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IS IT STILL POSSIBLE TO GENERATE ABNORMAL RETURNS WITH SRI? EVIDENCE FROM THE US

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ABSTRACT

This thesis investigates whether it is still possible to generate abnormal returns by applying SRI investment strategies. Early academic literature states a link between high ESG scores and abnormal returns. While that link vanished over time, due to a correction of the mispricing, using new data and methods recent papers once again report that a link between high ESG scores and abnormal returns exists.

Using a new set of ESG data acquired from Thomson Reuters ASSET4, as well as the new Fama and French five-factor model, this thesis investigates the financial performance of SRI in the US by using the S&P 500 investment universe to construct portfolios sorted on ESG scores. This thesis finds that SRI outperforms conventional investments in the US only during crises periods.

Covering a time horizon of 14 years, from January 2003 to January 2017, this thesis finds that portfolios sorted on the stocks of the 25% best rated companies in the Environmental-, Social-, and Governance dimension, as well as a combined ESG dimension, do not perform any different compared to conventional investments. Neither does a long-short approach of buying (selling) the top (bottom) 25% stocks. While SRI neither over-, nor underperforms under normal circumstances, the results indicate that low scores in the Environmental dimension are related to slightly negative returns.

In a series of following tests, this thesis investigates the performance of SRI during the financial crisis of August 2007 to March 2009. The author finds that over the whole sample period, as well as two sub-sample periods representing the decline of credit supply period and the decline of market trust period, SRI outperforms compared to conventional investments. Specifically, a portfolio consisting of the 25% best stocks of the Environmental dimension consistently outperforms, generating highly statistical return of 0.4% to 1.4%, and a portfolio sorted on the combined ESG score generates 0.5% to 0.6%. Furthermore, results indicate that a long-short approach over the Environmental dimension can generate 1.2% to 1.3%, and around 1.3% for the ESG dimension. Scores from the Social- and the Governance dimensions are individually not related to abnormal returns in any way.

KEYWORDS: Socially Responsible Investing, SRI, ESG

1. INTODUCTION

Traditional standard asset pricing models such as the "Capital Asset Pricing Model" (CAPM) as defined by Sharpe (1964) and Lintner (1965), or its variations, the "Inter-temporal Capital Asset Pricing Model" (ICAPM) and the "Consumption Capital Asset Pricing Model" (CCAPM), as defined by Merton (1973) and Lucas (1978), and Breeden (1979) respectively, share common assumptions about investors. More specifically, these standard asset pricing models agree on the assumption that investors prioritize the anticipated payoff of their investments in their decision making process. However, as described by Fama & French (2007), examples for violations to this assumption are abundant in academic literature.

One of the more recent and prominent violations to the assumption that investors only care about the payoff of their investment, is the trend of "Social Responsible Investing", or SRI in short. Social Responsible Investors do not necessarily follow the premise of maximizing their payoffs, but rather draw utility from the fact that an investment is in line with their personal (or law enforced in some cases for institutional investors), religious-, political-, environmental- or ethical values and concerns.

Over the last two decades, and even more strongly so in the last few years, SRI has experienced a tremendous growth phase. In the United Stated alone, the market size of ESG themed investments grew by 33%, to USD $8.72 trillion, from 2014 to 2016. This means that around one out of five dollars under professional management is invested in SRI assets. Continuing, the SRI assets are held by over 470 institutional investors, 300 money manager, and over 1000 investment funds (USSIF 2016). However, this trend is not confined to the US alone. In Europe, the growth of ESG themed assets experiences rates of up to 296%, depending on the SRI strategy investigated (Eurosif 2016).

With over $4.72 trillion under management in the US according to USSIF (2016), and around 80% of all SRI themed investments in Europe according to Eurosif (2016), institutional investors such as healthcare- or pension funds play a significant role in the ESG market. Even in the face of increased awareness and demand for ESG themed assets by

private investors, and the accelerated growth of the retail market for such products, the role of institutional investors remains unchallenged as of today. (USSIF 2016, Eurosif 2016)

Further evidence for the importance of the topic, and the dominance of institutional investors, is given by Principles for Responsible Investment (2016a). According to the source, over 1700 institutional investors from over 50 countries, which together have approximately USD $70 trillion under management, have signed the United Nations backed "Six Principles for Responsible Investment", incorporating ESG issues into their investment analysis and decision-making processes. Moreover, there are country level policies and regulations such as: "The National Pension Act" of Korea, the government pension fund's mandate of Norway, "The National Pension Insurance Fund Act" of Sweden, or the planned "Occupational Retirement Provision Directive" (IORP II) of the European Union. These principles have in common that they force some of the largest pension funds in the world to incorporate ESG criteria into their analyses and portfolio creation processes, and disclose how ESG issues were considered in their investment approaches. (Principles for Responsible Investment (2016b)

As evident by the growth rates and the amount of money involved, Social Responsible Investing and ESG-criteria analysis are highly relevant topics, which are not only interesting for institutional investors, policy makers and academic researchers, but also for a growing number of private investors. Analyzing the performance of SRI, and in extension ESG criteria, is an up-to-date topic that holds high relevancy in the present and near future, warranting additional research into this topic.

1.1. Research question, hypotheses, and contribution

The majority of the academic research on SRI of the last decade is focused on analyzing whether the incorporation of SRI into investment decisions affects financial performance

(Revelli & Viviani 2015). However, the results of SRI research remain at large conflicting, which is reflected in the three hypothesis regarding the performance of SRI investments:

The underperformance hypothesis states that due to screening processes inherent in SRI investment strategies, potential investors impose constraints on their investment universe, limiting their diversification potential and thus achieving less favorable risk-return conditions in comparison to conventional investments (Renneboog, Ter Horst, & Zhang 2008b). The second hypothesis, the over-performance hypothesis, is based on the arguments that high performance in Environmental, Social, or Governance related issues leads to a number of positive effects. High ESG scores can be regarded as a sign for managerial skill, translating into better financial performance, or they can reduce costs during crises (Renneboog et al. 2008b). The third and final hypothesis states that SRI neither destroys nor adds value, as the expected risk adjusted returns of SRI stocks equals those of conventional stocks (Revelli & Viviani 2015).

Investigating academic literature, the majority states that the incorporation of SRI neither destroys, nor adds value, as the performance is not significantly different from conventional investments. However, many of these earlier papers are subject to limitations such as incomparable data and methods. Newer papers such as from Borgers, Derwall, Koedijk, & Ter Horst (2013) and Bebchuk, Cohen, & Wang (2013), address these limitations and reinvestigate the performance of SRI under the premise of market learning and errors in expectations. These papers find that while SRI in fact yielded abnormal positive returns in the past, it does not anymore since 2001. The reason being a learning effect on behalf of the market participants, who learned to price the information encompassed in SRI correctly, seemingly ending the debate about the performance of SRI. However most recently, papers by Auer (2016) and Lins, Servaes and Tamayo (2017) report new results, conflicting with those of Borgers et al. (2013) and Bebchuk et al. (2013). Using new sets of data and methods, Auer (2016) and Lins et al. (2017), find that it is still possible to achieve abnormal returns by integrating SRI into investment decisions.

In light of the heterogeneous results provided by academic literature on the financial performance of SRI, the purpose of this thesis is it to once again reexamine the relationship and answer the following research question:

"Is it still possible to achieve superior returns with a SRI investment strategy in the US?"

To answer this research question, the following hypotheses were developed, and will be tested in the empirical part of the study:

H_1: High ESG scores are positively related to stock performance at all times.

This hypothesis is linked to the findings of Auer (2016), who recently proved that it is still possible for SRI to generate abnormal returns with portfolios sorted on the highest ESG scores in Europe. Partly emulating the author, this thesis employs a new set of data and methods to reexamine the performance of SRI in the US, aimed answering the question, if it still possible nowadays for SRI to achieve superior returns under normal circumstances.

H_2: High ESG scores are positively related to stock performance during financial crisis periods.

H_3: High ESG scores are positively related to stock performance during credit supply shock crisis periods.

H_4: High ESG scores are positively related to stock performance during low trust crisis periods.

Bebchuk et al. (2013), and Borgers et al. (2013) report that since 2001 it is impossible to generate abnormal returns with SRI in the US. However, Lins et al. (2017) show in a recent study that SRI is still able to achieve superior returns in the US, however, only during crises periods, and more specifically during periods of low trust. These hypotheses

support answering the research question by testing whether SRI possibly over-performs during more specific times, such as during financial crises periods.

By answering the research question, and testing the hypotheses, this thesis will provide the following contributions to academic literature: First, this thesis reexamines established literature on the performance of SRI by using new data and methods. This will help in providing more clarity in regard to the question whether SRI over-performs, underperforms, or does neither. Second, this thesis partially emulates the methods applied by Lins et al. (2017). Thus, this thesis serves both, to appraise the results reported by the Lins et al. (2017), as well as to possibly establish a narrower answer in regards to the research question. Lastly, since the new data and method, the Thomson Reuters ASSET4 ESG scores, as well as Fama & French's (2015) five-factor asset pricing model, have to the authors knowledge rarely been used in academic literature, this paper will also serves to appraise the usability of both in the context of SRI analysis.

1.2. Structure of the thesis

The remainder of the thesis is structured in the following way: The second chapter revolves around the theoretical background of this paper. More specifically, chapter 2.1 aims at explaining the concept of SRI, showing its importance, and explaining how SRI works. Continuing, chapter 2.2 aims at stating and analyzing all relevant academic literature on the performance of SRI. In further detail, chapter 2.1 is divided in four subchapters. Chapter 2.1.1 will explain the relationship between Socially Responsible Investing (SRI) and similar names and concept. Chapter 2.1.2 will give a brief historical overview over SRI, chapter 2.1.3 will give an overview over the current state of SRI in the world supported by market data, and finally, chapter 2.1.4 concludes with a list of SRI strategies, tools and techniques. Similarly, chapter 2.2 is divided into two subchapters. Chapter 2.2.1 describes the literature analyzing CSR and the financial performance of CSR, a strand of literature that precedes, and is closely intertwined with literature that analyzes SRI performance. Chapter 2.2.2 gives an in-depth analysis about the state-of-the-art literature that revolves around the analysis of the financial performance of SRI.

Continuing, the third chapter explains the data employed in this thesis. More specifically, chapter 3.1 revolves around describing the data source employed, as well as data sources commonly used in SRI analyses. Chapter 3.2 provides a detailed description of the data gathered for this thesis, providing first descriptive statistics for the raw data. Following, chapter four describes the methodology applied in this paper. More specifically, chapter 4.1 describes the portfolio construction process applied in this paper, and showcases descriptive statistics of them. Chapter 4.2 describes the model employed in this thesis to measure performance. Chapter 5 and its subchapters showcase and explain the results of the regression analyses and explain how they relate to the research question and –hypotheses in greater detail. Chapter 5.1 shows the regression results for the whole period analysis, while chapters 5.2 and 5.3, show the regression results for the financial crisis period, and its subsamples, the credit supply decline period and the trust decline period, respectively. Concluding this thesis is chapter 6, which will summarize the results, mention the limitations of this study, and elaborate on further possible research.

2. THEORETICAL BACKGROUND

This chapter of the thesis will describe the theoretical background in greater detail. The first subchapter revolves around explaining the concept of Socially Responsible Investing (SRI), and aims at explaining its origin, the importance of the topic, the current state of it in the modern investment environment, as well as tools and strategies related to SRI. Continuing, the second part of this chapter describes and analyses relevant academic literature on CSR and SRI, as well as their link to financial performance.

2.1. Socially Responsible Investing

This first subchapter aims at explaining SRI in greater detail, and is further divided into four separate chapters. The first subchapter below will define the concept of SRI and what is included in it, while establishing borders to similar related concepts. Continuing, the second chapter will provide a brief historical overview, stating the evolution of SRI from niche- to mainstream investment strategy. Following up, and supporting the view of SRI as a mainstream investment strategy, the third chapter provides detailed numbers and graphics of the current market state of SRI. Concluding this first part of the theoretical background chapter, the fourth subchapter describes the various tools and strategies applied in SRI.

2.1.1. Defining SRI

Social Responsible Investment, also known as Socially Responsible Investing, or its abbreviation SRI, is just one name among the multitude of names used in academic literature for an investment strategy that aims at combining social, ethical and/or environmental values of investors with financial return. It is an investment strategy based on the consideration that a potential investor may forego greater financial payoffs for increased social, ethical, or environmental benefits (Brzeszczyński & McIntosh 2014).

Eccles & Viviers (2011) reviewed 190 academic papers, spanning a period of 35 years with the goal to gather and analyze the origins and different meanings of the multitude of names given to investment strategies that incorporate Environmental-, Social-, and/or Governance criteria. More common names besides "Socially Responsible Investment" were found to be: "Ethical Investment", and more recent "Responsible Investment". Additionally, there exist a more extensive list of less frequently used names such as: "community investing", "environmentally responsible investing", "faith-based investing", "mission-based investing", "green-", "red"-, and "white investing", among various others.

When analyzing more common names such as: "Ethical Investment" and "Socially Responsible Investment", Sparkes (2001) found that the former description mainly describes investors that are bound by values, belief, or a code of conduct. Examples for Ethical Investment practitioners are churches, charities, or other investor groups that exhibit altruistic behavior and are non-profit driven. Meanwhile Socially Responsible Investment is described by Sparkes (2001) as combining ESG criteria with the financial goal to achieve at least market level returns. Another term, "Responsible Investment", which has gained prominence since the launch of the United Nations supported Principles for Responsible Investment, is defined by Eccles & Viviers (2011) as an investment strategy that incorporates ESG considerations with the main intention of achieving higher risk-adjusted returns.

While there are a multitude of names describing investment strategies aimed at integrating ESG criteria into decision making processes, in this thesis, the abbreviation "SRI" will be used as a synonym for all investment activities that integrate Environmental-, Social-, and/or Corporate Governance aspects, whether the strategy aims at creating superior returns, reaching the market level, or solely focuses on an added personal value aspect. Furthermore, "E" will be used as an abbreviation for Environmental, "S" for Social, and "G" for Corporate Governance, while "ESG" describes a combination of all three dimensions.

SRI itself is a facet of the Corporate Social Responsibility (CSR) trend. The definition for CSR, as proposed by the World Business Council for Sustainable Development (2000) is the following: "*CSR is the commitment of a business to contribute to sustainable economic development, working with employees, their families, the local community and society at large to improve the quality of life"*. CSR has become an important topic due to an increased demand by the public and policymakers alike, nudging corporations to assume responsibility towards the environment, society, and their stakeholders (Renneboog et al. 2008b).

Barnett (2007) states that CSR is the act of increasing social welfare and improving the relationship with stakeholders through company engagement. This engagement takes the form of company investments into activities such as for example reducing company waste, strengthening local communities, or improving shareholder rights. Continuing, agencies such as Thomson Reuters ASSET4 (2017a), gather the information on a company's CSR engagement, sort it into one of the three dimension: Environmental, Social, or Governance, and proceed to construct company individual scores for these dimensions, rating a company's CSR engagement. These ESG scores carry information that is in turn used by SRI investors to construct investment strategies. Hence, SRI can be considered a facet of CSR, as it is an investment strategy that aims on capitalizing on CSR, which in turn promotes further company CSR engagement.

To summarize the relationship between CSR, ESG, and SRI: CSR is company level engagement in various activities that are considered out of scope for the company, such as for example expenses for emission reduction. Agencies rate this company level CSR engagement and construct ESG scores to quantify this information for investors. SRI is an investment strategy based on incorporating ESG considerations, hence investors use this information acquired from agencies in their investment decisions.

2.1.2. Historical overview

While the exact place of origin and circumstances that lead to the creation of our modern notion of SRI is contested, academic literature generally agrees one the fact that the root

of SRI predates recent decades. Authors such as Schueth (2003), Derwall Koedijk & Ter Horst (2011), and Brzeszczyński & McIntosh (2014), identify the historical roots of SRI in religious values, -concepts, and -institutions. A notion that can still be seen in the prevailing widespread aversion of stocks of companies that promote alcohol, tobacco, gambling, weapons, or adult entertainment (Hong & Kacperczyk 2009).

According to academic literature, our modern notion of the term SRI is something that evolved only in recent decades, starting in the 1960's. More specifically, authors such as Schueth (2003) and Kinder (2005) claim that the Social Responsible Investment movement emerged in the United States during the political climate of the 1960. The emerging civil rights movements gave rise to a greater concern for topics such as the Vietnam War, the Apartheid regime in South Africa, and equal rights for women, which contributed to a rise in the awareness towards social responsibility as an issue (Schueth 2003). Contrasting this view on the origin of SRI, Louche & Lydenberg (2006), and Bengtsson (2008), state that the emergence of modern SRI in Europe predates the emergence of SRI in the US. Bengtsson (2008) presents the example of "AktieAnsvar Aktienfond", established as early as 1965, as one of the first ethical funds accessible by the public. Additionally, the author reports that the Methodist Church of the United Kingdom established an ethical fund in 1960, presenting evidence that early concepts of modern SRI were already in practice in Europe during that time.

While the origin of modern SRI is contested, its evolution in the US and Europe followed very similar patterns. The following decade, the 1970's, saw the social responsibility movement grow in size and depth, as the awareness towards topics such management practices and labor conditions increased. This in turn added the dimension of Corporate Governance to the early concept of SRI (Schueth 2003). Continuing the evolution of SRI, the 1980's saw an increase in the awareness for environmental issues worldwide. Factors that played a great role during this time were the Exxon Valdez incident which caused one of the greatest environmental catastrophes in the US, the Chernobyl incident in Europe, the growing hole in the ozone layer above Australia, and new information about global warming. All those environmental catastrophes lead to an increased awareness for environmental protection, adding the Environmental dimension to SRI. (Schueth 2003).

In line with this development, Bengtsson (2008) reports the establishment of Scandinavian environmental funds from the 1980's onward.

During the 1990's and 2000's, SRI started to become a global phenomenon, with governments and institutional investors taking the lead in defining and spreading the concept of SRI. Renneboog et al. (2008b) provide ample examples for the regulatory background during that period which supported the worldwide growth of the SRI industry. For example in 1991 and 1995 respectively, the German and Dutch governments introduced tax advantages for investments in the renewable energy industry. Furthermore, in 2000, the UK passed an amendment to its pension act, enforcing the disclosure of the extent to which social, environmental, and ethical considerations were integrated into the investment process. Similar regulation were passed by numerous other European countries in the following years. (Renneboog et al. 2008b)

2.1.3. The current state of SRI in the world

In recent years, SRI has developed into a mainstream investing strategy, particularly in Europe and in the United States. Yearly growth rates of 10% to 50% in western nations are common and well documented by proponents of SRI. As mentioned by Renneboog et al. (2008b), the early 2000's saw a mainstreaming of SRI as national governments picked up on the trend and enforced regulations, which in turn facilitated an accelerated growth of SRI assets. Further events underlying the importance and SRI, and providing evidence for a mainstreaming of it, are given by Humphrey, Lee, and Shen (2012). The authors report that stock exchanges around the world, such as for example in Sweden, South Africa, India, France, and Thailand, introduced formal- and voluntary measures of ESG disclosure and reporting guidelines for companies. Additionally, recent mergers and acquisitions further highlight the importance and mainstreaming of the topic among data providers. The increased demand for SRI and ESG related data saw the financial data provider MSCI taking over RiskMetrics, which beforehand acquired Innovest Strategic Value Advisors and KLD Research & Analytics, which were both well-known and frequently used ESG data providers in academic literature. Additionally, Thomson Reuters and Bloomberg, both major financial data providers, similarly acquired ASSET4 and

New Energy Finance respectively, to satiate the increased demand for SRI related data. (Humphrey et al. 2012)

A Furthermore noteworthy trend is that various influential organizations and associations are promoting-, and lobbying for an increased awareness for SRI, thus further facilitating a growth of it. For example the United Nations supported "Principle for Responsible Investment" (PRI), the world's leading proponent of SRI, created a framework lunched in 2006 to encourage the integration of SRI into the business and investment practices of institutional investors. Currently, PRI has 1750 signatories from over 50 countries, representing an amount of 70$ trillion USD under management. Signatories commit themselves to adhere the organizations six principles, which are: 1) To incorporate ESG issues into the analysis and investment process, 2) To incorporate ESG issues into ownership policies and practices, 3) To seek proper ESG disclosure by entities in which they invest, 4) To promote SRI and ESG issues within the investment industry, 5) To work together to enhance the effectiveness of the principles, and 6) To each report on their own activities and progress towards the implementation of the principles. (PRI 2016)

Further proponents of SRI include among others: the Sustainable Investment Forum of the US (USSIF) and -Europe (Eurosif), the Global Sustainable Investment Alliance (GSIA), and the Organization for Economic Co-operation and Development (OECD). For example, the current state of SRI in the United States is addressed by USSIF, an organization whose mission it is to propagate SRI and realize a *"shift of investment practices towards sustainability, ... long-term investment and the generation of positive social and environmental impacts"* (USSIF 2016). In their biennial report on SRI in the US, USSIF (2016) notes that the demand for SRI assets continues to grow, as the total amount of US assets under management that integrate SRI strategies, grew by 33% from $6.57 trillion in 2014, to $8.72 trillion in 2016. A trend unbroken since the early 2000's according to USSIF (2016).

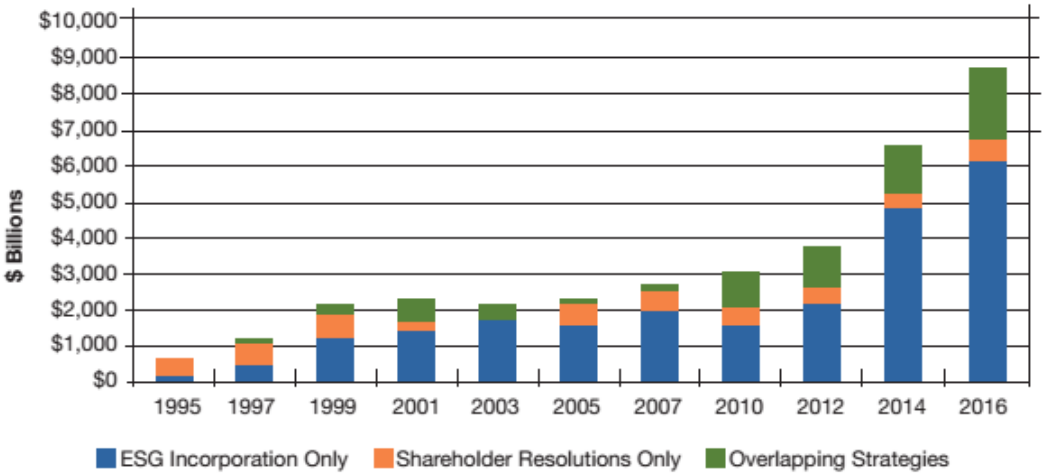

Figure 1. SRI-Assets under management in the US (USSIF 2016a: 12).

However, this trend is not confided to the US alone. Eurosif (2016) documents the current status of SRI in Europe, which in their analysis is compromised of the countries of Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Poland, Spain, Sweden, Switzerland, and the UK. Additionally, the Global Investment Alliance (GSIA 2016) gathers data on the status of current SRI trends from other member organizations in Canada, Australia & New Zealand, Japan, and greater Asia without Japan.

The following graphics taken from GSIA's (2016) Global Sustainable Investment Review are intended to showcase the numbers and proportions on the current status of SRI in the world, providing a better overview for the recent development of SRI assets in different regions around the globe.

Region	2014	2016	Growth over period	Compound Annual Growth Rate
Europe	$ 10,775	$ 12,040	11.7%	5.7%
United States	$ 6,572	$ 8,723	32.7%	15.2%
Canada	$ 729	$ 1,086	49.0%	22.0%
Australia/New Zealand	$ 148	$ 516	247.5%	86.4%
Asia ex Japan	$ 45	$ 52	15.7%	7.6%
Japan	$ 7	$ 474	6689.6%	724.0%
Total	**$ 18,276**	**$ 22,890**	**25.2%**	**11.9%**

Figure 2. Growth of SRI Assets by Region 2014-2016 (GSIA 2016: 7).

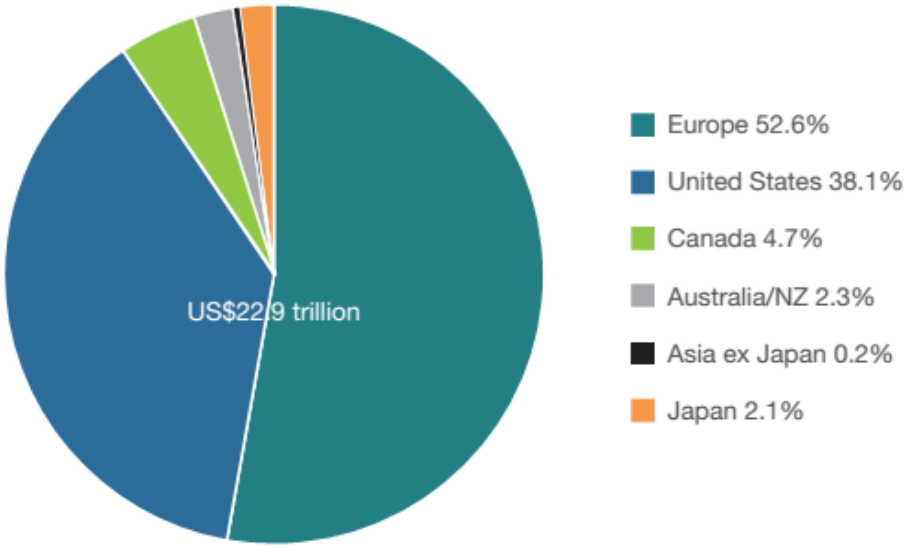

Figure 3. Proportion of Global SRI Assets by Region (GSIA 2016: 8).

According to GSIA (2016), SRI themed assets in Europe grew only by 12% from 2014 to 2016, compared to the US growth of 33%. However, reaching a volume of $12.04 trillion, SRI assets under management in Europe still outrank the US in volume. Further information that can be taken from figure one, is the fact that the growth trend for SRI seen in the US and Europe is occurring on a global scale. This can be seen in the total assets under management integrating SRI strategies worldwide, which grew from $18.28 trillion in 2014, to $22.89 trillion in 2016. An increase of about 25% in only two years. However, while regions such as Canada, Australia & New Zealand, and Japan saw impressive growth grates of 50%, 250%, and over 6600% respectively, the regional combined SRI asset volume of these three regions accounts to less than 5% on a global scale. Nevertheless, since SRI is still in the process of spreading globally and becoming a full-fledged mainstream investment strategy in many markets, and many regions in greater Asia are still considered developing financial markets, the growth trend of the global volume in SRI assets can be expected to continue to grow in the coming years.

Breaking down the ownership structure of SRI assets, Figure four, which was taken from GSIA (2016), shows that institutional investors are holding the majority of SRI themed assets. However, from 2014 to 2016 the ownership of institutional investors decreased by

around 12%. The shift from institutional to retail investors signals a change, and possibly the next step as the driving factor behind the exponential growth of SRI. A shift from mostly institutional investors such as pension funds and insurers, to the more diverse group of retail investors.

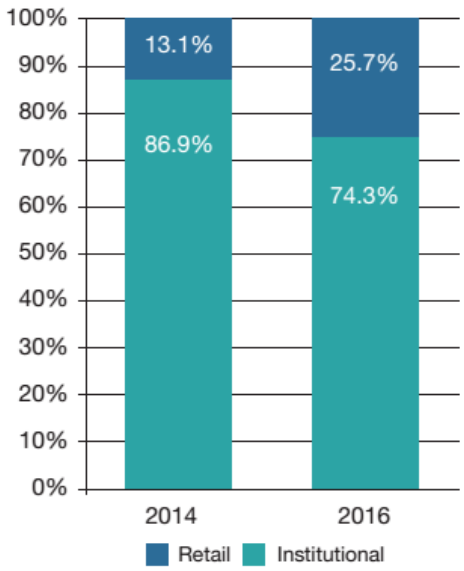

Figure 4. Assets held by Institutional & Retail Investors (GSIA 2016: 10).

Nevertheless, while retail investors are gaining a greater share, with almost 75% of all SRI themed assets, institutional investors still dominate most markets, and will continue to drive the growth of SRI in the foreseeable future. According to Renneboog et al. (2008b), this can be explained by the regulatory background of the early 2000's, which made SRI especially interesting and relevant for institutional investors. In their paper, the authors highlight some of the regulatory SRI initiatives undertaken by national governments and pension funds, which acted as forerunners and role models. For example, the California Public Employees' Retirement System (CALPERS), the largest pension fund in the world, and the Dutch Pension Fund for Public Employees (ABP), the biggest pension fund in Europe, engage in SRI. Furthermore, besides the tax advantages for investments in the renewable energy industry introduced by the German and Dutch governments and the pension act amendment passed in the UK, in 2001 the governments of Australia, Belgium and France introduced regulations which encourage listed companies to publish annual reports containing their SRI engagement, as well as disclose the extent

to which SRI and ESG criteria were taken into account. A trend which was followed by other countries such as Italy, Germany, Sweden and the US in the following years.

As evident by the shown numbers and figures, SRI is an up-to date topic that is highly relevant and attracts a substantial amount of wealth, as well as attention by both national and supra-national regulators and policymakers, institutional investors, and value-driven investors.

2.1.4. The tools of SRI

The investment strategies employed in SRI are many, and vary according to religious, cultural, or geographical background. Typically SRI related investment strategies employ various screens to analyze possible investment assets. These screens can be universally divided into two groups: negative-, and positive screens. However, as the concept of SRI evolved, so did the screens, enhancing the practices over time.

Negative screens are the most basic form of SRI strategies, and are deeply rooted in the religious origin of SRI. Negative screens typically aim at excluding certain stocks or whole industries from the investment universe, based on Environmental-, Social-, Ethical-, or Corporate Governance criteria and values. For example, a negative screen could be applied on the S&P 500 by excluding all so-called “sin-stocks” such as stocks related to alcohol, gambling, adult entertainment, and tobacco. Another negative screening approach would be to simply exclude stocks based on poor score performance in Environmental, Social, or Corporate Governance related areas, before considering financial- and risk relevant criteria to construct a suitable portfolio. (Renneboog et al. 2008b)

A more recent strategy in SRI revolves around the practice of positive screens. Positive screens aim at selecting assets that provide superior standards and ESG scores. Contrary to negative screens, positive screens do no limit the investment universe through exclusions of whole industries. This can be seen in the popular “Best-In-Class” approach, which goal it is to select companies that show superior ESG scores in relation to their

(industry) peers. As such, a positive screen approach does not exclude stocks of controversial industries, as long as they are the top of their peers in ESG related matters. (Renneboog et al. 2008b)

Renneboog et al. (2008b), describe negative and positive screens in their paper as the first and second generation in the evolution of SRI screens. The third generation of SRI screens is considered to be the combination of both, negative and positive screens. Such an approach might be for example to actively seek out firms that promote human rights standards, while at the same time avoiding any firm complicit in human right violations. Continuing the evolution of SRI screens, the fourth generation takes up the approach of using both negative and positive screens form the third generation, and combines it with the strategy of shareholder activism. Shareholder activism aims at influencing a company's action through dialogue with the management, or through investors voting rights. This means that SRI investors actively seek out to positively influence a firm in regards to ESG issues. (Renneboog et al. 2008b)

As of 2016, organizations such as the GSIA, USSIF, Eurosif, and PRI identify and describe between six to seven SRI strategies in total. These strategies, while varying slightly according to framework, can be used as individual investment strategies, or in any form of combination. The following figure taken from Eurosif (2016) shows the different classifications introduced to the frameworks in 2012.

Eurosif	GSIA-equivalent	PRI-equivalent
Exclusion of holdings from investment universe	Negative/ exclusionary screening	Negative/ exclusionary screening
Norms-based screening	Norms-based screening	Norms-based screening
Best-in-Class investment selection	Positive/ best-in-class screening	Positive/ best-in-class screening
Sustainability themed investment	Sustainability-themed investing	Sustainability themed investing
ESG integration	ESG integration	Integration of ESG issues
Engagement and voting on sustainability matters	Corporate engagement and shareholder action	Active ownership and engagement (three types): Active ownership Engagement (Proxy) voting and shareholder resolutions
Impact investing	Impact/community investing	-

Figure 5. Classification of SRI Strategies by Different Organizations (Eurosif 2016: 9).

Exclusions, norms-based screening, Best-in-Class selection, ESG integration, and Engagement, all reflect the previously described four generations of SRI screens. The newest generations of SRI strategies are "Sustainability themed investments", and "Impact investing". According to Eurosif (2016), the SRI strategy of Sustainability themed investments picked up in recent years thanks to events such as the UN Climate Change Conference in 2015, and the rising importance of topics such as climate change and renewable energy. The strategy revolves around screening for industries and firms with strong links to sustainable development topics, such energy efficiency, waste management, water management and renewable energy. Similar to Sustainability themed investments, Impact investing is a niche trend which came into existence recently, and aims at creating a positive impact across sustainable developments. Contrary to the formerly mentioned approach however, which aims at furthering sustainable development technologies, Impact investing aims at creating superior financial returns (Eurosif 2016).

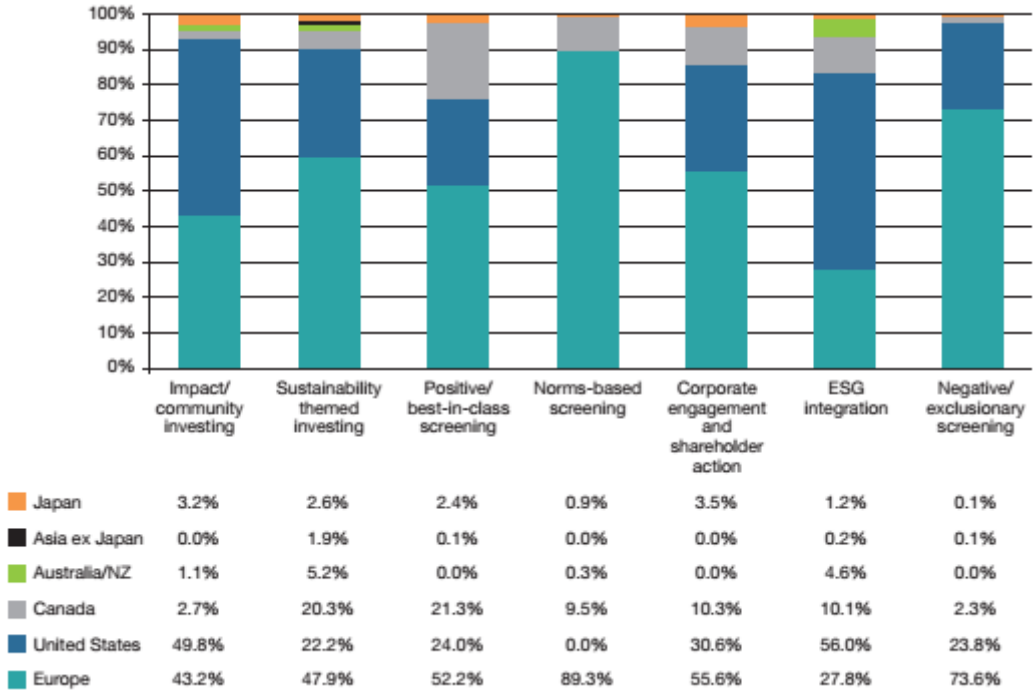

Figure 6. Regional Share, by Asset Weight, in Global use of SRI Strategies (GSIA 2016: 11).

Preferred SRI strategies of investors can vary significantly on the regional level as the figure showcases, further emphasizing the variation that exists within SRI. For example, Europe, which holds over 52% of all global SRI assets, also holds almost 75% of all global assets in the category negative screening, and almost 90% of all global assets under norms-based screening, making both SRI strategies the most popular in that region. Furthermore, it is possible to infer that the US holds the major share of global assets involved in ESG integration and impact investing. Meanwhile, although Canada only accounts for roughly 5% of all global SRI assets under management, the country accounts for over 20% of the global share of best-in-class assets.

2.2. Literature review

Following the exceptional growth of SRI, a heighted academic interest in the topic emerged. While there are many academic papers that aim at explaining the true nature of SRI and try to more closely define the term, such as for example Sparkes (2001), and

Eccles & Viviers (2011), this paper is in line with the strand of scientific research that aims at analyzing the financial performance of SRI. This strand of research usually aims at analyzing whether the integration of SRI into investment decisions invokes costs that are different compared to conventional investments, or whether a SRI strategy affects the financial performance of investments (Revelli & Viviani 2015).

The academic debate on the performance of SRI closely mirrors the one conducted on the relationship between Corporate Social Responsibility (CSR), Corporate Social Performance (CSP), and Corporate Financial Performance (CFP), in-between the 70's and 90's (Revelli & Viviani 2015). As previously mentioned, SRI is a facet of CSR. CSR is a company-level based concept, consisting of considerations aimed at enhancing firm performance and stakeholder relations through investments in activities that are considered to improve social welfare (Perrini et al. 2011). Meanwhile SRI is an investor-level based concept, consisting of investors applying screens to seek out, or reject, firms based on their CSR engagement, either to capitalize on the expected superior firm performance, or because of personal values or law enforced regulations (Revelli & Viviani 2015).

The following sub-chapters aim to provide a clearer picture on the multidimensional concepts of CSR and SRI, and describe how they are connected in academic literature. The first sub-chapter will describe the evolution of CSR research from its earliest beginnings in 1972, up until to the results and conclusions of modern research on it. Furthermore, the chapter will describe the shift that occurred in CSR related research with the emergence of SRI. Following that, the second sub-chapter will analyze and describe the results of modern research on SRI.

2.2.1. CSR, CFR, and the link to financial performance

In academic literature, the term Corporate Social Responsibility, "CSR", and Corporate Social Performance, "CSP", are often used interchangeably. However, according to Barnett (2007), as well as Perrini, Russo, Tencati & Vurro (2011) and earlier research, there is an important distinction between the two terms. Barnett (2007) states that CSP is in fact a summary, or snapshot, of a firms aggregated social performance at a point in time.

Meanwhile, CSR is stated by the author to be the investments in social activities over time that make up the CSP at a certain point in time. Hence, by investing in CSR activities, a firm is able to create a positive CSP.

Early academic literature identified Corporate Social Responsibility as an important duty. However, the relationship between CSR and a firm's financial performance remains complex, with different views on the matter prevailing in historical academic research (McGuire, Sundgren & Schneeweis 1988). According to McGuire et al. (1988), based on the research of Vance (1975), Moskowitz (1972), and Cornell & Shapiro (1987) among others, three different views on the relationship between Corporate Social Responsibility and Corporate Financial Performance are debated in academic research.

The first view on CSR states that, when choosing to implement CSR activities, such as establishing environmental protection procedures, or promoting community development, firms limit their strategic alternatives and forgo investment opportunities. By adhering to CSR principles, firms incur higher costs and limit their strategic alternatives. Thus, firms must face a trade-off between financial performance and socially responsible actions, as the latter incurs costs that put the firm at an economic disadvantage compared to its peers that refuse to implement CSR measures. (Vance 1975, McGuire et al. 1988)

The second view on the CSP-CFP link in early academic research suggests a positive relation. Stating that the costs of implementing CSR measures are minimal, and firms can expect benefits such as an increased employee morale, productivity, and customer goodwill. Furthermore, through the perception of having high CSR standards, a firm may improve its standing with banks, investors, and the government, enjoying economic benefits such an increased access to capital. (Moskowitz 1972, McGuire et al. 1988)

Lastly, the third view suggests that CSR neither adds-, nor destroys financial performance, as the substantial costs for CSR activities are offset by a reduction in other costs. However, CSR is nevertheless an important concept for firms, as stakeholder theory suggests that firms must not only satisfy shareholders, but also stakeholders who hold less

explicit claims such as for example product- or service quality (Cornell & Shapiro 1987, McGuire et al. 1988).

Besides the financial performance, another important aspect that was already considered in early academic research on CSR, is trust. McGuire et al. (1988) describe, based on Alexander & Buchholz (1978), that stake- and shareholder might see the implementation of CSR activities as a measure of management skill. Thus, an increase in CSR might get reflected in a more positive image of the company in the eyes of share- and stakeholders, resulting in benefits such as increased trust in the firm to honor its commitments. On the contrary, a low level of CSR, or a decrease of CSR activities, might correlate with a low level of trust, or a decrease thereof respectively.

Early empirical research on CSR is plagued by several problems limiting the comparability of results. Problems are among others, the varying methods to measure social- and economic performance, the incomparability of the analyzed time periods, as well as a lack of a clearly defined theory and key terms. Other mentioned problems include sampling problems, in addition to the failure to control for factors such as: risk, research and development expenses, and intangible assets such as human capital and reputation. (Barnett 2007, Perrini et al. 2011)

Since the days of early research on the CSP-CFP link, more than four decades have passed, and the number of studies investigating the relationship between Corporate Social Performance and Corporate Financial Performance has grown. Over time, the newer studies have addressed the problems mentioned above and improved on them, offering stronger theories, better analytical methods, and control mechanism for earlier unexplainable or omitted variables (Barnett 2007). The conflicting views on the impact of CSR activities on CFP however remain at large the same, with modern research outcomes mirroring earlier results, leaving the debate between CSR proponents and opponents unsolved. Nevertheless, company commitment to CSR practices, -documentation and -disclosure continues to grow, as new concepts and tools to evaluate CSR are being created

(Perrini et al. 2011). Nowadays, CSR reporting is seen as a standard among most companies and industries (KPMG 2017). However, while the popularity of CSR is growing, the conflicting views on it remain the same.

Critics of this practice still see it as having a negative impact on firm performance. For these critics, engaging in CSR activates is not the purpose of a firm, but should rather be left to the government. Following the neoclassical maxim as propagated by Friedman (1970), critics argue that CSR represents unnecessary costs that may lead to competitive disadvantages, and that the money should rather be used to improve firm efficiency or returned to shareholders (Barnett 2007, Perrini et al. 2011).

Proponents of CSR, which according to Perrini et al. (2011) make up the larger group, continue to propagate that CSR is in a firms best interest, as it facilitates competitive advantages. It is argued that CSR has a positive impact on firm performance, as an increase in CSR activities leads to a decrease in transaction costs, due an improvement in trust and the resulting belief that a firm with a strong engagement in CSR will honor its commitments. (Barnett 2007, Perrini et al. 2011)

Despite the improvement of the studies over the years, the modern view on the debate voices critique on both of the existing views on CSR. As Barnett (2007) mentions: *"…twenty-five years of research has not produced a solution but, rather, isolated islands of partial insight about an unseen larger picture…"*. Recent research suggested a shift in the prevailing academic approach to the topic, as CSP is too dependent on situational, and company individual elements. Instead of analyzing the link between Corporate Social Responsibility and Corporate Financial Performance, modern CSR research should aim for reviewing the CSR-CFP debate with a focus on the modern stakeholder theory, first propagated by Freeman (1984). The aim should be to analyze the link between CSR engagement and trust, to determine which aspects of CSR matter to which stakeholders. Additionally, with the mainstreaming of CSR practices, researchers should also be able to answer how to succeed in CSR (Barnett 2007, Perrini et al. 2011).

Accompanying this shift in CSR research was the emergence of SRI and the research thereof. As the research shifted away from analyzing the financial performance of CSR, analyses aimed at determining whether the new concept of SRI provided superior financial performance took over. Now academic research on financial performance tries to determine, whether SRI assets and -strategies are more profitable than conventional assets and investment strategies. Continuing, the next chapter will provide more insight into the SRI debate, and briefly mention how some aspects mirror the CSP-CFP debate.

2.2.2. Academic literature on SRI and financial performance

The majority of the academic research on SRI of the last decade is focused on analyzing whether the incorporation of SRI into investment decisions affects financial performance (Revelli & Viviani 2015). Similar to the earlier research on the CSR-CSP link, today's SRI research yielded mixed results, indicated in three prevailing alternative hypotheses:

The *"Doing Good While Doing Well"* (Statman & Glushkov 2009), or over-performance hypothesis, suggests that SRI investments generate excess returns that are higher than those of comparable conventional investments. Proponents of this hypothesis argue that firm with high ESG scores are less susceptible to potential additional costs caused by environmental disasters, corporate-, or social crises (Chan & Walter 2014). More specifically, through adapting SRI friendly practices, firms are less likely to occur environmental fines and lawsuits, while they are additionally more likely to create high firm loyalty, increased sales, and lowered costs (McGuire, Sundgren & Schneeweis 1988; Sauer 1997; Auer 2016). Reversely, firms with low ESG scores may destroy value in the long term, by having a higher chance to be subjected to reputation losses, decreased sales, or court costs (Chan & Walter 2014). Another aspect attributed to a high performance in environmental-, social-, or governance related issues, is managerial skill, which can also translate into better financial performance (Renneboog et al. 2008b).

The *"Doing Good but Not Well"* (Statman & Glushkov 2009), or underperformance hypothesis, follows the belief that investing in stocks of SRI-conform firms results in lower

expected returns, compared to investing in conventional stocks. Proponents of this hypothesis state that by applying SRI strategies investors restrict their investment universe, which according to mean-variance theory, results in reduced diversification opportunities and a decreased portfolio performance (Belghitar, Clark & Deshmukh 2014; Chan & Walter 2014). More specifically, SRI screens may eliminate some otherwise profitable companies and industries, leaving smaller and more volatile firms as investment options (Auer 2016).

The *"No Effect"* (Statman & Glushkov 2009) hypothesis states that SRI neither destroys, nor adds value, as the expected risk adjusted returns of SRI stocks equals those of conventional stocks. This might be the case if the benefit generated through an increase in SRI activities increases a company's costs by the same amount, resulting in company profitability to remain unaffected. On the other hand, if an increase in SRI activities only results in a greater increase of costs, company profitability may remain unaffected as long as SRI investors overestimate the firm value, or underestimate the real costs (Statman & Glushkov 2009, Revelli & Viviani 2015).

Ultimately, whether SRI investments over-perform, underperform, or neither, is a question answered by empirical research. For this reason, there is a great number of academic research that revolves around the analysis of the financial performance of SRI investments. Generally, this research can be divided into three categories: SRI stocks versus conventional stocks, SRI mutual funds versus conventional funds, and SRI indices versus conventional indices, which all partially yield conflicting evidence regarding the performance of SRI.

Empirical research that indicates a positive relationship between SRI and financial performance, supporting the over-performance hypothesis, can be found for example in the papers of Derwall, Guenster, Bauer & Koedijk (2005), and Kempf & Osthoff (2007). Using multifactor asset pricing models such the Carhart (1997) four-factor model, the authors show that a long-short strategy consisting of selling portfolios compromised of stocks with low ESG scores, and buying those with high scores, yields statistically significant abnormal returns. Newer research using similar methods that also supports the

over-performance hypothesis can found with Chan & Walter (2014), who report a "green premium" for stocks of environmentally friendly firms. Similarly, Statman & Glushkov (2009) report significant abnormal returns following a best-in-class approach (screening for the best scores, regardless of industry), and using stocks sorted on their "social responsibility" scores.

Empirical research that reports evidence for the hypothesis that SRI neither over-, nor underperforms, can be found for example with the papers of Renneboog, Ter Horst & Zhang (2008a), Bauer, Koedijk & Otten (2005), Kreander, Gray, Power, & Sinclair (2005), or Ferruz, Muñoz & Vargas (2012). All of the previously mentioned paper investigated the performance of SRI funds relative to conventional funds, however none found any statistical significant difference in performance. Providing similar evidence, but investigating indices rather than funds, are the papers by Schröder (2007) and Belghitar, Clark & Deshmukh (2014). In detail the latter two papers analyze whether SRI indices such as the FTSE4Good, the Domini Social, or the Dow Jones Sustainability Index, perform better than their conventional counterparts. However, neither paper found any statistical evidence for the over- or underperformance of SRI.

Following the general analysis, the following part will in more detail analyze some of the mentioned papers, before providing evidence as to why there are so many conflicting results within the academic SRI research.

Derwall, Guenster, Bauer & Koedijk (2005) investigate the question of SRI performance in their paper by sorting portfolios on an ESG measure called "eco-efficiency". Eco-efficiency is described by the authors as the ratio of the value a company adds, versus the waste a company produces. Using Innovest, nowadays MSCI, Derwall et al. (2005) acquired the ESG data of 450 US companies, covering the period from May 1995 to May 2003. Continuing, the authors proceeded to rank the companies according to their eco-efficiency scores, and create two portfolios, each consisting of the highest (lowest) 30% stocks, which were rebalanced annually according to updated score information. Using the CAPM, the Fama and French (1993) three-factor model, as well as the Carhart (1997) four-factor model, Derwall et al. (2005) find evidence that a portfolio consisting of the

most eco-efficient companies outperformed a portfolio of the least eco-efficient ones over the 1995-2003 period. Moreover, this statistical significant return of six percent above the bottom portfolio, cannot be explained by differences in market sensitivity, investment style, or industry specific factors. The results furthermore remain significant in the presence of transaction costs, indicating that the integration of SRI into investment considerations can have a tremendous impact.

Another paper that is in line with the over-performance hypothesis is the analysis conducted by Kempf & Osthoff (2007). Similar to the approach used by Derwall et al. (2005), the authors investigate whether a trading strategy based on past ESG ratings and a top-bottom approach leads to statistical significant abnormal returns. Using KLD, nowadays MSCI, Kempf & Osthoff (2007) acquire the ESG data for around 650 stocks which together compromise the investment universe of the S&P 500 and the DS 400 for a time period covering 1992 to the end of 2003. In detail, the authors acquired the score ratings for all of the sub-criteria compromising the categories of "community", "diversity", "employee relations", "environmental", "human rights", and "product", which they used to construct an overall, category individual score. Using these scores, the authors create portfolios consisting of the respective top (bottom) 10% of stocks, as well as one portfolio consisting of the combined average rating. A final portfolio is created by using a combined negative and positive screening approach, to first drop all companies that are involved in "controversial" business areas, before creating a portfolio on the combined average score over all categories. Using the Carhart (1997) four-factor model to measure the performance of the respective portfolios, the authors find that investors can earn statistically significant abnormal returns by short selling the bottom portfolios, and going long in the top portfolios. Moreover, even considering transaction costs, the best-in-class approach yields a statistically significant alpha of 8.7% a year.

Contrary to the evidence found in the papers of Derwall et al. (2005) and Kempf & Osthoff (2007), and conflicting with the view that a trading strategy based SRI can achieve substantial abnormal returns, the following papers by Renneboog, Ter Horst & Zhang (2008a) and Belghitar, Clark & Deshmukh (2014) show evidence that the returns

provided by SRI investments are not statistically different from the returns of conventional investments.

In their paper, Renneboog et al. (2008a), investigate the question whether the under- or over-performance hypothesis holds for SRI funds across the world. In detail, the authors investigate if SRI funds from 17 countries outperform their conventional counterparts over a period lasting from January 1991 to December 2003. Constructing their own database, Renneboog et al. (2008a) compare the performance of 440 country specific SRI mutual funds with the performance of 16,036 conventional mutual funds across the world. Using the Fama and French (1993) three-factor model, and the Carhart (1997) four-factor model, the authors find that SRI funds strongly underperform their benchmarks by -2.2% to -6.5%. However, except for SRI funds in France, Sweden, Ireland and Japan, this underperformance is statistically not significant, providing evidence for the underperformance hypothesis, as well as the hypothesis that SRI neither destroys nor adds value.

Another example refuting the over-performance hypothesis and thus providing further conflicting results, is the paper by Belghitar et al. (2014). Criticizing that earlier research usually limits itself to investigating performance using the CAPM, three-factor, or four-factor model, Belghitar et al. (2014) examine SRI performance by applying the concept of Marginal Conditional Stochastic Dominance developed by Shalit & Yitzhaki (1994). Under the premise that investors are risk averse, the Marginal Conditional Stochastic Dominance concept, or MCSD, investigates which assets a risk averse investor prefers over another. By increasing the share of these superior, or "dominant" assets, risk averse investors can increase their utility. Belghitar et al. (2014) use the FTSE4Good index and its regional variations, the FTSE4Good-US, -UK, - EU, and –Global index, to compare them to conventional regional index counterparts, as well as general regional market indices. Covering a sample period of 10 years, lasting from July 2001 to November 2010, the authors find that there is no statistical difference between the returns of SRI- and conventional indices in case of their mean and variance. However, conventional indices outperform their SRI counterparts in terms of higher skewness and lower kurtosis, indicating that SRI indices have a lower financial utility. This finding is further supported by results indicating that the strategy of shorting an SRI index, and investing the proceeds in

a conventional one, significantly outperforms both indices separately. Ultimately, SRI underperforms according to the authors.

A detailed overview of the various studies related to SRI performance can be found in the meta-studies of Renneboog et al. (2008a) and Revelli & Viviani (2015), both of which summarize, and give an overview of the results achieved in the analysis of the financial performance of SRI. Renneboog et al. (2008a) analyze the results of 16 papers that investigate the performance of SRI funds compared to conventional ones. However, the results mostly support the hypothesis that SRI neither over- nor underperforms, as the difference in returns between the two categories of funds is statistically not significant. Contrary to Renneboog et al. (2008a), Revelli & Viviani (2015) examine 85 studies over a period of 20 years, which are additionally not solely limited to the comparison of SRI funds with conventional ones. Revelli & Viviani (2015) find evidence for positive-, negative-, and neutral relationships between SRI and financial performance, leading the authors to conclude similar to Renneboog et al. (2008a) seven years prior that on average SRI globally neither over- nor underperforms. However, the various results are very heterogeneous and highly dependent on the chosen methods, data, and geographical location, indicating a lack of consensus in the field of empirical SR study.

In light of this lack of conclusive evidence regarding the financial performance of SRI, it is necessary to analyze the limitations shared between the previous studies, and examine possible explanations for the heterogeneity in results. As evident from the meta-studies by Renneboog et al. (2008a) and Revelli & Viviani (2015), a great number of studies revolve around comparing the performance of SRI mutual funds with the performance of conventional funds or unrestricted benchmark portfolios. All these studies have in common that they suggest SRI fund returns are not statistically different from conventional fund returns.

According to Statman & Glushkov (2009) and Auer (2016), while these studies are useful, they provide little evidence about the actual returns of stocks of companies that are heavily engaged in SRI matters. Additionally, these studies suffer from several drawbacks. First, evidence found by Wimmer (2013) indicates that funds change their status over

time, which means that funds initially considered SRI funds may lose their status as such, despite being continually labelled, and/or listed as SRI funds. In detail, Wimmer (2013) reports that ESG-score persistence in funds is terminated after approximately two to three years due to changes in the holdings of the fund. Second, Kempf & Osthoff (2007) as reported by Auer (2016), and Statman & Glushkov (2009), mention that a number of confounding effects create gaps between the returns of mutual funds. These gaps in turn make it difficult to rely on fund performance to analyze the impact of SRI. In detail, fund performance does not merely rely on the underlying securities, but also management fees and managerial skill. Finally, according to Auer (2016) while most studies use Jensen's alpha to measure the risk adjusted performance, this measure has its limitations. The author elaborates that Jensen's Alpha is a measure of performance for well-diversified portfolios. However, some SRI funds apply negative screening procedures, thus limiting their investment universe, and in turn their diversification potential. Hence, the results acquired by fund level comparison studies have to be handled with care.

Similarly, Statman & Glushkov (2009) also criticize the use of index level comparisons to determine the performance of SRI. Although indices are free of the confounding effects of mutual funds, such as management fees and managerial skill, index level comparisons suffer from other limitations that prohibit achieving a clear picture of SRI performance. First, there is much overlapping between stocks listed in SRI indices and stocks listed in conventional indices. For example, the Domini 400 Social Index shares roughly 250 stocks with the S&P 500, and thus a comparison likely underestimates the difference between SRI- and conventional stocks. Second, screening criteria and applied weights differ among indices. For example, the Calvert Social Index assigns relatively high weights to the Governance dimension, while the Domini 400 Social Index (DS 400) assigns relatively high weights to the Environmental dimension. Additionally, while both the DS 400 and the Calvert Social Index limit themselves by negatively screening for tobacco firms, the Dow Jones Sustainability Index (DJSI) only applies the best-in-class approach, thus allowing tobacco firms to be part of its investment universe. (Statman & Glushkov 2009)

Regarding the limitations above, it becomes clear that only a stock level analysis is suitable to determine the performance of SRI. Reinvestigating the previous literature under

this premise however does not provide the wished for clarity, as the results provided by literature focusing on stock level comparisons are still mixed, as seen when comparing the results of Kempf & Osthoff (2007), Statman & Glushkov (2009), Chan & Walter (2014), and Auer (2016) among others.

Although the results are mixed, one observation that can be made when comparing stock level SRI performance analyses is that studies that limit themselves to earlier time periods, more often report a positive relationship between SRI and performance, as well as generally higher, and more significant abnormal returns compared to later periods. This observation might indicate a learning effect, such as shown in the papers of Borgers, Derwall, Koedijk & Ter Horst (2013) and Bebchuk, Cohen & Wang (2013), both of which report that the abnormal returns vanished over time, as market participants learned to price SRI correctly. In detail, Borgers et al. (2013) analyzed whether portfolios constructed on ESG scores gathered from KLD, nowadays MSCI, yield any abnormal significant return over the 1992 – 2009 period. The authors find that a portfolio compromised of the highest scores provides statistically significant abnormal returns, and outperforms a portfolio compromised of the lowest scores during the 1992 – 2004 period. After this period however, the statistical significance ceased to exist, as investor attention grew and errors in investor expectations were reduced. Similar, Bebchuk et al. (2013) investigate in a related study, whether portfolios sorted on a corporate governance index (G-index) created by Gompers, Ishii & Metrick, (2003) yield any abnormal returns during the 1990 – 2008 period. Bebchuk et al. (2013) find that while the Governance dimension continues to be related to firm value and operating profits, the correlation with abnormal returns only lasted from 1990 to 2001. More specifically, portfolios compromised of stocks of companies with “good” Governance yielded significant positive abnormal returns until 2001, before they stopped doing so in the following periods. Investigating earning announcements, the authors conclude similar to Borgers et al. (2013) that the abnormal returns only existed due mispricing on behalf of the market, and that investors over time learned to price factors such as the (ES)G factor correctly, resulting in abnormal returns ceasing to exist.

Concluding all evidence gathered so far, to determine if SRI over-performs, underperforms, or does neither, it is best to use a stock level analysis. Furthermore, to make sure all possible confounding effect that plague other studies are addressed, it is advised to construct portfolios using the best-in-class approach, least the possible investment universe gets limited. However, when investigating studies following this approach, the results can be still mixed, depending on the investigated period. As Bebchuk et al (2013) and Borgers et al. (2013) reported, portfolios constructed on ESG information only yielded abnormal significant positive returns until 2001, before they vanished in subsequent years. Taking into consideration this learning effect, it is possible to conclude that investors learned to price the information contained in ESG scores correctly, and subsequently SRI does neither over- nor underperform in this day and age. While the above made conclusion seems to be the case, two recently published papers cast doubt upon this.

In his paper, Auer (2016) shows that portfolios created by screening for high ESG scores still provide significant positive abnormal returns in Europe, over the 2004 to 2012 period. In detail, Auer (2016) applies a never before used set of ESG ratings for the European market acquired from Sustainalytics to create stock portfolios sorted on Environmental, Social, and Governance scores respectively, as well as a portfolio based on a combined average weighted ESG score. Using the Sharpe ratio and the LW bootstrap test proposed by Ledoit & Wolf (2008), Auer (2016) finds that when using cut-off rates of 5% to 25% the portfolios sorted on Governance scores as well as the combined ESG score outperform the benchmark portfolio, while the portfolios sorted on Environmental and Social scores neither over-, nor underperform. Furthermore, the G score portfolios show significant abnormal returns compared to the benchmark portfolio consisting of all rated stocks. This indicates that stocks of companies with higher G-scores outperform those with lower scores. Thus, Auer (2016) provides evidence for the hypothesis that SRI can still over-perform after the 2001 period, despite the presence of a learning effect, as the European market is the biggest market for SRI, and had the comparably same time as the US market to incorporate SRI information.

The second paper indicating that it is still possible to generate abnormal returns with SRI despite a learning effect, is the recently published paper by Lins, Servaes and Tamayo

(2017). Lins et al. (2017) empirically analyze the relationship between high ratings in CSR, trust, and financial performance, and show that a positive relationship still exists. Using stakeholder theory as foundation, which indicates that high CSR ratings correlate with high trust, and ESG data from MSCI, the authors analyze the performance of SRI in the low trust environment of the financial crisis of 2008 – 2009. The financial crisis of 2008 to 2009 was an event that caused public trust in companies to decline drastically. As reported by the Edelman (2009) Trust Barometer, during this period global trust in companies declined on average by 62%, and in the US by 77%. Lins et al. (2017) argue that if a high engagement in CSR activities, proxied by high ESG scores, does indeed facilitate and proxy trust, the increased trust should pay off in low trust periods. Examining the performance of over 1600 non-financial firms during the period of August 2008 to March 2009, and using CSR data received from MSCI, the authors show that firms that entered the period with high ESG ratings significantly outperformed their peers with low ESG ratings by four to seven percent in stock returns. Furthermore, Lins et al. (2017) show that the result can be replicated for the period of the dot-com crisis in the early 2000's, which similar to the financial crisis of 2008-2009 lead to a sharp decline in trust.

Summarizing the evidence gathered from the above two thesis: Auer (2016) shows that it is still possible for SRI to provide statistically significant abnormal returns under normal circumstances nowadays, while Lins et al. (2017) provide evidence that SRI does outperform during crises periods. Concluding, the author of this thesis deems it warranted to once again reexamine the performance of SRI in the US, by using a new set of ESG data, as well as new methods.

3. DATA

This chapter explains the data source and the data employed in this thesis. Section 3.1 in particular aims at describing the various ESG data providers mentioned in academic literature, and the validity of their respective ESG scores. Furthermore, the chapter will describe the data provider chosen for this thesis, and explain how ESG scores are constructed. Continuing, chapter 3.2 describes and analyzes the data used in this thesis in greater detail, and provides first summary statistics for the ESG score distribution over the whole sample period.

3.1. Data sources and ESG score validity

Closely intertwined with the increase of public interest in issues such as climate change, business ethics, diversity, and human rights, is the increase of investor and company interest in topics such as Corporate Social Responsibility and Social Responsible Investments. Accompanying this heightened interest, the number of rating agencies specialized in analyzing and compounding information, to quantify these values for companies and investors, increased. In practice, rating agencies use company related information such as company fillings and -websites, annual reports, media- and NGO reports, to gather information on, and quantify numerous ESG sub-categories, which are then aggregated into single Environmental-, Social-, Governance-, and combined ESG scores. (Auer 2016; Thomson Reuters 2017a)

When working with ESG data, there are various viable data sources referred to in literature. The most prominent source of ESG data featured in academic literature is “MSCI ESG STATS” (MSCI). MSCI is the successor to “Kinder, Lydenberg, and Domini Research & Analytics” (KLD), another ESG data provider that is frequently quoted as a source in finance related academic literature that analyzes the performance of SRI. Examples for papers that use data from MSCI, or one of its predecessors, are Derwall et al. (2005, 2011), Kempf & Osthoff (2007), and Borgers et al. (2013), among many others. Other but less frequently used sources of ESG data that are mentioned in literature are

"Thomson Reuters ASSET4", called ASSET4 henceforward, and the Europe based data provider "Global Engagement Service" (GES).

A paper by Semenova and Hassel (2015), analyzes the validity of the Environmental ratings provided by the aforementioned three data source providers MSCI, ASSET4, and GES. In order to do so, the authors examine the empirical relationship between- and across the provided environmental strength and weakness scores, to assess the level of similarity. Semenova and Hassel (2015) conclude that based on the convergent validity approach, the environmental metrics provided by the three agencies are highly correlated and converge on each other, which indicates that all three data providers offer similar suitable data for empirical analyses.

Due to accessibility restrictions, and the fact that ASSET4 ESG data is only rarely quoted compared to the predominant MSCI data in academic literature, while offering the same level of suitability, this thesis will make use of Thomson Reuters ASSET4 ESG data, ensuring academic literature is enriched by providing additional insight into the SRI debate by using a different data source.

Thomson Reuters' Datastream is one of the world's largest sources of financial related information. According to Thomson Reuters (2017b), with data from 178 exchanges covering over 90 emerging and developed countries, as well as a minimum of 20 years pricing history for equities in major markets, Datastream offers a suitable breadth and depth of equity data, necessary to conduct a suitable analysis. Furthermore, with ASSET4, Thomson Reuters offers one of the most comprehensive ESG score databases, covering more than 6000 companies and over 400 ESG measures, going as far back as the year 2002 (Thomson Reuters 2017a).

ASSET4 ESG scores are designed to measure a company's relative ESG performance compared to its peers. To do so, Thomson Reuters uses publicly available data such as company disclosures, and media- and NGO reports, to capture over 400 company level ESG metrics to conduct a detailed company assessment. Considering comparability, data availability, and industry relevance, the 178 most relevant data points are then chosen for

the scoring process. Continuing, these 178 data points are further grouped into ten categories, each related to one of the three pillars: “Environmental”, “Social”, or “Governance”. For example, metrics that are grouped in the categories of “Resource Use” and “Emissions”, relate to the Environmental pillar, metrics grouped in the categories of “Product Responsibility” and “Human Rights” relate to the Social pillar, and metrics grouped in the categories of “Management” and “Shareholders” relate to the Governance pillar. The final ESG scores are then calculated by percentile rank scoring, which considers the amount of companies that are worse and equal to the analyzed one, as well as all companies in the sample that have no scoring at all. These, in accordance with the fiscal year annually updated ESG scores, can thus rank from 0 to 100, which are meant to be interpreted as percentile values, reflecting how well (high score), or bad (low score), a company’s ESG performance is relative to its peers. (Thomson Reuters 2017a)

3.2. Data description

The following part will explain the data employed in this thesis in greater detail, as well as provide a first descriptive statistic regarding the ASSET4 ESG score distribution over the whole sample period.

The from Thomson Reuter’s Datastream retrieved data consists of two parts. The first part of the data consists of the monthly, end-of-the-month prices of all stocks that are listed in the S&P 500, each year from January 2003 to January 2017. This results in over 77,000 monthly observations, spanning 168 months over a 14 year period, covering 892 companies that are, or were during this period, part of the S&P 500 investment universe. The second part of the retrieved data consists of the yearly, year-end ESG scores corresponding to the listed companies. The overall sample size of this thesis is limited by ESG scores not being available for the years prior to 2002, as well as past 2016.

The following figure showcases the overall distribution of ESG scores over the whole 14 year sample period. The respective y-axis for each histogram represents the amount of

companies that exhibit a certain score, while the respective x-axis represents the individual score that was achieved, ranking from zero to 100.

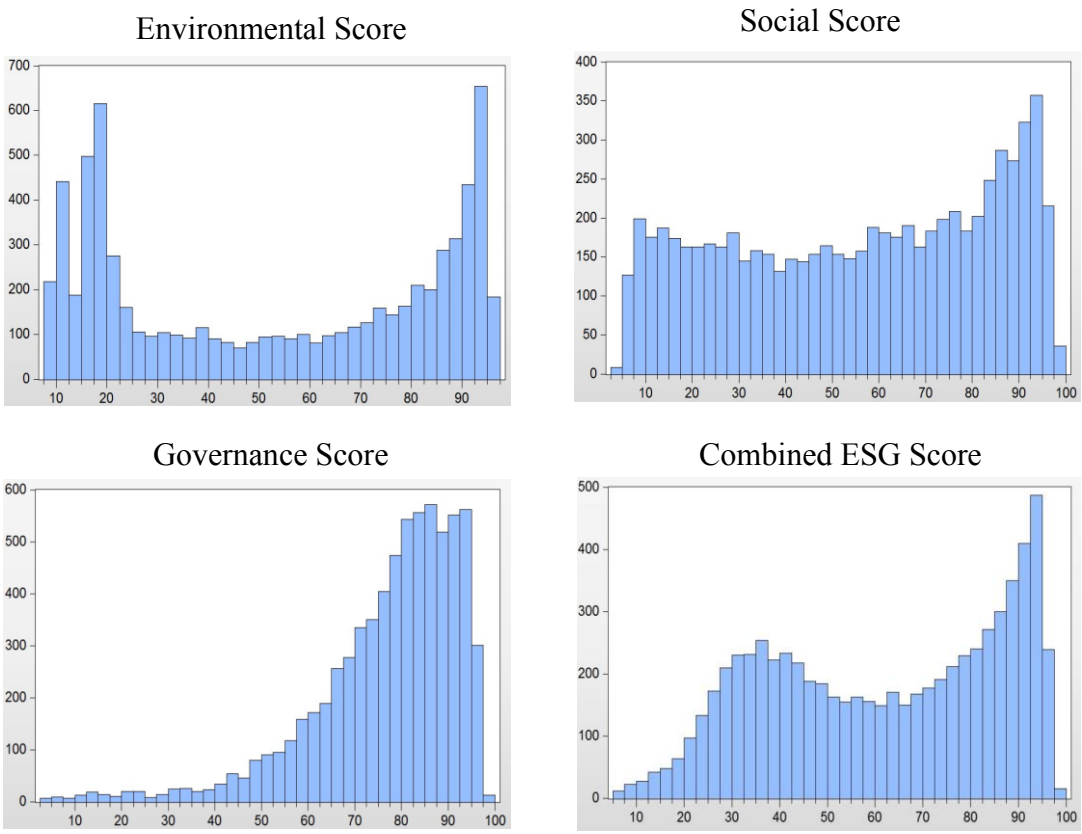

Figure 7. Distribution of ESG scores over the whole sample period.

The histogram for the Environmental score shows that many companies exhibit very high scores, around the 90th percentile, as well as very low scores, around the 10th to 20th percentiles. Meanwhile, only comparable few companies are located between the 30th and 80th percentile. This distribution might indicate that companies either tend to fully commit themselves to the Environmental dimension, and have a fairly high Environmental score, or tend to omit the Environmental dimension, resulting in a fairly low score performance. Additionally, as the sample does not differentiate between industries in the data, another possible explanation for this distribution might stem from the fact that "dirty" industries such as oil, or industrials, tend to have lower scores than "clean" industries such as financials, or information technology. This might indicate that there is a high number of "dirty" and "clean" industries in the S&P 500.

The distribution in the Social dimension shows that scores are fairly even distributed, with a tendency for more companies to have a score around the 90th percentile. Continuing, the Governance score distribution indicates that the major share of all companies commits themselves to uphold good Governance standards, as indicated by the fact that most companies are situated between the 70th and 90th percentile. This however might not be surprising, as good Corporate Governance as a value is older in comparison to the Environmental and Social dimensions. Furthermore, good Corporate Governance is an important value across all industrial sectors. Finally, the combined ESG score represents the equally weighted average across the three individual scores. The ESG histogram indicates that more companies tend to have higher scores over all three categories, than lower scores.

Supporting the above observations is the following table, containing the descriptive statistics of the ESG scores. The table spans the whole sample period, consisting of 6970 year-end firm individual ESG score observations. As can be seen, with a mean score of around 77, the Governance scores of companies tend to be on average 20 points higher than the Environmental, and Social scores. Additionally, as observed in the histogram, companies' Social scores exhibit a tendency to be closer to the higher percentile ranks, which is indicated with a mean score of 56 and a median score of 59. Meanwhile the distribution of Environmental scores tends to be fairly even with a mean score of 53, which is the results of many companies exhibiting either high- or low scores.

Table 1. This table represents the descriptive statistic of the score distribution over the whole sample period from January 2003 to January 2017. The sample consists of 6970 year-end firm individual score ratings per category. "E","S", and "G" represent the Environmental-, Social-, and Governance dimensions respectively. "ESG" represents the equally weighted average over the three individual scores.

	Mean	**Median**	**Max**	**Min**	**Std.Dev.**	**Skewness**	**Kurtosis**
E Scores	52.940	54.365	97.480	8.260	31.898	-0.012	1.338
S Scores	56.062	59.230	98.930	3.530	28.115	-0.211	1.717
G Scores	76.929	80.530	97.910	2.510	15.858	-1.485	5.856
ESG Scores	61.977	64.250	97.990	5.360	24.566	-0.217	1.718

4. METHODOLOGY

The following chapter revolves around the methods employed in this thesis. In particular, the first part of this chapter will explain how the portfolios used in the analysis were created, while the second part will explain the model that was employed in the performance analyzation process. Furthermore, first descriptive statistics of the created portfolios will be examined in tables two and three.

The aim of this thesis's empirical part is to analyze whether incorporating SRI considerations into the portfolio creation process has any measureable impact on returns. In more detail, the goal is to analyze the performance of a selection of portfolios, created by screening the stocks in S&P 500 investment universe for their Environmental-, Social-, and Governance scores. In order to measure this performance, this thesis will employ the five-factor asset pricing model propagated by Fama and French (2015), in four distinct tests.

The first test conducted in this thesis covers a data sample compromised of all stocks in the S&P 500 investment universe, spanning a period of 14 years, lasting from January 2003 to January 2017. This represents a sample of 168 months and over 77,000 monthly return observations. Furthermore, this sample covers 892 companies that are, or were during this period, listed in the S&P 500. Continuing, using the five-factor asset pricing model, this first test will determine if a best-in-class approach consisting of yearly rebalanced portfolios of the 25% highest scored stocks yields any abnormal returns. Additionally, this first test will further analyze whether a long-short approach of buying (selling) the portfolios consisting of the highest (lowest) scored 25% stocks, yields abnormal returns.

The second test conducted in this paper aims at investigating whether portfolios created in the same fashion as during the first test, yield any abnormal return during the financial crisis period in the US. In detail, this second analysis investigates if a set of portfolios consisting of either the 25% best or worst ESG stocks, as well as the difference between

the top and bottom portfolios, resulted in statistically significant abnormal returns during the 20 months period lasting from August 2007 to March 2009.

Furthermore, following Lins et al. (2017) who report that high ESG firms performed significantly better than low ESG firms during the latter part of the financial crisis, a third and fourth test will be conducted using the same methods and portfolio creation processes as before. Based on a subsample of the financial crisis period, the third test covers the time span of 12 months, lasting from the beginning of the financial crisis in August 2007 to July 2008, a period marked by a sharp decline in the availability of credit as described by Lins et al. (2017). The fourth and final test will cover the remaining time span of eight months, lasting from August 2008 to March 2009. This latter period of the financial crisis is described by Lins et al. (2017) as marked by a sharp decline in market wide trust, as the Lehman Brothers bankruptcy occurred in September 2008, while the S&P 500 hit its all-time crisis low in March 2009.

4.1. Portfolio construction & descriptive statistics

The portfolio creation process follows the logic that portfolios are created using either a positive (best-in-class), or a negative (worst-in-class), screening approach at the beginning of the year, to determine the best and worst ESG stocks. In detail, the stocks are sorted at the beginning of each year by their individual E, S, and G-scores, ranging from highest scored, to lowest scored stock. Following, eight portfolios are created. Two portfolios for each of the individual ESG dimensions, consisting of the highest and lowest rated 25% of stocks respectively, as well as two portfolios created in the same fashion on a combined ESG score. These portfolios are constructed with the information available at the beginning of the sample period, and are held until the end of the year, until new ESG information is published and the portfolios are rebalanced accordingly. Measures such as transaction costs and dividends are not considered when constructing the portfolios.

To further clarify the portfolio creation process and provide an example, the following paragraph will describe the portfolio construction for the first test in greater detail. In a first step, using the year-end ESG scores of 2002, all companies compromising the S&P 500 at that point in time were sorted from highest to lowest according to their individual Environmental-, Social-, and Governance scores respectively. In a second step, the 25% of companies exhibiting the highest E, S, and G scores respectively, were sorted into separate portfolios. Likewise, the 25% of companies exhibiting the lowest E, S, and G scores respectively were sorted into separate portfolios. Each of these portfolios were held until the end of the year, until they were rebalanced according to newly published ESG score information. This process was repeated until the end of the data period in 2016, resulting in six distinct portfolios (2E+2S+2G). Additionally, besides checking the impact of each individual dimension, a combined ESG measure was created. This ESG measure consists of the equally weighted average of the three respective individual scores, and similar to above, two portfolios were created consisting of the 25% highest (lowest) scores.

With the completion of this process, eight (2E+2S+2G+2ESG) distinct portfolios were created to be used in the first analysis covering the whole sample period. Henceforward the portfolios containing the 25% best scored stocks of a dimension are called “Top”, e.g.: “E Top” indicates a portfolio compromised of the 25% of stocks with the highest Environmental score rating. Likewise “Bot” indicates the portfolios containing the 25% of stocks with the lowest ESG ratings. E.g.: “E Bot” indicates a portfolio consisting of the 25% of stocks with the lowest Environmental rating.

To analyze the performance of SRI during the financial crisis period, another total of eight portfolios are created for the second analysis. These portfolios were created using the same process as described above, but limiting the data sample to the financial crisis period of 20 months starting in August 2007 and lasting to the end of March 2009. Additionally, another 16 portfolios were created for the two subsamples analyzed in the third and fourth test respectively. This amounts to a total of 32 Portfolios analyzed in this thesis: eight portfolios in the analysis covering the period of 2003 to 2017, eight portfolios covering

the whole financial crisis period from August 2007 to March 2009, as well as eight portfolios for each of the financial crisis subsample periods.

The following Table provides a descriptive statistic of the excess returns of the first eight portfolios. The excess returns were calculated by using the risk-free rate acquired from the database of French (2018). In detail, this summary statistic reports the mean, median, maximum, minimum, standard deviation, skewness, and kurtosis of the excess return time series covering the whole sample period.

Table 2. This table represents the descriptive statistic of the excess returns of the previously constructed portfolios. The period covered consists of 168 monthly return observations lasting from January 2003 to January 2017. "E" indicates the portfolios constructed using Environmental scores as the deciding criteria. "S" and "G" denote portfolios constructed using Social- and Governance scores respectively. "ESG" denotes the portfolios constructed using the combined equally weighted average of the three individual scores "E", "S", and "G". "Top" ("Bottom") indicates that a portfolio was constructed using the 25% of stocks with the highest (lowest) score of a given category.

	Mean	**Median**	**Max**	**Min**	**Std.Dev.**	**Skewness**	**Kurtosis**
E Top	0.768	1.045	17.040	-18.480	4.530	-0.353	5.345
E Bot	0.671	0.735	20.760	-21.590	5.028	-0.393	6.319
S Top	0.671	1.005	16.000	-19.390	4.280	-0.583	6.438
S Bot	0.817	0.850	23.130	-23.490	5.178	-0.290	7.273
G Top	0.755	1.105	16.010	-20.220	4.514	-0.652	6.286
G Bot	0.831	0.915	21.610	-22.520	5.137	-0.343	6.546
ESG Top	0.731	0.905	16.350	-19.360	4.393	-0.536	6.160
ESG Bot	0.773	0.790	21.830	-22.530	5.083	-0.350	6.769

Table 2 reports mixed results when investigated under the hypothesis that SRI still outperforms. While the mean excess returns for all portfolios are very similar to each other at first glance, ranging from 0.67% to 0.83%, it is possible to see that the portfolio consisting of the top 25% Environmental scored stocks outperforms its bottom counterpart

by almost 0.1%. However, except for the Environmental dimension, the mean excess returns of the bottom portfolios of the S, G, and ESG dimensions are above their top counterparts. These mixed observations might be a first indication that the hypothesis that SRI over-performs, does not hold. This claim is furthermore supported by similar mixed observations of the minimum and maximum values. The minimum values for the bottom portfolios are as expected lower compared to their top counterparts, ranging from -21.6% (E Bot) to -23.5% (S Bot), it is unexpected however to see that the bottom portfolios also have maximum values above those of their top counterparts, showing a difference in respective maximum values of 3.8% (E Bot – E Top) to 7.1% (S Bot – S Top). Overall, Table 2 provides mixed results, which can indicate support for the rejection of the hypothesis that SRI still over-performs.

Continuing the portfolio analysis, the next table, Table 3, will present a first summary statistic for the portfolios created with the data of the financial crisis sample, as well as its subsamples. Panel A describes the summary statistics for the eight portfolios covering the whole time period. Panel B provides the descriptive statistics for the shock to credit supply subsample representing the first 12 months of the financial crisis, while Panel C provides the summary statistics for decline in trust subsample representing the last eight months of the financial crisis. Overall, the descriptive statistic will provide observations for the excess return mean, median, maximum, minimum, standard deviation, skewness, and kurtosis values.

Table 3. Descriptive statistic for the financial crisis monthly excess return series. "E", "S", "G" denote portfolios constructed using Environmental-, Social-, and Governance scores respectively. "Top" and "Bot" signify that the respective portfolio was constructed using the 25% of stocks with the highest (Top) or lowest (Bot) scores of a dimension. Panel A represents the excess return series, covering the 20 month financial crisis period in the US from August 2007 until, and including, March 2009. Panel B is a subsample that represents the shock to the credit supply that occurred in the early stages of the financial crisis. This subsample consists of twelve monthly excess return observations, covering the period from August 2007 to July 2008. Panel C is a subsample of the financial crisis period that represents the unexpected decline in trust that occurred in the latter period of the financial crisis. This subsample consists of eight monthly excess return observations, lasting from August 2008 to March 2009.

Panel A: Whole Financial Crisis Period Sample

	Mean	Median	Max	Min	Std.Dev.	Skewness	Kurtosis
E Top	-2.692	-1.245	11.23	-18.48	6.909	-0.324	2.931
E Bot	-3.744	-2.905	10.44	-21.63	7.693	-0.375	2.859
S Top	-2.966	-2.095	9.73	-19.39	6.826	-0.5	3.045
S Bot	-3.493	-1.74	9.38	-23.49	7.809	-0.69	3.316
G Top	-3.137	-1.135	9.72	-20.22	7.218	-0.585	2.917
G Bot	-3.770	-2.845	9.34	-22.52	7.684	-0.539	3.00
ESG Top	-1.592	-0.205	7.25	-11.85	4.561	-0.411	2.841
ESG Bot	-3.67	-2.465	9.72	-22.55	7.688	-0.539	3.071

Panel B: Shock to Credit Supply Subsample

	Mean	Median	Max	Min	Std.Dev.	Skewness	Kurtosis
E Top	-1.105	-0.185	4.750	-10.360	4.146	-0.722	3.164
E Bot	-2.406	-2.300	4.210	-12.490	4.511	-0.778	3.330
S Top	-1.138	-0.585	4.950	-9.410	4.034	-0.478	2.593
S Bot	-1.647	-1.525	5.810	-10.570	4.345	-0.408	3.050
G Top	-1.282	-0.390	4.190	-9.480	4.019	-0.624	2.552
G Bot	-2.072	-2.050	5.680	-12.510	4.518	-0.595	3.848
ESG Top	-0.361	0.275	3.160	-5.900	2.743	-0.725	2.608
ESG Bot	-2.042	-2.040	5.230	-11.860	4.387	-0.596	3.500

Panel C: Shock to Trust Subsample							
	Mean	**Median**	**Max**	**Min**	**Std.Dev.**	**Skewness**	**Kurtosis**
E Top	-5.074	-8.505	11.230	-18.480	9.578	0.402	2.163
E Bot	-5.790	-10.075	10.660	-21.590	11.061	0.239	1.811
S Top	-5.707	-8.230	9.730	-19.390	9.305	0.280	2.167
S Bot	-6.262	-9.680	9.380	-23.490	11.011	1.923	0.388
G Top	-5.920	-8.400	9.720	-20.220	10.063	0.206	1.870
G Bot	-6.317	-10.855	9.340	-22.520	10.762	0.144	1.858
ESG Top	-5.566	-8.500	10.230	-19.360	9.628	0.298	2.064
ESG Bot	-6.122	-10.270	9.800	-22.530	10.922	0.143	1.864

Panel A describes the excess portfolio returns over the whole financial crisis sample period. As can be observed, the overall sample shows a negative mean excess return for all portfolios. However, the mean is less negative for portfolios sorted on the highest ESG scores. The difference ranges from 0.53% points between the portfolios sorted on the Social score dimension, up to a 2.08% difference between the combined ESG portfolios. This observation can be regarded as a support of the hypothesis that SRI over-performs during crises periods. Furthermore supporting this claim are the median values, which tend to be less negative for the top portfolios, indicating higher positive values. These observation are especially true for the ESG portfolio built using the combined top scores. Interestingly however, the median excess return value of the S Top portfolio shows that the portfolio contains more negative values than its bottom counterpart. Regarding the maximum and minimum values, it can be seen that the bottom portfolios exhibit larger negative values, ranging from -21.6% to -23.5%, while the top portfolios exhibit higher maximum values, ranging from 7.25% to 11.23%. Overall, Panel A supports the hypothesis that SRI over-performs during crises periods.

Panel B describes the excess returns of the first financial crisis subsample, covering the first 12 months, and representing a period marked by a sudden decline in credit supply. It can be observed that all means are negative, with the Top portfolios being less negative

than their respective bottom counterparts. Continuing with the analysis, the smallest difference in mean excess returns can be found between the portfolios built on the Social score, while the largest difference can be found between the combined ESG portfolios. The exact numbers are 0.5% and 1.68% respectively. When observing the median values, it becomes evident that the portfolios sorted on the highest scored stocks exhibit values that are far less negative than those of their counterparts. The exact difference in median values between the respective portfolio pairs ranges from 0.94% to 2.31%. The median value of the ESG Top portfolio even exhibits a positive median value, indicating higher positive excess return values, compared to negative ones. When observing the maximum and minimum values one can see that, as expected, the bottom portfolios exhibit lower minimum values. Surprisingly though, except for the Environmental portfolio pair, all bottom portfolios show higher maximum values, showing differences from 0.86% to 2.07%. Overall, regarding the mean and median excess return values, Panel B continues to support the hypothesis that SRI over-performs during crises, and more specifically the hypothesis that SRI over-performs during credit supply crises.

Continuing the descriptive statistics analysis, Panel C showcases the summary statistics for the second subsample period of the financial crisis. More specifically, Panel C shows the excess return mean, median, minimum, maximum, standard deviation, skewness, and kurtosis values for the latter eight months of the financial crisis, a period marked by a sharp decline in market trust, as described by Lins et al. (2017) and evident via the Edelman (2009) Trust Barometer analysis. Similar to the previously analyzed panels A and B, the mean and median values of the top portfolios are less negative than their bottom counterparts. In detail, the mean and median values of the bottom portfolios range from -5.7% to -6.3% and -9.7% to -10.3%, respectively. Meanwhile the mean and median values of the top portfolios rank from -5.1% to –5.9% and -8.2% to -8.5% respectively. Also similar to previous observations, the bottom portfolios show lower minimum values, while the top portfolios show higher maximum values. Overall, Panel C also indicates support for the hypothesis that SRI over-performs during crises, and more specifically during crises of trust.

Comparing the descriptive statistics of the credit supply shock subsample with the trust decline subsample, recorded in Panel B and Panel C respectively, it is possible to gather some interesting insights. The overall excess return means and medians are far lower during the trust decline period, indicating a trust decline had a stronger impact on company returns, than a credit supply decline. In detail, the mean excess return differences between the portfolios of Panel B and Panel C range from 3.38% to 5.12%.

Overall, concluding the analysis of the descriptive statistics depicted in Table 2 and Table 3, it is possible to claim the following two things. First, over the whole sample period, there is little difference between portfolios sorted on the highest- and lowest scored stocks. This observation is in support of refuting the hypothesis that SRI still over-performs. Second, during the financial crisis period, as well as its subsamples, portfolios sorted on the highest scored stocks provided less negative results than portfolios sorted on the lowest scored stocks, indicating support for the hypothesis that SRI still over-performs, albeit only during crises periods.

4.2. Performance measurement

The following subchapter revolves around explaining the model used in the empirical OLS regression analysis, as well as explaining how it differs from other frequently used models in academic literature that analyze SRI performance. In detail, this part describes the new five-factor asset pricing model introduced by Fama & French (2015), and how it differs compared to the three-factor model introduced in 1993 by the same authors, as well as the enhanced four-factor model introduced by Carhart (1997).

Commonly used asset-pricing models in SRI performance related academic literature are the well-known three-factor asset pricing model introduced by Fama & French (1993), and the enhanced four-factor model introduced by Carhart (1997). Examples of renowned papers that make use of at least one of these models to determine SRI performance are among others: Renneboog et al. (2008a), Hong & Kacperczyk (2009), Derwall et al. (2011), Bebchuk et al. (2013), Borgers et al. (2013), and Brzeszczyński & McIntosh

(2014). While both of the previously mentioned asset pricing models are prevailing in literature, this thesis will make use of the recently introduced five-factor asset pricing model. By using the five-factor asset pricing model, this thesis is to the author's knowledge the first and only SRI performance analysis that makes use of this new model. Furthermore, besides enriching existing academic literature by using a new model to reexamine the relationship between SRI and portfolio returns, the five factor model is also shown to be more accurate than its predecessors, the three-, and four factor model, thus providing the possibility of further validating previously documented results. More specifically, the five-factor model should be able to explain up to 94% of the cross-section variance of the expected portfolio returns (Fama & French 2015).

In the following paragraph, the three-factor model will be explained in detail, before proceeding to explain the four-, and five-factor models respectively. This way it is ensured that a reader can comprehend the regression results, as well as understand the possible differences between this and other analyses.

The Fama and French (1993) three-factor model is designed to complement the CAPM, specified by Sharpe (1964) and Lintner (1965). Specifically, the three factor-model was created to capture factors left unexplained by the CAPM: the relationship between average return and market capitalization, and the relationship between average return and price ratios such as the Book-to-Market ratio. (Fama & French 2015)

$$R_{it} - R_{Ft} = \alpha_i + \beta_{1,i}(R_{Mt} - R_{Ft}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + e_{it}. \quad (1)$$

The above model represents the three-factor model, as specified by Fama & French (1993). In this equation, R_{it} represents the return on a security or portfolio *i* for the period *t*, while R_{Ft} represents the risk-free return. α_i represents the unexplainable portion of the return, also called abnormal return. R_{Mt} is the return on a value-weighted market portfolio. In detail, $R_{Mt} - R_{Ft}$ is the excess return on a market portfolio consisting of all firms in the NYSE, AMEX, and NASDAQ universe, minus the one-month Treasury bill

rate. SMB_t, "Small Minus Big", also called the size factor, represents the return on a diversified portfolio made up of small stocks minus the return on a diversified portfolio made up of big stocks. HML_t, the abbreviation of "High Minus Low", represents the value factor and measures the difference between portfolios made up of high- and low book-to-market stocks. Finally, e_{it} represents a zero-mean residual, and is known as the error term.

While the Fama and French (1993) three-factor model managed to improve on the pricing errors of the CAPM, the model is nevertheless unable to fully describe the cross-sectional variations in portfolio returns. In particular, the three-factor model is unable to capture the momentum anomaly, as described by Jegadeesh and Titman (1993). This is evident in the results reported by Carhart (1997), who shows strong negative loadings on last year's loser stock portfolios and strong positive loadings on last year's winner portfolios. To improve on the average pricing errors of the three-factor model, Carhart (1997) constructs his four-factor model by combining the Fama and French (1993) three-factor model with Jegadeesh and Titman's (1993) momentum factor, eliminating a great portion of still existing pricing errors.

$$(2) \qquad R_{it} - R_{Ft} = \alpha_i + \beta_{1,i}(R_{Mt} - R_{Ft}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \beta_{4,i}UMD_t + e_{it}.$$

The above equation represents the four-factor model as specified by Carhart (1997). As described, Carhart (1997) created his model by combining the three-factor model of Fama and French (1993), with the momentum factor of Jegadeesh and Titman's (1993). The momentum factor UMD_t , "Up Minus Down", represents the return difference between a portfolio compromised of the past 12-month winner stocks, and a portfolio compromised of the past 12-month loser stocks. The rest of the equation remains unchanged compared to (1).

Continuing in this line of asset pricing model improvements is the recent paper by Fama and French (2015). Following evidence pointing out further incompleteness of the three-

factor model, as shown for example by Titman, Wei, and Xie (2004), and Novy-Marx (2013) among others, Fama and French (2015) introduced the five-factor model in response. The goal of the additions to the three-factor model are in particular to capture the factors of "profitability" and "investment". Novy-Marx (2013) finds in his paper that profitability, as measured by gross profits-to-assets, has the same predictive power of the cross-section of average returns as the book-to-market value. Furthermore, as shown in his paper, including the profitability factor into the three-, or four-factor model, significantly decreases the pricing errors. Similarly, Titman et al. (2004) find in their paper that an abnormal level of capital investment is negatively related to future stock return, and both the Fama and French (1993) three-factor model, and the Carhart (1997) four-factor model fail to fully reflect this.

(3) $$R_{it} - R_{Ft} = \alpha_i + \beta_{1,i}(R_{Mt} - R_{Ft}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \beta_{4,i}RMW_t + \beta_{5,i}CMA_t + e_{it}.$$

The above equation shows the Fama and French (2015) five-factor model. The five-factor model enhances the three-factor model (1) by adding two new factors. The RMW_t, "Robust Minus Weak" factor is the difference between the returns of a diversified portfolio consisting of stocks with high profitability, and the returns of a diversified portfolio consisting of stocks with low profitability. CMA_t, or "Conservative Minus Aggressive", is the difference between the returns of diversified portfolio consisting of low investment firms, minus the returns of a diversified portfolio consisting of high investment firms. In their paper, Fama and French (2015) show that by including these two new factors, and despite not including the momentum factor employed in the four-factor model, the five-factor model is able to explain up to 94% of the cross-section variance in returns of the examined portfolios.

In this thesis, $R_{it} - R_{Ft}$ represents the excess returns of the various ESG portfolios previously created. It was calculated by using the risk-free rate gathered from Kenneth R, French's (2018) homepage, which also served as source for the data on the SMB_t, HML_t,

RMW_t, and CMA_t factors. The model (3) presented above will be used in the OLS regression analysis, to determine if portfolios sorted on ESG factors provide any statistical significant returns (α_i) that cannot be explained by the five factors. If the results indicate that ESG factors can be used to achieve statistical significant abnormal returns, this would stand in support of the hypothesis that SRI over-performs.

5. RESULTS

The following chapter describes the results of the regression analyses. Chapter 5.1 showcases and describes the results for the analysis covering the whole sample period of 14 years, chapter 5.2 describes the results for the whole financial crisis period of 20 months, and chapter 5.3 showcases and describe the results for the financial crisis subs-samples: the credit supply decline, and the trust decline periods respectively. The results were generated by conducting OLS regression analyses utilizing the new Fama & French (2015) five factor model, and the portfolios constructed earlier. Alpha, describes the part of the returns that is left unexplained by the other five factors, and represents possible information contained in ESG scores. Rm-Rf, SMB, HML, RMW, and CMA represent the five-factors respectively, as described in chapter 4.2 in detail. R2 is the ratio of the explained variation to the total variation, and indicates how well the model explains the results. A higher R2 represents a better model.

5.1. Whole sample period

Table 4. This table reports the OLS regression results for the whole sample period, using the five-factor model as specified by Fama & French (2015). The period consists of 168 monthly return observations lasting from January 2003 to January 2017. "E", "S", "G" denote portfolios constructed using Environmental-, Social-, and Governance scores respectively. "Top" and "Bot" signify that the respective portfolio was constructed using the 25% of stocks with the highest (Top) or lowest (Bot) scores. "Top-Bot" showcases the results of the difference between the top and the bottom portfolio. Alpha indicates the estimated coefficient. The results for Rm-Rf, SMB, HML, RMW, and CMA indicate the factor loadings. R2 represents the goodness-of-fit. The p-values can be found in parentheses below the results. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level respectively.

	Alpha	**Rm-Rf**	**SMB**	**HML**	**RMW**	**CMA**	**R2**
E Top	-0.038	1.061***	-0.086*	0.127**	0.020	0.046	0.91
	(0.73)	(0.00)	(0.09)	(0.01)	(0.78)	(0.60)	
E Bot	-0.188*	1.086***	0.158***	0.209***	-0.088	-0.157*	0.93
	(0.09)	(0.00)	(0.00)	(0.00)	(0.22)	(0.07)	
E Top-Bot	0.150	-0.025	-0.246***	-0.081	0.108	0.203*	0.18
	(0.28)	(0.53)	(0.00)	(0.20)	(0.23)	(0.07)	
S Top	-0.128*	1.038***	-0.036	0.064*	0.067	0.019	0.96
	(0.08)	(0.00)	(0.30)	(0.06)	(0.16)	(0.74)	
S Bot	-0.067	1.121***	0.198***	0.052	-0.140*	-0.010	0.92
	(0.58)	(0.00)	(0.00)	(0.35)	(0.07)	(0.92)	
S Top-Bot	-0.061	-0.083***	-0.234***	0.012	0.207***	0.028	0.39
	(0.55)	(0.00)	(0.00)	(0.80)	(0.00)	(0.73)	
G Top	-0.073	1.053***	0.073**	0.055	-0.001	0.025	0.96
	(0.35)	(0.00)	(0.046)	(0.11)	(0.98)	(0.68)	
G Bot	-0.053	1.128***	0.138***	0.154***	-0.127*	-0.056	0.94
	(0.60)	(0.00)	(0.00)	(0.00)	(0.05)	(0.48)	
G Top-Bot	-0.020	-0.075***	-0.065	-0.099**	0.126**	0.081	0.24
	(0.83)	(0.00)	(0.14)	(0.02)	(0.04)	(0.27)	
ESG Top	-0.079	1.05***	-0.017	0.082**	0.028	0.030	0.96
	(0.27)	(0.00)	(0.62)	(0.013)	(0.54)	(0.60)	
ESG Bot	-0.103	1.112***	0.165***	0.138***	-0.119*	-0.074	0.94
	(0.31)	(0.00)	(0.00)	(0.00)	(0.07)	(0.35)	
ESG Top-Bot	0.024	-0.061**	-0.182***	-0.056	0.147**	0.104	0.35
	(0.79)	(0.02)	(0.00)	(0.17)	(0.01)	(0.14)	

Investigating the results of the regression in regards to the hypothesis H_1: "High ESG scores are positively related to stock performance at all times", there are several observations that seem to refute this hypothesis. First, all portfolios sorted on the highest scored stocks indicate that the respective dimension is negatively related to performance, which in case of the Social dimension is even statistically significant at the 10% level. This is surprising, as it indicates that high Social scores are actually negatively related to stock performance. Second, while the bottom scored portfolios are as expected negatively related to performance, with the results of the Environmental dimension even indicating that low E scores are negatively related to performance statistically significant at the 10% level, the difference between the top and bottom portfolios does not exhibit any statistical significance. Summarizing, these findings reject the first hypothesis, as neither a best-in-class approach, nor a long-short strategy, seems to be related to positive abnormal returns. Rather, most of these findings support the prevailing theory in academic literature that SRI neither over-, nor underperforms.

Continuing, analyzing the five-factors it is possible to see that over the whole sample period, the market factor Rm-Rf is mostly positively related to stock returns, as well as highly significant. This indicates that the expected returns are mostly driven by the market. Additionally, the SMB factor tends to be highly significant and positively related to the bottom portfolios, while being negatively related and less significant for the top portfolios, and strongly negative and significant for the Top – Bot portfolios. This result indicates that small companies tend to outperform big companies, while additionally having lower ESG scores compared to big companies. The HML factor is slightly positive and highly statistical significant in most cases, expect for the S Bot and G Top portfolios. This results indicates that returns are furthermore partly driven by the "High Minus Low" factor, indicating that value stocks tend to outperform growth stocks. The RMW factor exhibits mostly weak statistical significance, with mixed results, and the CMA factor only exhibits weak statistical significance in two cases.

Concluding the analysis, the Hypothesis: "H_1: High ESG scores are positively related to stock performance at all times", has to be rejected. The results indicate that ESG scores

are not positively related to stock returns. In fact, using a cut-off rate of 75%, the portfolios indicate that ESG scores are slightly negative related with stock returns. However the results are statistically not significant. Furthermore, regarding the research question: "Is it still possible to achieve superior returns with a SRI investment strategy in the US?", the answer is no. Neither does a best-in-class portfolio consisting of the top rated 25% ESG stocks generate any abnormal returns, nor does a long-short investment strategy of buying (selling) the top (bottom) portfolios. Concluding this first analysis, it is impossible to generate abnormal returns with SRI in the US.

However, while these results fail to give any new insight, they provide support for the learning effect reported by Borgers et al. (2013) and Bebchuk et al. (2013). Since the findings reported in this thesis indicate that returns are mostly driven by the market factor, it is possible to conclude that whatever information ESG score might have held in the past, the market since learned to incorporate it into their return expectations, further indicating that it is impossible for SRI to generate abnormal returns in the US.

5.2. Financial crisis period

The results of chapter 5.1 indicate it is impossible to achieve superior returns with SRI in the US under normal circumstances. However, Lins et al. (2017) report that it still possible, albeit during crises periods, and more specifically during low trust (crisis) periods. The following table report the results of the OLS regression for the whole financial crisis periods, lasting 20 months from August 2007, to March 2009.

Table 5. This table reports the OLS regression results for the whole financial crisis sample period in the US, using the five-factor model as specified by Fama & French (2015). The period consists of 20 monthly return observations lasting from August 2007 to March 2009. "E", "S", "G" denote portfolios constructed using Environmental-, Social-, and Governance scores respectively. "Top" and "Bot" signify that the respective portfolio was constructed using the 25% of stocks with the highest (Top) or lowest (Bot) scores. "Top-Bot" showcases the results of the difference between the top and the bottom portfolio. Alpha indicates the estimated coefficient. The results for Rm-Rf, SMB, HML, RMW, and CMA indicate the factor loadings. The p-values can be found in parentheses below the results. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level respectively.

	Alpha	**Rm-Rf**	**SMB**	**HML**	**RMW**	**CMA**	**R2**
E Top	0.580**	1.00***	-0.08	0.100	-0.429**	0.052	0.99
	(0.04)	(0.00)	(0.47)	(0.12)	(0.02)	(0.77)	
E Bot	-0.632	0.982***	0.475	0.144	-0.301	-0.116	0.93
	(0.40)	(0.00)	(0.13)	(0.41)	(0.51)	(0.82)	
E Top-Bot	1.212*	0.022	-0.555**	-0.044	-0.128	0.168	0.38
	(0.05)	(0.86)	(0.03)	(0.75)	(0.72)	(0.68)	
S Top	0.147	1.049***	-0.007	0.019	-0.239	0.126	0.99
	(0.61)	(0.00)	(0.95)	(0.77)	(0.19)	(0.53)	
S Bot	-0.666	1.144***	0.479*	-0.032	0.147	-0.204	0.96
	(0.28)	(0.00)	(0.07)	(0.82)	(0.69)	(0.63)	
S Top-Bot	0.813	-0.094	-0.486**	0.051	-0.386	0.329	0.43
	(0.15)	(0.40)	(0.04)	(0.69)	(0.25)	(0.38)	
G Top	-0.043	1.026***	0.252	-0.034	-0.340	-0.035	0.98
	(0.92)	(0.00)	(0.15)	(0.72)	(0.18)	(0.90)	
G Bot	-0.779	1.144***	0.196	0.122	0.134	-0.181	0.96
	(0.18)	(0.00)	(0.40)	(0.36)	(0.69)	(0.64)	
G Top-Bot	0.736	-0.118	0.056	-0.157	-0.474	0.147	0.25
	(0.20)	(0.31)	(0.81)	(0.24)	(0.18)	(0.70)	
ESG Top	0.585**	0.684***	-0.128	0.007*	-0.300	0.062	0.98
	(0.04)	(0.00)	(0.24)	(0.90)	(0.07)	(0.72)	
ESG Bot	-0.962	1.090***	0.383	0.078	-0.007	-0.166	0.96
	(0.26)	(0.00)	(0.13)	(0.57)	(0.98)	(0.68)	
ESG Top-Bot	1.276*	-0.406**	-0.510*	-0.071	-0.293	0.228	0.75
	(0.08)	(0.012)	(0.09)	(0.66)	(0.49)	(0.63)	

As the results indicate, a portfolio sorted on the 25% highest Environmental scores was able to achieve an abnormal return of 0.58% per month, statistically significant at the 5% level. Furthermore, comparing the results of the E Top and -Bottom portfolios, it is possible to generate an abnormal return of 1.21% per month, statistically significant at the 10% level. Continuing, while portfolios sorted on Social and Governance scores are not statistically significant, portfolios sorted on the combined ESG score are. A portfolio consisting of the top ESG stocks was able to generate an abnormal return of around 0.59% per month, statistically significant at the 5% level. Moreover, applying a long-short approach over the ESG portfolios, it was possible to generate around 1.3% of abnormal return per month during the financial crisis. While the market factor is highly significant is most cases, the model was overall unable to price the information contained in ESG scores correctly.

The results indicate that the hypothesis: "H_2: High ESG scores are positively related to stock performance during financial crisis periods", does not get rejected. In regards to the research question: "Is it still possible to achieve superior returns with a SRI investment strategy in the US?", the answer is yes. It is indeed possible to generate abnormal returns with SRI in the US, albeit only during financial crisis periods, and more specifically, by using a best-in-class, or long-short approach based on Environmental scores or a combined ESG score.

5.3. Financial crisis sub-periods

Taking inspiration from Lins et al. (2017) the following two tests are aimed at differentiating the previously achieved results, which indicate that it is possible to generate abnormal returns with SRI during financial crises periods. Lins at al. (2017) reports that SRI, with high ESG scores as a proxy for trust, specifically over-performs during low trust periods. Hence this thesis will follow Lins et al. (2017) and conduct tests for the mentioned subsamples of the financial crisis period, to possibly give more precise insight to the results reported in Table 5, as well as to apprise Lins et al.'s (2017) results with a different set of data and methods.

Table 6 and 7 will investigate the performance of SRI during two financial crisis period subsamples. Table 6 in detail will investigate the 12-month period from August 2007 to July 2008. This subsample reflects a decline in credit supply, as the increasing LIBOR had a negative impact on the solvency of the market participants (Lins et al. 2017). The second subsample period covers the next 8-month period, from August 2008 to March 2009. This second subsample reflects the sudden decline in market wide trust, caused due to the bankruptcy of Lehman Brothers (Lins et al. 2017). It is important to note that while credit supply limitations were also present in the later period of the financial crisis, the trust decline had not yet occurred during the first subsample. This way, this thesis aims at isolating the performance of high trust stocks, proxied by high ESG scores, during a low trust period, to determine the performance of SRI.

Table 6. This table reports the OLS regression results for the "credit supply decline" financial crisis subsample period, using the five-factor model as specified by Fama & French (2015). The period consists of 12 monthly return observations lasting from August 2007 to July 2008. "E", "S", "G" denote portfolios constructed using Environmental-, Social-, and Governance scores respectively. "Top" and "Bot" signify that the respective portfolio was constructed using the 25% of stocks with the highest (Top) or lowest (Bot) scores. "Top-Bot" showcases the results of the difference between the top and the bottom portfolio. Alpha indicates the estimated coefficient. The results for Rm-Rf, SMB, HML, RMW, and CMA indicate the factor loadings. The p-values can be found in parentheses below the results. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level respectively.

	Alpha	**Rm-Rf**	**SMB**	**HML**	**RMW**	**CMA**	**R2**
E Top	0.388**	1.082***	-0.346***	0.372***	-0.075	0.117	0.99
	(0.01)	(0.00)	(0.00)	(0.00)	(0.48)	(0.17)	
E Bot	-0.909	1.291***	-0.295	0.759**	0.459	0.357	0.93
	(0.18)	(0.00)	(0.38)	(0.02)	(0.39)	(0.56)	
E Top-Bot	1.297*	-0.209	-0.051	-0.387	-0.534	-0.176	0.42
	(0.08)	(0.42)	(0.88)	(0.19)	(0.35)	(0.78)	
S Top	0.132	1.038***	-0.096	0.284*	-0.006	0.034	0.98
	(0.68)	(0.00)	(0.54)	(0.05)	(0.98)	(0.90)	
S Bot	-0.545	1.399***	-0.199	0.350	0.924	0.482	0.93
	(0.38)	(0.00)	(0.54)	(0.20)	(0.11)	(0.43)	
S Top-Bot	0.667	-0.360	0.103	-0.066	-0.930	-0.450	0.35
	(0.33)	(0.19)	(0.77)	(0.81)	(0.13)	(0.50)	
G Top	-0.044	1.067***	-0.011	0.076	0.040	0.204	0.99
	(0.85)	(0.00)	(0.93)	(0.44)	(0.84)	(0.39)	
G Bot	-0.732	1.344***	-0.496	0.552**	0.594	0.279	0.95
	(0.20)	(0.00)	(0.11)	(0.04)	(0.22)	(0.60)	
G Top-Bot	0.688	-0.277	0.485*	-0.476**	-0.554	-0.075	0.64
	(0.16)	(0.15)	(0.08)	(0.04)	(0.18)	(0.87)	
ESG Top	0.549*	0.646***	-0.136	0.020	-0.190	0.070	0.97
	(0.07)	(0.00)	(0.34)	(0.85)	(0.40)	(0.78)	
ESG Bot	-0.728	1.344***	-0.330	0.554**	0.657	0.373	0.95
	(0.19)	(0.00)	(0.24)	(0.03)	(0.16)	(0.46)	
ESG Top-Bot	1.277	-0.698**	0.194	-0.534	-0.847	-0.303	0.67
	(0.11)	(0.04)	(0.61)	(0.11)	(0.19)	(0.67)	

Table 6 reports results similar to Table 5. During the credit supply decline period, it was possible to achieve abnormal returns by applying SRI strategies. In detail, using a best-in-class approach and cut-off rates of 75%, a portfolio sorted on the highest Environmental score yielded statistically significant monthly returns of around 0.4%, while a portfolio sorted on the combined ESG score yielded statistically significant abnormal returns of 0.55% per month. Additionally, applying a long-short strategy in combination with portfolios consisting of the highest (lowest) 25% E scores, it was possible to generate abnormal returns of 1.3% per month, statistically significant at the 10% level. Similar to the results of the whole financial crisis sample reported in Table 5, portfolios sorted on Social and Governance score do not yield any statistical significant return, although the results indicate that the respective top portfolios are positively (less negatively) related to stock returns, while the bottom portfolios are more strongly negative related with stock returns. Analyzing these results under the premise of the hypothesis H_3: "High ESG scores are positively related to stock performance during credit supply shock crisis periods", the hypothesis holds and does not get rejected. It was possible to achieve superior returns with SRI during the credit decline period of the financial crisis. Interestingly, these results are opposed by Lins et al. (2017) who report no such findings. On the contrary, the authors report that SRI does neither over- nor underperform during the credit supply shock subsample.

Table 7. This table reports the OLS regression results for the "decline in trust" financial crisis subsample period, using the five-factor model as specified by Fama & French (2015). The period consists of 8 monthly return observations lasting from August 2008 to March 2009. "E", "S", "G" denote portfolios constructed using Environmental-, Social-, and Governance scores respectively. "Top" and "Bot" signify that the respective portfolio was constructed using the 25% of stocks with the highest (Top) or lowest (Bot) scores. "Top-Bot" showcases the results of the difference between the top and the bottom portfolio. Alpha indicates the estimated coefficient. The results for Rm-Rf, SMB, HML, RMW, and CMA indicate the factor loadings. The p-values can be found in parentheses below the results. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level respectively.

	Alpha	**Rm-Rf**	**SMB**	**HML**	**RMW**	**CMA**	**R2**
E Top	1.372**	1.023***	0.109	-0.058	-0.915**	0.599*	0.99
	(0.01)	(0.00)	(0.14)	(0.13)	(0.02)	(0.06)	
E Bot	0.089	1.024**	1.008	-0.091	-0.382	0.134	0.98
	(0.97)	(0.04)	(0.22)	(0.79)	(0.84)	(0.95)	
E Top-Bot	1.275	-0.000	-0.900	0.034	-0.527	0.462	0.72
	(0.60)	(0.99)	(0.29)	(0.92)	(0.80)	(0.84)	
S Top	0.528	1.075***	0.076	-0.142	-0.742	0.718	0.99
	(0.41)	(0.00)	(0.68)	(0.22)	(0.24)	(0.30)	
S Bot	0.197	1.081**	1.097	-0.360	-0.966	1.004	0.99
	(0.90)	(0.01)	(0.11)	(0.22)	(0.50)	(0.53)	
S Top-Bot	0.332	-0.006	-1.023	0.218	0.222	-0.285	0.87
	(0.83)	(0.97)	(0.13)	(0.41)	(0.87)	(0.85)	
G Top	1.973	0.912**	0.783	-0.398	-2.646*	2.509	0.99
	(0.19)	(0.01)	(0.12)	(0.12)	(0.09)	(0.13)	
G Bot	-0.938	1.155***	0.779**	-0.086	0.340	-0.221	0.99
	(0.21)	(0.00)	(0.03)	(0.39)	(0.53)	(0.71)	
G Top-Bot	2.915	-0.243	0.005	-0.312	-2.986	2.733	0.84
	(0.16)	(0.23)	(0.99)	(0.27)	(0.13)	(0.18)	
ESG Top	1.290	1.003***	0.321	-0.199	-1.430*	1.271	0.99
	(0.14	(0.00)	(0.20)	(0.14)	(0.09)	(0.15)	
ESG Bot	-0.215	1.086**	0.961	-0.179	-0.337	0.304	0.99
	(0.867)	(0.013)	(0.108)	(0.414)	(0.768)	(0.813)	
ESG Top-Bot	1.513	-0.084	-0.638	-0.021	-1.104	0.977	0.80
	(0.416)	(0.655)	(0.292)	(0.935)	(0.488)	(0.577)	

Table 7 reports statistically significant alphas only for the E Top portfolio. More specifically, the result shows that during the low trust period of the financial crisis, it was possible to generate abnormal returns of almost 1.4% a month, by investing in a portfolio consisting of the 25% of stocks with the highest Environmental score in the S&P 500 universe. While the top portfolios sorted on the other scores are highly positive related to stock performance, the results are not statistically significant. Additionally, despite being positively related to stock performance, none of the long-short portfolios indicate any statistical significance. Analyzing these results in regard to the hypothesis, H_4: "High ESG scores are positively related to stock performance during low trust crisis periods", the hypothesis holds true and does not get rejected, indicating it is possible for SRI to over-perform during trust crises. Surprisingly however, the results differ compared to the ones reported by Lins et al. (2017). Lins et al. (2017) report that a combined ESG score portfolio achieved statistical significant abnormal returns during the low trust period. This thesis' results however indicate that only the Environmental dimension yielded any statistical significant returns. While a high combined ESG score is positive related to stock performance, it is not statistically significant.

Comparing the results listed in Tables 6 and 7, it is possible to report that during both crises periods it was possible to generate abnormal returns by applying SRI strategies. However, during the low trust crisis period, high ESG scores were more strongly related to abnormal performance, than during the credit shock crisis period. To be specific, a portfolio sorted on the highest Environmental scores, could achieve an abnormal statistical significant return of around 0.4% a month during the credit supply crisis, and almost 1.4% a month during the low trust period. A difference of 1% a month. Additionally, while not significant, high scores across the other dimensions are similarly related to higher stock returns during the trust decline subsample. While this thesis fails to reproduce the exact results reported by Lins et al. (2017), this thesis can confirm the finding that high ESG scores can work as a proxy for trust, as indicated by the performance of high ESG score portfolios during low trust periods.

6. CONCLUSION

This chapter concludes this Master thesis by restating the purpose of the study and the research question it aimed at answering, mentioning the data and methods used in the analysis, and describing the regression results and how they relate to the contribution of this thesis as well as to existing academic literature. Furthermore limitations to this study will be listed, as well as possibilities for further studies in this field of research.

This paper investigated the research question: "Is it still possible to achieve superior returns with a SRI investment strategy in the US?". Previous academic research on the financial performance of SRI, such as paper by Kempf & Osthoff (2007), and Statman & Glushkov (2009) among many others, report that incorporating SRI into investment decisions generates highly significant abnormal returns. However, according to Borgers et al. (2013) and Bebchuk et al. (2013), this lasted only until the year 2001. The authors report that SRI related information was mispriced, leading to the experienced abnormal returns. As soon as the market learned to price this information correctly, SRI tended to not perform any different compared to conventional investments. Recent papers by Auer (2016) and Lins et al. (2017) however, provide new insights. Auer (2016) reported that by using a new set of data, he found that it is still possible to generate abnormal returns with SRI strategies in Europe, which is among the oldest and biggest markets for SRI. Similarly, Lins et al. (2017) report that SRI can also be used to generate significant abnormal returns in the US, albeit only during periods marked by a sharp decline in trust.

Taking inspiration from earlier academic literature on SRI, Auer (2016), and Lins et al. (2017), this paper reinvestigates the financial performance of SRI with a new set of data and methods, which have been rarely used in academic literature before. In detail, this thesis uses data from Thomson Reuters ASSET4 ESG and the Fama & French (2015) five-factor asset pricing model to estimate the performance of SRI in the S&P 500 universe. To answer the research question, four hypotheses were set up and tested in this thesis. The first test covers the whole sample period of 168 months, investigating the performance of a best-in-class approach, as well as a long-short strategy based on earlier SRI considerations. The second, third, and fourth test, all revolve around the performance

of SRI during the financial crisis of 2007 to 2009. Partly emulating Lins et al. (2017), this study does not only investigate the performance of SRI during the financial crisis as a whole, but also during two subsample periods: a credit supply decline subsample, and a trust decline subsample.

This thesis finds that SRI does not generate any abnormal returns over the whole sample period. This results is in line with Borgers et al. (2013) and Bebchuk et al. (2013) who report that SRI does not provide any significant returns after 2001 under normal circumstances, as well as Lins et al. (2017), who report no statistical significant findings outside the financial crisis period. Furthermore in regard to the overall academic debate on the performance of SRI, this results supports the hypothesis that SRI does neither over-, nor underperform. However, the test does show that a portfolio of the lowest 25% Environmental scored stocks generates statistically significant negative returns of almost 0.2%, indicating that while positive ESG scores are not related to abnormal performance anymore, a lack of thereof is related to negative abnormal performance.

Continuing, this thesis finds that SRI could have been used to generate statistically significant abnormal returns during the financial crisis period, and more specifically, during both, a period of credit decline, and a period of trust decline. Over all three tests, the regression results report a statistically significant return of around 0.4% to 0.6% per month by following a best-in-class approach using Environmental- or combined ESG scores, as well as 1.2% to 1.3% statistical significant abnormal return per month by following a long-short approach based on buying (selling) the top (bottom) Environmental- or combined ESG score portfolio. These findings are furthermore partly consistent with Lins et al. (2017), who on one hand report significant abnormal returns during the trust decline period, but on the other hand no significant results during the credit supply decline subsample.

Summarizing these results in regards to answering the research question: “Is it still possible to achieve superior returns with a SRI investment strategy in the US?”, the author has to say: “It depends”. Under normal circumstances it is impossible to generate abnormal returns with SRI. However, during crises periods, such as during the financial crisis,

it was possible to generate abnormal returns with SRI. Additional insights that can be made in light of these results are twofold. First, it is possible to infer that engaging in CSR activities can be seen as an insurance for companies that pays off during economic crises (Lins et al. 2017). Second, it is possible to infer from the results that a high engagement in CSR activities, especially in the Environmental dimension, is beneficial to firm performance, as a lack thereof relates to negative performance.

While the results of this thesis are mostly supported by literature, there are several limitations that this thesis and the results are subjected to. First, the observed period for the decline in trust subsample reported in table 7, is relatively small, consisting of only eight monthly observations. This might be the case why the results reported in this thesis differ from those reported by Lins et al. (2017). To mend this limitation, a weekly observation approach might be preferable. Second, another limitation linked to the difference in results between this thesis and Lins et al. (2017) might be that in the latter, the authors sorted the companies in their sample by industry and excluded the financial ones. This was not done in this thesis, to not limit the possible investment universe.

Nevertheless, these limitations open up the possibility for further research. It would be possible to reexamine this thesis by more closely following Lins et al. (2017), and sorting the companies in the sample by industry. Furthermore, in light of the results reported by Auer (2016), it would be interesting to reexamine this thesis with a set of European data to apprise his results, or investigate the performance of SRI during the financial crisis, or the Eurozone crisis in Europe. Moreover, it would be also possible to replicate this study with a different investment universe, or higher cut-off rates.

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