a lack of clarity in exploring a causal relationship between those variables.

Despite those inconclusive results about the relationship between CSR and CFP, researchers have conducted investment strategies under social aspects with the aim to achieve abnormal returns. Those studies are subject to the limitations above, thus they differ in terms of their definition of CSR as well as the market and the time frame chosen. In terms of CSR, researchers apply different screens according to their individual interpretation of a social investor. Yamashita et al. (1999) applied a positive screening policy by conducting an event study on stock performance shortly after the announcement of an environmental score in Forbes. By filtering the announcements upon improvements, this very indicator provoked positive stock reactions, resulting in superior returns. However, considering only environmental aspect does not adequately represent SRI, as investments under these terms might also consider social aspects. Guerard (1997) & Mill (2006) applied negative-screening by defining SRI as the exclusion of companies operating in restrictive business areas like tobacco, alcohol, military etc. Despite different time frames, both works derived the same conclusion that this screening mechanism could not achieve significant abnormal returns.

Kempf and Osthoff (2007) have observed a broader universe of SRI definitions, which will serve as a reference study to this thesis. The work analyzed social investment strategies by applying the KLD ratings provided by MSCI as benchmark of social performance for the investment period 1991-2004. They applied multiple positive screens on the investment universe based on multiple social criteria provided by the KLD data. Additionally, a negative screening policy was applied by excluding controversial business areas defined by the Social Investment Forum (2005), and finally combining those screening policies. As reported by their results, investors screening their portfolios according to social factors do not have to give up on financial return, and eventually achieving positive abnormal returns in comparison to the market with this strategy.

This dissertation aims to identify whether these findings are still valid by applying the same methodology on a different time frame. However, instead of the KLD rating, this work applies the Thomson Reuters ESG score as a benchmark for social performance. Thus, the positive screening on multiple criteria is replicated by subdividing the ESG score into three major components and apply the same methodology on them individually. For the negative screening policy, this thesis does also apply an alternate definition of exclusionary business areas provided by Thomson Reuters. Several robustness tests and adaptations to the strategy are executed to identify the drivers behind the observed performance and optimization approaches are sought to be determined.

## 3. Data

This dissertation observes the effectiveness of social investment strategies taking the S&P 500 index as an investment universe. The time span at which the strategies are applied is set from January 2003 to December 2018. Financial performance is measured based on stock returns. Those returns are derived from historical prices at a security level, and the necessary data is retrieved from Thomson Reuters Datastream for the identified period on a monthly basis. For the value weighting of the companies included in the strategies, information on the market value of the involved firms is also necessary. Historical monthly data for the investment period are also retrieved from Datastream. Additionally, in order to pursue the best-in-class strategy, information on the operating industry for the individual company are required. The SIC codes for the companies, classifying them in one out of ten different industries, is as well available at Datastream.

For the positive screening strategies, this work applies the Thomson Reuters ESG Score as an indicator for the social responsibility of a company, which is also retrieved from the Datastream platform. The rating is available from 2002 until 2017 on an annual basis. Due to the increasing importance for investors for transparent ESG-reporting, the score's coverage is continuously increasing and currently comprises more than 7000 firms globally, from which up to 3000 are based in the target market North America (Thomson Reuters 2019). The development of its coverage of firms within the S&P 500 is presented in Figure 1. 2017 is not included in the illustration, as several companies have differentiating fiscal cycles and thus report later within the year, and the database has not yet incorporated all scores of the late reporting constituents.

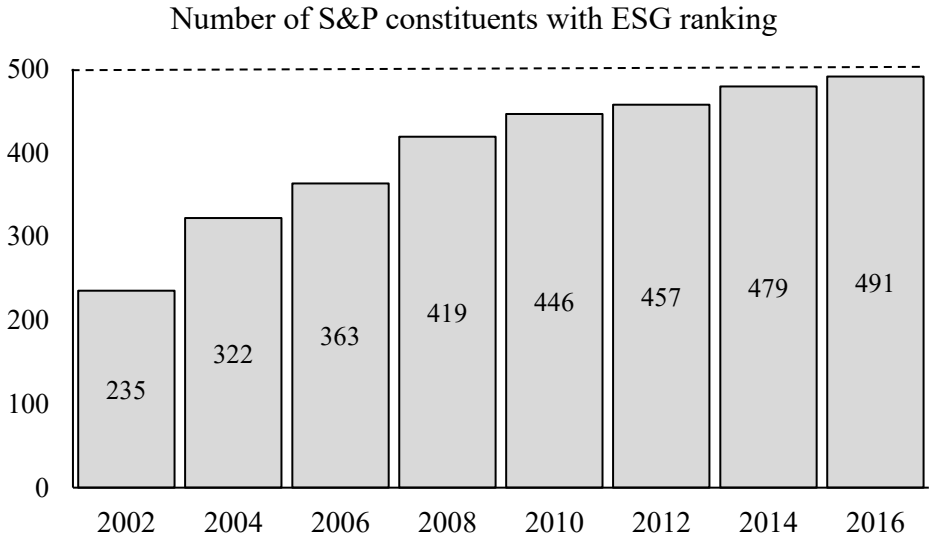



Figure 1: Number of S&P500 constituents with ESG ranking over investment period

The score is composed out of 400 different measures to ethical behavior, from which a subset of 178 most-comparable measurements are incorporated in the final scoring and evaluation process. Analysts scan internal and external information on a company, comprising financial statements published by the company as well as NGO information and news reports. In the aftermath, all that information is categorized into 10 categories for which Reuters provides a sub-criteria score. However, the positive screening policy in this dissertation are limited to the conglomerate score and, due to an approximately equal distribution in weights, to its three major pillars: Environmental, Social and Governance. The Environmental pillar incorporates the evaluations of a company's use of resources, its emission efficiency relative to its operating field and its drive to environmental innovation. The major social aspects measurable within the ESG assessment are the company's relation to its workforce, its compliance to human rights, the engagement with the community as well as its product responsibility for society. Finally, the Governance pillar assesses the quality of board and management, the nature of the company's shareholders as well as its CSR strategy. To allow an un-biased comparability of the social and environmental performance, an industry benchmark is set, upon which the companies' individual efforts are compared to. From the 400 indicators mentioned, only the ones relevant to the industry are taken into account. Upon the consolidation of the individual measurements into one category score, this one is then integrated into a flat distribution comprising the evaluations of the company's peers within the industry. The percentile in which the company ranks within this distribution determines the final outcome for the category score, e.g. the 1-100 score is in fact the company's percentile within the distribution. The ranking is facilitated through the following formula (Thomson Reuters 2019):

$$score = \frac{n.of\ companies\ with\ worse\ value + \frac{n.of\ companies\ with\ same\ value}{2}}{n.of\ companies\ with\ a\ value} \quad (1)$$

Appendix B provides an example on the composition of the 2017 ESG-Score for Procter & Gamble. Thus, to apply the different positive screening strategies, not only the ESG score, but also on these three major sub-divisions, the Environmental, Social and Governance scores are retrieved. As the investor can only make an investment decision based on available information, and the score is assigned retrospectively on the preceding year for which the company publishes its financial statements, the inquiry period for the scores lags one year to the investment time span, e.g. January 2002 – December 2017.

On the positive screening policy, several robustness are applied. For the best-in-class approach, which is ought to overcome a potential favoring of an industry within the investment portfolios,

information on the company's economic sector is required, which is retrieved from Thomson Reuters.

For the negative screening policy, information on the activity of a company in a pre-defined set of controversial business areas is necessary. The Datastream platform provides the possibility of filtering an inserted group of companies based on any desired characteristics, leaving only the ones fitting to the determined criteria. It also provides a suggestion for negative screening, in which on application the following business areas are excluded: Embryonic Stem-Cell Research, Genetically-Modified Organism Products, Animal Testing, Military Activities (Cluster Bombs, Anti-Personnel Landmines, and Armaments), Gambling, Tobacco, Alcohol, Contraceptives, Nuclear and Pornography. Out of the 500 companies listed in the S&P, 138 are involved in at least one of the previously listed activities. Thus, the socially responsible investor excludes them in the negative-screening strategy.

Finally, in order to test the results against the Carhart Four-Factor model, the factors Market minus the risk-free rate (MktRF) Small minus Big (SMB), High minus Low (HML), Momentum (MOM) are retrieved for the US market from the Kenneth French website[1], also on a monthly basis for the investment period (2003-2018).

## 4. Methodology

This work aims on overcoming the multi-dimensionality problem in the definition of corporate social performance, for which it applies multiple screening methodologies with the goal of replicating the decision-making process of a social investor. The investment processes comprise a broad span ranging from screening stocks on positive criteria, while also excluding some from the investment universe based on negative characteristics.

### 4.1 Positive Screening Policies

For the positive screening methods, the ESG score is applied as a benchmark to measure the social performance of a firm. Furthermore, the same methodology is performed on its three major component scores: Environmental, Social and Governance. In order to measure stock performance based on the ESG selection criteria, the portfolios are formed on the one year-lagged social responsibility ratings and its performance is examined in the subsequent year. The portfolios are constructed based on the annual ESG rankings provided by Thomson Reuters. Once obtained for all available companies in the given month, the stocks are divided into ten

[1] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

different portfolios based on percentiles constructed upon the derived scores. Hence, the portfolios can only contain companies with an allocated ESG score in the corresponding month. Referring to Figure 2, the investment portfolios thereby grow in the number of securities in accordance to the increasing ESG coverage within the S&P 500 firms. The high-rated portfolio consists of the upper 10% of all ranked stocks, while the low-rated portfolio contains the lower 10% of the sample. To derive a final portfolio return ($r_p$), the stocks' returns ($r_i$) are value-weighted within their corresponding portfolio based on their market value ($MV_i$) at the time:

$$r_p^t = \sum \frac{MV_i^t * r_i^t}{MV_p^t} \quad (2)$$

$$Where\ MV_p^t = \sum MV_i^t\ And\ r_i^t = \log(P_i^t) - \log(P_i^{t-1}) \quad (3)$$

ESG scores are allocated to companies on an annual basis upon the publication of their financial reports. Newly reported ESG scores make a reconstruction of the portfolios necessary. As there is the possibility that a firm with an alternating fiscal period reports within the course of the year and not in December, portfolios are rebalanced on monthly basis. However, as Figure 2 indicates, the majority of portfolio changes occur by year-end during the usual reporting period. The analysis shows that the monthly rebalancing will not highly distort the comparison to the Kempf & Osthoff (2007) results, though it makes the strategy slightly more precise.

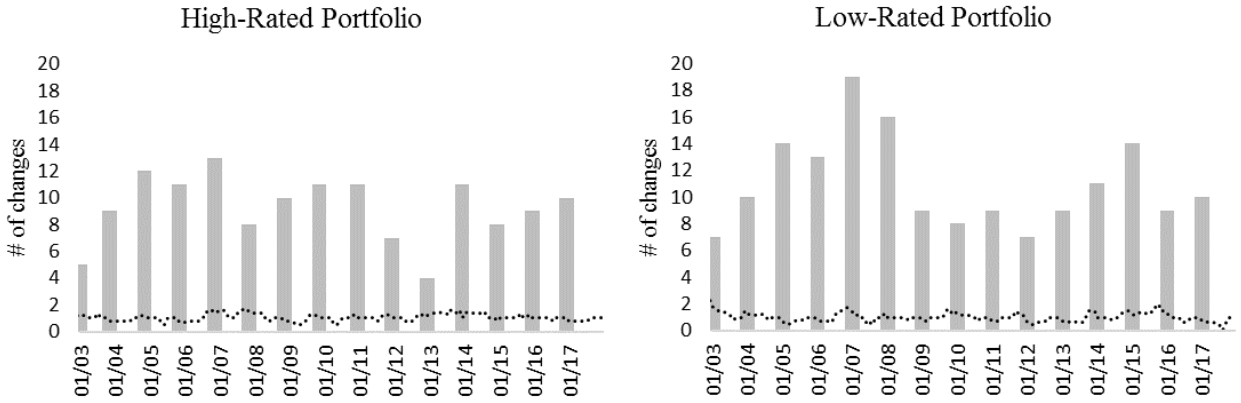



Figure 2: Changes occured in the investment portfolios within the investment period. The dotted line represents the 6- month moving average of changes within the other months of the year, while the bars show the absolute of alterations made in the corresponding portfolios at the beginning of the year.

As a first robustness check, the portfolios are equal- instead of value weighted. The methodology of ranking the stocks into different portfolios based on percentiles applied on the scores does not differ. However, each security's returns does now equally contribute to the portfolio's return, indifferent from its market value, thus the following formula applies:

$$r_p^t = \sum_{i=1}^{n} \frac{r_i^t}{n} \quad (4)$$

As a consecutive analysis, the best-in-class methodology is applied. This approach aims on reducing the influence a certain industry might have on a portfolio based on their operational nature. A potential favoring of the industry due to an overweight, in comparison to the market constellation, is therefore avoided. In order to filter the best- and worst-performing companies in terms of social aspects for each industry, the methodology is applied on ten sub-portfolios representing the major industry classes. For each of these sub-portfolios, percentile portfolios based on the ESG score are created. In the aftermath, the industry results are merged into one clustered portfolio. This is facilitated by value weighting the industries according to their market values. The weight of the individual industry is individually determined for each month in the time series by dividing the sum of market values for the companies included in the industry portfolio by the sum of market values for all companies included in the S&P 500, represented in the following formula:

$$w_{ind}^{t} = \frac{\sum_{i=1}^{n} MV_i^t}{MV_{S\&P500}^t} \quad (5)$$

Where n = number of companies in specific industry

The final-result for the conglomerate portfolios for the best-in-class are determined as followed:

$$r_p^t = \sum w_{ind}^t * r_{ind}^t \quad (6)$$

By selecting the best and worst socially performing companies for each individual industry and merging them in the aftermath, the best-in-class approach can mitigate the risk of one industry leveraging to heavily on the results and thereby creates an industry-balanced portfolio. Like all other robustness test, the best-in-class policy is solely applied on the ESG score to allow for a better comparativeness.

### 4.2 Negative Screening

The negative screening methodology approaches the selection process of SRI in a different way by defining a scope of restrictive business areas in which the social investor would avoid to infuse his capital into. Those restrictions can comprise the exclusion of whole industries, e.g. the armament or pharmaceutical sector, or restrict specific activities in which a company might be involved with (genetic modification of organic production, development of contraceptives etc.). For this strategy, the low-rated portfolio consists of all companies within the investment universe which are involved in at least one of the pre-defined restrictive areas (see Section 3), while the high-rated portfolio contains all remaining companies with no recorded activities in these fields. The final returns of these portfolios are again obtained by value-weighting the returns of the included securities.

A further step in the analysis observes the performance of subsets within the restrictive business fields to further elaborate on how certain activities perform return-wise and which effect its exclusion can have on the results. The major fields chosen to be further investigated were pharmaceutical (Stem Cell Research & Contraceptives), Military Activities (Cluster Bombs, Anti-Personnel Landmines, and Armaments), genetically-modified organic (GMO) products, Nuclear and the Sin Stocks, which conglomerate companies developing products of daily consumption for the end user with addiction potential (Tobacco, Alcohol, Gambling & Pornography). The grouping of sin stocks remained within the appeal of the author and is subject to discussion, though moves closely to the definition presented by major financial institutions and newspapers like Credit Suisse (Lejczak, 2015) and Financial Times (Mackintosh, J., Authers, J., 2015).

To test for the effectiveness of the negative screening policy, a combination strategy is performed where the same methodology as for the positive screening measures is applied. However, instead of considering the complete S&P 500 company listing as potential investment, the strategy is solely applied to remaining 362 companies which were not excluded by the negative screening filter.

### 4.3 Performance Measurement

Upon the execution of the above mentioned strategies, its performance is evaluated by controlling for the Carhart (1997) Four-Factor Model, which controls for the effects on the results for the variables market, size, book-to-market and momentum. The following regression is applied:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}RMW_t + \varepsilon_t \quad (7)$$

Where the dependent variable is the monthly return on portfolio $i$ in month $t$ minus the risk-free rate. The independent variables are the excess return of the market over the risk-free rate $(R_{mt} - R_{ft})$, which controls for the effect the market performance could have had on the portfolio returns. On the Kenneth-French Website, the US market represents a value-weighted conglomerate of the NYSE, AMEX and NASDAQ index. $SMB_t$ denotes the size factor and measures the return differences between small- and large capitalization securities. $HML_t$ checks on the derivation of returns from difference between high- compared to low book-to-market portfolios. If the strategy would rely on the abnormal return the value stocks can create, the beta would show to be positive and significant. The fourth factor $RMW_t$ represents the Momentum factor for stocks performing better when providing superior returns over the past year as well,

and was found to exist by Jegadeesh and Titman (1993). The beta coefficients measure the influence of those factors, retrieved from the Kenneth-French Website, on the monthly returns of the performed investment strategies. Alpha $\alpha_i$ measures the abnormal performance of portfolio $i$ after controlling for those four factors, which results were annualized in the presented tables. The significance of the previously listed coefficients is denoted in the tables on a 1%, 5% and 10% level.

The results are compared with the S&P 500 index, and its constituents serve as the investment universe in this dissertation. For the equal-weighted robustness test, the benchmark is altered by equally-investing in all S&P constituents for which price data is available for the corresponding month. An SRI mutual fund could not be applied as a benchmark, as they use several social screening methods, which are not observable from the outside.

## 5. Results

This section analyzes the financial performance of the different screens applied, starting from the positive screening methodologies where the high-rated and the low-rated portfolios, consisting of the upper and lower 10% of all ranked stocks, are more closely examined. The examination is followed by two robustness tests executed on the presented findings. First, the equally-invested portfolio results are analyzed, followed by the application of the best-in-class policy the control for a potential industry favoring. After the positive screening section, the negative screening approach is examined by first presenting the returns for the portfolios containing the remaining stocks after applying the controversial activities filter on the investment universe and comparing them with the sample of excluded companies and the whole market index. Finally, the effectiveness of the screens is analyzed by interpreting the results obtained from a combination strategy between the negative and positive screening policy. For all presented strategies, the cumulative returns for the investment periods as well as summary statistics are presented, while a table displaying the strategies´ beta coefficients for the four-factor model is provided subsequently. This table additionally encompasses the annualized Alpha (in %), while also giving information about the explanatory power of the model to strategies´ returns through the $R^2$. the indicator ranges between 0 for no explanatory power to 1 representing a perfect description of the model to the strategy´s return sources.

### 5.1 Positive Screening Policies

Figure 3 presents the cumulative returns for the high-rated portfolios of the value-weighted positive screening strategies, executed on the ESG- as well as its three major component scores; Environmental (ENV), Social (SOC) and Governance (GOV). Table 1 provides the strategies' beta coefficients and summary statistics.

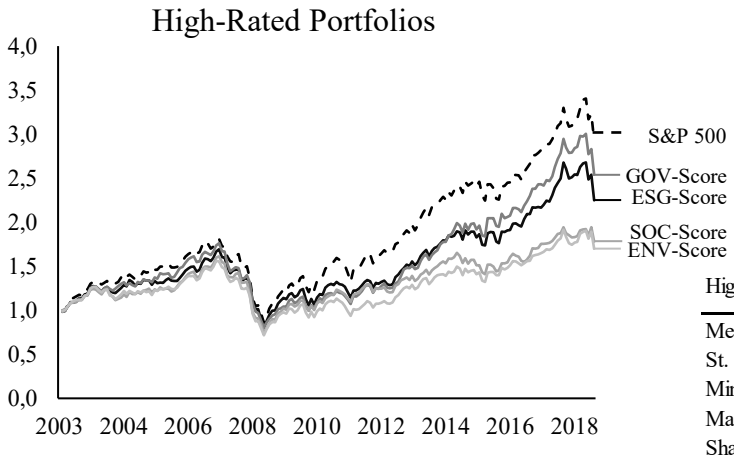



Figure 3: Cumulative Returns for Positive Screening High-Rated Portfolios

| High- Rated | ESG | GOV | SOC | ENV |
|---|---|---|---|---|
| Alpha | -3.31*** | -0.9 | -4.32*** | -4.99*** |
| MktRF | 0.96*** | 0.92*** | 0.94*** | 0.98*** |
| SMB | -0.22*** | -0.33*** | -0.33*** | -0.32*** |
| HML | 0.18*** | 0.07 | -0.02 | 0.12*** |
| RMW | 0.08 | 0.07 | 0.05 | 0.07 |
| R-Squared | **0.91** | **0.84** | **0.87** | **0.91** |

| High-Rated | ESG | GOV | SOC | ENV |
|---|---|---|---|---|
| Mean % | 5.23 | 5.88 | 3.01 | 2.62 |
| St. Dev. % | 13.99 | 13.93 | 14.27 | 14.62 |
| Min % (monthly) | -18.4 | -21.7 | -21.2 | -22.1 |
| Max % (monthly) | 10.4 | 10.7 | 9.09 | 11.8 |
| Sharpe Ratio | **0.37** | **0.42** | **0.21** | **0.18** |

Table 1: Four-Factor coefficients and Summary Statistics for High-Rated Portfolios

As one can observe in Figure 3, none of the high-rated portfolios in the positive screening methodologies was able to outperform the S&P 500 index over the investment period from a return perspective. On the contrary, all strategies apart from the Governance score provide a significant negative Alpha, indicating a confident prediction of an underperformance after controlling for the four-factor model, meaning that the construction of the high-rated portfolio themselves induces losses. Additionally, the return development of all strategies provides great similarity to the movements of the market, which is reflected through significant betas at the 1% level for all scores where their coefficients are all close to 1, which value would indicate a perfect replication of the strategy's performance to the market. However, the underperformance is majorly driven by the negative beta for the small minus big (SMB) factor. The SMB portfolio performed positively over the investment time span (1.5 cumulative return by 2018), thus a negative beta indicates a negative performance. The negative betas indicate that the high-rated portfolios of the positive screening strategies consist proportionally of more large capitalization companies then the market, for which this factor should be neutral, meaning that the high-rated portfolio suffers performance losses from large-cap underperformance in terms of return. Though, the ESG and environmental (ENV) strategy can slightly benefit from a higher

proportion of value-stocks, resulting in a significant high-minus-low (HML) factor. Though, as it can be observed in Figure 3, this positive influence cannot make up for the reduced returns inflicted through the SMB factor. For all strategies, the four-factor model has a high explanatory power with $R^2$ close to 1. Looking at the return patterns, one can identify that this is majorly driven by the market influencing the results.

Kempf & Osthoff (2007) indicated that their positive abnormal returns for the social investment strategy was achieved by going long in the high-rated portfolio, whilst shorting the low-rated one. The major source of income, as indicated in their study, was derived from the losses inflicted in the low-rated portfolio, creating a superior performance of the investment strategy. For this reasoning, the performance of the low-rated portfolios in the positive screening are analyzed in the following. Figure 4 again presents the cumulative returns of the low-rated buckets compared to the market, and Table 2 presents the beta coefficients to the Four-Factor Model as well as summary statistics.

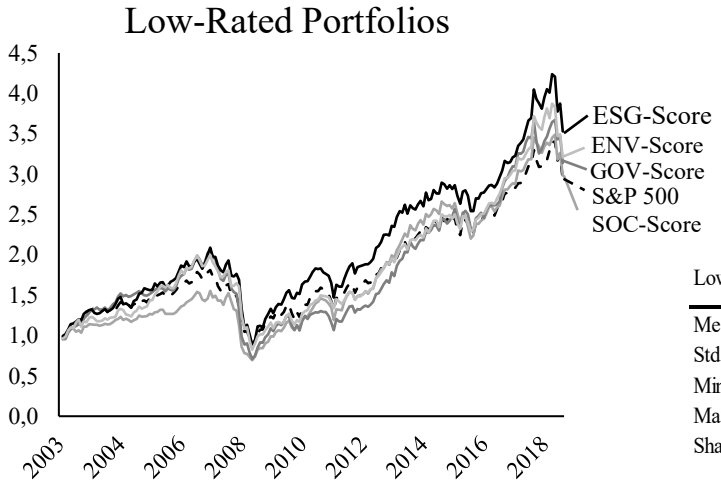



Figure 4: Cumulative Returns of Positive Screening Low-Rated Portfolios

| Low-Rated | ESG | GOV | SOC | ENV |
|---|---|---|---|---|
| Alpha | -3.28 | -2.54 | -1.06 | -1.1 |
| MktRF | 1.09*** | 1.14*** | 1.00*** | 0.96*** |
| SMB | 0.15* | -0.17*** | 0.04 | -0.04 |
| HML | -0.29*** | -0.02 | 0.08 | 0.15** |
| RMW | 0.11 | -0.09 | -0.06 | -0.07 |
| R-Squared | **0.82** | **0.86** | **0.80** | **0.80** |

| Low-Rated | ESG | GOV | SOC | ENV |
|---|---|---|---|---|
| Mean | 7.92 | 7.18 | 6.86 | 7.32 |
| Std. Dev. | 16.00 | 16.58 | 15.14 | 15.30 |
| Min% (monthly) | - 23.71 | - 29.14 | - 26.95 | - 25.41 |
| Max% (monthly) | 16.15 | 12.31 | 10.58 | 10.79 |
| Sharpe Ratio | **0.49** | **0.43** | **0.45** | **0.48** |

Table 2: Four-Factor coefficients and Summary Statistics for Low-Rated Portfolios

Opposing to the findings made by Kempf & Osthoff (2007), there is no negative performance observed in the low-rated portfolio which could provide returns for a potential long-short strategy. On the contrary, the low-rated portfolios for all score components seem to outperform the market slightly, though they cannot provide a significant alpha. As for their counterpart, the high-rated portfolios, the low-rated ones show a significant beta with for the market factor, which also moves close to 1. The negative effect on performance induced by the SMB factors for the high-rated portfolios is not significantly present except for the Governance (GOV) strategy. Though, the higher positive beta with the market can make of for those return losses, as the market also created positive returns. For the ESG strategy, it can even show a positive

sign in contrast to the high-rated counterpart, helping it to slightly outperform the index besides the above one beta for the market. The HML factors for ESG and ENV are also significant as observed for the high-rated portfolios; however, the beta turned negative for the ESG strategy indicating that in contrast to the high-rated counterpart, the low-rated bucket consists of more growth stock with low book-to-market ratios, which tend to be outperformed by the value stocks with a high ratio. However, the HML factor did not contribute to any returns within the observation period (2003-2018 HML cumulative return: 1.02), thus the negative beta did not negatively impact the ESG-strategy returns. In general, there is no substantial return difference between the low-rated portfolios of all positive screening strategies as being observed for the high-rated ones. The $R^2$ for all strategies has decreased in comparison to the high-rated portfolios, which is mainly due to the reduced influence of the SMB factor on the portfolio´s performance. The market remains the major explanatory power for the achieved returns, though the betas for the low-rated buckets are slightly higher, resulting in an outperformance in times of positive market performance. Due to the outperformance of the low-rated bucket to the high-rated one throughout all screenings, a long-short strategy as performed in the reference study does not lead to superior performance and thus does not have to be tested for.

In general, one can observe similarities the high- as well as the low-rated portfolio return pattern, though a dispersion between the two developments is created from 2008 onwards, were the higher-rated portfolio seem to lose its grip on the market. Especially the companies focusing their resources on social and environmental activities underperform the markets, while the high-rated Governance portfolio is the only one not providing a significant negative alpha. These results would speak in favor of Friedman's view on value creation for shareholders, where the manager's focus should solely lie in increasing the company's profitability. For their low-rated counterparts, the companies with little social and environmental performance were able to outperform the index. Though, the pattern remains the same that low-rated governance portfolio is outperforming the other strategies, from which one can derive that superior performance does not derive from a superior management performance. Thus, other factors explaining the return differences between the high- and low-rated portfolios have to be examined.

### 5.1.1 Control for Market Capitalization Effects through Equal-Weighted Portfolios

As indicated above, the high-rated portfolios suffer a performance reduction on the negative beta induced by the SMB factor, indicating that this portfolio contains of a higher ratio of large-cap companies being outperformed by small-cap firms. Figure 5 presents a box plot displaying

the average market capitalization of a firm included in the designated percentile portfolio over the investment period.

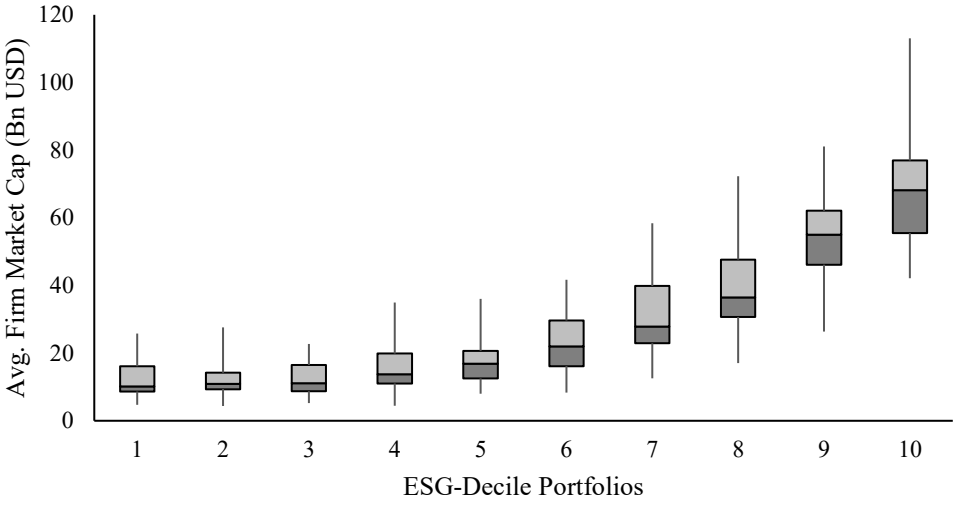



Figure 5: Avg. Firm Mkt-Caps in the ESG-Decile Portfolios (2003-2018)

The analysis confirms the intuition that the companies included in the high-rated portfolios (10) provide a much bigger average capitalization than the ones in the low-rated portfolios (1). Additionally, one can observe a transition in the skewness of the market cap distributions, changing from being positive with a wider gap between the median and the 3rd quartile (light-grey area) to being negative, with an increasing amount of historical market caps over the investment period lie below the median and thus indicate a less increasing development than the one observed in the low-rated portfolio (1), as reflected in lower returns observed (see above). Thus, the more positive skewness in the market-cap distribution in portfolio 1 is align with the SMB theorem of small-cap stocks outperforming its large-cap competitors and could provide an insight for the return differences observed for the portfolios. A market-cap bias in the ESG score has already been outlined by Doyle (2018), who argues that bigger companies have more funds available for ESG policies which can positively contribute to their score. However, "small and mid-sized companies are at a competitive disadvantage […], even though these companies […] tend to be the most innovative".

Through equally weighted investments, it is sought to overcome the unfavorable distribution characteristics of the high-rated portfolio by putting a greater emphasis on the smaller-firms included in this bucket and achieving superior results by capitalizing on its SMB capacity through the potential undervaluation of smaller firms. Figure 6 and 7 in the following present the cumulative returns of the equal-weighted high- and low-rated portfolios. To allow for comparativeness with the market, an equal-weighted S&P500 representative is constructed by

including every single constituent by the same weight into the return calculations. Controlling for the four-factor model would lead to distorted results, as the factors are retrieved for the value-weighted index and factor portfolios, which is Table 3 and 4 do only provide the portfolios' summary statistics.

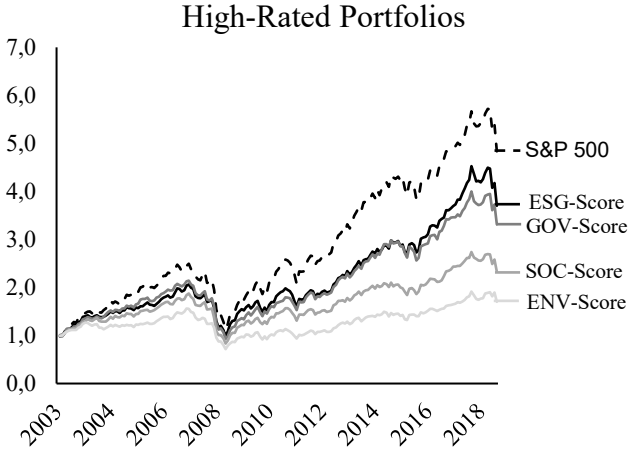



Figure 7: Cumulative Returns of Equal-Weighted High-Rated Portfolios

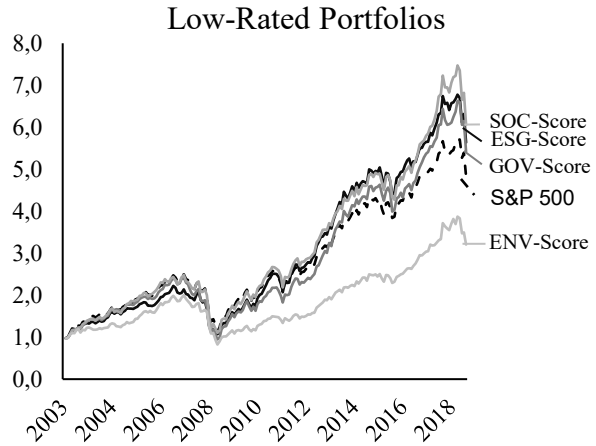



Figure 6: Cumulative Returns of Equal-Weighted Low-Rated Portfolios

| High-Rated | ESG | GOV | SOC | ENV | S&P 500 |
|---|---|---|---|---|---|
| Mean | 8.22 | 7.53 | 5.31 | 3.34 | 9.90 |
| Std. Dev. | 14.59 | 14.87 | 14.11 | 13.37 | 15.77 |
| Min% (monthly) | -19.64 | -23.84 | -22.95 | -19.30 | -23.75 |
| Max% (monthly) | 12.75 | 11.72 | 10.83 | 9.32 | 14.99 |
| Sharpe Ratio | **0.56** | **0.51** | **0.38** | **0.25** | **0.63** |

Table 4: Summary Statistics for Equal-Weighted High-Rated Portfolios

| Low-Rated | ESG | GOV | SOC | ENV | S&P 500 |
|---|---|---|---|---|---|
| Mean | 10.87 | 10.61 | 11.32 | 7.32 | 9.90 |
| Std. Dev. | 15.88 | 17.10 | 17.30 | 15.30 | 15.77 |
| Min% (monthly) | -26.52 | -29.53 | -27.07 | -25.41 | -23.75 |
| Max% (monthly) | 13.72 | 18.24 | 19.55 | 10.79 | 14.99 |
| Sharpe Ratio | **0.68** | **0.62** | **0.65** | **0.48** | **0.63** |

Table 3: Summary Statistics for Equal-Weighted Low-Rated Portfolios

In the high-rated portfolio, the relation between the return patterns to the market in the equal-weighted universe has not significantly altered from the value-weighted approach. Although all strategies can provide a higher Sharpe Ratio compared to the initial ones, they are still outperformed by the equal-weighted adjusted S&P 500 index. Hence, the effect derived from the re-balancing on the portfolios could not have been more beneficial than for the whole market. An exception represents the Governance strategy, which lost its tie to the index, indicating that the increased emphasis on the smaller firms in the high-rated bucket has induced relative performance losses.

For the low-rated portfolio, alterations in the return relations between the strategies and the market are not observable except for the low-rated ENV-stocks, which underperform the market considerably contrary to its value-weighted counterpart. Smaller firms showing little

environmental efforts seem to pay a price for operating non-sustainably. For the other strategies, the portfolios are not only out-performing the markets cumulative return, but the low ESG and SOC buckets show also a superior performance in terms of Sharpe Ratio contrary to the value-weighted ones.

Overall, the results do not show patterns surprisingly different from the original performed strategy. Due to the lack of comparativeness and the inability to control for the four-factors, the equal-weighted investment approach is being disregarded for the consecutive investment strategy analysis.

### 5.1.2 Control for Industry-Effects through Best-in-Class approach

The outperformance of the low-rated portfolios could also be derived from the nature of the companies included in the percentile buckets. An explanation for the result differences could be that there is a higher concentration of a more profitable industry in the one-bucket compared to the other. Figure 8 compares the proportion of industries in the investment portfolios to the one existing in the S&P 500 index.

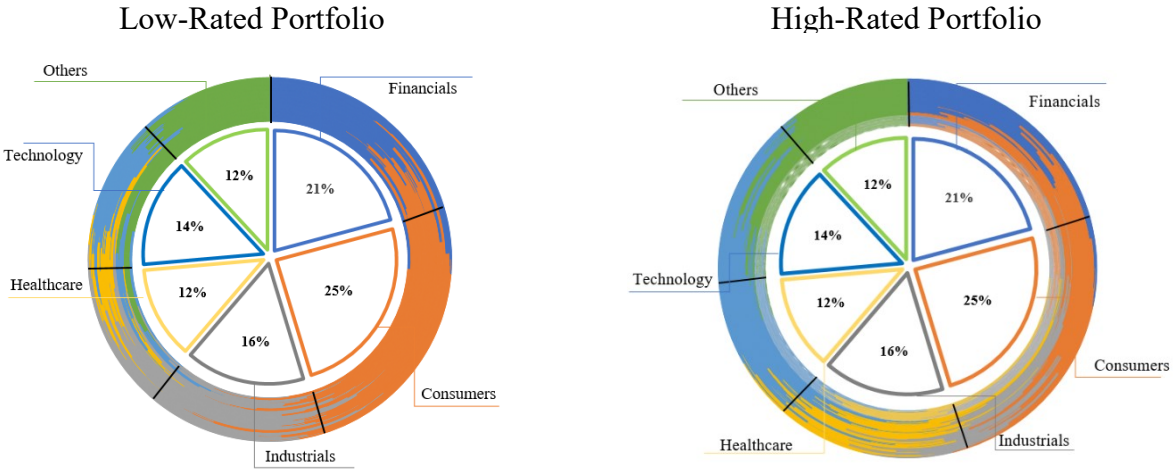



Figure 8: Industry Composition of Low- and High-Rated Portfolio vs. S&P 500. The pie chart represents the S&P 500 industry composition, while the circles display the buckets industry composition for each month in the investment time span, the outer circle representing the latest re-allocation in December 2018.

The low-rated portfolio provides a bigger resemblance with the market industry composition, even though providing a slight over-representation of Consumers and Industrials. Consequently, the Healthcare and Technology sector are less-represented than in the market. The high-rated bucket also presents a strong Consumer sector. However, the Industrials have almost vanished while being replaced by a representative Healthcare industry, with roughly the same proportion as prevalent in the market, and a strong technology division, making up almost

double the size of their market proportion throughout the investment period. The industries have naturally performed differently within the investment time span, and their returns are presented in the following Figure.

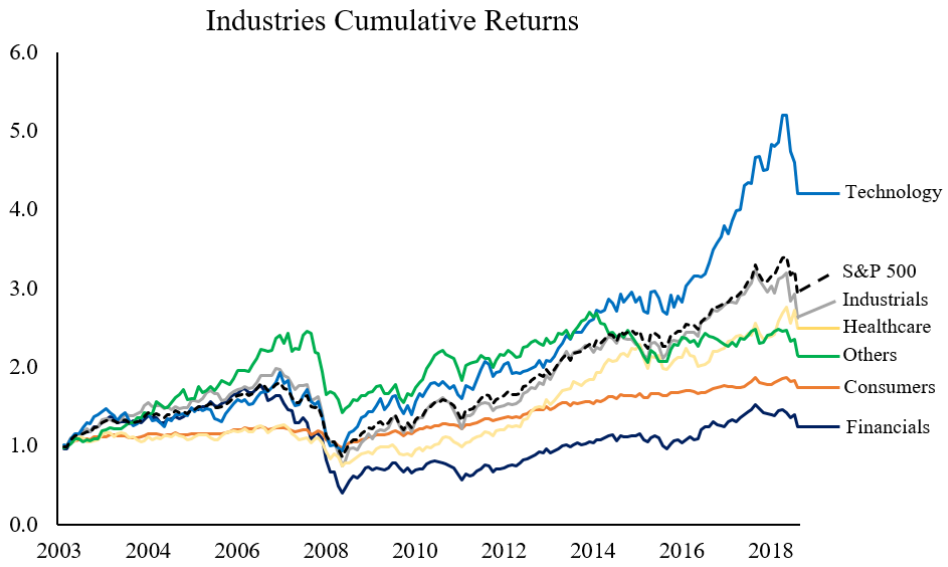



Figure 9: Cumulative Returns of Value-Weighted Industry Portfolios

Besides the similar industry composition between the market and low-rated portfolio, the strong orientation of the Industrials to the market performance and his relatively higher weight in the lower bucket could provide another explanation for its return being close to the market. For the high-rated bucket, the bigger stake of technology would give the intuition that it might perform better, however the results provide a different conclusion. To grasp the extent to different industry composition might have influenced the result, an industry-effect neutral investment strategy has to performed, which is presented as the best-in-class approach in the following paragraph.

As described above, the best-in-class approach applies the positive screening methodology individually on the major 10 economic sector in the S&P500 index and merges them consecutively by value-weighting the industry results based on their market capitalization proportion to the market. Figure 9 compares the cumulative returns of the high- and low-rated portfolio for the best-in-class strategy to the originally-executed positive screening strategy on the ESG score, while Table 5 provides the beta coefficient and summary statistics of the two portfolios and the long-short strategy; where the low-rated portfolio is shorted and the high-rated one is invested in as suggested by Kempf and Osthoff (2007). The red line represents the performance of the original low-rated portfolio, while the green line shows the cumulative returns of the original high-rated one.

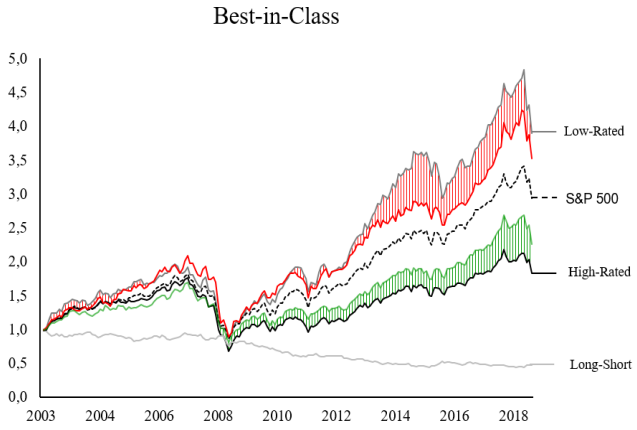



Figure 10: Cumulative Returns for Best-in-Class approach

| Best-in-Class | High-Rated | Low-Rated | Long-Short |
|---|---|---|---|
| Alpha | -5.10*** | -0.53 | -5.45*** |
| MktRF | 1.04*** | 1.03*** | 0.03 |
| SMB | -0.30*** | 0.06 | -0.33*** |
| HML | 0.27*** | -0.20*** | 0.44*** |
| RMW | -0.02 | -0.16* | 0.17 |
| R-Squared | **0.95** | **0.85** | **0.26** |

| Best-in-Class | High-Rated | Low-Rated | Long-Short |
|---|---|---|---|
| Mean % | 3.61 | 8.54 | - 5.48 |
| St. Dev. % | 14.68 | 15.80 | 8.43 |
| Min% (monthly) | - 20.08 | - 25.43 | - 11.22 |
| Max % (monthly) | 11.74 | 10.82 | 6.91 |
| Sharpe Ratio | **0.25** | **0.54** | **- 0.65** |

Table 5: Four-Factor coefficients and Summary Statistics for Best-in-Class approach

For both portfolios, the significance of the beta coefficients with the four-factor model remained unchanged. However, the negative amplitude of the SMB factor on the high-rated portfolio slightly increases, as well as the underperformance denoted by an increased negative Alpha. Even though the HML factor could also improve in comparison to the original strategy, the inability of the HML factor to create returns over the investment period (1.02 Cumulative Return) does not enable this factor to make up for the additional induced performance reduction. For the low-rated portfolio, the coefficients remain almost unchanged. Though, in terms of Sharpe Ratio, the low-rated BIC portfolio has improved against the previous methodology and provides the best risk-return profile of the positive screening portfolios.

Through merging the individual industry portfolios by their industry weight, thus avoiding distortions to the market composition, one can observe an amplification of the result dispersion between the two portfolios. This confirms the observation marked above (Figure 7&8) that the favorable industry composition for the high-rated portfolio has reflected upon better returns, while the over-representation of consumers has hampered the low-rated portfolio's profitability. The increased performance gap after eliminating the industry effects is a further indication that the superior performance of lower ESG-rated companies is derived from the nature of the included securities. The minor valuation in comparison to the high-rated firms (Figure 5) offer a greater potential for exploiting undervaluation at a company level.

### 5.2 Negative Screening Policies

This policy approaches the screening process from another perspective by excluding companies, rather than selecting them pro-actively based on their social performance. The

activities for which the social investor filters are defined in Section 3. From the investment universe comprising 500 companies, 138 constituents are involved in least one of the defined restrictive business activities and are therefore excluded from the investment portfolio. The following analysis compares the performance of one the portfolio with companies still included in the investment scope with the market, while also contrast the results with the performance of the "excluded" portfolio, containing all companies which have been afflicted by the negative screen. Figure 11 presents the cumulative return for all mentioned investments, while Table 6 presents the beta coefficients for the four-factor
model and the strategies' summary statistics.

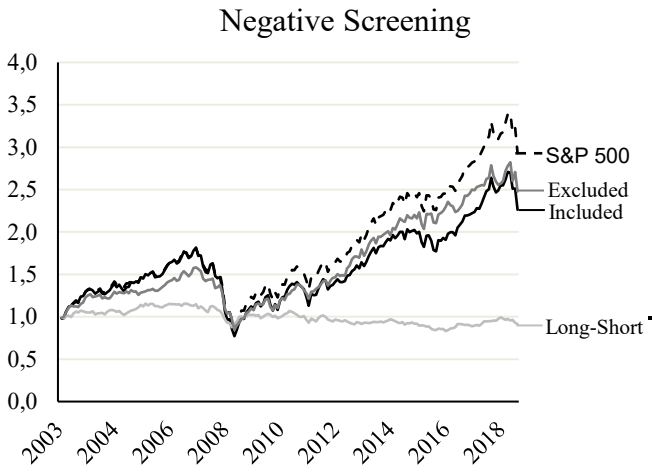



Figure 11: Cumulative Returns for the Negative Screening Portfolios

| Negative Screening | Included | Excluded | Long-Short |
|---|---|---|---|
| Alpha | -4.46*** | -1.94* | -4.02** |
| MktRF | 1.08*** | 0.89*** | 0.26*** |
| SMB | -0.08*** | -0.26*** | 0.22*** |
| HML | 0.08*** | -0.03 | 0.07 |
| RMW | 0.01 | 0.1 | -0.01 |
| R-Squared | **0.97** | **0.89** | **0.41** |
| Negative Screening | Included | Excluded | Long-Short |
| Mean % | 5.13 | 5.70 | -1.26 |
| St. Dev. % | 14.99 | 11.95 | 7.61 |
| Min% (monthly) | -21.33 | -15.24 | -9.55 |
| Max% (monthly) | 11.59 | 8.30 | 6.36 |
| Sharpe Ratio | **0.34** | **0.48** | **-0.17** |

Table 6: Four-Factor coefficients and Summary Statistics for Negative Screening Portfolios

The portfolio still "included" within the scope of the investor contains the majority of stocks listed in the market. Thus, the significant beta coefficient with the market is no surprise. However, the significant negative Alpha shows that the limited investment universe statistically underperforms the model, providing an implication excluding controversial business fields might cut profitable securities out of the portfolio, resulting in a performance loss. The SMB and HML coefficients, although being significant, do not majorly impact the results due to their low amplitude.

Even though being a possible restriction for the profitability of the "included" portfolio, the "excluded" securities themselves are also not able to provide superior returns in comparison to the market, producing also a negative Alpha even though it is less severe at a lower significance level. However, its slightly outperforms the post-filter investment universe of the social investor by delivering a greater Sharpe Ratio with approximately the same produced annual returns, but a lower volatility in terms of standard deviation.

### 5.2.1 Restrictive Business Areas analysis

To obtain a deeper insight on the driving forces behind the performance of the two contrasted investment universes, a more in-depth analysis of the excluded areas is performed to crystallize the profitability of the excluded business fields and their potential impacts on the results presented above. Figure 12 shows the cumulative performance of the major controversial business areas set in the negative screening filters. An overview of the excluded business activities, and the groupings performed by the author, can be seen in Appendix C.

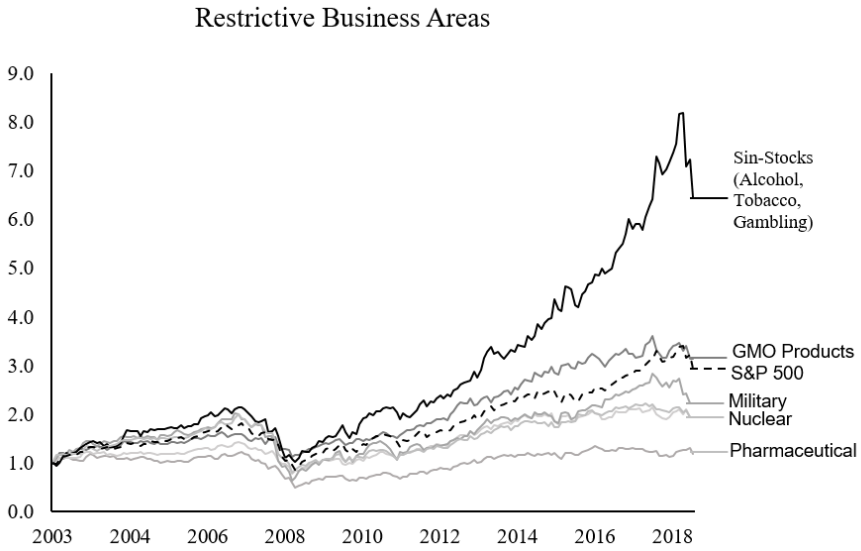



Figure 12: Cumulative Returns of Restrictive Business Areas over Investment Period

| Restrictive Business Areas | Pharma-ceutical | GMO Products | Military | SinStocks | Nuclear |
|---|---|---|---|---|---|
| Mean | 1.12 | 7.18 | 5.01 | 11.73 | 4.17 |
| Std. Dev. | 14.88 | 11.10 | 19.00 | 16.82 | 13.93 |
| Min% (monthly) | - 20.62 | - 11.44 | - 25.85 | - 20.99 | - 21.32 |
| Max% (monthly) | 9.53 | 8.03 | 16.84 | 12.76 | 10.45 |
| Sharpe Ratio | **0.08** | **0.65** | **0.26** | **0.70** | **0.30** |

Table 7: Summary Statistics of Restrictive Business Areas

The graph provides an intuition about the performance loss suffered from the negative-screened portfolio of the social investor in comparison to the market. As one can observe in the graph, industrial-related areas with capital-intensive operations are not able to outperform the market. Hence, due to their high market capitalizations, they take on a big proportion in the value-weighted "excluded" portfolio, explaining its conjointly underperformance relative to the market as presented in Figure 9. Nevertheless, one of the rejected social investment business fields presents a noteworthy development in returns. The securities of companies involved in tobacco, alcohol, gambling and pornography, summarized as "Sin-Stocks", can substantially

outperform the index while also providing the best risk-return profile in terms of Sharpe Ratio, with only one competitive portfolio of companies involved in GMO products which can also outperform the index' Sharpe Ratio of 0.50. Due to its greater variety of included companies, its more distinctive development from the market and majorly its ability to outperform it, and thorough analysis on the Sin-Stocks portfolio and its potential influence on the positive-screening strategy is presented in the following.

### 5.2.2 Sin-Stocks Influence on Positive Screening Strategy

The fact that some companies perform in non-ethical business fields does not automatically imply that they were classified with a low ESG score. Their activities, even though in a questionable area, can still denote a superior social performance in comparison to the peers in the industry upon which the scores are created. A brewery would be excluded automatically from the portfolio of the social investor applying the negative screening policy as it operates in the alcohol business. However, if it focuses its operations on sustainability, e.g. by producing locally and thereby saving carbon emissions for transport, it would still rank high among its global-acting consumer product competitors exploiting natural resources and producing in low-income countries. Thus, the potential effects of the Sin-Stocks for both the high- and the low-rated ESG portfolios are inspected.

Figure 13 marks the cumulative performance exclusively of the sin-stocks constituents involved in the high- and low-rated portfolio, applying the same monthly re-allocation as in the original strategy, meaning that a security is held only as long as it ranks in the $1^{st}$ or $10^{th}$ percentile of the ESG distribution for the whole investment universe in the corresponding month. However, deriving a conclusion on the nature of sin-stocks and its influence on the investment portfolios solely based on the returns is filled with limitations: First, the average amount of sin-stocks included in the high-rated portfolio is 1.07, while the low-rated portfolio contains 3.07 companies. Second, since the results are value-weighted, the influence of these securities on the overall portfolio returns are dependent on their relative weight in the portfolio in terms of market-capitalization, which Figure 14 illustrates for the investment time span.

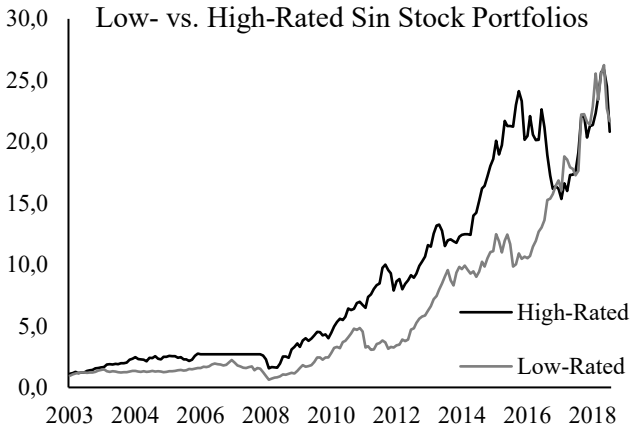



Figure 13: Cumulative Returns of Sin-Stocks included in High- and Low-Rated Portfolios

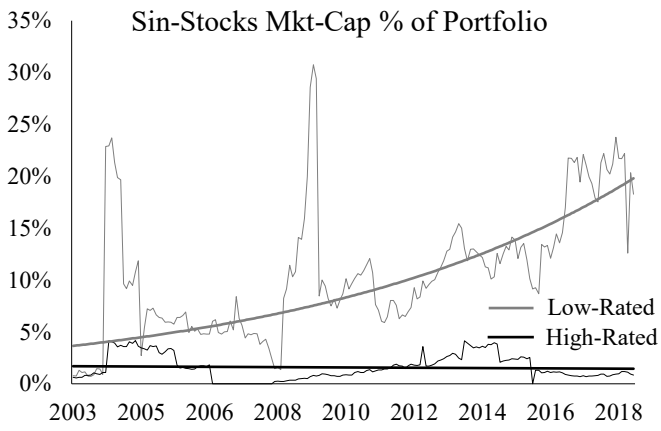



Figure 14: Mkt-Caps % of Sin-Stocks in High- and Low-Rated Portfolios

As Figure 13 indicates, the sin-stock securities included in both the high- and the low-rated portfolio were able to achieve formidable returns, with both portfolios multiplying the invested capital by 20 times over the investment period. The two companies of the sin-stock spectrum, which were able to take a spot in the upper-ranked portfolio, are Starbucks and Target Corp., both excluded by the negative screen due to their incorporation of alcoholic products in their portfolios. However, the outperformance observed from 2008 is mainly driven by the Starbucks-Share, as Target Corp was there after not able to return for many periods into the high-ranked ESG stocks. However, the sin-stocks are not able to majorly contribute to the overall return, as their market capitalization does only weight into the total portfolio value by just 2% throughout the observation period.

The sin-stocks contributing to the low-rated portfolio provide the same striking performance, however their relative-weight to the complete low-rated portfolio is much higher as for the high-rated counterpart, while also showing a growing tendency throughout the investment time span. The included company spectrum is slightly broader, ranging from alcohol corporations (Coors, Constellation Brands) to media and internet platforms (Amazon, Netflix), being excluded due to offering pornographic content. All those listed constituents were able to deliver superior results in comparison to the market, showing a more consistent performance pattern as the high-rated portfolio. Due to increased number of included constituents and their tremendous growth in size over the investment period, without changing their ESG ranking, they impose a considerable influence on the low-rated portfolio returns and could present a further explanation for its outperformance on the market.

Figure 15 aims on providing stronger conclusive statements on the relation between ESG and sin-stock performance by overcoming the sample size limitation through expanding the low- and high-rated portfolio. This is facilitated by merging the sin-stock companies into one portfolio for which the ESG performance has never ranked above the 5th decile in the ESG market distribution for the low-rated portfolio, while conglomerating all stocks which never fell below the 6th ESG rank for the comparative benchmark of the high-rated portfolio.

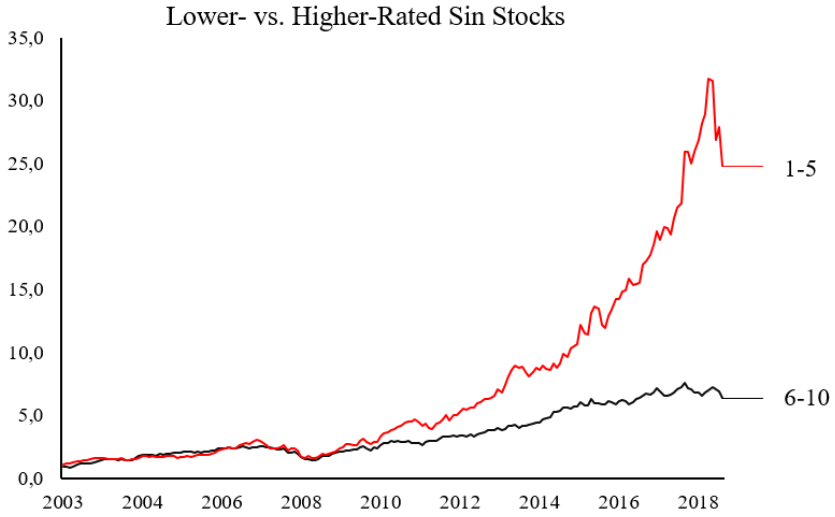
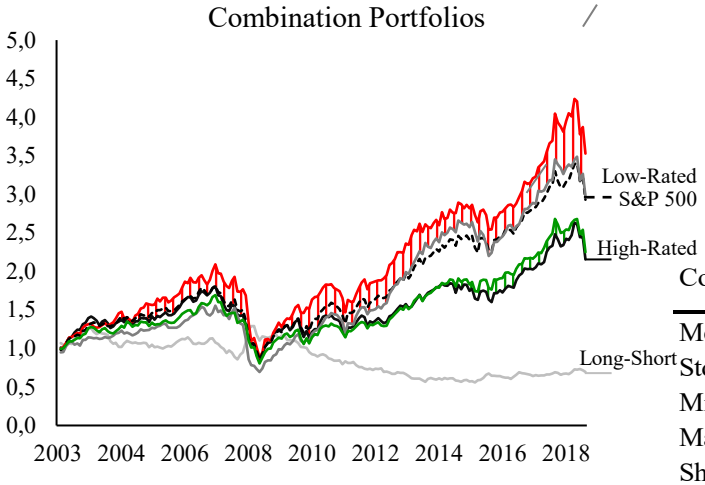



Figure 15: Cumulative Returns of Lower- (1-5) vs. Higher- (6-10) rated Sin Stocks

The graph infers that the superior performance of sin-stocks is more concentrated on the lower-rated ESG buckets. Thus, companies with little ESG efforts in the area of alcohol, tobacco, pornography and gambling are more likely to outperform their competitors concentrating its resources on sustainability issues. This is a further implication that the low-rated portfolio might benefit largely from the inclusion of restrictive business areas in the portfolio formation, especially the sin-stocks.

### 5.3 Combination Portfolio

To control for the effects these securities might have had on the results, an additional robustness test is performed on the ESG strategy by performing the positive screening methodology solely on the market constituents remaining after applying the negative screen and excluding companies involved in controversial activities. Figure 16 compares the performance of the portfolios combining the positive and negative screening policies with the originally performed ESG screening strategy, where the low-rated portfolio is denoted as a red line, while the original high-rated portfolio performance is highlighted through a green line. The hatched areas represent the return differences between the combination and the original portfolios.




| Combination | High-Rated | Low-Rated | Long-Short |
|---|---|---|---|
| Alpha | -3.68*** | -2.52 | -0.41 |
| MktRF | 1.01*** | 1.03*** | -0.08 |
| SMB | -0.19*** | -0.04 | -0.34*** |
| HML | 0.20*** | -0.20*** | 0.49*** |
| RMW | -0.07 | 0.06 | -0.18 |
| R-Squared | **0.88** | **0.77** | **0.15** |

| Combination | High-Rated | Low-Rated | Long-Short |
|---|---|---|---|
| Mean | 4.83 | 7.10 | -2.27 |
| Std. Dev. | 14.90 | 16.91 | 11.41 |
| Min% (monthly) | -15.02 | -29.12 | -9.18 |
| Max% (monthly) | 10.67 | 11.96 | 14.40 |
| Sharpe Ratio | **0.32** | **0.42** | **-0.20** |

Figure 16: Cumulative Returns for the Combination Portfolios

Table 8: Four-Factor coefficients and Summary Statistics for Combination Portfolios

Like the original-high rated portfolio in the original strategy, the one created on the negative screen adjusted investment universe shows a significant negative Alpha as an indication of a certain underperformance relative to the factors it is controlled for, and its amplitude even increased slightly. The SMB factor still negatively affects the returns, meaning that the market-capitalization issue presented in Figure 5 was not resolved. The market remains the driving factor for explaining the portfolio's results with a significant beta close to 1. In general, excluding the restrictive business areas from the portfolio construction basis did not impose significant changes on the high-rated portfolio, which can still not compete with the market.

The low-rated portfolio in fact did experience an impact on the results after applying the negative screen. The SMB factor, which had been positive and significant at a 10% level for the original strategy, could not take an influence on the low-rated combination portfolio. The HML factor remained significantly negative, implying that the portfolio has a higher proportion of growth stocks being outperformed by value-stocks as suggested by the factor, even though it does not hold for the US market in the investment period and thereby does not affect the strategies results. The market remains the most influencing factor for the low-rated returns, which can be observed by the even greater similarity of the return pattern with the market as compared to the original low-rated portfolio. Although seeming almost identical, the 1st decile stocks are outperformed by the market in terms of Sharpe Ratio (0.5 for S&P 500), due to a greater return volatility. Thus, the negative screen did impose a performance loss on the low-rated portfolio. However, creating a long-short strategy is still out of range, as the high-rated stocks are still outperformed resulting in negative returns.

# 6. Conclusion

This dissertation concluded that investing under social aspects, applying the S&P 500 index as an investment universe, does come at a price in terms of reduced financial performance, as suggested by the negative Alphas observed throughout all-positive screening strategies. The robustness of these findings was tested by controlling for industry effects and controversial business areas, yet no social investment approach with the ability to deliver abnormal returns was identified.

The underperformance of the socially-responsible portfolio is especially observable from 2008 onwards. Subsequently to the market turmoil experienced in the financial crisis, new regulations have been implemented settling of minimum capital requirements of financial institutions based on the riskiness of their assets (Basel III, Dodd-Frank Act). According to Devalle et al. (2017), a company's ESG performance can meaningfully affect its credit rating and thereby reduce its associated risk, qualifying it as an investment target for the increasingly risk-averse financial institutions. According to the CFA Institute (2017), 65% of professional investors consider ESG in their decision process to manage investment risks. In this dissertation, the only variable suggesting this statement the hold true is the slightly lower observed standard deviation for the high-rated portfolios in contrary to the low-rated counterpart. Applying further volatility models on the decile portfolios might facilitate to obtain a deeper insight on the relationship between ESG and financial risk.

Another potential bias interplaying to the phenomena described above is the increased fund availability of large firms for ESG policies, as highlighted by Doyle (2018). Smaller firms on the contrary focus their resources on their operations, giving them potential to outperform their large-cap competitors, even though giving up on social performance. A further indication for CSR conflicting with achieving returns is provided by Petitjean (2019), who finds that the existence of environmental policies may be perceived as useless, especially in times of crisis where investors focus on economic survival. However, according to Mackey et al. (2007), a firm should still invest some resources in socially responsible activities as these might reduce the present value of a firm's cash flows, but create economic value when there is an excess demand for socially responsible investment options. Yet, the inferior performance observed for high-rated companies could be an indication that this opportunity was already exploited, and the market is over-saturated. Identifying the circumstances under which social responsibility is help- or harmful for financial performance is an interesting field for further research.

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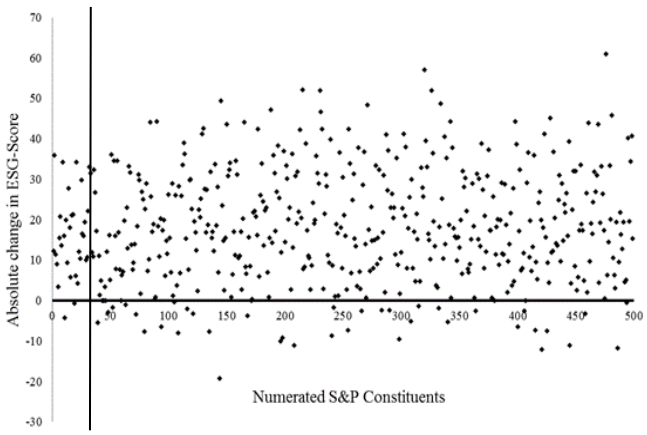
# Appendix




Appendix A: ESG-Score Development on a firm level over the time span

| | P&G Procter & Gamble | Category | | Pillar | |
|---|---|---|---|---|---|
| | | Score | Weight | Score | Weight |
| ENVIRONMENT | **Resource Use** | 30.60 | 11% | 35.34 | 34% |
| | **Emissions** | 71.39 | 12% | | |
| | **Environmental Innovation** | 0.75 | 11% | | |
| SOCIAL | **Workforce** | 56.47 | 16% | 66.20 | 36% |
| | **Human Rights** | 48.51 | 4.50% | | |
| | **Community** | 91.29 | 8% | | |
| | **Product Responsibility** | 71.14 | 7% | | |
| GOVERNANCE | **Management** | 84.72 | 19% | 68.84 | 31% |
| | **Shareholders** | 47.69 | 7% | | |
| | **CSR Strategy** | 34.72 | 4.50% | | |
| TOTAL | | | | **56.51** | |

Appendix B: ESG-Score Composition on the example of Procter and Gamble (2017)

| Grouping of Controversial Business Areas | | | | |
|---|---|---|---|---|
| GMO Products | Nuclear | Sin Stocks | Pharmaceutical | Military |
| | | Gambling | Stem Cell Research | Cluster Bombs |
| | | Alcohol | Contraceptives | Landmines |
| | | Tobacco | Animal Testing | Armaments |
| | | Pornography | | |

Appendix C: Grouping of Controversial Business Areas for Sin-Stock Analysis