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THE IMPACT OF SOCIAL RESPONSIBLE INVESTING ON THE EUROPEAN STOCK MARKET

Vice versus Nice

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ABBREVIATIONS & VARIABLE DEFINITIONS

BIC	Best-In-Class
CAPM	Capital Asset Pricing Model
CSR	Corporate Social Responsibility
EMH	Efficient Market Hypothesis
ESG	Environment, Society, Governance
Ethical Investing	Social Responsible Investing
EU	European Union
EW	Equal Weighted
EWP	Equal Weighted Portfolio
HML	High minus Low
HPR	Holding Period Return
MPT	Modern Portfolio Theory
S&P 500	Standard & Poor's 500
SML	Small minus Big
SR	Social Responsibility
SRC	Social Responsible Company
SRI	Social Responsible Investing
VW	Value Weighted
VWP	Value Weighted Portfolio
WML	Winner minus Loser

Return	Fund annual raw return.
Alpha	Funds annual adjusted fund return in terms or risk and explanatory power, is the estimate of the parameter 'α' in Carhart's (1997) four-factor model and CAPM one factor-model.
Beta	Volatility as opposed to the market
R-square	Goodness-of-fit, how well does the data fit the model.
β_{MKT}, β_{SMB} , β_{HML} , β_{UMD}	Carthart four-factor loadings on the market.

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ABSTRACT

This thesis investigates possibility to generate abnormal returns on the European market, by applying various Social Responsible Investment strategies. A significant amount of academic literature suggests there to be a connection between higher ESG-rated stock portfolios and abnormal returns, while others deny such notion. Using a set of various ESG-values obtained from the Thomson Reuters ASSET4 database, financial data from the Datastream database and factor-data from Kenneth R. French database, this thesis attempts to investigate the financial performance of SRI in Europe. The thesis uses stock-information from 18 different European countries, applying the Carthart (1997) four-factor model and CAPM single-factor model, to construct portfolios based upon different ESG-scoring strategies. This research concludes that Social Responsible Investing does outperform the market, but only when applying a social investment screen that focusses on highly governance ranked companies. There are no significant or abnormal returns regarding the social and environmental dimension, besides the Positive and Best-in-Class SRI strategies.

This thesis, in order to research the impact of Social Responsible Investing, employs three different SRI investment strategies, being a Positive, Best-In-Class and E-S-G investment strategy, during the same time period. This thesis finds that over the whole sample period, SRI underperforms compared to the market or investing in low ESG-ranked stocks, as well as generating lower Treynor Ratio's and/or Betas, with the Governance 10% cut-off portfolio being the exception, generating a 6.4% return annually.

Using a sample period of 10 years for stock returns from January 2007 to January 2017 and ESG-data from December 2006 to December 2016, this thesis finds that portfolios screened with a Positive and Best-In-Class, combined with a cut-off rate of 10, 15, 20 and 25%, neither over *or* underperform on the general European stock universe. In addition the Long-Short investment strategy produces counterproductive results due to the better performing nature of low ranked ESG portfolios, as well as lower Treynor-ratios. The E-S-G approach only returns significance for Governance portfolios on a 10% basis.

KEY WORDS: SRI, ESG, Carhart (1997), Abnormal, Europe

1. INTRODUCTION

Social Responsibility has become in recent years a more prevalent topic, even though Social Responsibility has been around as investment incentive for centuries. As consumers, shareholders and corporations are showing a growing interest for making a profit, positive revenue or difference while being driven by varying personal ethical and social convictions trough sustainable business (SIF, 2010). With the U.S. Pax World Fund, the first modern SRI-fund was brought into existence in 1971 and was created for investors that were opposed to the Vietnam War and investing in weapons in general. Renneboog et al. (2008:1723-1742)

Even though U.S. based companies are only required to disclose financial results and Australia the only continent is outside of Europe (ASIC, section 1013DA) that has adopted a regulation regarding SRI, a growing amount of annual reports is showing an increase in addressing '*social responsibility, sustainable practices and corporate giving'* (Forbes.com, 2018). The question that in return can be asked is, why there is a growing amount of non-financial reporting?

The answer seems to stem from a growing interest for transparency from investors when making their investment choices, which carries the term Social Responsible Investing – referred to as 'SRI'-. SRI is Corporate Social Responsibility's mission and purpose by committing to the same goals and involves incorporating some form of social and ethical screening (SRI Registrar, 2018). To address the above picture, some numbers to put the increase in SRI in perspective. In 2001 around 2.24 trillion dollars or roughly 12% of total asset management underwent some kind of social screening, this amounts up to 8.72 out of 40.3 trillion dollars (or 21%), an increase of 33% since 2014 (USSIF Report, 2016).
A Social Responsible company tries to engage in business activities that avoids certain markets like tobacco, alcohol, nuclear power and military and seeks to employ itself in social justice, environmental sustainability and alternative energy/clean technology efforts (Investopedia, 2018). A Social Responsible investor, or 'socially-conscious'-investor, tries to seek investments that focusses on above mentioned companies. They claim that the very nature of those companies is a profitable and growing practise, capable of

yielding positive returns over a certain amount of time. Positive return can be expressed in this situation in two different ways. The first being; reaching a certain social impact and the second to be of financial gain. Social initiatives are supported by for example the OECD (2019). However, actually finding information about companies' ethical behaviour in a manner that satisfies the investor's needs is complicated. As stated above, the amount of required legislation in regards of CSR is minimal. On the other hand, there are numerous critics in doubt of SRI and related practises. They claim that including both social and environmental screens in the investment universe hinders returns and that investors are actually losing out of (financial) returns.

The main question that arises, can be summed in the following question: Does incorporating any form of SRI considerations in the portfolio creating process, cause any (significant) financial benefits or does it hamper it? Answering this question could pose significant opportunities for future investing opportunities and the consequences can be substantial as more and more different investors are drawn towards more high ranked Social Responsible companies where the emphasis not only lies on financial performance (at any cost), but where an actual value can be derived from proper business etiquette.

1.1. Research Problem

The main research problem or question stated in this thesis is of the previous mentioned second goal; financial gain, and is as follows: '*Can Social Responsible Investing abnormal returns on the European stock market?'.* This translates in questioning whether Social Responsible or ethical investing can be statistically profitable by holding socially ethical or sustainable stocks. Should avoiding ethically dubious or controversy stocks within a portfolio be desired? Even though much research has been conducted within this field of studies, this thesis attempts to focus on the European stock market, as opposed to the U.S. stock market (Kempf & Osthoff, 2009; Mollet & Ziegler, 2014 and Malladi et al., 2017), while closely looking at previously executed researches.

During this thesis, an attempt is made to give a detailed insight into the performance of portfolios that are constructed according to stocks that are ranked high in terms of Environment, Social and Governance. This is done by applying three different screening strategies within the portfolio forming process, including a long-short investment strategy, which is inspired from the academic research of Kempf & Osthoff (2007). With this strategy, the goal is to hold an ESG-ranked positive portfolio, whereas an ESG-poor performing, or controversy, portfolio will be held short. The data for these proposed screening policies is derived from the ASSET4 Thomson Reuters database and equity information is coming from Datasteam. During the research, a four-factor model and a one-factor model is applied on the European portfolios, to research what is actually the driving factor behind the abnormal returns.

To get a more thorough measurement, different investment strategies will be applied, in order to find out which strategy drives the results the most. For SRI-information and scoring, ESG-data will be used. ESG stands for 'Environmental', 'Social' and 'Governance' and are the three central factors when it comes to measuring sustainability impacts and ethical measurement. Chapter 2 will expand more on explaining the rationale behind ESG-data.

The general idea is to research if significant excess returns can be obtained through the Carhart (1997) four-factor model and the CAPM one-factor model, derived from the Fama-French three-factor model. Inspiration for this method is derived from Hong & Kacperczyk (2009) and Kempf & Osthoff (2007). In these papers, the authors apply a similar strategy for sin stock portfolios and is according to Bauer et al. (2004: 1751–1767) capable of returning more detailed information in regards of explaining fund returns as opposed to the CAPM single-factor model.

1.2. Research Hypothesis

Based on the earlier given exposition of the research problem, the research hypothesis can be formulated. The hypothesis within a thesis is important, because it determines the type of data required for collection. In this thesis, previous conducted research in similar

markets on various continents will looked at and replicated on the European stock market. The null hypotheses, is the hypotheses that is trying to be disproved, rejected or nullified.

H0: Social Responsible Investing gives neither higher nor lower risk-adjusted returns

Reasons for this hypothesis to hold, can be derived from several possible causes. Perhaps, the profit that occurs when one diversifies their portfolio (for ethical reasons) is not significant enough for significant excess returns to occur.

H1: Social Responsible Investing is increasing risk-adjusted returns.

H1a: Positive Screening provides significant excess returns.
H1b: Best-in-class Screening provides significant excess returns.
H1c: E-S-G Screening provides significant excess returns.

This hypothesis supports those in favour of Social Responsible Investing and claims that investing in ethical beneficial purposes also holds a financial gain. Ethical investment supporters claim that SRI is one for the longer term, which eventually will lead to superior returns over time. The argument holds that excluding non-ethical performing companies automatically excludes future under-performing companies and thus increases risk-adjusted portfolio returns.

H2: Social Responsible Investing reduces risk-adjusted returns.

With this hypothesis supporting the opponents of SRI (or ethical investing), the most prevalent argument is the modern portfolio theory. They claim that any limitation put on the investment universe being available will hamper benefits from diversification and in return will lower the risk adjusted returns. For companies this would mean that ‘doing well while doing good’ might prove to be expensive.

1.3. Thesis Structure

In this paragraph a brief explanation will follow as to how this thesis and research will be structured. The thesis will continue with chapter 2, separated in two main paragraphs, after having stated and propositioned the research question in chapter 1, where a general

explanation and description of SRI will be formed. By doing so there will be a consensus of what SRI exactly entails throughout the rest of this thesis. In the following paragraph's, different viewpoints of SRI will be addressed, SRI's counterpart Sin stocks will be introduced and to conclude the paragraph, ESG-data will be introduced, the defining scoring mechanism of SRI.

The second part of chapter 2 will discuss the theoretical framework. Within this paragraph, the theories regarding to different return properties being applied in this thesis will be explained, addressed and looked at in an academically context. For selecting, evaluating and measuring performance differences, various approaches and theories are available. By combining the literature research from chapter 3, the most preferable theories will be selected and explained. This chapter explains factor-models, starting from the conventional CAPM single-factor model to the Carthart (1997) four-factor model.

In chapter 3, a literature review in regards of SRI and related topics will be conducted. The reader will get a clear idea on the most recent studies conducted on SRI. There are three main viewpoints on SRI related investment strategies, being that SRI can be over performing, underperforming or not significantly different as opposed to conventional investing methods. In addition, the literature research will expand on measuring SRI-performance.

Chapter 4 addresses data and methodology. The chapter explains the research methods being applied. This involves discussing the selection of the ESG-screening methods, data selection from the Thomson Reuters database and annual year-end returns from Datastream, as well as the input for the Carhart (1997) four-factor model. Furthermore, the different factor loadings derived from the Kenneth R. French database will be addressed.

Chapter 5 focusses on the empirical results of the research and shows the regression results, whereby the research problem gets answered through the different previously set up hypotheses.

Chapter 6 briefly addresses the discussion about the data-input and the topic of SRI itself. Concluding in chapter 7, the researched data and information gained through literature research, run regressions and different performance measurements through mentioned regressions, will be compared with the initial research question and problem. In this chapter the conclusion will be drawn based on reliable and solid analysis.

1.4. Thesis contribution and limitations

The intended contribution of the thesis, is to research whether or not a statistical significant abnormal risk-adjusted return can be achieved on the European Stock market through Social Responsible Investing, otherwise known as ethical investing. This has been largely inspired by previous research, like Mollet & Ziegler (2014: 208-216). A significant amount of research has been or is already being performed in regards Social Responsible Investment strategies. Several papers involve the U.S. or Asia-Pacific equity market, or are being conducted resolving around bonds and other risk bearing materials. By adding the analysis of ESG-data derived from the ASSET4 Thomson Reuters database, Datastream and Kenneth R. French, combined with several screening strategies, the results will be of added value towards academically debate on the viability of SRI. Furthermore, the different investment strategies will be taken into account. With this thesis, a long-short strategy will be conducted and will be taken a closer look at what makes sustainable strategies so attractive to ethical investment seeking investors.

Possible limitations within this thesis research are, but not limited to, the availability of the ESG-data. Though the data derived from the ASSET4 Thomson Reuters Database is extensive, some companies have no data available and according to Halbritter & Dorfleitner (2015; 25-35), the magnitude and impact of the retrieved data are heavily depended on the rating supplier, the selected company sample and the selected sub-period. One has to assume that these scores are an accurate reflection of the investor's view of selecting and evaluating their companies to be invested in regards of their ethical behaviour. Besides above mentioned argument, does this thesis not take tax and transaction costs into account, despite being aware of these costs actively influencing the annualized returns.

2. THEORETICAL BACKGROUND

This chapter introduces the reader to the topic of Social Responsible Investing in the first part and will go over the general theories regarding return properties and performance measurements in the second part. The first paragraphs will explain the general concept of SRI, explaining where SRI originates from and what led it to the form SRI has today. The second part of chapter 2 will describe the different tools and investment strategies that are at hand for investors and will help understand and interpreted the results in chapter 6 better.

2.1. Social Responsible Investing

Social Responsible Investment strategies are not new and have been around for several decades, but have been increasing in popularity as an investment tool since recent years. EuroSif (2016) states following about social investing: "*SRI is a long term oriented investment approach, which integrates environmental, social and governance (ESG) factors in the research, analysis and selection process of securities within an investment portfolio*".

This indicates that analysis and the evaluation of different ESG-factors is combined, with the aim of capturing a better long term return for different (institutional) investors and in addition to benefit society (EuroSif, 2016). Integrating different Environment, Governance and Social screens into business practices is a popular strategy, experiencing an increase between 2017 and 2018 by 60% according to (EuroSif, 2018). This compliments the USSIF measurements, indicating that since 1995, US SRI assets have seen an 18-fold increase, a 13.6 percent annual growth rate (USSIF, 2018). SRI is however still negatively perceived by many financial advisors. According to an European SRI study by EuroSif in 2018, the idea persists that sustainability-oriented products are perceived as unprofitable, presenting a negative trade-off with returns, stating that information asymmetry is mainly present when it involves responsible investment products (EuroSif, 2018).

One of the fastest growing SRI strategies is one of those that manage to incorporate one form or another of ESG-investment considerations, closely followed by exclusion-investment considerations. In terms of asset allocation, bonds and equities share the SRI market almost equally, at 40% and 47% respectively (EuroSif-CityWireSelect, 2018).

The endorsement of environmental, social and governance (ESG) in regards of investment considerations, has developed and matured over the span of several decades. Where SRI started from a risk management focus (excluding specific industries and sectors) to opportunity seeking investment strategies for generating long-term added value for investors and society. This has meant a strong boost for the SRI-market which, quoting the latest Global Sustainable Investment Alliance (GSIA) report from 2016, is now at $22.89 trillion of assets being professionally managed (EuroSif, 2018).

Finding one set definition or one name for Social Responsible Investing is not an easy task. This becomes clear looking closer the research from Eccles & Viviers (2011). In 2011, Eccles & Viviers reviewed over 190 different academic papers in their research over the course of 35 years in order to analyse and collect the different meanings and names attached to investment strategies that incorporate different 'Environmental', 'Social', and 'Governance' criteria. They found that Social Responsible Investing is also known as 'Ethical Investing', 'Responsible Investing' and 'Environmentally Responsible Investing', with the last one focussing mainly on environmentally selected investment criteria. However, terms as 'Faith-Based-Investing' are not completely out of the question either, incorporating differences between Islamite and Christian investment screens, where 'Ethical-Investing' is more commonly associated with churches, charities and those who are mainly driven by altruistic behaviour and non-profit (Sparkes, 2001).
Despite there being many different names for social investment approaches, this thesis will be using SRI as an abbreviation for incorporating various Environmental-, Social-, and Governance screens.

2.1.1. Historical SRI

The exact origin of SRI is hard to pinpoint, however academic literature agrees on the roots of SRI to be in certain religious values and institutions, supported by authors as (Schueth, 2003; Derwall et al., 2011; Brzeszczyński & McIntosh, 2014). Examples can be found in Jewish, Christian and Islamic traditions, where there were ethical restrictions on loans and investments (Renneboog, 2008, p.1725). Dating back as far as the 17th century, the Quakers refused to profit from weaponry and slavery upon settling in North-America (Renneboog, 2008, p.1725). Leaning already closer towards our more modern understanding of ethical investing, in the 1920s, the UK Methodist Church forbid investing in 'sinful' companies involved in producing alcohol, tobacco, weapons and gambling (Renneboog, 2008, p.1725).

Following academic literature, such as Renneboog et al. (2008) and Schueth (2003), the version currently used as Social Responsible Investing started somewhere in the 1960's in the United States. During the civil rights movements, topics like the Vietnam War, the shareholder boycott of South Africa's Apartheid Regime (Teoh et al.,1999) and the strive for equal woman rights, all contributed to a raising concern in regards of social awareness and general sense of responsibility (Schueth; 2003).

In the following decade, during the 1970's, social responsibility saw a rise in size, whereas during the '80s, an increase in worldwide environment issues evolved. An event that contributed heavily towards this awareness for example, was the Russian Chernobyl incident, and the U.S. environmental Exxon-Valdez-oil tanker disaster fuelling environment global awareness (Schueth, 2003).

The early 1990's witnessed SRI growing strongly in the U.S., Europe and quickly following the rest of the world, in which ethical consumerism played a strong role. Consumers started paying a premium for products that were in line with their personal values, with the United Kingdom passing a law in 2000, incorporating social, environmental and governance considerations in the investment process of pension funds. Several countries followed swiftly, with the latest average of six in ten investors planning to increase their allocations to responsible investments over the next three years (Financial Times, 2018; Renneboog, 2008, p.1725).

2.1.2. ESG-Ratings

Within SRI (or ESG) investing, there are several companies or institutions specialising in ESG or SRI related research and company ranking. For example, but not limited to, companies like ASSET4, KLD, Bloomberg, Sustainalitics and Ethical Investment Research Service. These companies, according to World Pax (2018), '*suggest that ESG-factors, when integrated into investment analysis and portfolio construction, may offer investors potential long-term performance advantages*'. Verheyden, et al. (2016) continues on this in their paper 'ESG for All?'. The authors explore the possibilities of incorporating the use of ESG-data in investment approaches and possible opportunities for fund managers and investors in general.

In other words, does ESG-investing lead to abnormal returns, when comparing unscreened investment universes. In order to measure the differences and the effects of ESG-screening's risk and returns, Verheyden, et al. (2016) looks at 'the different measures or indicators of corporate performance against ESG criteria'. Based upon this they created six different ESG-portfolios, excluding all companies for which the necessary ESG data/ranking was not available at the time of measuring. After applying these portfolio screens, Verheyden et al. (2016) finds a '*remarkably'* high correlation among the six different portfolio returns, but found that three out of four screened portfolios outperformed the unscreened portfolios. Though, according to Verheyden et al. (2016), ESG-data has provided only slight effects on performance and it is '*mostly for the better'.* Notable point from the article is that the influence/effect from the screened portfolios can be mainly **attributed to European based companies** and North America. Overall, they conclude that the specific use of ESG-screening policies adds around 0.16% in annual performance average, strengthened by lowered overall volatility.

Previous research has shown similar results, but use in general different ESG-ratings or pillars, depending on the different SRI-indices or screenings used. As the data used in this thesis is based upon the Thomson Reuters index, the data is rated according to the ESG-scores, being environmental, social and governance as provided by Thomson Reuters. According to the SIF (2003)-report, over 64% of mutual funds with a social screening,

use over five different screens, which can be classified in two groups: negative and positive ESG-screens.

Hallbritter & Dorfleitner (2015), apply a high-low strategy, where the high portfolio consists of over 850 different indicators as provided by the ASSET4 rating universe for U.S. companies. These indicators are built on four pillars, being: Governance, Social, Environment and Economic performance. Where Hallbritter & Dorfleitner (2015) use Social Responsible pillars, Kempf & Osthoff (2007), acknowledge that most studies select SR-companies based only on their environmental screen. However they state, as backed up by the Investment Forum (2006) report, that SRI fund managers typically employ several SR-screens at the same time. Kempf & Osthoff (2007) apply both negative, positive and best-in-class screens (which will be explained more in depth in the next paragraph). Kempf & Osthoff (2007) derive their ESG-screen ratings from the KLD Research and Analytics centre. Forming a long SR-portfolio and a short low-rated SR-portfolio, their high SR-portfolio is based upon six scoring screens: community, diversity, employee relations, environment, human rights, and product. Whereas the exclusionary screens used are: alcohol, tabaco, gambling, military, nuclear power and firearms.

Nofsinger & Varma (2014), used for their selection of SRI mutual funds, a list compiled of various databases. Looking through publicly available lists from USSIF.org and SocialFunds.com. Furthermore they added CRSP U.S. Mutual Funds that contained certain SRI-keywords. Leading to the following screens: A range of negative product related screens (alcohol, Tabaco, nuclear, gambling, etc.), environment (positive and negative), Social (positive and negative), governance (positive and negative) and faith/religion based.

2.1.3. SRI-screening

Where the previous paragraph discussed different ESG-ratings, this paragraph will point out some more concrete examples of different SRI-screening approaches. The use of different SRI-screening approaches gets justified by Auer et al. (2016). By performing a research using a dataset based upon ESG-screens, Auer et al. (2016) attempts to prove whether (or not) SRI has a certain performance advantage. Mainly the inclusion of Europe

in this research makes their conclusion and methodology an interesting addition for this thesis. In this publication the authors use various screens to value and score listed companies. Auer. et al. (2016) states that within the U.S. and Asia-Pacific regions, holding an ESG-portfolio does not hold a significant return as opposed to holding a passive portfolio, whereas for Europe the authors find a certain price to be paid for holding ESG stocks.

Social Investing allows an investor to apply a certain set of different investment strategies to reflect their ESG-preferences. Examples of these preferential screens can be: Excluding companies to be invested in, investing based upon norms, best-in-class investing, sustainability based investing and impact investing. Each of these classes generally know subclasses regarding these investment strategies (Sustainable Finance Initiative, 2018). Best-In-Class investing can be split up in (i) Eco-weighted best-in-class, (ii) Investment-weighted best-in-class and (iii) Financially-Weighted Best in Class investing. Negative screening can be split up in Ethical 'negative' screening and Environmental/social 'negative' screening. According to the SIF (2003), 64% of social mutual funds in the US tend to use more than five different screens,

Social Responsible based Investment-screens (including the above mentioned), change over time and the requirements and expectations of investors change with it (Renneboog et al., 2008:1723-1742). SRI can be divided in two main groups: negative-, and positive screening (SRIconnect, 2018).

Negative investment screens belong to one of the oldest forms of SRI and can find their roots back decennia back into time. Negative investment screens generally focus on the exclusion of certain stocks, classes, industries or companies based upon various Environmental-, Social-, Ethical-, or Governance factors. Negative screens can -but not limited to- be for example: (i) alcohol, (ii) Tabaco, (iii) gambling, (iv) defence industries, (v) poor labour relations, (vi) adult entertainment, (vii) abortion, and (viii) animal testing.

Positive investment screens are part of the more modern version of SRI, and include in general superior CSR-standards. A positive investment screen, as opposed to negative screens, does not exclude industries. Ghoul & Karoui (2017) use KLD-ratings for individual firms, which ranks stocks by using a binary rating for a set of strengths, combined with seven dimensions: community, corporate governance, diversity, employee relations, human rights and product quality and safety.

When looking at the positive screening approach, several deviations and combinations are possible. One being the **Best-In-Class** approach, which will be used as well as a hypothesis for this thesis, as can be seen in Chapter 1. The Best-In-Class approach involves ranking firms within each industry or market sector based upon their ESG-rating. A more in-depth explanation of this strategy used for this thesis can be found in Chapter 4, Methodology.

Both positive and negative screens can be subdivided in four generations according to Renneboog et al. (2008). Positive and negative screens in this case make up for the first and the second generation in terms of SRI screens. The third generation includes both positive and negative screening approaches in their investment considerations. The fourth generation of investment considerations, applies the third generation of positive/negative investment considerations, combined with shareholder activism. Shareholder activism in this instance, aims by making actively use of shareholder voting rights, by influencing company policy or management (Renneboog et al.,2008).

Hertzel et al. (2011), examines the effect of screening on the SR-universe and find that depending on the type of asset exclusion, the screening can be extremely invasive, ending up removing over 90% of market capitalisation. They find -for example- that when an investor adopting a 10% screening approach on the lowest possible risk, must be willing to giving up to 1,5% Sharpe ratio. This can however rank up to as high as 3.6%.

2.1.4. Sin Stocks and returns

At the other side of the medal from SRI, one can find sin stock investing. Sin stocks, in general, are used to study the effect of social norms. This is particularly well pointed out by Hong & Kacperczyk (2009: 15-36), providing a comprehensive and numerous cited publication. In academic literature sin stocks are also referred to as ‘vice stocks’, ‘unethical stocks’, ‘controversial stocks’ and ‘shunned stocks’. In other words, stocks not bound by any kind of social constraints.

Hong & Kacperczyk (2009) provide evidence that putting the emphasis on securities as far as possible removed from SRI -or social norms- are capable of generating statistically

significant abnormal risk adjusted returns. They check for this by analysing prices and returns, using cross-sectional regressions controlling for firm characteristics, and compare valuation ratios (e.g. market-to-book) and finally a series of robustness checks.

The authors state that putting emphasis on securities as far as possible removed from SRI are capable of generating abnormal returns. Hong & Kacperczyk (2009) form investment strategies around sin stocks (publicly traded companies in ethically dubious industries that focus on tobacco, alcohol and gaming). The authors hypothesise abnormal returns to form, due to regular investors willing to pay a price from abstaining from aforementioned sin stocks (stocks related to promoting human vice). According to the authors, sin stock portfolios tend to give a higher expected return. This argument gets further defended by the fact that sin stocks are held by some of the more 'less norm-constrained' institutions like hedge funds.

Lastly sin portfolios tend to be relatively cheap (low P/B or P/E ratios), when benchmarked against market comparables. The authors state that the stock market is an ideal ground for researching the effects of social norms where investors pay for their discriminatory tastes. They find that sin stocks on average are followed by 1.3 analysts, 'representing a 21% decline in coverage relative to the mean'.
A result of this neglect in owning sin stocks by for example institutional investors, means the prices of these stocks will be repressed. Due to this stock under-pricing, the authors predict that sin companies should ideally finance their operations with a majority of debt as opposed to equity, since debt markets are less transparent.

Following on Hong & Kacperczyk (2009), Richey (2016) researches and proves empirically, that when sin-investing strategies in a portfolio composed of sin stocks, one can obtain statistically significant risk-adjusted abnormal returns for the period 1995-2015, as opposed to the S&P 500 Index, by measuring through the Carhart (1997) four-factor model and in this publication the Sortino-ratio.

In response to 'vice investing', despite the academic evidence not always using a general accepted definition, Blitz & Fabozzi (2017: 105-111) revisit the existing literature, claiming that the high abnormal returns for sin stocks 'can be fully explained by the recently introduced asset pricing factors -profitability and investment- by Fama & French's five-factor model'. Blitz & Fabozzi (2017) find that sin stocks pose a positive alpha through the CAPM, but find as mentioned in above sentence, that this disappears when they control for two most recent factor-loadings. The authors state that after controlling for these five factors, they find no significance of a premium allocated towards sin stocks. Thus solving the mystery around sin-stocks and their allocated risk adjusted abnormal premium returns. In their publication, Blitz & Fabozzi (2017) use the 'Big Three' sin categories, also known as the '*triumvirate of sin*', according to 'Sin Stock Report' and most empirical researches: alcohol, tobacco, gambling and as a sub-sub category; weapons. They find their return-data for the industry returns through the Thomson Reuters Datastream database and Kenneth French online data library.

2.1.5. Cost of SRI

Even though SRI may be a favourable option and approach from a moral standpoint, it is not exactly clear where the boundary lies between 'doing good versus doing well'. How do SRI-portfolios perform against their non-SRI counterparts, based upon risk-return and risk-adjusted basis (Blanchett, 2010). Therefore, determining the performance 'cost' of SRI-portfolios is of value. Herzel et al. (2011) attempts to determine the impact of sustainability-related investing constraints in optimal portfolio-making, through a classic mean-variance approach. Herzel et al. (2011) does so by comparing efficient frontiers of SRI and non-SRI portfolios. They state the hypothesis: '*What does the efficient frontier for an SR-investor look like, and what does it imply for asset allocation?'.* They found that SR-funds constraints are not able to create any additional value and differences between their non SR-counterparts tended to disappear. To conclude, they developed their 'price of sustainability' based upon the loss of Sharpe-ratio over time, and find that the price of sustainability is rather small, even after invasive market capitalisation losses.

Contrary to Herzler et al. (2011), Adler & Kritzman (2008) reject the claim that SRI is without cost or is even able to increase performance. Therefore they adopt the statement from Langbein & Posner's (1980) about SRI as following: '*excluding the securities of otherwise unattractive companies from investor's portfolio, because the companies are judged to be socially irresponsible, and including the securities of certain otherwise unattractive companies because they are judged to be behaving in a socially laudable way*' (p73). Through a Monte Carlo simulation they attempt to measure the cost of SRI.

2.2. Theoretical Framework

In this second paragraph, the theoretical framework will be addressed where the underlying theories and practises will be discussed, explained and validated. By doing so, the literature research and the theoretical framework, will support the empirical findings. The results will be backed up by sufficient amount of research, both methodical and theoretical, providing a solid base for the results to be computed. In this paragraph, theories regarding the forming of portfolio strategies and return properties, in order to compute the three hypotheses, will be explained and discussed.

To understand the Carhart (1997) four-factor model and the CAPM one-factor model, the next paragraphs will go in to detail explaining the ratio's for measuring abnormal returns. As stated in the literature research, there are compelling arguments for equal weighted portfolios. In regards of this thesis, twenty-four different portfolios will be constructed, based upon the portfolio strategies, as proposed by Kempf & Osthoff (2007). After this, one should have sufficient knowledge to interpret the outcome of the data in chapter 6.

2.2.1. Return Properties & Performance Measurements

The returns on a security or stock, can be expressed by taking the sum in the change of the price in the security between date X and X_{t+1}. Expressing the returns on a stock by this method is also better known as the Holding Period Return (HPR). The HPR is the return that one receives for holding or owning an asset for a certain amount of time, which is usually expressed in a percentage. The HPR can be calculated or measured based on

the amount of total returns on that asset (or portfolio) and is especially useful for measuring the returns between investments between different time periods. More formally the HPR can be written as follows.

(1) $$HPR = \frac{Pt+Dt}{Pt-1} - 1$$

Where P_t and P_{t-1} are the value of the stock at time t and time t-1 and Dt equals the dividends received.

2.2.2. CAPM (Capital Asset Pricing Model)

With the Modern Portfolio Theory (MPT), being constructed by Harry Markowitz in 1952, the MPT is the basis of CAPM. The CAPM is also referred to as the single-factor model. An investor's goal is to reach a maximized expected return in accordance to their risk-appetite. Risk is in this instance measured through a standard deviation. By diversifying a portfolio, through adding more and more securities, the efficient frontier is approached (Sharpe, 1964).

In nowadays finance world, the Capital Asset Pricing Model (CAPM) is amongst one of the most widely used measure models to predict and calculate the required rate of return on an asset. Derived from the MPT, the Treynor ratio and Sharpe ratio were constructed as well (Sharpe, 1964).

In accordance to the CAPM, investors are motivated in asset investing, if there is a certain return or compensation for the time-value of their money in ratio for the (financial) risk they are taking. This is called the risk-free rate, which is supposed to compensate an investor or holder of a portfolio for the return he/she would have normally gained in an otherwise completely risk-free investment with the same amount of investment. (Sharpe, 1964) The CAPM refers to this as R_f (or systematic risk) and is the risk that cannot be avoided. Apart from R_f, there is a secondary risk. Non-systematic risk. Non-systematic risk or specific risk is in general related with risk that affects a certain type of asset.

Through the CAPM, a Beta (β) to compensate for this risk taken, is calculated. A higher Beta is associated with an asset being sensitive or volatile to changes. This results in the showing formula below for both the CAPM and Beta.

(2) $$E(_{Ra}) = R_f + ß_a \times E(_{Rm} - _{Rf})$$

Where:

$E(_{Ra})$: *Expected return on assets*
R_f : *Risk-Free Rate*
$ß_a$: *Beta Asset*
$E(_{Rm})$: *Expected return on market*

(3) $$\beta = \frac{Covariance(Ri,Rm)}{Variance\ Rm}$$

Where:

Cov.: *Measures how two stocks move together*
Var.: *Refers to how far a stock moves relative to its mean*
Ri: *Security return*
Rm: *Market return*

There where the CAPM excels in simplicity, the other side of the medal could be argued that the CAPM only uses one Beta to explain returns. The following paragraphs will expand on the CAPM single-factor model, by adding additional Beta's (or loadings).

2.2.3. Fama-French three-factor model

The Fama-French model is an expansion on the above described CAPM model. Where in the CAPM, market-risk is described, there is also a complication. The Fama-French model is in its essence an expansion on the CAPM. As can be seen in the CAPM formula, there is a market risk factor. The problem with the CAPM was that it seemed that two classes of stock did better than the market as a whole; small caps and value stocks. Because of this, Fama and French decided to add two more factors to the model; *size risk* and *value risk*. Because the first part of the formula is nearly the same, this paragraph will mainly focus on the SMB and HML factors. The Beta in the three-factor model is analogous to the beta used in the CAPM (Fama & French, 1993), but they are not the same,

because there are two more factors explaining the return on the portfolio. SMB is short for Small (market capitalization) Minus Big. The SMB measures the (historical) excess returns of small caps over big caps. The HML stands for High (book-to market ratio) Minus Low. The HML measures the (historical) excess returns of value stocks over growth stocks (Fama & French, 1993). Value stocks are stocks with a high book-value-to-price ratio. Consequently, growth stocks are stocks with a low book-value-to-price ratio. This results in eventually in the following model:

(4) $$E(_R) = R_f + ß(K_m - R_f) + \beta_{smb} * SMB + \beta_{hml} * HML$$

Where:

$E(_R)$:	*Expected Return On the Asset*
K_m:	*Return of the stock market*
R_f;	*Risk-free rate*
ß:	*Beta of the assets*
β_{smb}:	*Coefficient SMB*
SMB:	*Small Minus Big*
β_{hml}:	*Coefficient HML*
HML:	*High Minus Low*

2.2.4. Carhart (1997) four-factor model

The long-short strategy (which will be described in the next chapter) will be calculated by measuring the alpha's of the portfolios by using the Carhart (1997) model. The Carhart-model controls for the impact of the (i) market risk, (ii) the size factor, (iii) the book-to-market factor, and the (iv) momentum factor on returns. The Carhart (1997) four-factor model is similar to the Fama & French model, but expands by adding one additional factor, momentum. Reason for this expansion is because, researchers by the likes of Jegadeesh & Titman (1993) and Fama & French (1996) concluded that earnings could be increased by buying successful stocks and selling 'loser' stocks over the past twelve months.

In 1999, researcher Mark Carhart published a research where he added momentum to the factors proposed by Fama & French to create the Carhart four-factor model. The market

tends to correct itself over the course of several years, which means that momentum is a short-term phenomenon. Carhart suggests that there is a so-called 'sweet spot' in determining what is the right time period to look back in determining momentum. Nowadays, a significant amount of the academically definitions in regards of momentum use stock prices over the past two to twelve months (SeekingAlpha: 2018). Below can be seen a summary of the four-factor model.

(5) $$E(_R) = R_f + ß(K_m - R_f) + \beta_{smb} * SMB + \beta_{hml} * HML + \beta_{wml} * WML$$

Where:

E(R):	*Expected return on assets*
Km:	*Return of the stock market*
Rf:	*Risk-free rate*
$ß_a$*:*	*Beta of the assets*
β_{smb}*:*	*Coefficient SMB*
SMB:	*Small (cap) minus Big*
β_{hml}*:*	*Coefficient HML*
HML:	*High (book/price) minus Low*
β_{wml}*:*	*Coefficient WML*
WML:	*Winner minus Loser*

2.2.5. Sharpe, Treynor & Jensen measures

Sharpe

The Sharpe-ratio is a measure of performance and is developed by William Sharpe in 1966. He proposed this ratio in his paper called 'Mutual Fund Performance'. As the Treynor-ratio carries the term 'reward-to-volatility', the Sharpe-ratio is also referred to as the 'reward-to-variability'. Under the assumption that an investor is risk-averse, the premium (or expected return for amount of risk taken) has to be positive.

Despite the Sharpe-ratio being as a widely used measure, it has several drawbacks worth being mentioned. One of them being, is that the ratio does not take the correlation between

assets currently owned and those being evaluated into account. Sharpe-ratios should therefore be preferably used enriched with other measures of performance (Sharpe, 1994). Secondly, a Sharpe ratio might give a distorted view. On days with particularly positive returns, the standard deviation co-moves as much as on days with negative returns. This in turn can lead to a lower Sharpe-ratio according to Harding (2002).

(6) $$E(Ri) = Rf + b\sigma i$$

Where:

R_i: Return of asset i

R_f: Return of the risk free asset

b: Risk premium

σ_i: Standard deviation of asset i

Treynor

The Treynor-ratio, as originally introduced by Treynor & Mazuy (1966), is perhaps better known as the "reward-to-volatility ratio" and is shown in equation 7 below. The portfolio Beta consists of the equal-weighted average of all stocks in said portfolio (Eq. 3). This ratio -derived from the same concept as the Sharpe-ratio- focusses on asset performance and it's relation to covariance with the market, rather than standard deviation. The Treynor-ratio calculates the excess return of a portfolio per unit of risk which is measured as the Beta of the portfolio (Belghitar et al., 2014). When an investor is able to choose between investing and a risk-free asset, the investor will always choose one with the higher Treynor ratio. By doing so, the investor gets a higher return for its level of risk taken.

Despite the Treynor-ratio being similar to the Sharpe-ratio, there are some noteworthy differences. Firstly, the Treynor-ratio has demonstrated to be a more suitable forward looking measure. Due to the fact that the Beta of a portfolio turns out to be a steadier variable as opposed to its volatility (Sharpe, 1966). Additionally, the Treynor-ratio uses the market-index as a benchmark. Even though the Treynor-ratio is a better measure for portfolio evaluation, the Sharpe-ratio is also suitable for evaluation single stocks or securities.

(7) $$T = \frac{Rp - Rf}{\beta p}$$

Where:

T: *Treynor-Ratio*

βp: *Portfolio Beta*

Rp: *Portfolio Return*

Rf: *Risk-Free Rate*

For this research, for all 1100 stocks, over a ten year period, each stock has an annual Beta, calculated to its respective domestic market index, using daily HPR's, resulting in over 10.000 unique Betas.

Jensens Alpha

Within finance, the use of Alpha (α) can be seen as a measure of performance on a risk adjusted basis, or in other words, the return on investment as opposed to the return of investment against either a market index/benchmark. The excess return from the investment minus the return from the market index reflects Alpha (α). Alpha (α) is often represented as a number indicating a percentage. Where Beta (β) represents usually a form of volatility, Alpha (α) represents an abnormal rate of return. Abnormal in the sense of being different from the benchmark (Jensen, 1968).

Investors, portfolio managers or anyone that is trying to generate an Alpha (α) in a portfolio, is trying to eliminate the earlier mentioned unsystematic risk. Alpha (α) is a representation of the performance of a diversified portfolio. Therefore Alpha (α) is the ROI (Return-On-Investment) that is not the cause of the move of the general market/benchmark (Jensen, 1968).

However, as investors often purchase either financial aid or advice, these financial advisors charge a base fee. When an investor manages a portfolio and has a net Alpha of zero, the actual portfolio will represent a net loss for the investor due to the charged fee. This

is however not accounted for within this research. When a portfolio obtains an Alpha of zero, the investment has earned an adequate amount of return for the risk taken/volatility undergone. Any Alpha above zero, means that the portfolio has obtained an excess (risk adjusted) return in correlation with the risk/volatility taken. Any alpha below has taken too much risk for the reward obtained from the investment.

3. LITERATURE REVIEW

In this literature review-chapter, a summary on previous SRI and ESG researches and studies will be discussed. The three main viewpoints of SRI investing will be discussed and backed up by previous studies. Pointing out whether SRI performs over, under or at a same level as conventional investment strategies where no social policy is applied. The following paragraphs discuss how a portfolio should and can be formed ideally, depending on a market versus equal weighted portfolio. Secondly, different studies in regards of different ESG-rating policies and various screening approaches will be highlighted.

3.1. Previous Studies

Whether SRI is capable of generating statistically significant abnormal risk-adjusted returns, or that the latter is true, has been and is an ongoing debate that is subjected to change throughout recent years. Is regular investing or even investing in controversy portfolios capable of generating abnormal returns? According to a paper published by Kempf & Osthoff (2007), the authors mainly focus on whether SRI can be accounted for general abnormal returns by applying a long-short strategy. Here, the top 10% of selected companies based upon ESG KLD Research & Analytics data are held long and the bottom 10% are shorted and turns ours to be capable of generating abnormal returns up to 8.7% per year.

To determine the scope, contribution and the limitations of this research, it is necessary to examine the current state of research available in regards of SRI. This literature research will help determine where to put emphasis on and to potentially focus on certain pitfalls within the portfolio screening process. The following paragraphs will give an explanation concerning the three main hypotheses in current academically debate in regards of SRI performance explained by a research performed by Mollet & Ziegler (2014: 208-216).

Brammer et al. (2006) conducts a similar research, where the authors examine the relation between social performance and stock returns within the United Kingdom. Doing so, the

authors use screens for environment, employment, and community activities. Here they state that in favour of 'Efficient Market Hypothesis': '*Removing some stocks, sectors, or even whole countries on ethical grounds from the investable universe of securities will reduce portfolio efficiency'*.

Building upon the general state of SRI research, the paper published by Renneboog et al. (2008) comes forward and poses a suitable introduction to the definition and introduction of SRI. Renneboog et al. (2008) states and constructs a critical review on the existing literature in regards of SRI and is mainly useful within this thesis to overview the current state of the literature (and get a good grasp of the main findings in chapter 5). Especially the hypothesis -whether or not SRI investors care less about financial performance then regular investors- and whether investors are motivated by any non-financial criteria. While taking this into account, the authors also take a closer look if SRI investor behaviour/motivation differs from regular investors and is supporting the general theories in this thesis and is providing some theoretical back-up.

As a useful source of information, and offering of perspective, Galema et al. (2008) researched the contradictions between the empirical literature and the predictions from their theoretical model. From Galema's view it is the result of misinterpretation of the risk-adjusted performance measures used in most empirical studies. Stating that the trade-off between financial and SRI performance is at least partly captured by the book-to-market ratio. The book-to-market ratio is the value of a company, by comparing the book-value of a firm to its market-value. He states, that the empirical literature research yields little significant results between SRI and expected returns.

For obtaining a better understanding of the correlation between SRI and abnormal portfolio returns, the paper provided by Mollet & Ziegler, (2014: 208-216) gives a clear insight and relevancy, considering the authors focussed their approach for both the U.S. and the entire European stock market using the Carhart (1997) four-factor model. A model that is similarly used in comparable papers like, Richey (2016), Hong & Kacperczyk (2009) and Blitz & Fabozzi (2017). Furthermore, much like in other comparable research, both state that the Carhart (1997) model, is capable of returning the required risk-factors

that are necessary to estimate the risk-adjusted returns that are more reliable than the one-factor CAPM model. Mollet & Ziegler (2014) state that in theory the relation between SRI and performance is ambivalent and can be separated in three different hypotheses, being explained further in Bauer et al. (2005) and in Hamilton et al. (1993). The first theory states that SRI stocks are overpriced, because they are being purchased a lot and therefor have lower expected returns than conventional stocks or funds. Second viewpoint being, is that SRI gives higher expected returns. Stating that if high corporate social responsible behaviour by the company is recognised by investors, the responsible behaviour tends to be tied to the performance of said company. This is causing the SRI stocks to be under-priced. The third and last hypothesis is one following the most traditional finance view. This viewpoint is following the efficient capital markets and elastic demand curves, stating that all stocks, irrelevant of their ESG-values, corporate sustainability performance or corporate social responsibility status or not, are correctly priced by the market.

As can be seen with Mollet & Ziegler (2014), as well Bauer et al. (2005: 1751–1767), which have performed their research on the European (German and United Kingdom) and the U.S. stock market. Bauer et al. (2005) furthermore states that they do not find any significant different in the risk-adjusted returns between SRI (ethical) and conventional funds. Though the authors do state that SRI funds underwent a 'catching up phase'. This backs up that previous research on earlier U.S. data suggests little empirical evidence on SRI related abnormal performance. This paper provides interesting results as the data involves European ethical returns and points out rightfully and successfully so, the importance of avoiding survivorship bias. It should be taken into account however, that this publication does not concern individual ethical portfolio performance, but only looks at the ethical market as a whole (as opposed to for example best-in-class approaches). In their research the authors compose their data of 103 ethical equity funds and 4384 different conventional mutual funds.

Continuing on the screening approaches and the question on what SRI exactly entails, Renneboog et al. (2008:1723–1742) states and poses a critical review on the existing literature published in regards of SRI. This is mainly useful within this thesis, for purposes of reviewing the current state of the literature and get a good grasp of the main findings.

Especially the hypothesis on whether or not SRI investors care less about financial performance as opposed to regular investors and if they are motivated by any non-financial criteria is interesting. While taking this into account, the authors also take a closer look if SRI investor behaviour/motivation differs from regular investors and is supporting the general theories in this thesis. With Renneboog et al. (2008) being numerously cited throughout other publications in the following years, following conclusions from Renneboog et al. (2008) are worth being noted.

3.1.1. Positive Returns

In light of performance of SRI strategies and returns, Gil-Bazo et al. (2010) apply a matching estimator methodology and find that for the period 1995-2005, U.S. SRI Funds had a more profitable return then conventional funds. Even though the funds had, as the author's state: '*similar characteristics'.* The paper shows the SRI fund outperforming the conventional fund by a substantial 0.96% to 1.83% per year before expenses and SRI funds run by specialized companies up to 2.6% annually. Gil-Bazo et al. (2010) concludes however, that this performance return is dependent on whether or not these funds are run by management companies specialised in SRI. Stating that generalist management companies underperform and SRI management specialist companies are capable of over performing. In their conclusion, SRI could be associated with superior performance but only for certain specialized companies. This is a response to previous research that failed to find differences between conventional fund performance and SRI fund performance. Gil-Bazo et al. (2010) derived a set sample of SRI funds from the Social Investment Forum. Gil-Bazo et al. (2010) furthermore states that investors do not pay a price for investing in SRI mutual funds either, something that in previous research came to be a limiting factor. Instead they found SRI funds to have earned a premium in regards of risk-adjusted performance in comparison to similarly characterised conventional mutual funds, both before and after fees. This suggests investors to take management investment companies characteristics into account, as it heavily depends whether or not SRI will give a premium in return.

The publication from Nofsinger & Varma (2014: 180-193) is able to provide proof through three different factor models (CAPM one-factor, Fama & French three-factor, Carhart (1997) four-factor), much like Gil-Bazo et al. (2010) are showing as well. These models are showing that investing in SRI based mutual funds is capable of handing out significant returns in regards to conventional mutual funds. The authors find that during market crisis periods, the SRI funds capable of outperforming conventional funds by an annualised 1.18%, where during non-crisis periods, conventional funds are able to outperform SRI funds. Even though this thesis focusses on portfolios built upon individual stocks, this publication is showing similar research methods and comes to useable conclusions. Nofsinger & Varma find that SRI funds outperform conventional funds during periods of market crisis between the years 2000-2011, at the cost of underperforming during non-crisis periods. Stating that SRI, and especially ESG portfolio generated ones, are driving an '*asymmetric return pattern*' during economic turmoil. They tested more specifically if SRI funds were able limit the down downside risk during crisis and non-crisis periods by applying various ESG-induced screening strategies. The authors are researching why, despite other research showing SRI to be costly and unfavourable, the professionally managed SRI assets grew by 380% from 1995 to 2010. According to Nofsinger & Varma there must be some utility that the investors are deriving from SRI. Nofsinger & Varma however state that not just any SRI is performing the same and that emphasis needs to be put within the ESG-screening selection process. For example, firms with good corporate governance practise seem to perform better than other screens during crisis periods. Furthermore, they find that focussing on positive screening strategies is hinting towards better and more sustainable returns as opposed to negative screening selection processes.

3.1.2. Negative Returns

The previous paragraph proposed several papers, where the authors found evidence for SRI based investing and premium risk adjusted returns, using either the Carhart (1997) four-factor model or Fama & French three-factor model. This paragraph takes several papers into regard where SRI shows to be performing less than conventional stocks and/or mutual funds. In 2015, Derwall et al. (2015:112-126), researched whether social factors

could influence investment behaviour and performance, by analysing several holdings of U.S. equity mutual funds during the period 2004-2012. They furthermore researched if various mutual funds beside the SRI-ones, show exposure to sin stocks. In addition to SRI-funds, Derwall et al. (2015) states (much like Hong & Kacperczyk (2009) do), that even non SRI-funds are -due to social norm constraints- to shun socially sensitive stocks and engage in a form of so-called 'closed-SRI'. This raises the question whether there are similar investment implications for (mutual) funds that have implications for its investors. Derwall et al. concludes that besides socially conscious funds, also conventional funds display several social dimensions, based upon their investors and clientele. Furthermore they conclude that the payoff in socially sensitive stocks (sin stocks) is both positive and statistically significant.

In line with the following paragraph in regards to ESG-ratings and ESG-data suppliers, Halbritter & Dorfleitner (2015:25-35) have conducted a research, taking a critical look at different ESG-data providers. Halbritter (2015) takes a closer look at the link between social and financial performance based upon different ESG-ratings, using the Carhart (1997) four-factor model. Where several previous empirical researches were able to find a relation between ESG-ratings and positive abnormal returns (for example: Derwall et al. (2005); Eccles et al. (2014); and Kempf & Osthoff (2007)), Halbritter, shows that maintaining portfolios based upon ESG-ratings and applying a long-short strategy, in fact, does *not* yield an abnormal return. The research was able to prove this by using a combination of three different rating agencies, where most previous research is based upon one rating agency. By combining data from 1991-2004 from (i) KLD, (ii) ASSET4 and (iii) Bloomberg, the authors conclude that investors *no longer* should reliably expect abnormal returns from a ESG-based portfolio. In their approach, Halbritter & Dorfleitner use the same approach as Kempf & Osthoff (2007), sorting the companies/stocks according to their given ESG-score. Taking the 20% of best and 20% of worst performing companies. Shorting (selling) the worst and Longing (buying) the best performing and scoring companies. To conclude, Halbritter & Dorfleitner find that ESG-rating investment based considerations show a lower influence on financial performance then previous research has been showing so far.

3.1.3. Insignificant Returns

Bauer et al. (2005: 1751–1767) states that SRI -or ethical investing- gives no significant returns as opposed to conventional funds. However, given that their publication has been published back as far as 2004, the following publication continues to build upon this statement in more recent research. El Ghoul & Karoui (2017: 53-63) have performed a research to study the effects of CSR on mutual fund performance. They find that funds with high value weighted CSR-scores, show negative univariate results. Meaning that a high CSR-score goes hand in hand with a poorer risk-adjusted performance, but shows lower levels of volatility and a lower R-square[1], showing that the high CSR-funds are less diversified and more selective.

Perhaps one of the older publications in regards to SRI, but has been the source of innumerate citing's, is the one performed and published by Hamilton (1993). Hamilton states, as several other publications, that investors favour certain companies over others, with one type of investors favouring the avoidance of certain socially sensitive stocks, SRI investing. Hamilton (1993) finds that Social Responsible funds do *not* earn any statistically significant risk adjusted returns and that performance of Social Responsible funds does not differ significantly from conventional funds based upon calculating Jensen's Alpha (see chapter 2, for in-depth explanation). Hamilton proposes three different hypotheses that lay the groundwork for several later studies, as has been discussed earlier within this literature research. Hamilton states that in regard of social responsible portfolios and conventional portfolios, the following can be stated (i) SR-portfolios perform *equal* (risk adjusted) in regards to expected returns as conventional portfolios, (ii) SR portfolios *under* perform in regards to conventional portfolios and the (iii) the expected returns of SR funds *outperform* (risk adjusted expected returns) conventional funds. Hamilton coined this as '*doing well, while doing good'*.

The following five publications come to a similar conclusion that SR-mutual funds, one way or another, do not pose a statistical significant risk adjusted return.

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[1] R-squared measures how close the data is fitting to the regression line. Also known as the coefficient of determination.

According to Goldreyer and Diltz (1999) SR-investing does not necessarily give a definite advantage to either group (conventional versus SR). Their publication shows that funds with inclusion screens outperform those without. Following and continuing on the above, Belghitar et al. (2014) researches the performance of SRI indices with similar conventional indices. Using past studies, using mean-variance techniques found insignificant as well results. The authors found strong evidence that ethical investors pay a heavy price for investing ethically, losing the added expected return in transaction fees.

Referring back to Nofsinger & Varma (2014) -Hamilton's third hypothesis-. Comparing conventional mutual funds to socially responsible, mutual funds and SR-funds only outperform during periods of market crises. Within the publication of Leite et al. (2015), the authors investigate the performance, investment style and managerial abilities of French SRI-funds investing in Europe during crisis and non-crisis periods. Their results show that SRI-funds significantly underperform. Theirs characteristics matched conventional funds during non-crisis periods, but match the performance of their peers during market downturns, much like Nofsinger & Varma (2014) state.

3.2. Market and Equal weighted portfolios

In order to properly determine whether or not SRI is causing risk adjusted abnormal returns based upon ESG selected screens, a portfolio needs to be formed. Portfolios can be mainly shaped through two different ways. Equal weighted portfolios and Value weighted portfolios. This paragraph will summarise the academical debate, concerning portfolio shaping techniques. Malladi et al. (2016:188-208) discuss and suggest that equal-weighted portfolios seem to outperform various other portfolio forming strategies, including value-weighted portfolio (from now on referred to as VWP) strategies. In their publication, Malladi et al. proposes a theoretical framework for equal and value weighted portfolio-models. The authors continue on previous research provided by DeMiguel et al. (2009) and Plyakha (2015), which state that equal-weighted portfolios (from now on referred to as EWP) appear to outperform at least fourteen different portfolio strategies. What Malladi et al. (2016:188-208) is proposing, is the following. Their portfolio is built with two stocks; stock A and stock B. At time = 0 the investment is either put in a VWP

or EWP. At *time* $(_t)$ = 1, the period returns are then expressed in VWP and EWP. The main difference here, is that the EWP has to be rebalanced at $t = 1$ for $t = 2$ and the VWP does not. They find that the EWP finds positive returns 59% of the time after 10.000 alterations and the VWP finds positive returns 49% percent of the time, as well as finding a higher Sharpe ratio for EWP's. They find that EWP's excess returns in 19 out of 20 cases can be explained through the rebalancing act of the portfolios and therefore as Malladi et al .(2016:188-208) states '*equal weighting makes economic sense'.*

Dorfleitner & Halbritter (2015) use a VW approach by firms' market capitalization, the authors however do not specifically specify their motivation for their portfolio weighting strategy choice. El Ghoul & Karoui (2017) also use a VW score using firm level CSR scores, but are not specifying their motivation. Whereas Kempf & Osthoff (2007) form both EWP's and VWP's as well, to find out whether their portfolio weighting decision is of influence on the outcome, but do not specify their reasoning's and/or motivation for either decision. They conclude however that there is not a statistically significant difference within at least the scope of their research.

3.3. Performance Measures and indicators

In past and most recent literature, several papers regarding the measurement of abnormal returns in combination with ESG-considerations, apply frequently used asset-pricing models in regards of SRI are in order to measure portfolio performance. Either the *CAPM* is applied (Brammer et al., 2006; Mollet & Ziegler, 2014; Hong & Kacperczyk, 2009; Richey, 2016), *Fama-French three-factor* model (Kempf & Osthoff, 2007; Herzel et al., 2011; Mollet & Ziegler, 2014; Blitz & Fabozzi, 2018), *the Carhart (1997) four-factor model* (Halbritter & Dorfleitner, 2015; Derwall et al., 2005; Gil-Bazo et al., 2010; Blitz & Fabozzi, 2018) or the more recent Fama-French five-factor model. Often in combination with said performance measurements, papers include a Sharpe-ratio (Herzel et al., 2011; Renneboog et al., 2008; Bauer et al. 2005), Treynor-ratio (Belghitar et al., 2014)) and/or Sortino-ratio (Richey, 2016; Auer, 2016). These three ratios are often used to compliment the factor-models in order to measure volatility (or risk) to reward ratio. Either to show that despite performance, a portfolio performs steadily (or lack thereof).

4. DATA & METHODOLOGY

Within this chapter, the data and methodology applied to the thesis will be explained. Starting with addressing the source of the data, followed by explaining in greater detail the database, data being used and the description of the data extracted and employed throughout the empirical research in paragraph 'Description'. In the following paragraphs, the methodology will be addressed, with the construction and forming of the various portfolios used in this thesis.

4.1. Database & Sources

As public interest is rapidly increasing in the past few years for (political) topics like business-ethics, climate-change, human-rights and diversity, so is investor interest increasing for topics that are covering similar areas. Areas as 'Corporate Social Responsibility (CSR)', 'Social Responsible Investments (SRI)' and regulatory compliance give investors the opportunity to blend ESG-information into their asset allocation-process decision (Refinitiv, 2018). In addition, this knowledge gives an investor's hands-on information on whether or not to invest in certain companies or fields of industry. In order to meet this growing interest for information on companies in regards to their (financial) performance and non-financial behaviour, rating-agencies use company-related information to gather this information. They use sources such as annual reports, company -and NGO websites, stock exchange filings and CSR reports. With this information they set up various ESG (Environment, Social and Governance) dimensions or categories. (Refinitiv Reuters, 2017)

When working with ESG-data or researching variables, there is a plethora of rating agencies/databases available which offer ESG-data in various ways. The most used rating agency being in this case the MSCI ESG STATS (MSCI) database. MSCI is an independent provider of research-driven insights and tools for institutional investors (MSCI, 2018) and is often used as a source in ESG (and SRI)-driven academic finance research and publications. Other examples of databases being often used are Thomson Reuters ASSET4, KLD Research & Analytics, Bloomberg, Sustainalitics, CSRHUB and the Ethical Investment Research Service

Despite MSCI being largely used in academic literature, this thesis will make use of the Thomson Reuters ASSET4 database (or since recent called Refinitiv), adding new data and insights by using a different database which offers the same level and depth of information as the MSCI database is capable of. In addition to the ASSET4 database, Thomson Reuters' Datastream will be used. Thomson Reuters' Datastream, is a full cross-asset offering database, including reference-data, corporate actions, entity-data, end-of-day/intraday pricing and evaluated pricing services (Eui.eu; 2018). Including, according to Refinitiv, data from over 178 different exchanges, economic profiles of 162 countries including a twenty years pricing history. Furthermore, offering comparable data from different international organizations for worldwide perspective and coverage of 215 countries. To conclude, Thomson Reuters covers more than 22,000 active and 40,000 inactive companies worldwide across over 100 developed and emerging markets, covering information from over 400 different ESG-metrics. (Refinitiv, 2018)

Most of these metrics come from corporate, public reporting (annual reports, corporate social responsibility (CSR) reports, company websites, and global media sources) (Refinitiv, 2018). The ESG-scores aim to get a measure from a companies' ESG-performance scattered over ten different ESG dimensions, divided in three main fields. The three main fields being "Environmental", "Social" and "Governance", as can be seen in Figure 1 below.

Figure 1. Thomson Reuters ESG factsheet (2018) of three ESG pillars**.**

Last but not least, the final ESG-scores are measured by a rank-scoring in percentiles. These scores are updates on a yearly basis and rank from 0 to 100 which reflect on whether a company scores well (a high score), or bad (reflecting a low score) (Refinitiv, 2018)

4.1.1. Data Description

In this paragraph, the data being employed will be explained in more detail. Alongside the first descriptive statistics being employed in regards of the ASSET4 ESG-data scores, combined with a score-frequency distribution and explanation of different markets being targeted, covering the sample period of the thesis.

The data retrieved from Thomson Reuters Datastream, consists of two different parts. The first part of the data being employed, consists of the annual, month-end stock prices and Return Index numbers from all companies listed in the twenty biggest European countries, sorted by GDP over the various European stock markets. This data reaches from 2007 to 2017. This sample size results in well over 10.000 different annual return observations, covering 10 years and over 1000 different stocks, that are (or were) listed on a European stock exchange within the country sample size. The stock prices from the selected European countries will later be used for calculating the HPR, Beta and Treynor ratio.

The second step of data retrieval consists of the annual ESG, Environment, Social and Governance-scores, Stock Exchange (index), and SIC codes that match with the above mentioned listed companies. The sample size is limited for stocks that have at least one of the three ESG-score dimensions available.

In figure 2 below can be seen the ESG-frequency distribution, similar like one that can be found in Auer (2016) and is inspired on the research approach of Kempf & Osthoff (2007). The histogram shows the distribution and frequency of ESG-scores over the ten years sample period being chosen. The Y-axis showcases the frequency, where the X-axis shows the distribution of ESG scores between 0 and 100.

Figure 2. Distribution of different E/S/G scores over sample period.

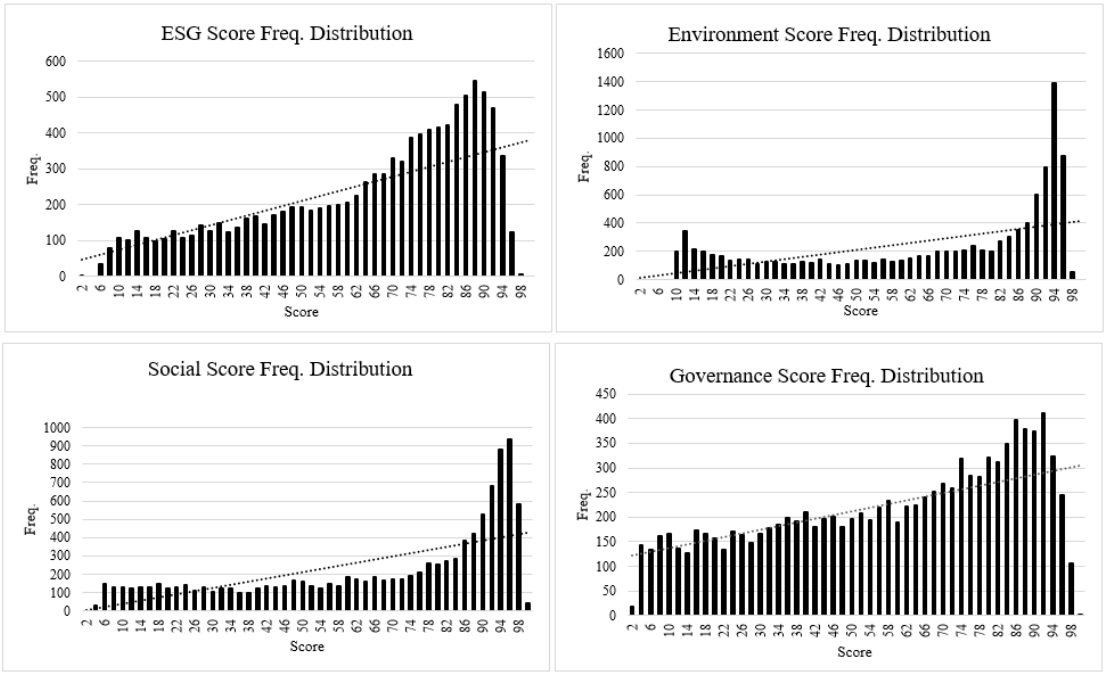


Figure 2 depicts, as mentioned above, the ESG-frequency distribution. The histogram for 'Environment' shows that there is a division in scores from different stocks. It demonstrates that a significant amount of companies show both high (90th percentile) and low (10-15th percentile) scores. One might indicate that companies either show full commitment towards Environmental company behaviour, resulting in high Environment scores, or none (low) at all. Supported by this behaviour can be argued -as the data in the histogram does not differentiate between industry sectors- that the sectors in for example industrials, oil and automotive-industry tend to have lower scores and industries like banking or alternative energy have higher scores. Secondly, with the 'Social'-histogram, one can see that the scores tend to be relatively fairly distributed with a significant amount of companies listing high in the 90th percentile round. As third, there is the 'Governance'-frequency distribution. The 'Governance'-distribution shows that the majority of companies manages to score between the 35th and 75th percentile. Reason for this might be that Corporate Governance practises know a longer history in terms of company behaviour, causing a bigger percentage of (listed) companies to exhibit a more decent score in term of Governance. Subsequently, the combined 'ESG'-distribution, reflecting the equally weighted average between the three dimensions, shows that most companies tend to score higher on the distribution.

In addition to figure 2, is added table 1, exhibiting the descriptive ESG-statistics of the division of scores.

Table 1, contains the ESG-scores covering the entire sample period of around 10.000 observations each for ESG, ENV, SOC and GOV, totalling over 42.000 measurements. Table 1 is considering the combined entire sample period and consists of the various 'E','S','G' and weighted average 'ESG' scores. As can be seen below, Environment and Social are relatively close together.

Table 1. Summary statistics for ESG Scores.

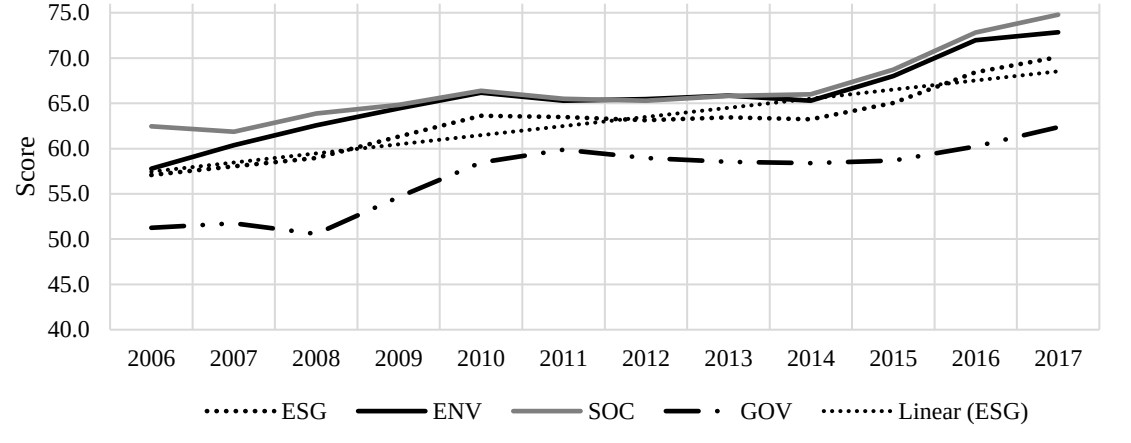
	Mean	Median	S.D.	Min.	Max.	*N.*
ESG Score	63.32	69.87	23.88	1.41	96.49	10650
ENV Score	65.88	76.83	28.64	8.39	96.83	10627
SOC Score	66.82	77.33	28.29	2.95	99.03	10627
GOV Score	57.30	61.95	27.08	1.23	98.30	10642

Descriptive ESG Statistics derived from the score distribution from 2006 to 2017. Consists of between 10627 and 10650 year-end firm ratings divided per individual category, as well as overall ESG. 'E', 'S' and 'G' represent the Environmental-, Social-, and Governance dimension. 'ESG' represents an equal weighted score.

Taking Table 1 in consideration, given the fact that they represent the overall sample size means and medians, below in Figure 3, can be seen the average ESG-score development during the sample period.

In Figure 3, the average annual ESG-scores are in allocation with the values as represented in Table 1. The scores develop over the course of the sample period, indicating that ESG-awareness is present with companies and are improving as time passes. As the annual average ESG-score's increase, so does the average portfolio size for all three strategies, hinting that for every year, more companies are capable of being taken into consideration for the portfolio as a result of increasing (average) scores.

Figure 3. Average Annual Overall ESG-scores 2006-2017.



4.2. Methodology

This paragraph will continue to explain the different methods employed in order to answer the research hypothesis, as well as the null hypothesis within the scope of this thesis. The first paragraph will go into deeper and more precise detail on how the particular portfolios are created in addition with the descriptive statistics of the various constructed portfolio strategies. Paragraph 'Performance Measurement' will go into more depth on how to measure performance of said portfolios using Betas and Treynor-ratios.

The purpose of this thesis, taking the scope, limitations and contributions into account, is to determine whether or not taking ethical investment considerations into account in one's investment strategy has measurable impact on returns. To be more precise, the goal of this thesis is to research the performance of a selection of different portfolios employed over several strategies. These portfolios are created by taking the stocks of companies in different European exchanges over the span of ten years, based on their ESG-scores. This performance will be measured by applying the Carhart-four factor (1997) model, throughout three different strategies.

The three strategies employed in this thesis cover each the same data sample that contain information on all the stocks in twenty European countries sorted by GDP-size, spanning

a period of ten years, from December 2006 to December 2017. This includes a sample of 120 months and over 11000 annual year-end return observations. The sample covers around 1100 different listed companies that were, are, or have been listed on a European stock exchange during this sample period. Using the four-factor model for asset pricing, the first strategy will determine if a **Positive** Screening strategy is capable of abnormal returns. By doing so, eight year-end rebalanced portfolios consisting of the highest 10%, 15%, 20% and 25% percent of all ESG-equally weighted rated stocks and the lowest 10%, 15%, 20% and 25% percent of ESG equally-weighted will be formed. These eight portfolios then will be held long for high ranked portfolios and short for low ranked portfolios

The second strategy will employ a derivate from the above positive screening method, being the **Best-In-Class** screening strategy. By doing so, the database stock sample will be divided in ten different SIC scores categories. Following these ten SIC categories, again four different portfolios will be formed on a 10%, 15%, 20% and 25% basis, where per SIC category the top (long) and bottom (short) ranked equally weighted ESG-scores will be taken. The portfolios will be analysed to determine whether or not they yield abnormal returns. SIC, in this case, stands for Standardized Industry Classification (not to be mistaken for Sustainable Industry Classification). The SIC is classifying different business establishments and other statistical units by the type of economic activity in which they are engaged (UK SIC 2007).

The third strategy is the **E-S-G screening** method. Within this strategy, eight portfolios will be formed in a similar manner as for the first two portfolio strategies. However, in the first two strategies the weighted ESG-score average has been used to form portfolios. For this strategy, the portfolios will be formed on their individual ‘E’, ‘S’ and ‘G’ –scores to find out and analyse whether or not the results are driven by an individual ESG-dimension. The cut-off rate for these portfolios is 10% and 15% for top (bottom) ranked portfolios. These eight portfolios then will be held long for high ranked portfolios and short for low ranked portfolios.

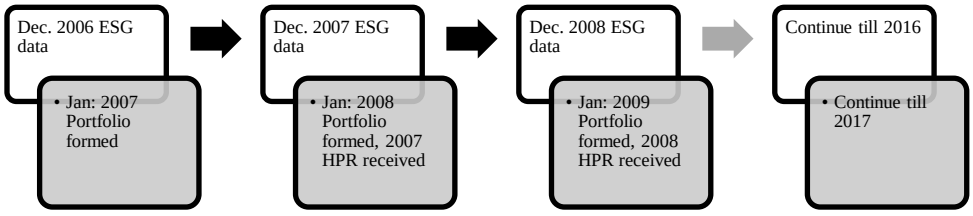
4.2.1. Portfolio Construction

According to the financial academically empirical literature; constructing an ESG-sorted stock portfolio, is a more commonly applied strategy in order to point out the relationship between Social Responsibility and financial performance, as pointed out by Halbritter & Dorfleitner (2015; 25-35).

The three different portfolios strategies (Positive, Best-In-Class, and E-S-G), as described in the previous paragraph, are constructed with the idea in mind that the portfolios are formed at the beginning of the year, only to be reallocated at the end of the year. In order to find the highest (lowest) ranked ESG-rated stocks, at the end of each year for the sample period 2006 to 2017, the 'E', 'S' and 'G'-ratings are turned in an equal-weighted ESG rating per stock/listed companied, ranging from high to low.

Taking ESG-data to form portfolios, looks as following in the figure below:

Figure 4. ESG-portfolio forming process.



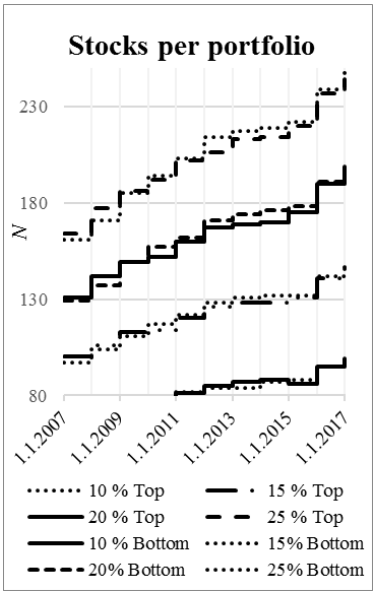
For the first portfolio-strategy, Positive Screening, eight portfolios are created at the beginning of each year. The portfolios include for high (low) the top (bottom) 10%, 15%, 20% and 25% ranked stocks, picked from the equally weighted ESG-scores. The portfolio for year *t*, is made with the year-end ESG data from year t_{-1}. This portfolio will be held for one year until the end of the year until new ESG-information is made public. This is because when forming the portfolios, the known information at that time is available from the previous year. For the stock returns, the Return Index HPR is taken. Transaction costs are not taken into account for.

As an example, the period 2006-2007 will be taken. At the end of year 2006, the equally weighted ESG-ratings for the stocks will be sorted from high to low. From there on, the top (bottom) 10%, 15%, 20% and 25% of the stocks are taken and put into a high (low) portfolio. This means that stocks in the beginning of the year are selected using previous year end ESG-data. In this portfolio additionally the Return Index HPR for 2007 is taken, which is comprised from the beginning of 2007 to the end of 2007, after which for the following year a new portfolio will be formed. In table 2 below, the descriptive statistics are shown for the Positive Screening portfolio strategy, showing the excess return by using the Kenneth R. French risk-free rate, as is used by Hallbritter & Dorfleitner (2015). Table 2 shows the mean, median, maximum, minimum and standard deviation of both the average and the excess return.

Table 2. Summary statistics Positive Screening Strategy.

This table represents the descriptive statistics of the average and excess returns of the Positive Screened portfolios. Covering 10 years return and 10 years ESG-observations from December 2006 to December 2017. Top/Bot shows for the various portfolios that are constructed using several different inclusion and exclusion ratio's, being 10%, 15%, 20% and 25%.

Variable	Mean	Median	S.D.	Var.	Min.	Max.	*N.*
Panel A: Average Positive Screened returns							
Top 10%	0.082	0.068	0.342	0.117	- 1.0	3.6	942
Top 15%	0.083	0.062	0.373	0.139	- 1.0	4.0	1409
Top 20%	0.083	0.072	0.372	0.138	- 1.0	4.0	1823
Top 25%	0.089	0.074	0.369	0.136	- 1.0	4.0	2287
Bottom 10%	0.082	0.047	0.501	0.251	- 1.0	4.1	941
Bottom 15%	0.089	0.058	0.490	0.240	- 1.0	4.1	1407
Bottom 20%	0.107	0.062	0.589	0.346	- 1.0	5.5	1876
Bottom 25%	0.115	0.078	0.536	0.287	- 1.0	5.9	2264
Panel B: Excess Positive Screened results							
Top 10%	0.073	0.077	0.202	0.041	- 0.4	0.3	11
Top 15%	0.073	0.070	0.216	0.047	- 0.4	0.4	11
Top 20%	0.070	0.088	0.218	0.047	- 0.4	0.4	11
Top 25%	0.076	0.147	0.290	0.084	- 0.5	0.6	11
Bottom 10%	0.071	0.123	0.299	0.090	- 0.5	0.7	11
Bottom 15%	0.094	0.149	0.308	0.095	- 0.5	0.7	11
Bottom 20%	0.106	0.162	0.313	0.098	- 0.5	0.7	11
Bottom 25%	0.077	0.099	0.216	0.047	- 0.4	0.4	11



Panel C: Annualized Excess returns of the sample portfolios 2007 – 2017

	2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Top 10%	4.1 %	-39.6 %	33.1 %	4.1 %	-11.5 %	21.7 %	32.0 %	7.0 %	7.7 %	9.8 %	11.8 %
Top 15%	2.3 %	-42.2 %	36.6 %	7.0 %	-12.1 %	20.3 %	35.0 %	5.7 %	6.5 %	8.3 %	12.3 %
Top 20%	-8.7 %	-51.0 %	61.4 %	16.2 %	-22.4 %	22.7 %	27.3 %	-1.7 %	14.7 %	7.9 %	16.9 %
Top 25%	1.0 %	-42.5 %	38.3 %	8.0 %	-13.5 %	17.8 %	33.5 %	5.4 %	8.9 %	8.8 %	11.7 %
Bottom 10%	-7.6 %	-50.8 %	68.6 %	12.7 %	-23.2 %	21.0 %	24.2 %	-2.2 %	12.3 %	7.2 %	15.8 %
Bottom 15%	-6.5 %	-50.5 %	70.5 %	17.2 %	-21.8 %	25.5 %	30.0 %	-2.1 %	14.9 %	10.2 %	16.4 %
Bottom 20%	0.7 %	-41.9 %	37.8 %	9.9 %	-12.1 %	19.5 %	33.4 %	6.3 %	9.9 %	8.3 %	13.2 %
Bottom 25%	-5.6 %	-49.0 %	74.3 %	17.6 %	-20.5 %	26.6 %	30.8 %	-1.3 %	16.2 %	11.5 %	16.5 %

The second portfolio screening strategy is the Best-In-Class and is derived from the method applied as used in Halbrittner & Dorfleitner (2015) and Kempf & Osthoff (2009) screening-strategy, which is a derivate from the Positive Screening strategy. In order to calculate and determine the intra-industry dependencies, Standard Industrial (SIC) data is used. The SIC data is divided into 653 different SIC classes, which are in turn grouped into ten major different sectors, being: basic materials, consumer cyclicals, consumer non-cyclicals, energy, financials, healthcare, industrials, technology, telecommunication services and utilities. By dividing the SIC classes into the sub-groups (see table 3 below), the thesis can ensure a high numbers of firms in each class.

Table 3. Descriptive Statistics per country and SIC industry.

	#	ESG μ	Env.μ	Soc.μ	Gov.μ	Beta.μ
Panel A: Country						
Austria	16	52.06	57.07	60.02	39.08	0.79
Belgium	29	64.08	65.02	66.03	61.19	0.70
Denmark	27	59.91	67.35	70.78	41.59	0.76
Finland	25	68.29	72.18	76.65	55.72	0.74
France	88	66.57	69.05	70.09	60.48	0.69
Germany	101	56.41	51.43	60.54	57.14	0.78
Greece	19	65.43	62.86	69.18	64.24	0.74
Ireland	13	64.44	70.10	75.38	49.36	0.71
Italy	47	59.81	54.09	62.75	62.27	0.72
Netherlands	69	72.78	75.81	76.97	65.56	0.88
Norway	22	53.82	57.54	56.12	47.80	0.61
Poland	31	63.65	57.09	63.77	70.54	1.13
Portugal	10	68.66	77.57	71.62	56.78	0.91
Russia	33	71.28	80.75	74.43	58.65	0.91
Spain	79	68.77	79.36	78.55	48.38	0.86
Sweden	56	64.12	69.61	68.30	55.20	0.80
Switzerland	112	64.63	71.14	69.52	53.24	0.84
United Kingdom	335	58.99	61.26	59.70	56.02	0.74
Mean	1112	63.32	65.88	66.82	57.30	0.80
Panel B: Standard Industry Classification						
Agriculture, Forestry, Fishing	-	-	-	-	-	-
Construction	31	69.14	78.24	71.93	57.11	0.98
Finance, Insurance, Real Estate	235	55.67	56.89	55.68	54.44	0.72
Manufacturing	363	67.59	73.68	72.25	56.98	0.84
Mining	63	61.43	58.04	63.38	63.24	0.93
NA	47	71.66	76.87	75.73	62.39	0.59
Public Administration	-	-	-	-	-	-

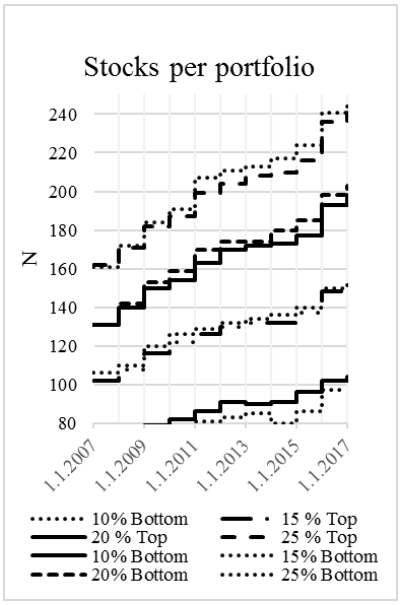
Retail Trade	71	65.08	63.26	69.59	62.44	0.74
Services	122	56.75	51.43	60.49	58.23	0.78
Transportation & Public Utilities	153	66.38	70.50	72.54	55.97	0.71
Wholesale Trade	27	54.21	53.42	55.41	53.80	0.76
Mean	1112	63.32	65.88	66.82	57.30	0.80

After the selected companies in the data sample have been divided on their grouped SIC-code, the process of selecting stocks is similar as the process mentioned in the first strategy. For each sub SIC-group, the top (bottom) 10%, 15%, 20% and 25% of the equally weighted ESG-scores per year will be taken and grouped together in one high (low) portfolio and be held until the end of the year. These portfolios are formed at time *t* and are based on their information from time *t - 1* and held for a whole year until *t + 1*. For stock returns the annual stock prices and dividends are used based on the Return Index. Table 3 shows the average Beta for these categories as well. Table 4 shows the descriptive Best-In-Class statistics.

Table 4. Best-In-Class Descriptive Statistics.

This table represents the descriptive statistics of the average and excess returns of the Best-In-Class portfolios. Covering 10 years return and 10 years ESG observations from December 2006 to December 2017. Top/Bot shows for the various portfolios that are constructed using several different inclusion and exclusion ratio's, being 10%, 15%, 20% and 25%. - Table on next page-

Variable	Mean	Median	S.D.	Var.	Min.	Max.	*N.*
Panel A: Average Best-In-Class Screened Descriptive Statistics							
Top 10%	0.087	0.076	0.374	0.140	- 1.0	3.6	915
Top 15%	0.084	0.069	0.383	0.146	- 1.0	4.0	1369
Top 20%	0.102	0.069	0.538	0.289	- 0.9	5.3	1428
Top 25%	0.088	0.073	0.386	0.149	- 1.0	4.0	1830
Bottom 10%	0.105	0.078	0.537	0.288	- 0.9	4.1	952
Bottom 15%	0.111	0.071	0.561	0.315	- 4.0	5.3	1908
Bottom 20%	0.090	0.078	0.377	0.142	- 1.0	4.0	2273
Bottom 25%	0.116	0.078	0.545	0.297	- 4.0	5.3	2363
Panel B: Excess Best-In-Class Screened Descriptive Statistics							
Top 10%	0.071	0.074	0.212	0.045	- 0.4	0.4	11
Top 15%	0.070	0.081	0.211	0.044	- 0.4	0.4	11
Top 20%	0.090	0.149	0.324	0.105	- 0.5	0.8	11
Top 25%	0.074	0.087	0.223	0.050	- 0.4	0.4	11
Bottom 10%	0.086	0.137	0.310	0.096	- 0.5	0.7	11
Bottom 15%	0.098	0.142	0.328	0.108	- 0.5	0.8	11
Bottom 20%	0.077	0.088	0.220	0.049	- 0.4	0.4	11
Bottom 25%	0.105	0.154	0.317	0.100	- 0.5	0.7	11



Panel C: Annualized Excess returns of the sample portfolios 2007 – 2017

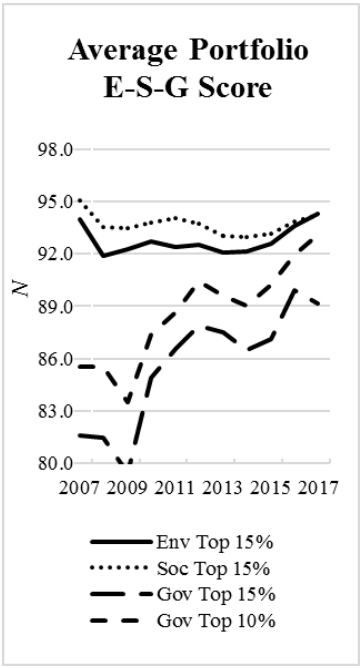
	2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Top 10%	-0.6 %	-38.8 %	36.6 %	4.2 %	-12.5 %	20.6 %	36.9 %	6.3 %	7.4 %	7.8 %	10.5 %
Top 15%	0.5 %	-40.4 %	35.9 %	8.1 %	-11.7 %	19.4 %	34.7 %	4.9 %	4.3 %	9.3 %	12.0 %
Top 20%	-5.6 %	-52.6 %	76.0 %	18.9 %	-24.2 %	24.0 %	24.6 %	-5.8 %	13.5 %	14.9 %	15.1 %
Top 25%	0.5 %	-42.5 %	39.1 %	8.7 %	-14.0 %	18.6 %	35.9 %	4.8 %	8.6 %	8.7 %	12.8 %
Bottom 10%	-9.0 %	-52.9 %	67.5 %	18.9 %	-21.0 %	26.7 %	26.8 %	-7.0 %	13.7 %	12.0 %	19.5 %
Bottom 15%	-4.3 %	-51.2 %	77.2 %	19.0 %	-24.0 %	24.5 %	30.7 %	-9.0 %	14.2 %	13.7 %	16.8 %
Bottom 20%	1.1 %	-41.8 %	40.7 %	9.1 %	-12.9 %	18.0 %	34.1 %	5.4 %	8.4 %	8.8 %	13.2 %
Bottom 25%	-4.0 %	-49.9 %	74.0 %	19.1 %	-23.9 %	25.4 %	32.2 %	-1.4 %	15.4 %	12.4 %	16.3 %

To conclude, the last SRI portfolios will be formed, conform the long (short) strategy in accordance with the last hypothesis, being the individual ‘Environment’, ‘Social’ and ‘Governance’ portfolios. In this portfolio strategy, the top and bottom 10% and 15 % of the portfolios will be selected in a similar manner as the portfolios have been formed for the first Positive Screening strategy where the top 10-25% portfolios were formed. The difference here however, is that the portfolios will be formed based upon their individual ‘E’, ‘S’ and ‘G’ ratings. The top portfolios will be held long and be revised per year based on the new individual ‘Environment’, ‘Social’ and ‘Governance’ data, whereas the bottom 10% will be held short. Due to lack of additional value, Social and Environmental 10% values and results have been left out and can be requested upon needed.

Table 5. E-S-G Portfolio Descriptive statistics.

This table represents the descriptive statistics of the average and excess returns of the E-S-G portfolios. Covering 10 years return and 10 years ESG observations from December 2006 to December 2017. Top/Bot shows for the various portfolios that are constructed using several different inclusion and exclusion ratio's, being 10%, 15%, 20% and 25%.

Variable	Mean	Median	S.D.	Var.	Min.	Max.	*N.*
Panel A: Average E-S-G screened returns							
Env Top 15%	0.099	0.080	0.394	0.155	-1.0	4.0	1393
Env Bot 15%	0.106	0.064	0.510	0.260	-0.9	4.1	1394
Soc Top 15%	0.077	0.063	0.337	0.113	-1.0	3.6	1394
Soc Bot 15%	0.099	0.072	0.524	0.275	-4.0	5.9	1393
Gov Top 15%	0.104	0.079	0.406	0.165	-1.0	3.6	1396
Gov Bot 15%	0.092	0.062	0.494	0.244	-0.9	4.1	1394
Gov Top 10%	0.103	0.078	0.385	0.148	-1.0	2.8	951
Gov Bot 10%	0.093	0.059	0.488	0.238	-0.9	4.1	933
Panel B: Excess E-S-G screened results							
Env Top 15%	0.088	0.117	0.229	0.053	-0.43	0.39	11
Env Bot 15%	0.093	0.114	0.299	0.089	-0.46	0.65	11
Soc Top 15%	0.065	0.083	0.198	0.039	-0.40	0.30	11
Soc Bot 15%	0.085	0.135	0.283	0.080	-0.47	0.62	11
Gov Top 15%	0.092	0.092	0.220	0.049	-0.38	0.43	11
Gov Bot 15%	0.079	0.130	0.286	0.082	-0.50	0.64	11
Gov Top 10%	0.094	0.095	0.207	0.043	-0.37	0.41	11
Gov Bot 10%	0.080	0.133	0.287	0.082	-0.50	0.62	11



Panel C: Annualized Excess returns of the sample portfolios 2007 – 2017

	2007	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Env Top 15%	4.6 %	-42.8 %	38.8 %	14.5 %	-19.3 %	20.9 %	33.0 %	6.1 %	10.6 %	11.7 %	19.2 %
Env Bot 15%	-8.3 %	-46.0 %	64.8 %	12.8 %	-23.2 %	24.8 %	41.0 %	0.7 %	11.4 %	6.4 %	17.2 %
Soc Top 15%	4.3 %	-40.5 %	30.2 %	7.3 %	-14.7 %	17.7 %	28.4 %	6.1 %	11.1 %	8.3 %	13.9 %
Soc Bot 15%	-6.9 %	-47.5 %	61.6 %	19.1 %	-20.2 %	27.4 %	27.2 %	-2.3 %	13.5 %	7.3 %	14.1 %
Gov Top 15%	-4.1 %	-37.5 %	42.9 %	9.2 %	-10.8 %	24.8 %	34.5 %	4.9 %	8.3 %	16.0 %	13.1 %
Gov Bot 15%	0.1 %	-49.6 %	63.6 %	13.0 %	-24.4 %	19.0 %	21.4 %	-1.9 %	14.7 %	9.8 %	20.7 %
Gov Top 10%	-4.1 %	-37.5 %	42.9 %	9.2 %	-10.8 %	24.8 %	34.5 %	4.9 %	8.3 %	16.0 %	13.1 %
Gov Bot 10%	0.1 %	-49.6 %	63.6 %	13.0 %	-24.4 %	19.0 %	21.4 %	-1.9 %	14.7 %	9.8 %	20.7 %

The above mentioned three portfolio investment strategies, and with them the twenty-four different portfolios will be formed according to the equally weighted portfolio theory. According to DeMiguel et al. (2009) and Plyakha (2015) the equal weighted portfolios appear to outperform market (or value) weighted portfolios in at least 14 instances. This is supported by Malladi et al. (2016:188-208) who states that '*equal weighting makes economic sense'.* Practically this means that each stock gets appointed an equal weight in the portfolio, regardless of market capitalisation.

In terms of portfolio structure and country dependency the following can be said. Since the portfolio sample size consists of roughly 1100 different stocks divided over eighteen different countries, each with their individual returns and different ‘E’, ‘S’, ‘G’ and ‘ESG’ values, each annual portfolio, for each social investment strategy, will have their own portfolio structure in terms of country composition. As can be seen table 3, the United Kingdom takes up around one third of the sample size. Figure 5 however shows for each of three investment strategies and for the E-S-G investment strategy each ‘E’, ‘S’ and ‘G’ top 10% cut-off rate overall portfolio composition. Figure 5 shows for the overall sum of the ten year data sample the average frequency distribution for each country. This means for example, that for the E-S-G Top 10% Governance portfolio, where stocks are selected on their Top Governance rating, on average, the United Kingdom takes up on around 67% of the stocks per portfolio. Figure 5 furthermore shows that for the E-S-G Bottom 10% Governance portfolio, where stocks are selected on their Bottom Governance rating, on average, the United Kingdom takes up on around 3,34% of the stocks per portfolio. This is shown for every country and every strategy at the 10% cut-off ratio, in the data sample.

Figure 5. Portfolios Strategy Country Division.

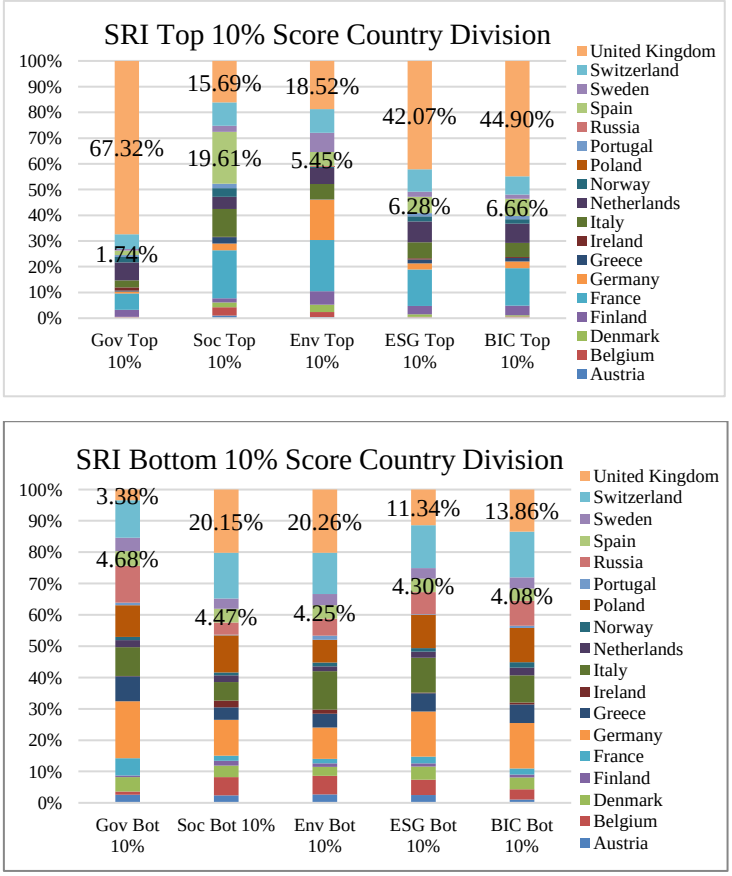
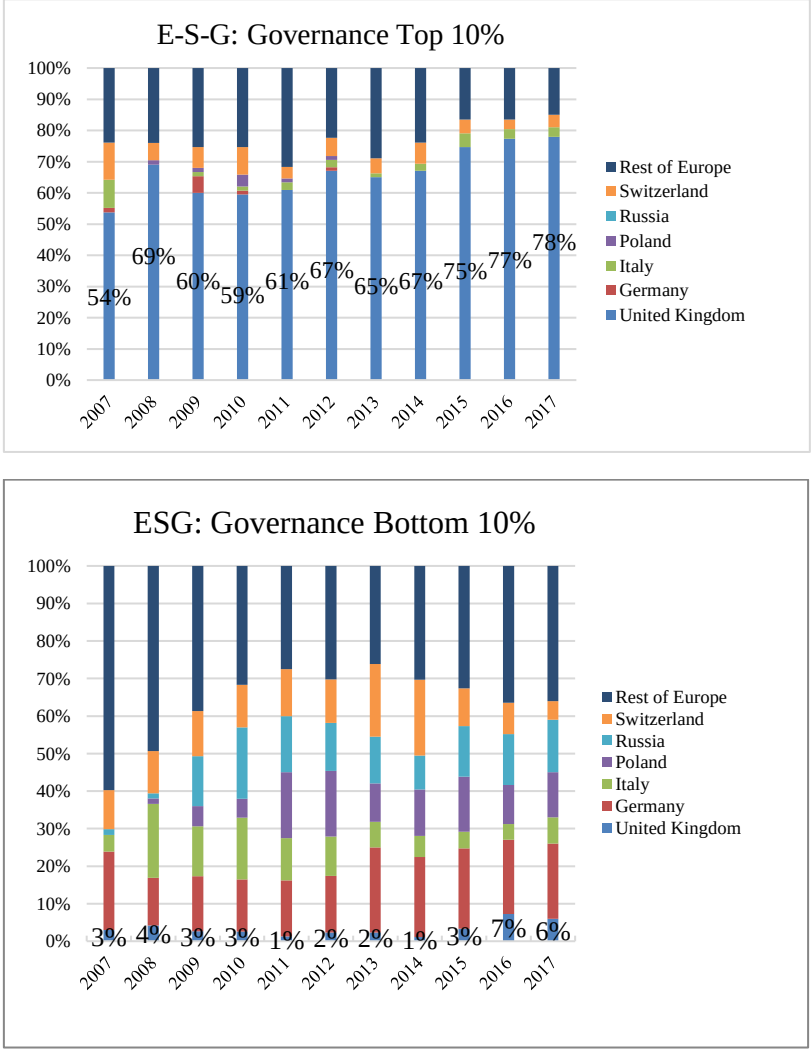


Figure 6, shows the decomposition on a more detailed level per year for the E-S-G- Governance Top and Bottom portfolio and shows the portfolio development per year. Since figure 5 already indicated to be predominantly present in the strategy sample, figure 6 shows in more details the development of (in this case Governance score) the portfolio throughout the sample period for both the top and bottom scores. The bottom ranked figure shows for example the United Kingdom to be barely present through the sample period, whereas Italy and Switzerland are rather present. Within the thesis Social and Environment strategies have been compared as well, but did not show any additional information or value and can be requested upon interest.

Figure 6. E-S-G. Governance 10% portfolio strategy.



5. EMPIRICAL FRAMEWORK AND RESULTS

In this chapter the results of the conducted regression analyses will be described. The empirical framework of this section largely complies with Kempf & Osthoff (2007). Chapter 5.1 and table 6 describe and show the Positive Screening strategy results, which cover the entire sample period of 10 year using only top and bottom rated stocks, as well as long-short portfolio results. Chapter 5.2 and table 7 describe and show the Best-In-Class Screening strategy results, using the Standard Industry Classification to apply a derivate of the Positive Screening strategy. Chapter 5.3 and table 8 describe and show the E-S-G Screening strategy results, by applying an individual 'E', 'S' and 'G' screening strategy with a 15 % cut-off rate for each dimension and an additional 10 % cut-off rate for the Governance dimension.

The results in the tables are generated by applying an OLS regression analysis using the Carhart (1997) four-factor model as well as the CAPM one-factor model. The four-factor model explanation and validation -compared to the one factor-CAPM or Sharpe-ratio- is currently the most common asset pricing model for general applications in financial economics (Bollen & Busse, 2005; L'Her, Masmoudi, & Suret, 2004) including SRI portfolios (Mollet & Ziegler).

Furthermore, Treynor-ratio's and portfolio Beta's are given. The generated portfolio Alpha's (α) attempt to explain the return that is incapable of being explained by the other factor (loadings) and showcase information given by making investment decisions based upon ESG data. The factors Rm-Rf, SMB, HML and WML represent the four Carhart factors, as explained in the theoretical background. R2 (R *squared*), shows the degree of the model capable of explaining the results. The empirical framework is largely guided by existing research approaches as can be seen in chapter 'Methodology'.

5.1. Positive Screening Strategy

The Positive screening strategy, as described in the paragraph above, takes ESG-values from a year-end-weighted average, after which it continues to select top (bottom) rated

stocks based upon these values. This approach is based upon a cut-off rate of 10%, 15%, 20% and 25% and concludes with a Long-Short approach for the portfolios in order to attempt to generate an abnormal return. In line with Kempf & Osthoff (2007), the authors employ Negative, Positive, and Best-In-Class screens. Kempf & Osthoff's Positive Screening strategy does not exclude any companies belonging to either industry or controversial business areas and rates all companies.

Table 6. Representation of the OLS regression data for the 'Positive Screening'- Strategy for the whole sample period, using the four-factor model as specified by Carthart (1997), an extension of the Fama & French 3-factor model (2012) and the Capital Asset Pricing Model (CAPM). The ten yearly revised stock portfolio's consist of 132 monthly return observations lasting from January 2007 to January 2017, where the regression consists of 11 years, by revising the portfolio once per year using previous year end average 'ESG', 'E', 'S' and 'G' data from December 2006 to December 2016. The Treynor and Beta measures are calculated by taking daily HPR's for both stocks and Indexes for ten years to form annual average portfolio and Betas and Treynor measures. 'ESG' denotes the portfolios constructed using the weighted average of stock Environmental-, Social-, and Governance scores. "Top" and "Bot" stand for the portfolio being constructed using 10%, 15, 20 and 25% of stocks with the highest (Top) or lowest (Bot) scores. "Top-Bot" shows the Long-Short results of the difference between the Top and the Bottom portfolio. Alpha indicates the estimated coefficient intercept. The results for Rm-Rf, SMB, HML and WML indicate the various factor loadings. R2 represents the goodness-of-fit. TR indicates the Treynor Ratio and $\bar{x}$. B represents the average portfolio Beta (β). The uneven model numbers depict the results from the 4-factor model, whereas the even numbers give the results of the one factor model with market return. –Table on next page-

Positive Screening Strategy

		Alpha	Rm-Rf	SMB	HML	WML	R2	TR	x̄. B
Top ESG 10%	(1)	0.030	0.690***	0.376	0.190	-0.027	0.90	0.07	1.00
		(0.37)	(0.00)	(0.41)	(0.60)	(0.84)			
	(2)	0.029	0.812***				0.88		
		(0.25)	(0.00)						
Bot ESG 10%	(3)	0.023	0.76***	1.340***	-0.106	-0.374**	0.97	0.10	0.76
		(0.40)	(0.00)	(0.01)	(0.71)	(0.01)			
	(4)	0.008	1.14***				0.80		
		(0.86)	(0.00)						
Top-Bot	(5)	0.007	-0.074	-0.96**	0.296	0.347***	0.90		
		(0.73)	(0.51)	(0.01)	(0.24)	(0.00)			
	(6)	0.020	-0.331*				0.31		
		(0.60)	(0.07)						
Top ESG 15%	(7)	0.025	0.727***	0.515	0.184	-0.031	0.91	0.07	1.00
		(0.45)	(0.00)	(0.26)	(0.60)	(0.82)			
	(8)	0.024	0.868***				0.89		
		(0.32)	(0.00)						
Bot ESG 15%	(9)	0.014	0.756***	1.435***	-0.096	-0.240*	0.97	0.11	0.77
		(0.60)	(0.00)	(0.00)	(0.74)	(0.06)			
	(10)	0.014	1.119***				0.82		
		(0.73)	(0.00)						
Top-Bot	(11)	0.011	-0.034	-0.921***	0.280	0.209**	0.87		
		(0.60)	(0.74)	(0.01)	(0.23)	(0.04)			
	(12)	0.01	-0.250*				0.28		
		(0.74)	(0.10)						
Top ESG 20%	(13)	0.021	0.687***	0.679	0.137	-0.049	0.92	0.07	0.99
		(0.53)	(0.00)	(0.15)	(0.70)	(0.72)			
	(14)	0.023	0.865***				0.87		
		(0.40)	(0.00)						
Bot ESG 20%	(15)	0.039	0.778***	1.468***	-0.043	-0.324**	0.96	0.13	0.77
		(0.23)	(0.00)	(0.00)	(0.90)	(0.04)			
	(16)	0.030	1.174***				0.80		
		(0.53)	(0.00)						
Top-Bot	(17)	-0.018	-0.091	-0.789**	0.180	0.276**	0.86		
		(0.44)	(0.45)	(0.04)	(0.50)	(0.03)			
	(18)	-0.006	-0.308**				0.36		
		(0.83)	(0.05)						
Top ESG 25%	(19)	0.024	0.695***	0.681	0.078	-0.031	0.92	0.08	0.98
		(0.44)	(0.00)	(0.14)	(0.82)	(0.81)			
	(20)	0.030	0.860***				0.88		
		(0.26)	(0.00)						
Bot ESG 25%	(21)	0.054	0.769***	1.485***	-0.049	-0.364**	0.96	0.14	0.77
		(0.13)	(0.00)	(0.01)	(0.89)	(0.03)			
	(22)	0.042	1.180***				0.79		
		(0.40)	(0.00)						
Top-Bot	(23)	-0.030	-0.074	-0.804**	0.126	0.333**	0.87		
		(0.26)	(0.54)	(0.04)	(0.62)	(0.01)			
	(24)	-0.011	-0.319*				0.34		
		(0.74)	(0.06)						

p-values indicate statistical significance at the 1%. 5%. and 10% level showing: ***, **, and *

Looking at the data in table 6 and analysing the results of the Positive Screening strategy in regards to the first hypothesis H1a: "SR Investing is increasing risk-adjusted returns with a Positive Screening strategy", brings several results to mind that reject this hypothesis. Starting at the portfolio results from top to bottom, most of the portfolios seem to have a positive relation to performance (positive alpha), however none turn out to be statistically significant (or even close for that matter), with the exception of the ESG-bottom ranked 25% cut-off rate, which has a p-value of 0.13. As shown later with the Governance 10% cut-off ratio, perhaps loosening up the 25% cut-off ratio to 30 or even 30% could perhaps drag the result into significance. Continuing on this, the ESG Positive Screening strategy, where top ranked portfolios will be held long and bottom ranked portfolios will be held short, seems to react counterproductive. Two out of four portfolios fail to generate a positive return, in addition to not being significant either.

Building upon the results table 6 generates, the four-factor model shows that over the whole sample period of 11 years, the Rm-Rf factor is (highly) significantly driving the returns. This can be interpreted as the expected returns being mainly driven by the overall market returns. Furthermore, the SMB (small minus big) factor loading is significant and positively correlated to bottom portfolios, while being for top portfolios positive, but insignificant. This can be interpreted as small companies outperforming bigger companies (by market cap.), which are associated with lower overall ESG-scores as compared to bigger companies. HML is insignificant overall portfolio approaches. WML is for the bottom ranked portfolios significant, where WML is the equal-weighted average of the returns for the two winner portfolios for a region minus the average of the returns for the two loser portfolios (Kenneth. R. French, 2019), this can be seen as bottom ranked lower ESG companies outperforming.

Continuing on the results, the Treynor-ratio, or also known as the reward-to-volatility ratio, shows the amount of excess return that is generated in return for the risk taken by a portfolio as selected for the Positive Screening approach. The Treynor-ratio, while Ceterus Paribus[2], provides a good measurement to compare otherwise seemingly equal

[2] Taking everything else equal.

portfolios. The results show surprisingly enough that the bottom ranked portfolios outperform the top ranked portfolios in terms of Treynor-ratio. Indicating that an investor takes less risk investing in an ethically dubious company or portfolio than in highly ranked ESG-stock, which is also reflected in the average portfolio Beta's.

In the next two paragraphs the Best-In-Class screening, as well as the E-S-G strategy results will be shown and analysed. This will continue on the results from the Positive Screening strategy, to see if H1: "SR Investing is increasing risk-adjusted returns." can and/or should be rejected.

5.2. Best-In-Class Screening Strategy

The Best-In-Class strategy is a derivate from the Positive Screening strategy, taking the top (bottom) 10%, 15%, 20% and 25% ESG rated-stocks, per SIC industry, per year and puts these in a portfolio, assuring that the resulting portfolio is balanced across industries, which according to Kempf & Osthoff (2007) leads possibly to higher returns than the Positive Screening approach. The following table reports the results of the OLS regression for the same whole sample period applying the Best-In-Class strategy.

Table 7. Representation of the OLS regression data for the 'Best-In-Class' - Strategy for the whole sample period, using the four factor model as specified by Carthart (1997), an extension of the Fama & French 3-factor model (2012) and the Capital Asset Pricing Model (CAPM). The ten annually revised stock portfolio's consist of 132 monthly return observations lasting from January 2007 to January 2017, where the regression consists of 11 years, by revising the portfolio once per year using previous year end average 'ESG', 'E', 'S' and 'G' data from December 2006 to December 2016. The Treynor and Beta measures are calculated by taking daily HPR's for both stocks and Indexes for ten years to form annual average portfolio and Betas and Treynor measures. 'ESG' denotes the portfolios constructed using the weighted average of stock Environmental-, Social-, and Governance scores. "Top" and "Bot" stand for the portfolio being constructed using 10%, 15%, 20% and 25% of stocks with the highest (Top) or lowest (Bot) scores. "Top-Bot" shows the Long-Short results of the difference between the Top and the Bottom portfolio. Alpha indicates the estimated coefficient intercept. The results for Rm-Rf, SMB, HML and WML indicate the various factor loadings. R2 represents the goodness-of-fit. TR indicates the Treynor Ratio and $\bar{x}$. B represents the average portfolio Beta (β). The uneven model numbers depict the results from the 4-factor model, whereas the even numbers give the results of the one factor model with market return. –Table on next page-

Best-In-Class Screening Strategy

		Alpha	Rm-Rf	SMB	HML	WML	R2	TR	x̄. B
Top ESG 10%	(1)	0.027	0.653**	0.610	0.256	-0.045	0.89	0.07	1.02
		(0.46)	(0.01)	(0.24)	(0.52)	(0.76)			
	(2)	0.025	0.833***				0.85		
		(0.37)	(0.00)						
Bot ESG 10%	(3)	0.025	0.795***	1.51**	-0.040	-0.286	0.97	0.12	0.78
		(0.39)	(0.00)	(0.01)	(0.90)	(0.05)			
	(4)	0.021	1.19***				0.81		
		(0.64)	(0.00)						
Top-Bot	(5)	0.002	-0.143	-0.900*	0.296	0.241	0.76		
		(0.95)	(0.43)	(0.09)	(0.44)	(0.13)			
	(6)	0.005	-0.360*				0.36		
		(0.90)	(0.05)						
Top ESG 15%	(7)	0.025	0.672***	0.571	0.262	-0.034	0.92	0.07	1.02
		(0.43)	(0.00)	(0.20)	(0.44)	(0.80)			
	(8)	0.023	0.842***				0.88		
		(0.35)	(0.00)						
Bot ESG 15%	(9)	0.041	0.756***	1.570**	0.008	-0.407**	0.95	0.13	0.75
		(0.27)	(0.00)	(0.01)	(0.99)	(0.03)			
	(10)	0.023	1.20***				0.79		
		(0.66)	(0.00)						
Top-Bot	(11)	-0.016	-0.086	-0.996*	0.254	0.374**	0.82		
		(0.63)	(0.61)	(0.06)	(0.49)	(0.03)			
	(12)	0.000	-0.363*				0.31		
		(0.99)	(0.07)						
Top ESG 20%	(13)	0.022	0.696***	0.735	0.185	-0.036	0.92	0.07	1.05
		(0.50)	(0.00)	(0.12)	(0.60)	(0.79)			
	(14)	0.025	0.899***				0.88		
		(0.36)	(0.00)						
Bot ESG 20%	(15)	0.044	0.783***	1.614**	0.078	-0.370**	0.96	0.14	0.78
		(0.21)	(0.00)	(0.01)	(0.83)	(0.03)			
	(16)	0.029	1.240***				0.79		
		(0.57)	(0.00)						
Top-Bot	(17)	-0.023	-0.087	-0.880*	0.107	0.335**	0.80		
		(0.50)	(0.60)	(0.08)	(0.76)	(0.04)			
	(18)	-0.005	-0.350*				0.34		
		(0.90)	(0.06)						
Top ESG 25%	(19)	0.028	0.692***	0.695	0.141	-0.070	0.93	0.04	1.72
		(0.37)	(0.00)	(0.12)	(0.66)	(0.59)			
	(20)	0.028	0.880***				0.88		
		(0.29)	(0.00)						
Bot ESG 25%	(21)	-0.022	-0.079	-0.850**	0.099	0.267**	0.85	0.14	0.79
		(0.37)	(0.52)	(0.03)	(0.71)	(0.03)			
	(22)	0.039	1.200***				0.79		
		(0.43)	(0.00)						
Top-Bot	(23)	-0.022	-0.079	-0.850**	0.099	0.26**	0.85		
		(0.37)	(0.52)	(0.03)	(0.71)	(0.03)			
	(24)	-0.01	-0.320*				0.38		
		(0.74)	(0.05)						

p-values indicate statistical significance at the 1%. 5%. and 10% level showing: ***, **, and *

Looking at the data in table 7 and analysing the results of the Best-In-Class strategy in regards to the first hypothesis H1b: “SR Investing is increasing risk-adjusted returns with a Best-In-Class strategy”, seems to reject hypothesis H1b as well. When taking a closer look at the portfolios from top to bottom, most of the portfolios, besides differing very little in result (intercept) from the Positive Screening strategy, seem to have a positive relation to performance (positive alpha), however none turn out to be statistically significant. This shows that the Best-In-Class strategy, as opposed to Kempf & Osthoff (2007), does not cause abnormal returns in regards of SRI, especially considering the fact that this thesis does not take transaction fees into account.

The Best-In-Class strategy, where top (bottom) ranked portfolios, divided in ten different SIC industries, will be held long and bottom ranked portfolios will be held short, seems to react counterproductive. This in turn further assures that the Best-In-Class Screening approach does not provide positive significant results.

In the results of table 7, the four-factor model, in addition to table 6, shows that over the whole sample period of 11 years, the Rm-Rf factor is highly significantly driving the returns. This can, much like the results in table 6, be interpreted as the expected returns being mainly driven by the overall market returns. In addition, the SMB loading is significant and positively correlated to bottom portfolios, while being for top portfolios positive, but insignificant.

As mentioned in the previous paragraph, this can be interpreted as small companies outperforming bigger companies, which are associated with lower overall ESG scores as compared to bigger companies. This seems to be irrelevant for any industry. As the Best-In-Class strategy only takes the top (bottom) 10, 15, 20 and 25 percent of stock per industry. The Positive Screening strategy does not discriminate which industry makes the top (bottom) portfolio, yet the results seem to differ minimally. HML shows to be overall mainly insignificant.

The Treynor ratio, results show again surprisingly enough that the bottom ranked portfolios outperform the top ranked portfolios in terms of Treynor ratio and average Beta. In-

dicating that an investor takes less risk investing in an ethically dubious company or portfolio than in a highly ranked ESG company, when basing their investment decision on picking exclusively stocks per industry on a high (low) basis.

5.3. E-S-G Screening Strategy

The third and last screening strategy, is the E-S-G Screening strategy, where the individual 'Environment', 'Social' and 'Governance' scores per stock are taken and turned into three different individual investment screens. Instead of taking the weighted ESG average, stocks will be picked according to either an E, S or G equal weighted average. Meeting a 10% (shown for Governance) and 15% top (bottom) cut-off rate per dimension, resulting in eight different portfolios: E top (bottom) 15%, S top (bottom) 15% and G top (bottom) 10% and 15% portfolios. This in order to find out if the weighted ESG results are perhaps driven by a particular screen, motivated by the different annual ESG scores as can be seen in Figure 2 and Table 2. This is in addition motivated by Halbritter & Dorfleittner (2015), which pick for each ESG score a high and low portfolio. Halbritter & Dorfleittner (2015) estimate two model specifications. Where they use an overall ESG score as an explanatory variable and focus on particular ESG pillars.

Table 8. Representation of the OLS regression data for the 'E-S-G' - Strategy for the whole sample period, using the four-factor model as specified by Carthart (1997), an extension of the Fama & French 3-factor model (2012) and the Capital Asset Pricing Model (CAPM). The ten yearly revised stock portfolio's consist of 132 monthly return observations lasting from January 2007 to January 2017, where the regression consists of 11 years, by revising the portfolio once per year using previous year end average 'ESG', 'E', 'S' and 'G' data from December 2006 to December 2016. The Treynor and Beta measures are calculated by taking daily HPR's for both stocks and Indexes for ten years to form annual average portfolio and Betas and Treynor measures. 'ESG' denotes the portfolios constructed using the weighted average of stock Environmental-, Social-, and Governance scores. "Top" and "Bot" stand for the portfolio being constructed using 10%, 15%, 20% and 25% of stocks with the highest (Top) or lowest (Bot) scores. "Top-Bot" shows the Long-Short results of the difference between the Top and the Bottom portfolio. Alpha indicates the estimated coefficient intercept. The results for Rm-Rf, SMB, HML and WML indicate the various factor loadings. R2 represents the goodness-of-fit. TR indicates the Treynor Ratio and $\bar{x}$. B represents the average portfolio Beta (β). The uneven model numbers depict the results from the 4-factor model, whereas the even numbers give the results of the one factor model with market return. –Table on next page-

E-S-G Screening Strategy

		Alpha	Rm-Rf	SMB	HML	WML	R2	TR	x̄. B
Top GOV 10%	(1)	0.064*	0.600**	0.583	0.363	-0.137	0.92	0.09	1.01
		(0.07)	(0.01)	(0.18)	(0.29)	0.30)			
	(2)	0.050*	0.813				0.85		
		(0.09)	(0.00)						
Bot GOV 10%	(3)	0.027	0.798***	1.155**	-0.098	-0.283	0.95	0.12	0.74
		(0.41)	(0.00)	(0.03)	(0.79)	(0.07)			
	(4)	0.018	1.108				0.82		
		(0.64)	(0.00)						
Top-Bot	(5)	0.037	-0.201	-0.573	0.461	0.146	0.62		
		(0.36)	(0.32)	(0.29)	(0.29)	(0.38)			
	(6)	0.0302	-0.29*				0.32		
		(0.382)	(0.06)						
Top ENV 15%	(7)	0.028	0.724***	0.814*	0.210	0.016	0.95	0.09	1.00
		(0.31)	(0.00)	(0.06)	(0.48)	(0.89)			
	(8)	0.0374	0.925***				0.90		
		(0.15)	(0.00)						
Bot ENV 15%	(9)	0.037	0.748***	1.436**	0.216	-0.237	0.95	0.13	0.80
		(0.29)	(0.00)			(0.12)			
	(10)	0.029	1.15***				0.82		
		(0.50)	(0.00)						
Top-Bot	(11)	-0.008	-0.023	-0.622*	-0.007	0.253*	0.76		
		(0.74)	(0.85)	(0.10)*	(0.99)	(0.05)			
	(12)	0.008	-0.226*				0.28		
		(0.70)	(0.10)						
Top SOC 15%	(13)	0.012	0.679***	0.531	0.063	0.027	0.92	0.07	0.91
		(0.68)	(0.00)	(0.21)	(0.84)	(0.83)			
	(14)	0.022	0.89***				0.89		
		(0.34)	(0.00)						
Bot SOC 15%	(15)	0.025	0.745***	1.347**	-0.104	-0.233	0.95	0.11	0.82
		(0.45)	(0.00)	(0.02)	(0.77)	(0.13)			
	(16)	0.025	1.08***				0.81		
		(0.55)	(0.00)						
Top-Bot	(17)	-0.013	-0.067	-0.816*	0.167	0.259*	0.78		
		(0.66)	(0.65)	(0.07)	(0.60)	(0.07)			
	(18)	-0.003	-0.288*				0.31		
		(0.91)	(0.07)						
Top GOV 15%	(19)	0.052	0.585**	0.871*	0.353	-0.110	0.91	0.09	0.98
		(0.15)	(0.01)	(0.08)	(0.34)	(0.44)			
	(20)	0.045	0.85***				0.83		
		(0.17)	(0.00)						
Bot GOV 15%	(21)	0.028	0.789***	1.168**	-0.110	-0.310**	0.97	0.12	0.75
		(0.30)	(0.00)	(0.01)	(0.70)	(0.02)			
	(22)	0.017	1.11***				0.83		
		(0.66)	(0.00)						
Top-Bot	(23)	0.024	-0.204	-0.297	0.463	0.200	0.64		
		(0.48)	(0.25)	(0.51)	(0.22)	(0.18)			
	(24)	0.027	-0.253*				0.31		
		(0.37)	(0.08)						

p-values indicate statistical significance at the 1%. 5%. and 10% level showing: ***, **, and *

Comparing the results from the *15% cut-off rate* in terms of SRI-portfolios, taking the following dimensions: (i) ESG, (ii) ENV, (iii) SOC, (iv) GOV, several results come forwards. Besides the statement that none of the portfolios generate any kind of significant alpha, it is interesting comparing the actual (insignificant) portfolio returns, in order to determine if the lack of return is mainly driven by one particular score. Starting with the Top rated portfolios, it shows that the Governance rated portfolios, on average create an alpha of two times the size of both the ESG and the ENV portfolio. For the bottom ranked ESG-ENV-SOC-GOV portfolios, mainly ENV and GOV seem to have the highest alphas. While looking at the Top-Bottom results, all the investment strategies react poorly and in case of ENV and SOC even generate negative intercepts.

However, when taking a *10% cut-off rate*, the results seem to change. The Governance Top 10% ranked portfolio does generate a significant Alpha and shows that it is possible to generate abnormal returns by applying a SRI strategy. Not included in table 8, when sorted on Social and Environment score on a 10% cut-off rate, the portfolios are not capable of generating any statistical significant returns. Despite this, the results on a 10% level for Social and Environment show that the top ranked positive Social portfolios (on a 10% level) are positively related to stock returns (negatively related for Environment top 10%), while the bottom portfolios are more strongly positively related with stock returns.

The results from the top 10% ranked E-S-G Governance portfolio indicate an unexplained result, besides the other factor loadings. The results are significant on a 7% level and 9% taking the CAPM into account. Indicating that a Governance based selection approach, focussing heavily on Corporate Governance positively ranked companies, in fact, does turn out to be favourable over a ten year period. This holds even for taking the 2007 economic crisis into account where most companies seemed to be performing poorly.

Table 8, in addition to table 6 and 7, concludes the first hypothesis H1c: “SR Investing is increasing risk-adjusted returns with an E-S-G strategy”. However for hypothesis H1c, the statement is not rejected. It is possible to generate abnormal returns with SRI based investment strategy. This shows that the E-S-G strategy, depending on the investment dimension (governance), can lead to abnormal returns in regards of investment strategies focusing on socially conscious approaches. However for most other portfolios, the results

mainly are driven by either market return and/or small companies outperforming bigger companies (by market cap.), which are associated with lower overall ESG-scores as compared to bigger companies.

Continuing on the results of table 8, the Carhart (1997) four-factor model and the CAPM one-factor model, show that over the sample period, Rm-Rf continues to be the driving factor behind explaining the intercept for the 15% ranked portfolios. On a 10% level for the Governance dimension, all other factors remain insignificant. The Rm-Rf factor is for 15% ranked (both Carhart and CAPM) portfolios statistically significant. The Treynor-ratio shows, supplementing to the previous two tables, that the bottom ranked portfolios outperform the top ranked portfolios in terms of Treynor-ratio and average Beta.

The relatively low R2 for Long-Short portfolios is in accordance with Halbritter & Dofleittner's (2015) results. This applies for all three strategies; E-S-G strategy, Positive and Best-In-Class

All alphas, with the exception for the 10% cut-off Governance selected portfolios, resulted to be insignificant. However, there seems to be no noticeable pattern concerning the abnormal returns. Meaning that it seemingly makes very little to no difference if a Social or Environment selected strategy is applied for ethical investment decisions. Altogether, with the exception for Governance, the Social and Environment dimension strategies do not support enough evidence to prove a significant relation between investment decisions and abnormal financial performance. Indicating that, at least for this European sample size, timeframe and different ESG-portfolio strategies, irrelevant of cut-off rate, the results do not show a relationship between corporate financial performance and corporate social/environmental/governance performance.

The used Carthart (1997) four-factor model, nor the CAPM one-factor model, is capable of proving significant returns in regards of high rated, low rated or high-low investment strategies for any of the portfolios applied based upon the 15% cut-off rate, nor on the 10% cut-off rate with the exception for E-S-G Governance rated portfolios. The calculated Treynor-ratios and Betas seem to support this claim. Betas and Treynor ratios seem to be even performing on average better in the ethically dubious low ranked portfolios then in the high ranked portfolios. Results are however not fully unexpected and backed

up by previous academic literature like Goldreyer et al. (1999). The authors used an extended sample of ethical funds including equity, bond and balanced funds and by using Treynor ratios, they concluded that social screening did not affect the investment performance of ethical funds in any systematic way.

In summary, tables 6 and 7 provide proof that a positive and best-in-class screening strategy for European listed companies on either 10, 15, 20 or 25% cut-off rate, using an equally-weighted ESG-portfolio approach, does not provide statistically significant returns. Table 8 shows that European listed companies on either 15, 20 or 25% cut-off rate, do not provide statistically significant returns, but when selecting a Governance rated dimension portfolios, the results are significant on a 7% and 9% significance level. The long-short strategy provides counterproductive results, thereby rejecting partially the first hypothesis (H1a, H1b). Hypothesis H1c does hold for an investment dimension when exclusively highly ranked governance companies are picked.

These results are backed up by a numerous amount of academic literature that seems to support this claim, for example: Halbritter & Dorfleitner (2015), Brammer et al. (2006), Auer & Schuhmacher (2016), Ghoul & Karoui (2017). More examples can be found in the literature research.

Be that as it may, while the analysed results provide new understanding, they in addition sustain support for the economical learning hypothesis. This effect has been reported by Borgers et al (2013) as well as by Bebchuk et al. (2013). The authors state that the learning hypothesis indicates that past information on the market has been incorporated in their future return expectations. Considering that the returns of the portfolios in this research are mainly driven by market returns, there is a possibility that the information within the ESG results has been thus far already incorporated in the expected market returns. Though, just an assumption, this can be interpreted as further proof that SRI is partially incapable of returning abnormal returns as opposed the more conventional investing strategies.

6. DISCUSSION

This chapter finalises the research by starting a brief discussion about the data-input and the topic of SRI itself. Chapter 7 describes the conclusion that continues on answering the research question and hypotheses, highlighting the data and databases utilised in combination with the methodology applied.

The virtue of this thesis on the topic of Social Responsible Investing, is at the mercy of the ESG-information provided by the databases consulted. Simply stated, good input, generates good output. The empirical SRI-results are closely tied to the information that has been derived from the ESG-score and company database. Therefore, it is beneficial to start off with some of the disadvantages of the ESG-ranking system that has been applied in this research and how this can be taken into account for the obtained results and future research.

Referring back to Dorfleitner et al. (2015), the authors state that the derived results and ESG-value distributions largely depend and differ, based upon the data supplier they approach. Indicating that -based on above sentence- the outcomes and analyses of this thesis are both the result of the Thomson Reuters ASSET4-Datastream database, as they are the direct correlation between ESG-investing and the performance of different portfolios.

A bias that has been controlled for (and partially responsible for lowering the useable sample size), is that when a company cannot or does not supply ESG-data, the value of zero gets attached to the stock. This impacts the overall results for the weighted ESG-value cut-off rate. For example, five stocks with ESG-value (2, 4, 5, 3, 0) have an average value of 2.8 and a cut-off rate of 4.4 (taking a 15% rule). Excluding 0 leads to an average ESG-value of 3.5 and a cut-off rate of 4.55. As a result, excluding 0, avoids impact on the overall portfolio return. As stated in the ‘thesis contributions and limitations’ in chapter 1, this thesis does not account for transactions costs or fees. Despite the results being partially statistically significant and profitable, it is hard to determine to what degree the transaction costs erode the profitability of the applied screening strategies.

7. CONCLUSION

This final chapter focusses on answering the main research question and will describe the limitations and scope of the research, completed with suggestions for possible follow-up research in the field of social responsible investing.

The following research question has been stated in chapter 1 of this thesis: "*Can Social Responsible Investing lead to abnormal returns on the European stock market*?".

This research approaches the connection between financial and non-financial performance based on Environmental, Social and Governance ratings (or ESG-ratings). Even though previous academic literature is divided between the existence of a positive relation between ESG and returns, this thesis researches three different ESG-investment strategies, each divided in eight different portfolios. These portfolios, containing stocks with both high and low ESG-ratings, show partially a significant difference in return. However, none the Long-Short strategies seem to hold. This result seems to hold for one variation and cut-off rate within the portfolio weightings. When selecting stocks on a ten percent cut-off rate based solely on Governance based ratings, the portfolio, over the span of ten years holds significant on a 7% level. For all other portfolios and screening approaches (irrelevant of cut-off rate), no significance has been found.

In addition, the thesis finds only SRI generated abnormal returns on the European market when looking at a Governance 10% level. However, one should take into account, that the Governance E-S-G 10% top rated portfolio is heavily influenced with United Kingdom stocks. When looking at figure 6, between 54% and 78% percent of the stocks over a ten year period sample are from the United Kingdom. This in turn raised the question how much of the returns are due to the European data selection or because of the United Kingdom results.

Complimenting current existing academic literature, the results mainly (with the exception of one strategy) seem to carry support for statements made earlier by Bauer et al. (2004), Sadok El Ghoul & Aymen Karoui, (2017) and Hamilton (1993), stating that SRI

neither over *or* underperforms. One might even adopt the views of Borgers et al. (2013) and Bebchuk et al. (2013), stating that the market since then has learned to incorporate the SRI-pricing and investor-expectation already in the market

The results are arguing against several publications, claiming abnormal returns due to SRI-investing approaches and the existence of a pattern in regards of SRI-portfolios (Derwall et al. (2005), Kempf & Osthoff, 2007), Gil-Bazo et al. (2010), Nofsinger & Varma (2014) and Auer & Schuhmacher (2016). These researches state that incorporating ethical investment screens in one's portfolio strategy is capable of generating significant abnormal returns.

Taking a close look a previous research methodologies from Kempf & Osthoff (2007), Auer & Schuhmacher (2016) and Hong & Kacperczyk(2009), this thesis takes recent, post-crisis data, with a rarely used database for SRI-research, to investigate the financial performance of companies with good ethical intent versus those that get noticed by vice.

Continuing on the main research question, the results are clarified by answering and analysing the results derived from the three sub questions stated in H1a-c.

In the *first* hypothesis (H1a), a positive screening approach is applied. Within this screening the regression analysis reports a statistically insignificant return of around 1.4% to 5.2% per year, depending on the cut-off rate applied, in which the long-short approach, generated returns amounting to 1.1% and -3.3% a year.

The *second* hypothesis (H1b), applied the Best-In-Class screening approach, a derivate from the positive screening approach. This approach takes the top (bottom) stocks, per industry selected. The regression analysis reports a statistically insignificant return of around -2.2% to 4.4% per year. The bottom ranked portfolios are outperforming the top ranks portfolio by a twofold. The long-short approach, generated only negative returns.

The *third* hypothesis (H1c), conducts the E-S-G screening approach. This ethical investment strategy -the thus so far most successful approach- maintained a cut-off rate of 10%

and15%. This cut-off rate is then applied to the individual Environment, Social and Governance scores. By doing so, one can find out which investment value is driving the results the most. The outcomes from this third strategy produce the most promising results (albeit still insignificantly for every 15% cut-off rate dimension and 10% level for social and environmental). The Governance ESG-screening approach where the top 10% highest rated stocks get picked, managed to get closest to being statistically significant with a Carhart Alpha p-value of 0.07 and a CAPM p-value of 0.09, respectively generating 6.4% and 5.0% per year.

For future research, thesis writing or anyone interested in the field of social responsible investing, following point could be taken into account for. This research has not taken different exclusion-based approaches into account. The provided samples from the Thomson Reuters ASSET4 database with combined SIC, did contain very little controversial investment classes (Sin stocks), which made an exclusion based portfolio, as suggested by Auer & Schuhmacher (2015), impossible.

Furthermore, making the sample size bigger, or perhaps measuring ESG-data in different time frames during a certain period could provide interesting insights. Measuring abnormal returns on the European market from 2000 to 2018 as a whole approach might be a novel providing ample contribution to SRI-research. Constructing a hypothesis on certain crisis and non-crisis time-frames, to measure how stocks, their corresponding ESG values and volatility differ over time might be of value as well.

In addition, one could construct monthly ESG-portfolios. In this thesis, portfolios only get reallocated once per year. Perhaps making a monthly portfolio (taking transaction fees into account or not), might provide a different insight on the profitability and investor skill of ESG-based investment approaches.

As a final suggestion, it might provide interesting results by applying the three and five factor-models in order to discover whether or not, the significance of market influence can be perhaps explained by other factors.

To conclude, this thesis proves to show that there is evidence (albeit little) of risk-adjusted abnormal returns in the financial performance of ethical sustainable investing as opposed to conventional investment strategies, applying the Carhart (1997) four-factor model and/or the CAPM one-factor model. This conclusion can be seen as beneficial for both researchers and investors that prefer to focus on a portfolio that is constructed upon different 'E', 'S' and 'G' values. Irrelevant by the significant returns, or lack thereof, social responsible investing can be seen as a standalone independent investment category. SRI provides investors a positive return that can be expressed in reaching a certain social impact and financial gain.

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