Vaasan yliopisto
UNIVERSITY OF VAASA

Tomi Kapri

Implications of mutual funds' ESG score on performance

ABSTRACT:

There are conflicting economic theories on the implication of ESG criteria on fund performance. Previous academic research has mostly mixed returns in portfolio level studies on the relationship of ESG and performance. The mutual fund industry and ESG investing have both seen rapid growth in the recent years, increasing the importance to better understand the effects of ESG profile of mutual funds. Therefore, this thesis investigates impact of fund ESG ratings on the performance of the funds. The thesis uses ESG rating data from Morningstar and factor data from Kenneth R. French's database. The data sample of the thesis consist of US based equity mutual funds that have received ESG rating from Morningstar between January 1999 and October 2020. After excluding duplicate funds and deploying best-in-class and worst-in-class approach on top and bottom 20% funds based on Morningstar historic ESG rating, the sample consist of 326 mutual funds.

To investigate risk-adjusted returns of high and low ESG fund portfolios, the monthly returns of the portfolios are analysed with the CAPM, Fama and French (1993) three-factor model, Fama and French (2015) five-factor model and Fama and French (2018) six-factor model. Multiple factor models are considered to minimize the possibility of p-hacking which is argued by Revelli and Viviani (2015) to be one of the drivers of previous mixed results in the SRI portfolio performance literature. Moreover, to investigate previous evidence and theory on ESG implication during market downturns dummy variable depicting 10% of lowest market returns is introduced to the factor models.

This thesis finds that low ESG rated funds have statistically significant negative abnormal returns during 1999 to 2020. The found significant negative abnormal return for the low ESG funds is monthly return of -0.282% For the high ESG rated funds statistically significant abnormal returns cannot be found. Moreover, this thesis finds that high ESG funds outperform low ESG portfolios during the sample period. When introducing market downturn dummy variables, the models find positive alphas for high ESG and low ESG fund portfolios. However, the alphas are not statistically significant. Furthermore, the spread of high minus low ESG return with the dummy variable is positive and not statistically significant.

ABSTRACT:

Talouskirjallisuuden teorioissa on ristiriitaisia näkemyksiä ESG-tekijöiden vaikutuksessa rahasto-jen tuottoihin. Aiemmat tieteelliset tutkimukset ovat löytäneet sekalaisia tuloksia rahastojen ESG-profiilin ja tuottojen välisestä suhteesta. Rahastoala sekä ESG-sijoittaminen ovat kasvaneet nopeasti viime vuosien aikana, minkä takia tärkeys ymmärtää rahastojen ESG-profiilin vaikutuk-sia on kasvanut. Tämä tutkielma tutkii rahastojen ESG-luokituksien vaikutusta rahastojen tuot-toihin. Tutkielmassa käytetään Morningstarin ESG-luokituksia sekä faktoridataa Kenneth R. Frenchin tietokannasta. Tutkielman otantana käytetään yhdysvaltaisia oman pääoman rahas-toja, jotka ovat saaneet ESG-luokituksen Morningstarilta tammikuu 1999 ja lokakuu 2020 väli-senä aikana. Tutkielmassa käytetään paras luokassaan (best-in-class) ja huonoin luokassaan (worst-in-class) lähestymistapaa, missä ESG-luokituksen perusteella ylin sekä alin 20% rahas-toista otetaan tarkasteluun. Nämä vahvimman ja heikoimman ESG-profiilin rahastoportfoliot pi-tävät sisällään yhteensä 326 rahastoa.

Tutkielmassa rahastojen riskikorjattujen tuottojen analysoimiseksi käytetään CAPM, Fama ja French (1993) kolmen faktorin mallia, Fama ja French (2015) viiden faktorin mallia sekä Fama and French (2018) kuuden faktorin mallia. Usean faktorimallin käyttö vähentää mahdollisuutta p-hakkerointiin (p-hacking), joka on Revelli ja Viviani (2015) mukaan yksi syy aiempiin sekalaisiin tuloksiin vastuullisen sijoittamisen kirjallisuudessa. Tutkielma myös tutkii ESG:n vaikutuksia markkinoiden laskusuhdanteessa lisäämällä faktorimalleihin indikaattorimuuttujan (dummy-va-riable), joka kuvaa alhaisimman 10% markkinatuottoja.

Tämän tutkielman perusteella alhaisen ESG-luokituksen rahastoilla on poikkeavaa negatiivista tuottoa 1999 ja 2020 välisenä aikana. Löydetty negatiivinen tuotto on -0.282% kuukaudessa. Korkean ESG:n rahastoissa ei löydetä tilastollisesti merkittävää poikkeavaa tuottoa. Korkean ja alhaisen ESG:n rahastojen vertailussa korkean ESG:n rahastoilla on parempi riskikorjattu tuotto. Markkinoiden laskusuhdanteen indikaattorimuuttujamallit tuottavat positiiviset alfat alhaisen sekä korkean ESG:n rahastoille. Lisäksi korkean ESG:n rahastojen alfat ovat suurempia alhaisen ESG:n rahastoihin verrattuna. Markkinoiden laskusuhdannefaktorimallien alfat eivät kuitenkaan ole tilastollisesti merkittäviä.

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1 Introduction

Socially responsible investing (SRI) is integrating personal values and social concerns into investment decision (Schueth 2003). In the forefront of modern SRI is ESG investing where investments are made based on environmental, social and governance criteria. ESG investing has keep gaining popularity especially in the 21st century. US SIF foundation (2020) reports that since 1995 size of sustainability investing universe has increased over 25 times over, from 639 billion dollars in 1995 to over 17 trillion dollars in 2020. The most rapid growth in the ESG investing in the US, has occurred since 2012 and trend has yet to slow down. This is demonstrated in the growth data from the US SIF which reports that the total US-domiciled assets under management using ESG incorporation strategy grew over 43%, from 11.6 trillion to 16.6 trillion, during 2018-2020.

The mutual fund industry has also considerably grown in the last two decades. Even though the number of US mutual funds have stayed stagnant at around 8000 funds since 2000, the assets under management in the funds have grown rapidly. According to market data platform Statista (2021) total net asset of US mutual funds have grown from 7 trillion in 2000 to 21.3 trillion in 2019. The largest investment funds' asset class in 2019 was domestic equity with 43% of the distribution of the total funds. According to Statista's survey in 2019 74% of professional investors worldwide plan to increase their allocation to socially responsible investment options over the next year. As the results from growth in ESG investing and mutual fund market, recently there has been introduction of public ESG rating for funds. The ratings are provided by different organizations such as Morningstar, who introduced their fund ESG ratings first in 2016.

As the popularity and assets under management of SRI has grown, also the interest in the performance implications of ESG incorporation has increased. From theoretical standpoint there are conflicting theories on the matter. The efficient market theory views that ESG factors are public information and therefore in the efficient markets the ESG information is reflected in the prices. Thus, according to the efficient market theory using ESG criteria in investment should not yield any abnormal returns. On the other

hand, the adaptive market hypothesis views that market shifts from efficient to inefficient as investors process information in changing market conditions. This theory implicates that as market conditions change, as for example investors pay more attention to ESG criteria in their investment decision, markets can be inefficient with pricing new information, such as ESG ratings for mutual funds. Therefore, according to the adaptive market theory incorporating ESG criteria into investments can lead to abnormal returns.

Another two conflicting theories on the performance of SRI are shareholder theory and stakeholder theory. Shareholder theory was first presented by Friedman (1962; 1970) and it views that companies only purpose and responsibility is to generate profits for the shareholders. Friedman argues that firm's responsibility for social contributions should only be through corporate tax. In other words, shareholder theory views socially responsible efforts of companies as distraction from maximizing the shareholder profits. Contrarily, stakeholder theory believes that firms should not only try to maximize their shareholders' wealth but rather act on best interest of all its stakeholders (Mansell, 2013). Stakeholder theory view that maximizing wealth of all the stakeholder, such as for example employees and community, also maximizes the wealth of the shareholders and the value of the company. Thus, stakeholder theory predicts that good ESG practices of a company can positively drive its valuation.

The previous research evidence on ESG implications on portfolio performance is mixed. In a meta study of 2200 individual studies, Friede, Bush and Bassem (2015) find that 37,4% of the portfolio level studies have mixed results and 36,1% neutral results on the relationship between ESG and market performance. Moreover, Fulton Kahn and Sharples (2012) analyse over 100 academic studies on SRI funds' performance and find 89% of the studies to have neutral or mixed results. Revelli and Viviani (2015) argue that the nature of mixed results of previous SRI literature on portfolio performance is driven by differences in methodologies, for example thematic approach and investment horizon.
 As public sustainability ratings, such as Morningstar sustainability ratings are relative new phenomena, many of the older SRI studies are based on funds/companies own SRI

mandates or authors own criteria to determine how strong/weak company's or fund's ESG profile is. When forming SRI fund portfolio based on different SRI mandates of the funds it does not consider combined strength of fund's ESG profile, for example fund with low-carbon mandate can be defined as SRI fund without consideration of its social and governance factors. Using ESG rating such as one of Morningstar considers all of the three dimensions of ESG as well as enables the analysis of the funds with weak ESG profiles and how those funds compare to funds with strong ESG profiles. With the introduction of public ESG ratings it is easier for researchers to use more homogenic SRI evaluation approach as well as for investors to implement ESG ratings into their investment decisions.

As previously mentioned, there are conflicting theories and mixed results from the existing literature on ESG rating of funds and their performance. The purpose of this study is to add to the SRI mutual fund performance literature using the latest ESG data and factor model methodology to investigate these conflicting theories and previous evidence. This thesis contributes to SRI literature by investigating the relationship between US mutual funds' ESG ratings and their performance during 1999-2020. In this thesis latest ESG data from Morningstar is used and returns are analysed using multiple asset pricing models, such as the capital asset pricing models and three-, five- and six-factor models of Fama and French.

1.1 Hypothesis construction

Modern portfolio theory predicts that mutual funds with high ESG ratings cannot produce abnormal risk-adjusted returns. According to the portfolio theory investing in only high ESG rated companies significantly reduces the mutual fund's investment universe, and thus sacrifices diversification benefits leading to less optimal efficient frontier. For example, Fabozzi, Ma and Oliphant (2008) find evidence that excluding sin stocks can lead to lower returns. Moreover, according to efficient market theory higher ESG rated companies and funds should not produce abnormal returns. ESG screening methods and

data are public information and therefore according to the efficient market theory this information should already be reflected to the stock prices. Thus, using ESG metrics in investing should not result better performance according to the efficient market theory. Additionally, shareholder theory views that socially responsible efforts of companies are distraction from maximizing the shareholder profits and socially efforts should be done through corporate tax (Friedman 1962; 1970).

On the other hand, adaptive market theory (AMT) views that the markets are not constantly efficient but rather shift back and forth from efficiency to inefficiency as different market participant groups adapt to changing market environment (Lo 2017). Therefore, AMT supports the view that it is possible that higher ESG-rated companies can have higher market performance. Furthermore, contradicting the view of modern portfolio theory, Gil-Bazo, Ruiz-Verdu and Santos (2010) argue that smaller investment universe of the SRI mutual funds can improve the performance of these funds as the SRI fund managers can have better knowledge of their smaller investment pools. In fact, Kacperczyk, Sialm and Zheng (2005) find that mutual funds with more concentrated holdings outperform diversified portfolios. The authors argue that the outperformance is due to the informational advantages of the fund managers with more concentrated investment pools. Furthermore, the stakeholder theory view that companies should not only maximize the profits of shareholder but rather all the stakeholder of the company. Stakeholder theory predicts that maximizing wealth of all the stakeholder, such as for example employees and community, also maximizes the wealth of the shareholders as well as the value of the company (Freeman 2008).

The empirical evidence on ESG criteria's impact on portfolio performance is mixed. According to Friede et al. (2015) in their meta study of 2200 individual studies, 48% of the studies find positive, 11% negative and 41% mixed or neutral relationship between ESG and performance. Moreover, when divided to portfolio and individual stock level studies the authors find that the individual stock level studies find more often positive relationship and the portfolio level studies mixed relationship between strong ESG and

performance. In their meta-analysis Revelli and Viviani (2015) argue that the nature of mixed results of previous SRI literature on portfolio performance is driven by differences in methodologies, for example thematic approach and investment horizon.

As summarize above the efficient market theory and the shareholder theory view that high ESG-rated mutual funds should not be able to produce positive abnormal returns. In the other hand, the adaptive market theory and the shareholder theory have contradicting views. The question is which theories can better explain the implications of mutual funds' ESG criteria on performance. Therefore, the research questions for this thesis are does ESG criteria incorporation in mutual fund selection generate abnormal returns and does high ESG funds outperform low ESG funds? To investigate these questions the following hypothesis are established:

H0: Incorporating ESG criteria in mutual fund selection does not lead to abnormal returns.

The null hypothesis will hold if no significant abnormal returns can be found in the regression analysis of the low and high ESG funds. Abnormal returns are represented by the alpha in the factor models. Acceptance of null hypothesis would implicate that efficient market theory and shareholder theory explains the pricing of ESG criteria in the markets better than the adaptive market theory and stakeholder theory. However, if the factor models produce positive or negative statistically significant alphas, thus showing statistically significant abnormal return, the null hypothesis can be rejected, and the following alternative hypotheses can be considered.

H1: High ESG rated mutual funds have positive abnormal returns.

Alternative hypothesis H1 can be accepted if in the regression analysis of the high ESG rated fund portfolio the factor models produce significant positive alphas. Acceptance of H1 would implicate that stakeholder theory and adaptive market theory better explain

relationship of ESG fund ratings and performance than shareholder theory and efficient market theory.

There is empirical evidence that SRI funds outperform conventional funds during market downturns. For example, Nofsinger and Varma (2014) find that socially responsible mutual funds outperform conventional funds during the global financial crises. Moreover, Hoepner et al. (2019) find that company's engagement in ESG issue reduces the company's downside risk and Ihan et al. (2019) find that firms with high carbon emissions have higher tail risk. Jo and Na (2012) and Godfrey, Merrill and Hansem (2009) argue that the smaller downside risk and risk of severe incidents of high ESG-rated companies is driven by better risk control and compliance standards of these companies. In addition, Verwijmeren and Derwall (2010) find that companies with higher employee satisfaction have lower bankruptcy risk and therefore it can be hypothesized that high ESG-rated should be more stable during market downturns. Based on the previous literature two more alternative hypothesis are formed:

H2: Low ESG mutual funds have negative abnormal returns.

H3: High ESG mutual funds have positive abnormal returns during market downturns.

Alternative hypothesis H2 can be accepted if the regression analysis on low ESG fund portfolio produces significant negative alphas. To investigate H3, dummy variable that depicts 10% of the lowest market return months is introduced to the models. The use of dummy variable to investigate market downturn returns is similar to the study of Nofsinger and Varma (2014).

Additionally, this thesis considers the spread between the returns of high and low ESG funds to further investigate the implications of mutual fund ESG ratings. Based on the previously mentioned evidence of smaller downside risk of high ESG stocks as well as

the predictions of stakeholder theory and adaptive market theory hypothesis 4 is constructed:

H4: High ESG mutual funds have higher risk-adjusted returns than low ESG mutual funds.

1.2   Structure of the thesis

In the first chapter of the thesis is the introduction chapter. The introduction chapter presents the background of the topic, purpose, and contributions of the thesis as well as hypothesis construction. In the second chapter the background, evolution, and status of socially responsible investing, and the most common SRI strategies. In the third chapter previous SRI literature is reviewed. Fourth chapter present the theoretical background of the thesis. In the fifth chapter data and methodology of the thesis are established. Finally, the sixth chapter concludes the finding of the thesis and presents possible further research on the subject.

2 Socially Responsible investing

Socially responsible investing (SRI) is investing approach that aims to create more than just monetary gain. Schueth (2003) describes SRI as integration of personal value and social concerns into investment decision. In SRI, the investment pool is filtered by guidelines that follow different moral or ethical concepts (Matloff and Chaillou 2013). There are different styles of SRI. Matloff and Chaillou (2013) explain that the most common styles of SRI are religion-based SRI, mission-based SRI and environmental, social and governance (ESG). The earliest known SRI style is based on religion. In religion-based RSI investment is either focused on investments or diverted away from investments based on religious beliefs and teachings. For example, alcohol and gambling companies can be excluded from the investment pool because they are forbitten by a religion. In the second style of SRI listed by Matloff and Chaillou, mission-based SRI, the investments support mission of the company that is often based on the original ethical foundation of the company. Matloff and Chaillou use a medical organization as an example where the organization does not invest funds to a company that have negative impact on people's health, for example tobacco companies. More recently the most common type of SRI is environmental, social and governance (ESG) investing, and it is considered as the most popular style of modern SRI. In ESG investing environmental, social and governance issue are considered when making investment decision.

2.1 SRI strategies

As SRI has evolved different strategies to employ SRI has formed. Global Sustainable Investment Alliance, GSIA (2018), summarizes seven most common SRI strategies. The strategies are negative/exclusionary screening, best-in-class screening, norms-based screening, ESG integration, sustainability themed investing, impact/community investing and corporate engagement and shareholder action. The 2018 SRI strategies by assets undermanagement in different regions are summarized in figure1. In 2018 the two globally most popular SRI strategies were ESG integration and Negative/Exclusionary

screening. Corporate engagement and shareholder action was the third most popular strategy and in 2018 in Europe the strategy was more popular than ESG integration. In the US corporate engagement strategy is not as popular as in Europe as ESG integration and negative screenings are the two main SRI strategies in the US. (GSIA 2018).
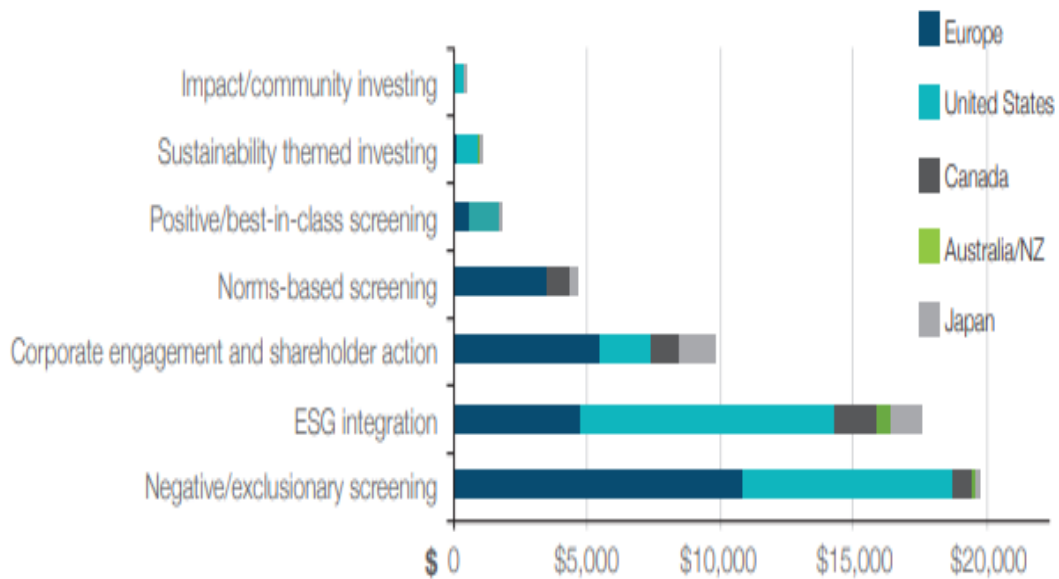
Note: Asset values are expressed in billions of US dollars.

Figure 1.) Socially responsible investing assets by strategy and region in 2018 (GSIA 2018).

Even though, as illustrated in figure 1 the total asset in the impact investing, sustainability themed investing and best-in-class strategies are considerably lower than in the rest of the strategies, the growth of these strategies has been strong during 2016-2020. Global growth of the strategies during 2016-2018 is summarized in the figure 2. Moreover, as shown in 2, even though in 2018 negative screening was the most popular strategy, ESG integration had stronger growth during 2016-2018. The growth of popularity of SRI strategies has continued also since 2018. According to US SIF (2020) report SRI strategies have grown 42% between 2018-2020 in the US with ESG incorporation being the most popular strategy in 2020.

	Impact/ community investing	Sustainability themed investing	Positive/ best-in-class- screening	Norms-based screening	Corporate engagement and shareholder action	ESG integration	Negative/ exclusionary screening
2018	$444.26	$1,017.66	$1,841.87	$4,679.44	$9,834.59	$17,543.81	$19,770.96
2016	$248.47	$276.16	$818.01	$6,195.40	$8,385.17	$10,353.20	$15,063.57
Growth 2016–18	79%	269%	125%	-24%	17%	69%	31%
CAGR	33.7%	92.0%	50.1%	-13.1%	8.3%	30.2%	14.6%

Figure 2.) Global growth of socially responsible investing strategies between 2016-2018 (GSIA 2018).

2.1.1   Negative/exclusionary screening

Negative screening is SRI investing strategy where the investor excludes companies, industries or countries from their investing pool based on their SRI criteria. A typical negative screen can be applied to asset pool for example S&P 500 and by excluding alcohol, tobacco, and gambling companies (Renneboog et al. 2008). Negative screening is the oldest SRI strategy, and it has its roots from ethical investing where investment pool is filtered on religious bases.

2.1.2   ESG integration

ESG integration is in the forefront of modern SRI. In ESG integration strategy environmental, social and governance factors are used in investment decision. According to US SIF (2020) US money managers invested in the three ESG categories rather evenly in 2020, as demonstrated in the figure 3. As summarized in the figure all of the three ESG

categories have seen over 50% increase in total assets by money managers between 2018 and 2020.

ESG Categories Incorporated by Money Managers 2018–2020

	2020	2018
Social	$16,134	$10,839
Governance	$15,975	$10,764
Environment	$15,967	$10,144
Products	$4,942	$4,487

Total Assets (in Billions)
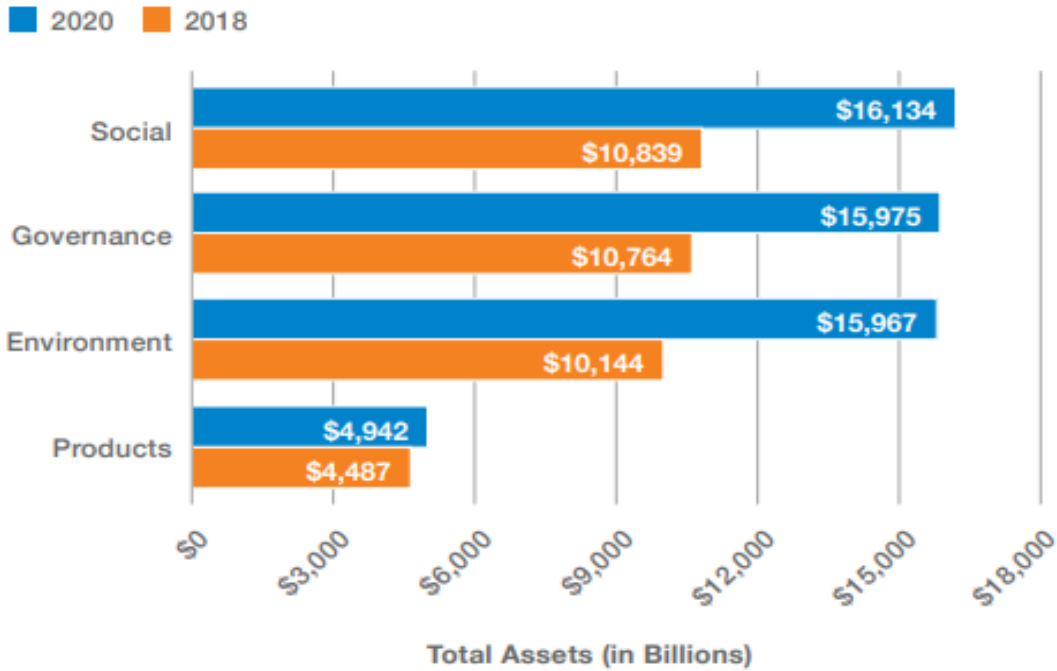
Figure 3.) ESG categories incorporated by money managers between 2018 and 2020 (US SIF 2020).

US SIF (2020) specifies that the most popular ESG themes for money managers in 2020 are climate change/carbon, anti-corruption, board issues, sustainable natural resources/agriculture, and executive pay. The distribution of institutional funds to the ESG categories is illustrated in figure 4. For institutional investors, the biggest allocation of funds is on social category followed by environmental and then governance categories of ESG. According to US SIF (2020) the main five ESG themes for the institutional investors in 2020 are conflict risk (terrorist or repressive regimes), climate change, tobacco, board issues and sustainable natural resources/agriculture.

ESG Categories Incorporated by Institutional Investors 2018–2020

■ 2020 ■ 2018

Social: $5,737 (2020), $5,244 (2018)
Environment: $4,310 (2020), $3,493 (2018)
Governance: $3,858 (2020), $3,453 (2018)
Products: $2,956 (2020), $2,935 (2018)

Total Assets (in Billions)
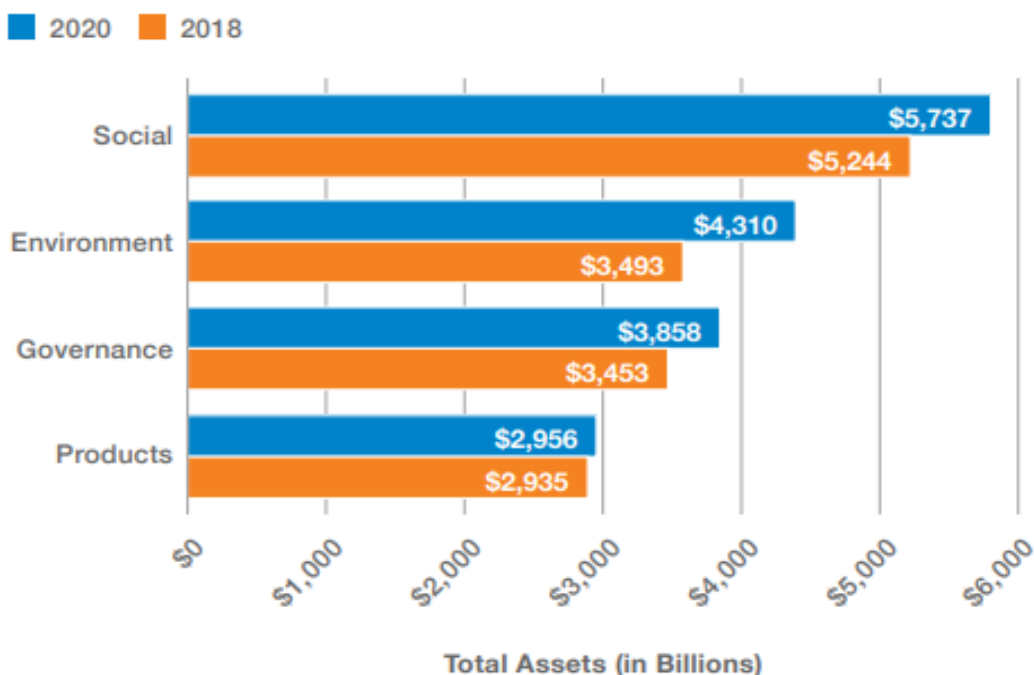
Figure 4.) ESG categories incorporated by institutional investors between 2018 and 2020 (US SIF 2020).

2.1.3 Corporate engagement and shareholder action

In Corporate engagement and shareholder action, shareholders use their power to impact company to act in a more socially responsible way. Shareholders try to achieve this by direct communication to the management and/or board of the company as well as using shareholder proposals and proxy voting (GSIA 2018). According to Sullivan and Mackenzie (2006) institutional investors play the biggest role in shareholder action as they have stronger direct influence on companies than smaller shareholders. However, smaller investors can group up to drive for specific change or encourage their fund managers to act. Sullivan and Mackenzie add that shareholder action also can be seen through investors impact on the share price through the selling and buying of shares. For example, company's practises that are not seen as socially responsible can make

investors to sell their shares driving the stock price down and therefore influencing the company to possibly make changes in the future.

2.1.4 Norms-based screening

Norms-based screening is SRI strategy where the investment pool is screened based on international norms. The norms are usually issued by an international institution. Few of the commonly used norms used in norm-based screening are norms issued by Organisation for Economic Co-operation and Development (OECD), International Labour Organization (ILO), United Nations (UN) and United Nations International Children's Emergency Fund (UNICEF). (GSIA 2018).

2.1.5 Best-in-class screening

Best-in-class screening is the opposite to the negative screening SRI strategy. In best-in-class SRI screening companies and projects are compared to other companies in their industries. The companies that have the best social responsibility practices, in other words companies that are best-in-class, will be selected for investments. Similar strategy to best-in-class screening is the worst-in-class screening strategy where weak performers in SRI criteria are excluded from investments. (GSIA 2018).

2.1.6 Sustainability themed investing

Like the name suggests, sustainability themed investing is strategy where investment is based on a sustainability theme. This theme can be for example clean energy, green technology, or sustainable agriculture. Sustainability themed investing is most often focused on environmental aspect of ESG, but it can also involve social issues, such as health. (GSIA 2018).

2.1.7 Impact investing

Impact investing is an SRI strategy where the goal of the investment is to solve a social or environmental problem. Two forms of impact investing are social impact bonds and green bonds. Social impact bonds aim to impact a social problem for example homelessness or community exclusion. Green bonds aim to impact on environmental aspects as for example supporting renewable energy and better public transport options. Moreover, community investing is form of impact investing. In community investing investment are focused on communities and individual who would have trouble getting funding in more traditional ways. Furthermore, in community investing business that have a social or environmental purpose are offered financing. (GSIA 2018).

2.2 Evolution of SRI

Initially responsible investing was considered and known as ethical investing. Ethical investing has its origin from Jewish, Christian, and Islamic traditions. The first forms of ethical investing can be traced to the 18th and 19th centuries where for example groups like Quaker and Methodist did not want to profit from weapon and slave trade on religious reasons. Moreover, based on teachings of Koran, Islamic investors have not invested in various industries such as gambling, pornography, and interest-based financial institutions. The first mutual fund to screen investments based on religion-based reasons is the Pioneer Fund, which was founded in 1928. (Fu, Lin and Zhang 2020: Renneboog, Horst and Zhang 2008.)

The original ethical investing is based on religion. However, the modern SRI is more based on the ethnical beliefs of individual investors. In the 1960s investors started to become more aware of the environmental and social impact of their investments as the results from series of anti-war and anti-racism movements. The World Fund was founded in 1971 and it is considered to be the first modern SRI mutual fund. The fund was created

for investors that did not support the Vietnam war and did not want to invest in weapons industry. The environmental side of the SRI gained more popularity during the 1980s. For example, the catastrophes of Chernobyl nuclear power plant in 1986 and the Exxon Valdez oil spill in 1989 made investors more conscious the environmental impact of their investments. (Renneboog et al. 2008.)

Even though, SRI has long history the real growth of SRI started in the 2000s. In the responsible investing field investing on ethical/religious bases started to be replaced by investing based on issue of socially irresponsible of firms. Responsible investing shifted toward modern responsible investing which makes investment decisions based on firms' ESG metrics. (Fu et al. 2020.)

2.2.1 SRI today

In 2005 by the initiative of the United Nations together with world's largest institutional investors the Principles of Responsible Investment (UNPRI) was created. The UNPRI was a big progress towards larger unified effort to bring more attention to ESG issues and ESG investing. The UNPRI is network of signatories that have signed the six principles for responsible investment. The goal of the UNPRI is to better understand the investment impacts on environmental, social and governance issues and help the signatories to take these issues into account in their investment decisions. (UNPRI 2021)

The six principles of UNPRI (2021) for responsible investment are as follows:

1. Incorporate ESG issues into investment analysis and decision-making processes.

2. Activating owners and incorporating ESG issues into ownership policies and practices.

3. Seeking appropriate disclosure on ESG issues by the invested entities.

4. Promoting acceptance and implementing the principles within the investment industry

5. Working together to enhance effectiveness in implementing the principles.

6. Reporting activities and progress towards implementing the principles.

According to UNPRI (2021) there are 2000 UNPRI signatories from more than 60 counties managing over 80 trillion dollars in assets in 2020. In the figure 5 you can observe that PRI has grown consistently from its beginning in 2006. This demonstrates how SRI and ESG investing has grown in popularity and investors pay more and more attention to ESG matters. The number of signatories has grown from starting of the PRI program in 2006 to over 3000 in 2020. Moreover, the assets under management of the signatories have risen to over 100 trillion in 2020.

The PRI has grown consistently since it began in 2006:
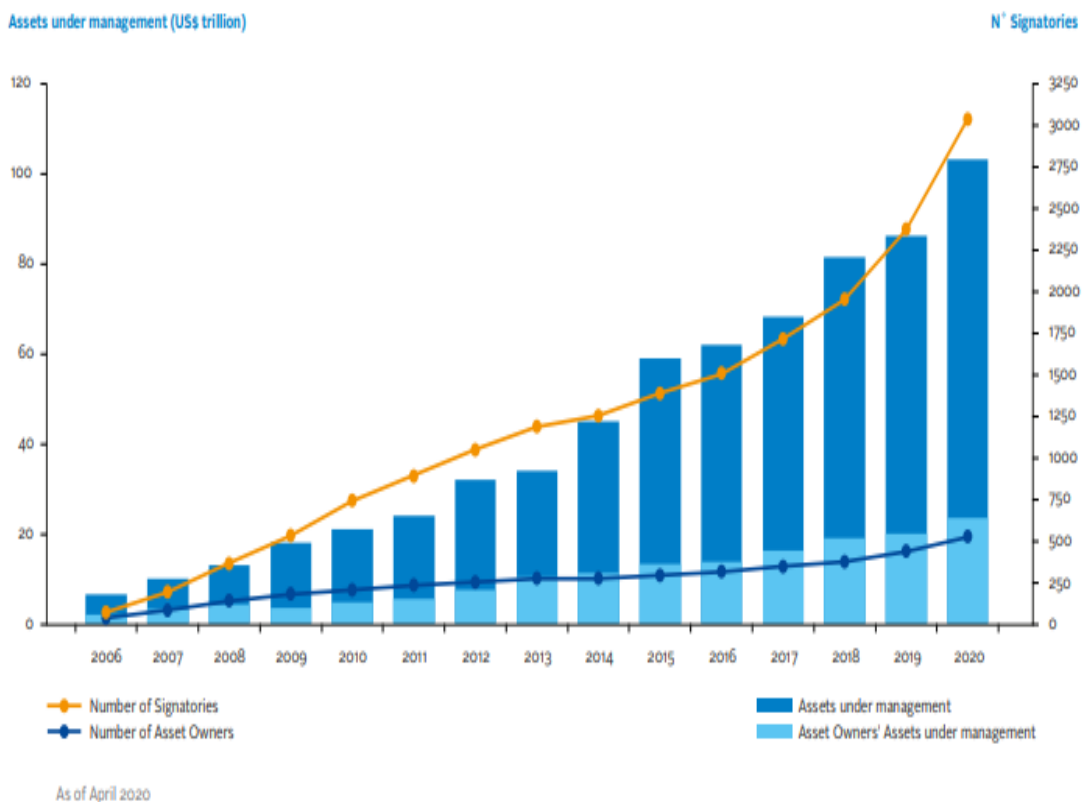
Figure 5.) Growth of PRI between 2006 and 2020 (UNPRI 2020).

The sustainable investing universe has grown fast especially in the US. According to the US SIF foundation (2020) since 1995 sustainability investment universe has grown from

639 billion dollars to 17,1 trillion dollars in 2020. The growth of sustainability investing in the US is illustrated in the figure 6. As demonstrated in the figure, ESG incorporation is the most popular form of sustainable investing in the US. Its popularity measured in total assets has seen strong growth especially since 2012. According to the US SIF in the start of 2020 there were total 17,1 trillion dollars assets undermanagement in sustainable investing strategies in the US. This represents third of the total assets under professional management in the US.
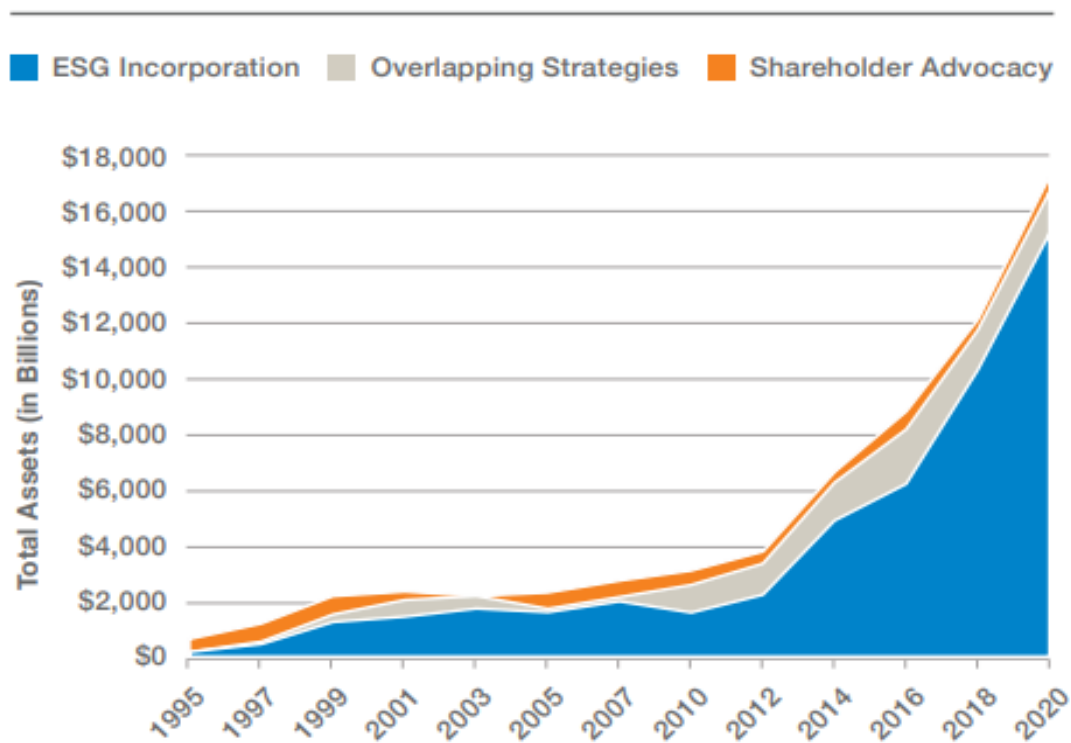
Figure 6.) Socially responsible investing in the US between 1995 and 2020 (US SIF 2020).

2.3 Morningstar ESG rating

In 2016, Morningstar released a ESG rating called Morningstar sustainability rating. The goal of the rating is to help investors to better integrate ESG matter into their investing decisions. With the Morningstar's rating investors get a third-party assessment on ESG

matters on companies and funds. In 2018 Morningstar partnered up with Sustainanalytics, an independent institution that provides ESG research and ratings, to enhance their ESG rating formula to provide more accurate ESG ratings. For fund to get ESG rating minimum of 67% of the fund's holdings must be analysed. Morningstar uses data provided by Sustainalytics in their fund ESG ratings. (Morningstar 2019)

Morningstar's sustainability rating process has three steps. In the first step portfolio sustainability score is calculated for a portfolio. Portfolio sustainability score is calculated from the asset-weighted sum of ESG factors of the portfolios. In the next step historical portfolio sustainability score is calculated by 12 months weighted average of portfolio sustainability scores. In the last step the portfolios are ranked in to 5 categories based on their historical portfolio sustainability score illustrated in table 1. (Morningstar 2019)

Distribution	Score	Descriptive Rank	Rating Icon
Highest 10%	5	High	
Next 22.5%	4	Above Average	
Next 35%	3	Average	
Next 22.5%	2	Below Average	
Lowest 10%	1	Low	

Table 1). Morningstar ESG rating ranking (Morningstar 2019).

With ESG ratings investors can evaluate how the companies that are held by funds, take ESG matters into consideration in their operations. However, Hale (2016) explains that ESG ratings should not be used alone in investment decision, but rather in combination with other traditional analytical methods.

3 Literature review

This chapter reviews previous literature of implication of SRI factors on performance and cost of portfolios as well as individual stocks. The SRI research has developed from investigating individually each ESG category to the more modern SRI approach were the joint implication ESG factors are considered. In this chapter firstly ESG incorporation performance research is review. This is followed by studies on individual studies on environmental, social and governance implications. Then SRI studies on funds are review followed by studies of SRI in different market conditions. Finally studies on SRI implication to the costs are reviewed.

3.1 Performance ESG

Ashwin Kumar et al. (2016) investigates the ESG factors' effect on stock performance. They take 157 stocks from the Dow Jones Sustainability Index (DJSI) and compare them to 809 randomly selected stocks that are not in the index. To be included in the DJSI, stocks go through thorough assessment and thus the 157 stocks represent stocks that are best-in-class in the ESG. To avoid biases of different industries, the DJSI stock are divided into groups based on their industry. Aswin Kumar et al. then analyse the weekly returns and volatility of their stock groups during 2014-2015. They find that ESG factors produce higher risk-adjusted returns in 9 out 12 industry groups and on average the studied ESG stocks are less volatile. The results from the study are promising for concept of using ESG as stock picking criteria. However, there are some limitations to the study. The sample period of 2 years is short and thus does not exclude the possibility of data mining.

Verheyden, Eccles and Feiner (2016) also find positive correlation between ESG factors and risk-adjusted stock returns. They form global equity portfolios with and without screening for ESG criteria and compare the risk adjusted return between the portfolios during 2000-2015. There are six different portfolios that are compared in the study. First

Verheyden et al. create two different investment universes. One universe includes large and mid-cap stocks from 23 developed markets and 23 emerging markets, representing all global stocks. The second universe includes large and mid-cap stocks from 23 developed markets, representing all developed markets' stocks. The two universes are then screened for ESG criteria and two more portfolios from both stock universes are formed by excluding bottom 10% and 25% ESG performers per industry. Verheyden et al. then compare the risk-adjusted returns of the six formed portfolios during 2000-2015. They find that 3 of the 4 screened portfolios outperform their unscreened equivalents. Surprisingly, the developed market portfolio with the 25% ESG screening underperformed its counter portfolio. Verheyden et al. also look at the daily returns at stock level and find evidence that the ESG screening reduces stocks' downside risk.

Friede, Busch and Bassem (2015) combines findings of 2200 individual studies between 1990-2015 on the relationship with ESG criteria and corporate financial performance. They find that in 48% of the 2200 studies the relationship between ESG criteria and financial performance is positive and in 11% negative. The remaining 41% of the studies find neutral or mixed results between ESG and financial performance. Friede et al. also divide studies by stock level studies and on stock portfolio level studies and find that the results are mostly positive in the individual stock level studies and mixed in the portfolio level studies.

Fulton, Kahn and Sharples (2012) analyse over 100 academic studies about sustainable investing. They find when screening for ESG criteria 89% of studies they investigated find outperformance. Fulton et al. also find that from ESG factor Governance is the most important driver for outperformance followed by Environmental and then Social characterises. They also investigate the literature on SRI funds' returns and find that 88% of the studies they analysed find neutral or mixed results. Therefore, Fulton et al. add that SRI fund managers have not been able to fully capture the outperformance in firms with strong ESG performance.

3.1.1 Environmental factor

Al-Tuwaijri, Christensen and Hughes (2004) investigate the relation of firms' environmental disclosure, environmental performance, and economic performance during 1994. They find that companies with better environmental performance have better economic performance. Al-Tuwaijri et al. argue that both good environmental and economic performance are linked to good management. These good managers focus on firms' long-term interest by paying attention to firm's social responsibility and controlling environmental effects. Moreover, Altuwaijri et al. discover that firm with good environmental performance also disclosure more environmental information. They explain there are limitations to the study. Because the sample is limited to 1994 IRRC Envimental Profiles Directory, the sample period is only a year.

Guenster, Baur, Derwall and Koedijk (2011) add to the literature on relationship of firm's environmental performance and economic performance by focusing on concept of eco-efficiency score. The eco-efficiency score is a proxy for firms' environmental performance in five areas: historical liabilities, environmental operating risk, sustainability risk, managerial risk, and environmental competitive advantages. Guenster et al. investigate the relation of eco-efficiency score and financial performance during 1997-2004 and find that firm's eco-efficiency is positively correlated with firms operating performance and market value. Moreover, Guenster et al. discover that "market's valuation of environmental performance has been time variant" (p. 679), thus this suggest that the "market incorporates environmental information with a drift" (p.679). In other words, they find that markets do not price environmental information efficiently, thus implicating that there is possible to earn abnormal returns using the environmental information in the markets.

Hassel and Semenova (2008) add to the environmental performance literature by investigating different industries. They study both clean and polluting industries in the US and investigate environmental preparedness and performance. Hassel and Semenova use data set of 163 US companies between 2003 and 2006. To evaluate the environmental

profile of companies the authors use multiple different data sources, e.g., different surveys and eco-efficient ratings. Their results suggest that reputation benefit associated with environmental preparedness increase firms' performance, measured as Tobin's Q, as well as market valuation. Furthermore, they find that companies in industries with high pollution have higher costs for environmental management, which reduces the operating performance of the companies in these industries. Hassel and Semenova explain that limitation to the study is relatively short time period which was due to the limited available data set.

3.1.2   Social factor

Edmans (2011) investigates the effect of employee satisfaction on long-term stock returns. He uses sample of US firms from 1984 to 2009 and value-weighted portfolio of "100 best companies to work for in America" representing portfolio of firms with high employee satisfaction. The list of the 100 best workplaces is based on yearly valuation that scores firms based on a survey and factors on credibility, respect, fairness, and pride/camaraderie. Edmans finds that firms with higher employee satisfaction have higher stock returns after controlling for multiple firm and industry factors. Therefore, the results suggest that market fails to price intangibles into stock prices. This is in line with human relation theories that argue that there is a positive relation between employee satisfaction and corporate performance which is driven by improved recruitment, retention, and motivation.

Adding to the social factor research, Richard, Murthi and Ismail (2007) study the possible effect of racial diversity in human resources on financial performance. They use index of heterogeneity to measure racial diversity and Tobin's Q to measure financial performance from 1997 through 2002. The authors use fixed- and random-effect regressions to determine the effect of racial diversity on financial performance. Ismail et al. find positive relation with racial diversity and financial performance. They add that this effect is stronger with companies in higher growing industries ("munificent environment")

compared to industries with smaller range of available strategies ("resource-scare environment").

Fu and Shan (2009) study the effect of firm's corporate equality on firm's stock returns. Their measure of corporate equality is collected from the Corporate Equality Index.They investigate US firms during 2002-2006 and find that firm with stronger corporate equality have higher stock returns and market valuation measured as Tobin's Q. Fu and Shan argue that higher equality drives higher performance in product and labour markets which then leads to stronger financial performance. They add that firms with higher equality on average have larger sales, profit margins and employee productivity.

3.1.3 Governance factor

Gompers, Ishii and Metrick (2003) investigate the effect of firms' level of shareholder rights on firms' market performance. They form a "governance index" that represents level of firms' shareholder rights and studies the effect on 1500 firms during 1900-1999. They find that firms with better shareholder rights have higher growth in sales, profits and value compared to firms with lower shareholder rights. Moreover, these firms have lower capital expenditures and less acquisitions. Gompers et al. also, back test investing long-short strategy that buys the top decile of firms with strongest shareholder rights and sells bottom decile of firms with weakest shareholder rights. The strategy achieves about 8.5 percent abnormal returns per year during the sample period. Core, Guay and Rusticus (2006) investigate the results of Gompers et. all further and find that firms with weak shareholder rights have lower operating performance. However, using data for analyst forecast error and return around earning announcements for weak shareholder right firms they find that weak governance does not cause the found abnormal returns. In other words, Core et al. do not find causal link between weak shareholder rights and weak stock returns.

Ammann, Oesch and Schmid (2011) investigates the relationship of corporate governance and market performance on an international scale. They study firms in 22 different developed countries during 2003-2007. They use data from governance metrics international that uses 64 individual corporate governance metrics to measure the strength of corporate governance practices of the firm. They form 3 indices based on corporate governance and find that in all three indices there is a positive correlation between firm-level corporate governance and performance measured as Tobin's Q. They also find evidence that better corporate governance practices of a company lead to higher market valuation. Ammann et al. argue that costs of implementing corporate governance systems in a firm is smaller than the benefits of monitoring provided by these systems which results into higher returns for investors and lower cost of capital. The authors of the study argue that companies should view corporate governance practices as an opportunity rather than obligation or added cost.

Harjoto and Jo (2011) find supporting evidence to the study of Ammann et al. Harjoto and Jo investigate the internal and external corporate governance monitoring system's effect on firm valuation. They find that strong corporate governance practises positively effect firm valuation, measure by Tobins Q. They also find that firm that engage in CSR practises are associated with better corporate governance, institutional ownership, and analyst coverage. Harjoto and Jo find that analyst following of CSR firms is strong driver of positive relation between corporate governance and firm valuation. Moreover, they find that internal corporate social responsibility activities, such as employee diversity, employee relationship and product quality positively drive the valuation of the firm.

There are also studies that find evidence of negative relationship between corporate governance standard and firm performance. Bauer, Guenster and Otten (2004) investigate the effect of corporate governance on stock returns and firm valuation in Europe. They follow the methodology previously review study of Gombers et al. (2003) during 2000-2001. Bauer et al. find negative correlation between governance standards and firm valuation measured in net-profit-margin and return on equity. The authors argue

that good governance standard may be already reflected to the prices and thus not leading to positive correlation between corporate governance and returns.

3.1.4 Negative screening

Trinks and Scholtens (2017) investigate effects of negative screens on stock performance. They consider international sample of over 1600 stock during over 20 years and screen for 14 potential controversial issues. Trink and Scholtens then exclude the firms from the portfolio and analyse the performance. They find that the screened market portfolio underperforms the unscreened counterpart. They add that in many cases negative screening of controversial firms lowers the risk-adjusted returns of the portfolio. Negative screening also significantly reduces the number of potential investments in the stock universe, this is however very dependent of the selected negative screens.

3.2 SRI mutual funds

Gil-Bazon, Ruiz-Verdu and Santos (2010) investigate the performance of SRI mutual fund before and after fees. They find that during their sample period of 1997-2005 SRI funds in the US have better performance than conventional funds both before and after fees. The outperformance of the SRI funds is driven by funds which are managed by companies that are specialized in SRI. Additionally, they find evidence that funds that are run by companies not specialized in SRI underperform conventional funds. The authors argue that smaller investment universe of the SRI mutual funds can improve the performance of these funds as the SRI fund managers can have better knowledge of their investment pools. Similarly, Kacperczyk, Sialm and Zheng (2005) find that mutual funds with more concentrated holdings outperform diversified portfolios. They argue, similarly to Gil-Bazon et al. (2010), that the outperformance is due to the informational advantages of the fund managers with more concentrated investment pools. Gil-Bazon et

al. do not find significant difference in the fees between SRI funds and conventional funds and they

explain that based on their findings SRI investors should consider the management company characteristics when investing into SRI funds.

Chang and Witte (2010) investigate the performance of SRI funds in the US between 1995 and 2010. In the study socially responsible funds are defined as funds that use SRI screening. The screening can be positive or negative. Positive screening can be for example investing in companies that have good environmental practices and negative screening is excluding companies that are seen not socially responsible from the investment pool. Chan and Witte find conflicting results to Gil-Bazon et al. (2010) as Chan and Witte find SRI funds to have smaller risk-adjusted returns compared to conventional funds. However, the authors find that in the fixed-income and balanced fund categories SRI fund have higher average risk-adjusted returns than conventional funds.

3.3 Different market conditions

Nofsinger and Varma (2014) investigate the performance of socially responsible funds between 2000-2012. They identify equity funds that invest in the US market that can be considered SRI funds and compare the performance of the funds with conventional funds. They use Fama-French three factor model and Carhart four factor model to compute risk-adjusted returns for the SRI funds and conventional funds. Nofsinger and Varma find that during the financial crisis period the SRI funds outperform the conventional funds. However, in the non-crisis period the SRI funds underperform the conventional funds. They also find that the outperformance of the SRI funds during crisis period is driven by funds that concentrate on ESG issues and funds that use positive screens rather than negative screens. Nofsinger and Varma argue that the socially responsible characterises of a company make the company less risky during market crisis. They explain that for example good governance practices help company to better deal with challenges that crisis periods bring.

Motivated by the Nofsingers and Varmas (2014) study, Lesser, Rößle and Walkshäusl (2016) investigates if they get similar results with socially responsible funds that invest internationally. Lesser et all find no outperformance in SRI funds in either market conditions. Therefore, this suggests that the results from Nofsingers and Varmas study does not transfer to international funds. Lesser et al. argue that the outperformance of SRI funds in the US is driven by the abilities of the US fund managers who can exercise better stock-picking during bearish market conditions. Based on their findings they add that investors of SRI funds should look closely at the market regime the fund operates and the management of the fund to make better investment decisions.

Areal, Cortez and Silva (2013) investigate socially responsible and irresponsible funds' performance during different market conditions during 1993-2009. They find that irresponsible funds, for example funds that invest in unethical firms outperform in low-volatility market conditions and underperform during high-volatility market conditions. They find that the performance of SRI funds during different market conditions varies by the different social screens used in the funds.

Becchetti, Ciciretti, Dalo and Herzel (2015) compare the performance of SRI funds and conventional funds during 1992-2012. They compare 1213 funds that they define to be SRI funds to 21 860 conventional funds. Becchetti (2015) et al. cannot find clear outperformance of either fund during the hole sample period. However, they find that SRI fund generally performed better in the period after the financial crises. Becchetti et al. argue that SRI funds can be considered as insurance for ethical risk factors. Investors of SRI funds pay premium in a form of lower returns during market booms and are better protected from ethical risk factors during market crises., which leads to better after market crises.

3.4 Cost of capital

Goss and Roberts (2011) studies the relationship between corporate social responsibility and bank lending. They investigate sample of over 3900 loans to US firms and find that firms with low social responsibility performance, pay between 7 and 18 basis points more for their loans than firms without corporate social responsibility concerns. Thus, this suggests that banks consider bad CSR practises as a risk, which leads to worse loan terms.

El Ghoul, Guedhami, Kwok and Mishra (2011) investigate the effect of CSR on cost of equity. Using sample of 2809 unique firms from 1992 to 2007 and after controlling for firm specific, industry and year fixed effects, they find that firm with higher CSR scores have lower capital cost of equity. El Ghoul et al. also find that especially employee relations, environmental policies and product strategies are drivers for the lower cost of equity. However, diversity, human rights and community relations of firms do not lower their cost of equity. Dhaliwal, Li, Tsang and Yang (2011) find similar negative relationship with CSR performance and cost of equity. They find that after voluntary disclosure of CSR activities firms with good CSR performance get more institutional investors and analysis coverage. Additionally, these firms are more likely to raise capital after the disclosure than firms without the initiation of CSR disclosure. Moreover, Dhaliwal et al. find that after initiation of CSR disclosure, firms raise larger amount of equity capital than other firms that are raising capital and do not have CSR reporting.

Cheng, Loannou and Serafeim (2011) study the effect of firms CSR and the firms access to financing. They investigate firms from 49 counties during 2002-2009. They find that firms with better CSR have lower capital constrains and thus have better access to financing. Cheng et al. argue that firms with better CSR have lower capital constrains because of better transparency and stakeholder engagement. Better transparency reduces informational asymmetry between firm and the investors, thus lowering the risk. They also argue that better stakeholder engagement makes managers focus on long-term direction of the firm rather than short term. Moreover, Cheng et al. argue that firms with

better stakeholder engagements have better relationships with customer and employees which reduces agency costs and improves profitability potential. Cheng et al. analysis also finds that the biggest driver of the lower financing constraints of CSR firm are social and environmental factors.

Bassen, Meyer and Schlange investigate the effects of corporate responsibility to regulation of companies. They find that stronger commitment to CR has negative relation to regulatory risk. In other words, firms with stronger CR practises have lower risk exposure associated with regulation. Bassen et al. argue that risk is capital cost driver, and therefore companies with strong CR practices have lower cost of capital.

4 Theory

There are conflicting theories on the impact of ESG criteria on performance of stocks. Theories such as shareholder theory and the efficient market theory predict that using ESG criteria in investment decision does not lead to abnormal returns. On the other hand, stakeholder theory and adaptive market theory view that it is possible to achieve abnormal returns using ESG criteria.

4.1 Shareholder theory

The shareholder theory was first introduced by Friedman (1962; 1970). Friedman theories that firm's only purpose and responsibility is to generate profit for the shareholders in the limits of the law. He argues that operations that do not aim to generate profits lower the shareholders' decision power, and thus us a misuse of the shareholders' investments. According to Friedman only situation where firms should consider social responsibility over profits would be if free society is in stake. Moreover, he argues that firms' responsibility for society contributions should be only through corporate tax. Friedman (1970) argues that it is socially responsible for firm to maximize profits as they are serving the interest of their shareholders.

Brown, Helland and Smith (2006) argue that firm spending on activities that do not produce profits is an agency cost. They explain that when managers spend on what they think is a good cause, shareholders suffer an opportunity loss. Thus, managers can spend firm's money on causes that they think are important on the expense of the shareholders. According to Friedman (1962; 1970) these kind of agency problems are against the ethical rules of the free market and should be avoided by firms having only goal of increasing shareholder wealth. Therefore, shareholder theory views that efforts to strengthen companies' ESG profiles are not in the best interest for the company unless it benefits the shareholders.

4.2 Stakeholder theory

Stakeholder theory believes that firms should not only try to maximize their shareholders' wealth but rather act on best interest of all its stakeholders (Mansell, 2013). Thus, stakeholder theory rejects the idea of shareholder theory where company only focuses on one group of stakeholders, the shareholders. Furthermore, stakeholder theory views that firm cannot be ethical if it only focuses on increasing shareholder wealth (Mansell, 2013). Freeman (2008) argues that maximizing wealth of all the stakeholder also maximizes the wealth of the shareholders. He explains that for firm to have good services and products they need good relationships with their suppliers, employees, and communities. He adds that managers should try to focus stakeholders' interests on the same direction which then maximizes the value for all the stakeholders of the firm. The "joint interest" described by Freeman is for example company that provides good services to their customers and have motivated employees due to good working conditions can produce higher profits to their shareholders than a company that would only focus on their shareholders. Therefore, Freeman, Harrison, Wicks, Parmar and Colle (2010) argue that stakeholder theory and shareholder theory do not in practise necessarily differ in the purposes of the firms but rather how to drive for those purposes. Freeman et al. explain that in stakeholder theory firms try to maximize wealth creation for all their stakeholder's without prioritising one over another. In the other hand, shareholder theory states that trade-offs between stakeholders should be made if it benefits the shareholders' interests.

According to Freeman (1984) to serve all their stakeholders' interest, firm must identify their stakeholders. He adds that one tool for the identification is stakeholder map, which shows and categories the firm's stakeholders that have an impact on firm's success. Bourne and Walker (2005) argue that stakeholder mapping is an effective way for the firm to visualize their stakeholders and each stakeholders' influence on the company. A stakeholder map is illustrated in figure 7. Stakeholder listed in the figure 7 are examples and multiple more stakeholders can be added to the stakeholder map.
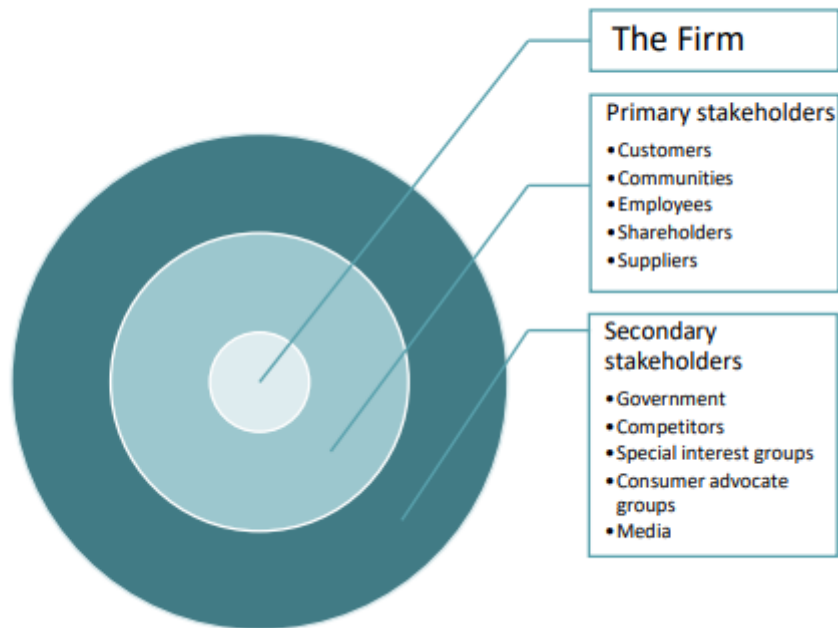
Figure 7.) Stakeholder map (Bourne and Walker 2005: Freeman 2008).

According to Bourne and Walker (2005) the primary stakeholders are the stakeholders that are most able to influence the company's operations. They continue that the secondary stakeholders have influence on company's operation, but the influence is not as powerful as the primary stakeholders. According to stakeholder theory ESG practices that benefit stakeholder also benefit the value of the company. Therefore, stakeholder theory views that strong ESG practices, for example better environmental standards that help communities or governance standard that benefit employees, positively drive the company's valuation.

4.3   The efficient market theory

The main purpose of the financial market is to allocate funds. In order to do this efficiently the pricing of the assets in the market should also be efficient. When the pricing is efficient, information in the market is reflected into the prices of assets at any given time. A market where all the prices reflect all the available information is considered efficient. (Bodie et al. 2014.)

According to Fama (1976) sufficient terms for efficient markets can be met when (i) there are no transaction costs, (ii) all information is available for free for all market participants and (iii) all the participants agree how the available information effect the prices of the market. Fama continues that when these terms are met all the available information is reflected into the prices and therefore the market is efficient. However, Grossman and Stiglitz (1980) argue that in practise it is impossible for a competitive market to meet this strict definition of efficient market all the time, as there are transaction costs in the market.   Also, Fama (1992) agrees that the strict definition does not hold in practice and he presents that weaker definition for efficient market is that the prices reflect the available information to the point where the profits don't exceed the costs for reacting to this information.

According to Fama (1976; 1992) there are three levels of market efficiency based on how the information reflect to the stock prices. The levels are weak form, semi-strong form, and strong form of market efficiency. According to Fama markets have weak form of efficiency when the stock prices reflect all information from the historical prices of the stocks. He explains that in this form of efficiency no one should be able to use historical prices to earn abnormal return. Fama adds that weak form of market efficiency can be tested by investigating how well can the previous returns predict future returns. The weak form implicates that known technical analysis methods are not profitable because all market participants already use them, and new buy and sell signals would immediately reflect to the prices (Bodie et al. 2014).

According to Fama (1992) in semi-strong form of market efficiency stock prices reflect all available public information of stock. This information also includes information that is not economical nature. Fama explains that when a semi-strong efficiency market stock prices change immediately after new public information is available to reflect this new information. He adds that semi-strong efficiency can be tested by observing how fast stock prices reflect new public information.

In the strong form of market efficiency markets reflect all public and private information (Fama 1992). According to Fama (1992) the strong-form market efficiency can be tested by investigating if there are investors with private information that does not reflect to the stock prices. Bodie et al. argues that strong form of efficiency is "quite extreme" because usually the company insiders have access to information before it becomes public, and it is possible for them to profit from the information. However, insider trading is illegal and there are institutions in place to prevent insider trading of happening. Bodie et al. adds that defining insider trading is not always easy as stock analyst are actively trying to discover information that is not publicly known making it sometimes hard to define what is private and what is public information.

The efficient market theory assumes that the markets are efficient. Therefore, as previously described investors should not be able to earn abnormal returns using public information. Thus, as ESG information such as ESG ratings for funds are publicly available information, according to the efficient market theory using ESG criteria in investment decision should not lead to abnormal returns.

4.4   Portfolio theory

One of the biggest questions for an investor is how to allocate their equity between different investments assets. Finding this best way for allocation is called portfolio theory (Elton and Gruber, 1997). Portfolio theory is vastly researched subject that was developed by Markowitz (1952). Markowitz does not view assets in a portfolio as individual

investments but also considers the relationships between the assets in the portfolio. This enables the portfolio to achieve better risk-return ratio than a portfolio that does not consider these portfolio's internal interactions (Elton and Gruber, 1997.) The process of finding optimal risk-return portfolios is called mean-variance analysis and it is illustrated in the figure 8. When maximising expected return-risk ratio investor invest in a portfolio that is on the line AB. This line is called the efficient frontier. (Elton and Gruber, 1997).
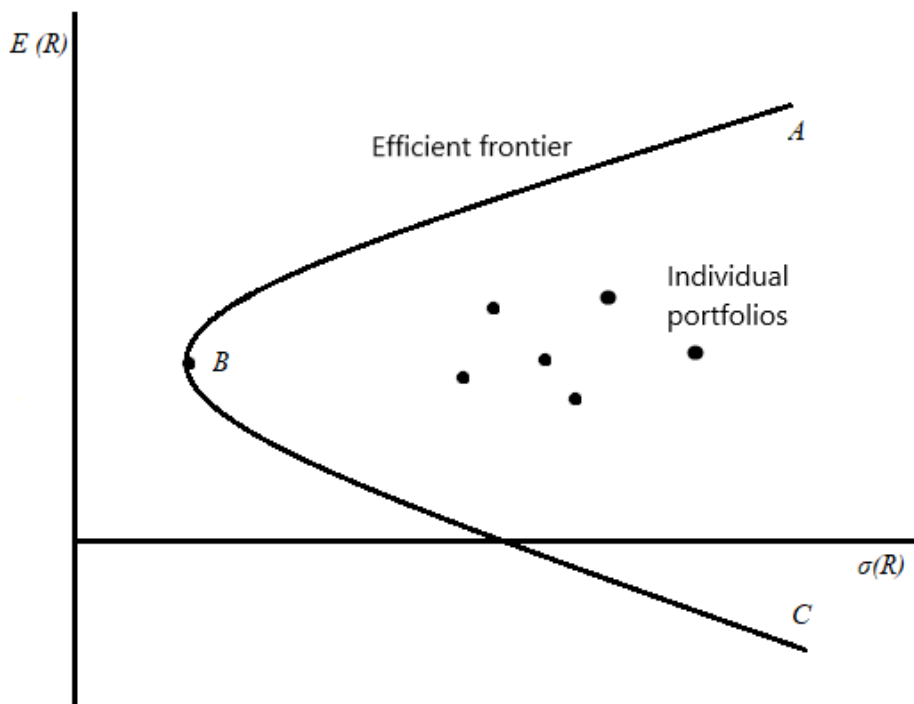
Figure 8). Efficient frontier **(**Elton and Gruber 1997).

Using ESG criteria in investing limits the investment universe thus limiting the diversification opportunities. Therefore, according to the modern portfolio theory investing based on ESG criteria can move a portfolio from the efficient frontier leading to suboptimal risk-return ration. However, there are also opposite views on the implications of smaller investment universe in the mutual fund performance research. Gil-Bazo, Ruiz-Verdu and Santos (2010) argue that smaller investment universe of the SRI mutual funds can improve the performance of these funds as the SRI fund managers can have better

knowledge of their investment pools. Additionally, Kacperczyk, Sialm and Zheng (2005) find that mutual funds with more concentrated holdings outperform diversified portfolios. They also argue that the outperformance might be driven from better knowledge of managers who focus on smaller investment universe.

4.5 Adaptive market theory

Lo (2017) suggests an alternative theory to efficient market theory called adaptive markets theory (AMT). Lo explains that adaptive market theory does not share the views of modern portfolio theory of market participants that are rational and trying to maximize their utility. Instead, adaptive market theory views market participant as different groups who have different investment horizons and are constantly adapting to the current market environment. In other words, the theory views that there are both rational and irrational investors in the market who are constantly adapting and learning. For example, the adaptive market theory views institutional investors, retail investors and hedge funds as different market participant groups (Lo, 2017). Lo argues that the level of market efficiency depends on the market's conditions and the composition of market participant groups. He adds that market that has many different market participant groups competing is likely to be more efficient. In the other hand, a market with small number of competing market participant groups is not as likely to be as efficient. Therefore, Lo argues that adaptive market theory can explain why markets cannot efficiently price new risks, such as ESG risks, as not all of the market participant groups are not investigating these risks. Andersson, Bolton and Samama (2016) find evidence supporting Lo's theory as they find that markets have not priced in carbon risk and arguing that the mispricing can be traced to institutional investors' limited attention to environmental factors.

4.6 ESG transmission channels

Giese, Lee, Nagy and Nishikawa (2019) identify transmission channels between ESG and company's performance using discounted cash flow (DCF) framework. The DCF model evaluates the value of the company from the present value of future cashflows discounted with cost of capital. The DCF formula is as follows:

(1) $$PV = \sum \frac{CF_t}{(1+r)^t}$$

, where PV is the present value of the company, CF_t is the cash flows at the time t and r is the cost capital.

Using the DCF model Giese et al. (2019) theorize two ESG investing idiosyncratic transmission channels and one systemic transmission channels using the discounted cash flow model.

4.6.1 Idiosyncratic transmission channels

Giese et al. (2019) argue that firm specific ESG factors effect firm's performance and risk. They explain that firms specific ESG factors have two transmission channels that affect firms' risk and performance through future cashflows in the discounted cash flows model. The first transmission channel is the cash-flow channel illustrated in figure 9 (Giese et al. 2019).

Figure 9.) Cash-flow ESG risk transmission channel (Giese et al. 2019).

Gregory, Tharyan and Whittaker (2014) argue that firms with good ESG practices are more competitive. They argue that this is due to ESG firms being able to use resources, develop human capital and manage innovation more efficiently. Moreover, Gregory et al. explain that strong ESG profile firms are generally better at creating long-term business plans and incentives for the management. They add that due to the competitive advantage of firms with good ESG practices these firm have higher profitability and higher dividends. Giese et al. (2019) find evidence supporting the cash-flow channel. They investigate ESG factors impact on firm profitability and dividends during 2007-2017 and find that high ESG rated firms have higher gross profitability and dividends.

The second transmission channel is idiosyncratic risk channel, and it explains the link between ESG profile and firms' operational risks (Giese et al. 2019). The channel is summarized in figure 10.

Figure 10.) Idiosyncratic ESG risk channel (Giese et al. 2019).

Jo and Na (2012) argue that companies with strong ESG profile and CSR engagement have on average better risk control and compliance standards. According to Godfrey, Merrill and Hansem (2009) because of the better risk control strong ESG firms have lower risk of severe incidents. Furthermore, they describe strong ESG practices as "insurance-like protection" during negative events. This lower risk of severe incidents leads to lower downside risk in the firm's stock price (Oikonomou, Brooks and Pavelin 2012).

Hoepner, Rezec and Siegl (2017) and Giese et al. (2019) find evidence supporting the idiosyncratic risk channel and the relationship of ESG profile and tail risk. Hoepner et al. find that firms that are high-ESG rated have lower partial moments, downside volatility and worst-case loss, thus these firm have lower tail risk. Giese et al. find similar results.

They use residual the CAPM volatility as measure for tail risk during 2007-2017 and find negative relationship between firms' ESG-rating and tail risk. Moreover, Giese et al. also investigate the impact of firm ESG-rating on the frequency of idiosyncratic incidents. They find that during 2007-2017 firms with high ESG rating have on average lower incident frequency than firms with lower ESG ratings.

4.6.2 Systematic risk transmission channels

Giese et al. (2019) analyse the impact of firms' ESG profiles on the exposure to systemic risk and illustrate the impact with systemic risk transmission channel. In the DCF model the exposure to systemic risks affects cost of capital, the denominator $(1 + r)$ in the DCF formula. Giese et al. argue that there is valuation channel where strong ESG profile leads to higher valuation. The valuation channel is summarized in figure 11.

Strong ESG Profile → 1. Low Systematic Risk → 2. Low Cost of Capital → 3. High Valuation

Larger Investor Base
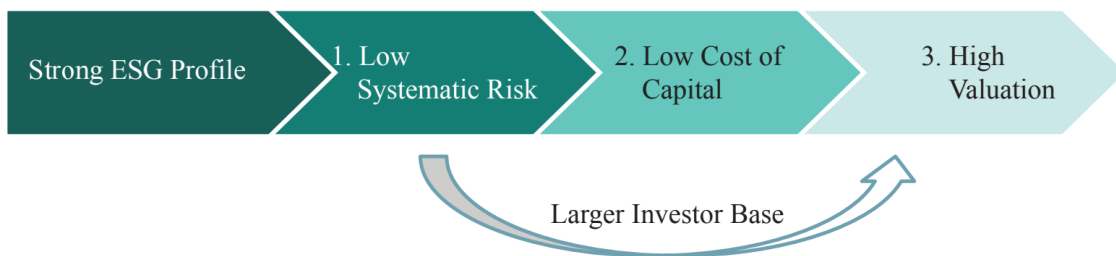
Figure 11.) Valuation ESG transmission channel (Giese et al. 2019).

Gregory et al. (2014) argues that companies with strong ESG profiles are more resilient to systematic shocks in the market and therefore the firms also have lower systematic risk. They explain that for example firms with good energy-efficiency leads to less vulnerability to changes in energy pricing and thus these firm have also lower systematic risk. Giese et al. (2019) use the CAPM to explain how lower systematic risk leads to lower cost of capital in the value chain. They argue that CAPM beta measures firms' exposure to systematic risk as well as shows the stocks risk premium as required rate of return. Therefore, firm with lower systematic risk exposure also has lower beta and investor of

the firm require lower return, which finally leads to lower cost of capital for the firm (Giese et al. 2019). Using DCF framework Giese et al. argue that firm with lower cost of capital has higher valuation in the valuation chain.

In addition to low systematic risk resulting higher valuation through low cost of capital, El Ghoul et al. (2011) argue that low systemic risk can impact valuation through relative size of the investor base. They argue that low ESG-rating companies have relative low investor base because of investor preferences and information asymmetry. El Ghoul et al. explain that risk-averse and socially conscious investors avoid investing in low ESG-rated firms. Furthermore, they argue that high ESG-rated companies are more transparent with their risk exposures and governance practices. Therefore, there is less information asymmetry between high ESG-rated companies and their investors compared to low ESG-rated companies and their investor.

5   Data & methodology

To investigate the ESG criteria's effect on mutual fund performance, this thesis uses sample of US based equity mutual funds that have received an ESG rating from Morningstar. To receive a rating a fund must have minimum of 67% of their holdings ESG valuated. Fund's ESG rating is based on the value weighted ESG ratings of the hold assets. The mutual fund data is collected from the Morningstar mutual fund database from January 1999 and October 2020. Data on excess market return, size-, value-, robustness, investment, and momentum factors in the US market from 1999 to 2020 is collected from Kenneth French data library. To investigate the impact of ESG rating, this thesis follows best-in-class and worst-in-class approach similar to for example Halbritter and Dorfleitner (2015). The funds are categorized based on their historical Morningstar ESG rating by picking top 20% of funds forming high ESG portfolio and the bottom 20% forming low ESG portfolio. The high (low) ESG portfolio represent funds with strong (weak) ESG profile. After excluding duplicate funds, for example funds that have same holdings but different minimum deposit, there are combined 326 funds in high and low ESG fund portfolios. Monthly closing prices of the 326 funds are collected between January 1999 and October 2020 (262 months) to calculate the monthly returns of the two ESG portfolios. Additionally, to investigate the ESG criteria's effect on mutual performance during market downturns dummy variable that depicts the lowest 10% of market returns is added to models. The dummy variable is 1 in the lowest 10% of market returns and 0 in the rest of the returns. The S&P500 index returns collected from Kenneth French data library are used as the market returns.

Information of funds' assets-under-management and investments style for the funds in the top and bottom ESG rating quintiles are collected from the Morningstar database. The average and median assets-under-management of the fund portfolios are summarized in table 2. Low ESG funds have more assets under management on average than in the high ESG fund portfolio. Moreover, the low ESG fund portfolio has higher median assets under management. High ESG portfolio has on average 1,53 billion dollar under management per fund when low ESG portfolio has 2,58 billion.

	Average assets under management (Mil)	Median assets under management (Mil)
(1) High ESG	1525.45	180.69
(2) Low ESG	2575.17	223.89
(1)-(2) Difference	-1049.72	-43.20

Table 2.) Average and median assets under management for high/low ESG portfolios.

Morningstar categorizes mutual funds based on their investment style using Morningstar style box. The style box is 9 square grid that represent mutual fund investing styles using market capitalization as well as value/growth factors. There are three investment style size categories, "small", "mid" and "large". Furthermore, there are value and growth category as well as blend category which is for fund that hold combination of value and growth stocks. The Morningstar fund investment style box is illustrated in figure 12. The funds placement in the investment style box is defined by the asset-weighted average of net value scores and growth scores of the stocks that the fund holds.
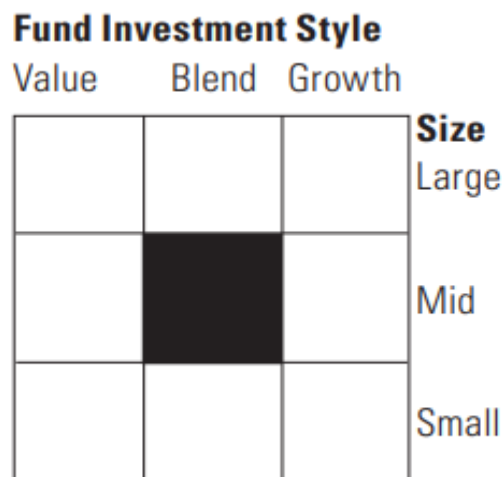
Figure 12.) Morningstar fund investment style box (Morningstar 2020).

In table 3 the investment style distributions of high ESG fund portfolio and low ESG fund portfolio are compared within the Morningstar style box. High ESG and low ESG portfolio's funds investment styles focus the most on large cap companies as 55.2% of high ESG portfolio and 50.7% of low ESG portfolios fund's investment style is large cap. For the rest of the distribution, high ESG funds are more focused on mid cap with 30,2% distribution compared to low ESG funds mid cap distribution of 15%. The low ESG funds are more concentrated to small caps with 34.2% of their distribution. Therefore, from size standpoint of investment style distribution, high and low ESG portfolios are relatively even in distribution to large caps. However, high ESG portfolio is more invested in mid-caps compared to low ESG portfolio which is more invested in small caps. Moreover, the high ESG funds are more invested in growth investment style than low ESG funds. On the other hand, low ESG funds are more invested in value than high ESG funds. The blend investment style is more popular with high ESG fund portfolio than low ESG portfolio with investment style distributions of 35.5% and 29.7%, respectively.

Investment style	High ESG Distribution	Low ESG Distribution
Large Value	16.3%	22.4%
Large Blend	19.8%	13.8%
Large Growth	19.2%	14.5%
Mid Value	2.9%	5.3%
Mid Blend	7.0%	6.6%
Mid Growth	20.3%	3.3%
Small Value	4.1%	11.8%
Small Blend	2.9%	15.1%
Small Growth	7.6%	7.2%

Table 3.) Investing style distributions of high/low ESG portfolios.

5.1 Methodology

This thesis' methodology follows previous SRI performance studies such as Nofsinger and Varma (2014), Renneboog et al. (2008) and Halbritter and Dorfleitner (2015). The previous studies all use OLS regression analysis with factor models such as the Sharpe (1964), Lintner (1965) and Moss' (1966) capital asset pricing model (CAPM) and Fama and French (1993) three-factor model (FF3) to analyse the performance of SRI investing. Additionally, this thesis adds Fama and French newer factor models the Fama and French (2015) five-factor model (FF5) and Fama and French (2018) six-factor model (FF6) to the return regression analysis. To investigate the impact of ESG rating of funds on fund performance best-in-class and worst-in-class approach similar to Halbritter and Dorfleitner (2015) is used. In this thesis high (low) ESG portfolio is formed from top (bottom) 20% US based mutual funds based on their historical Morningstar ESG rating. OLS regression analysis is conducted on the formed ESG portfolios' monthly returns between January 1999 and October 2020. Additionally, to evaluate the implication of ESG criteria during market downturns, dummy variable depicting the lowest 10% of the monthly market returns is introduced to the models. Monthly returns of the high and low ESG portfolios' funds are calculated from the monthly closing prices of the funds adjusting for possible dividends. Then, OLS regression analysis is conducted on the returns of portfolios using the CAPM, FF3-, FF5- and FF6 factor models to investigate possible abnormal return in the portfolios.

5.1.1 Capital asset pricing model

Capital asset pricing model (CAPM) developed by Sharpe (1964), Lintner (1965) and Moss (1966) is often used to measure performance of mutual funds. The CAPM is single factor model that uses market return as its factor. The model is as follows:

(2) $$E(R_i) - R_f = \alpha + \left[E(R_m) - R_f \right] \beta_i + \varepsilon_i$$

, where $E(R_i)$ is expected return, R_f the risk-free rate, $E(R_m) - R_f$ the excess return on market and β_i the slope of coefficient of the regression. The intercept α_i represents the excess return of the portfolio compared to the benchmark. To analyse the returns during market downturns dummy variable for lowest 10% of market returns is introduced to the model. The CAPM with the market downturn dummy is as follows:

(3) $$E(R_i) - R_f = \alpha D_{MD} + \left[E(R_m) - R_f\right]\beta_i + \varepsilon_i$$

, where D_{MD} is dummy variable that takes value of 1 during the 10% of lowest market returns and 0 otherwise.

5.1.2 Fama-French three-factor model

Fama and French (1993) introduces a three-factor model by extending the CAPM with two new factors, high minus low (HML) referred to as value factor and Small minus big (SMB) factor referred as the size factor. The HML factor is based on Fama's and French's findings of high book-to-market (BM) stocks outperforming the low book-to-market stocks. The HML factor is computed by calculating average return of high BM portfolio's minus low BM portfolio's return:

(4)   HML = 1/2 (Small Value + Big Value) − 1/2 (Small Growth + Big Growth).

The SMB factor controls for the risk related to company size. The SMB factor is computed by calculating the average portfolio return of small companies minus the average return of big companies, as follows:

(5)   SMB = 1/3 (Small Value + Small Neutral + Small Growth) − 1/3 (Big Value + Big Neutral + Big Growth).

The Fama-French (1993) three-factor (FF3) model is as follows:

(6) $$R_{it} - R_{ft} = \alpha + b_1[RM_t - R_{ft}] + b_2 SMB_t + b_3 HML_t + e_{it}$$

Where: R_{it} = total return of a stock or portfolio *i* at time *t*

R_{ft} = risk free rate of return at time *t*

RM_t = total market portfolio's return at time *t*

$R_{it} - R_{ft}$ = expected excess return

$RM_t - R_{ft}$ = excess return on the market portfolio

SMB_t = size premium (small minus big)

HML_t = value premium (high minus low)

$b_{1,2,3}$ = factor coefficients

e_{it} = error term

To analyse the returns during market downturns dummy variable for the lowest 10% of market returns is introduced to the Fama-French three-factor model:

(7) $$R_{it} - R_{ft} = \alpha D_{MD} + b_1[RM_t - R_{ft}] + b_2 SMB_t + b_3 HML_t + e_{it}$$

, where D_{MD} is dummy variable that takes value of 1 during the 10% of the lowest market returns and 0 otherwise.

5.1.3 Fama-French five and six factor models

Fama and French (2015) construct a new five factor pricing model by adding robustness and investment factor to their previous three-factor model. The added factors are based on Miller's and Modigliani's (1964) theorem. The robustness factor, known as robust-minus-weak (RMW) factor, is measured by calculating the average portfolio return of high profitability companies minus average portfolio return of low profitability companies. The investment factor, known as conservative-minus-aggressive (CMA) factor, is measured by calculating average portfolio return of companies with low investment rate

minus average portfolio return of companies with high investment rate. The Fama-French five-factor model is as follows:

(8) $R_{it} - Rf_t = \alpha + b_1[RM_t - RF_t] + b_2SMB_t + b_3HML_t$

$+b_4RMW_t + b_5CMA_t + e_{it}$

Where: R_{it} = total return of a stock or portfolio *i* at time *t*

R_{ft} = risk free rate of return at time *t*

RM_t = total market portfolio's return at time *t*

$R_{it} - R_{ft}$ = expected excess return

$RM_t - R_{ft}$ = excess return on the market portfolio

SMB_t = size premium (small minus big)

HML_t = value premium (high minus low)

RMW_t = robust premium (robust minus weak)

CMA_t = investment premium (conservative minus aggressive)

$b_{1,2,3,4,5}$ = factor coefficients

e_{it} = error term

To analyse the returns during market downturns dummy variable for the lowest 10% of market returns is introduced to the Fama-French five-factor model:

(9) $R_{it} - Rf_t = \alpha D_{MD} + b_1[RM_t - RF_t] + b_2SMB_t + b_3HML_t$

$+b_4RMW_t + b_5CMA_t + e_{it}$

, where D_{MD} is dummy variable that takes value of 1 during the 10% of lowest market returns and 0 otherwise.

In their study Fama and French (2018) add an additional factor to their five-factor model. The added factor is momentum factor known as up-minus-down (UMD) factor. The momentum factor is based on empirical findings in existing literature which suggests that

stock with recent past upside momentum tend to beat stock with recent past downside momentum. The Fama-French six-factor model is as follows:

(10) $$R_{it} - RF_t = \alpha + b_1[RM_t - RF_t] + b_2 SMB_t + b_3 HML_t$$
$$+ b_4 RMW_t + b_5 CMA_t + b_6 UMD_t + e_{it}$$

Where: R_{it} = total return of a stock or portfolio i at time t

R_{ft} = risk free rate of return at time t

RM_t = total market portfolio's return at time t

$R_{it} - R_{ft}$ = expected excess return

$RM_t - R_{ft}$ = excess return on the market portfolio

SMB_t = size premium (small minus big)

HML_t = value premium (high minus low)

RMW_t = robust premium (robust minus weak)

CMA_t = investment premium (conservative minus aggressive)

UMD_t = momentum premium (up minus down)

$b_{1,2,3,4,5,6}$ = factor coefficients

e_{it} = error term

To analyse the returns during market downturns dummy variable for the lowest 10% of market returns is introduced to the Fama-French six-factor model:

(11) $$R_{it} - RF_t = \alpha D_{MD} + b_1[RM_t - RF_t] + b_2 SMB_t + b_3 HML_t$$
$$+ b_4 RMW_t + b_5 CMA_t + b_6 UMD_t + e_{it}$$

, where D_{MD} is dummy variable that takes value of 1 during the 10% of lowest market returns and 0 otherwise.

6 Results

To investigate the risk-adjusted returns of the ESG-rating portfolios factor models, CAPM and Fama-French three-, five- and six-factor models are used. In the factor models alpha (α) represents the possible abnormal returns that cannot be explained by the factor model. Therefore, if factor models have statistically significant positive (negative) alpha in the regression analysis, it implicates that the portfolio produces (negative) abnormal returns. R-square, R2, represent the goodness-of-fit of the model. The higher the R2 is for a model better the model can explain the variance.

Table 4 represents the descriptive statistics of the excess monthly returns for the high and low ESG portfolios as well as the return difference of the two portfolios between January 1999 and October 2020 (262 months). As presented in table 4, high ESG portfolio's monthly mean excess return of 0.68% is 0.30 percentage points higher than the low ESG portfolio's mean excess return of 0.37%. This suggests that the without considering risk-adjustment, high ESG portfolio outperforms the low ESG portfolio. The medians of the portfolios have smaller difference compared to the means. High ESG and low ESG portfolio have medians of 1.01% and 0.95%, respectively. Therefore, both portfolios have negative skewness, and the skewness is lower for the low ESG portfolio compared to the high ESG portfolio. The negative skewness indicates that the monthly returns are more frequently positive with small gains and the negative return months are less frequent with larger losses. The kurtosis is higher for the low ESG portfolio with 0.24 difference to high ESG portfolio. The kurtosis suggests that there is higher probability for low ESG portfolio to have more extreme high gain and loss months. Therefore, kurtosis of the portfolios suggests that low ESG portfolio has higher financial risk than high ESG portfolio. The maximum monthly return is higher for the high ESG portfolio compared to the low ESG portfolio with maximum returns of 17.85% and 13.95%, respectively. Similarly, the minimum return is higher for the high ESG portfolio compared to the Low ESG portfolio with -18.04% and 18.83%, respectively. To summarize the mean and median of the two

portfolios suggest that before adjustment for risk the high ESG outperforms the low ESG portfolio.

	Mean	Median	Max	Min	STD	Skewness	Kurtosis
(1) High ESG	0.68	1.01	17.85	-18.04	4.86	-0.40	1.63
(2) Low ESG	0.30	0.95	13.95	-18.83	4.83	-0.70	1.87
(1) - (2)	0.37	0.06	3.90	0.79	0.03	0.30	-0.24

Table 4.) Descriptive statistics.

6.1 Factor model results

	Alpha	Mkt-Rf	SMB	HML	RMW	CMA	MOM	R2
High ESG								
(1)	0.134	0.931***	0.242***	-0.071	0.053	-0.049	-0.076***	0.882
	[1.22]	[32.63]	[6.16]	[-1.49]	[1.06]	[-0.74]	[-3.44]	
(2)	0.113	0.957***	0.221***	-0.020	0.033	-0.078		0.936
	[1.00]	[34.11]	[5.59]	[-0.44]	[0.65]	[-1.16]		
(3)	0.109	0.961***	0.206***	-0.038				0.875
	[1.01]	[38.90]	[5.83]	[-1.19]				
(4)	0.143	1.001***						0.858
	[1.25]	[39.66]						
Low ESG								
(1)	-0.282***	0.950***	0.242***	0.045	0.039	0.122*	-0.062***	0.886
	[-2.64]	[34.36]	[6.31]	[0.97]	[0.81]	[1.88]	[-2.88]	
(2)	-0.302***	0.970***	0.226***	0.086*	0.023	0.100		0.883
	[-2.78]	[35.83]	[5.87]	[1.91]	[0.46]	[1.53]		
(3)	-0.265***	0.953***	0.223***	0.133***				0.881
	[-2.54]	[39.99]	[6.50]	[4.24]				
(4)	-0.235**	0.989***						0.853
	[-2.03]	[38.82]						
High – Low								
(1)	0.416***	-0.037*	-0.043	-0.130***	-0.035	-0.061	-0.021	0.177
	[5.36]	[-1.77]	[-1.49]	[-3.74]	[-0.97]	[-1.27]	[-1.30]	
(2)	0.415***	-0.030	-0.048*	-0.116***	-0.041	-0.069		0.172
	[5.29]	[-1.48]	[-1.70]	[-3.51]	[-1.13]	[-1.44]		
(3)	0.374***	-0.013	-0.037	-0.158***				0.162
	[5.00]	[-0.74]	[-1.48]	[-6.82]				
(4)	0.378***	-0.015						0.002
	[4.56]	[-0.79]						

Table 5.) The OLS regression results from January 1999 to October 2020 with (1) Fama and French six-factor model, (2) Fama and French five-factor model, (3) Fama and French three-factor model and (4) the capital asset pricing model. Alpha represents the abnormal returns that cannot be explained by the factors. Mkt-Rf, SMB, HML, RMW, CMA and MOM represent the factor loadings of the beta coefficients. R2 is the R-squared of the regression indicating the goodness-of-fit of the models. T-statistics are presented in

brackets under the results. *, ** and *** show the statistical significance at the 10%, 5% and 1%, respectively.

When investigating the OLS regression results for the high ESG portfolio under hypothesis 1 "High ESG rated mutual funds have positive abnormal returns", it can be observed that there is lack of evidence to accept the hypothesis. The regressions for the high ESG-rated mutual funds generate positive intercept for the CAPM model and for the three Fama-French factor models. However, the intercepts are not statistically significant for any of the models. In other words, the models do not find significant abnormal returns for the high ESG-rated funds. Therefore, there is not sufficient evidence to accept the H1 and the hypothesis can be rejected.

When examining the results under H2 "Low ESG mutual funds have negative abnormal returns", evidence supporting the hypothesis can be found. For the low ESG-rated funds all the four factor models find significant negative abnormal returns at the 1% statistical significance level. The FF6 model has the highest R-squared of 0.886 out of the four models and it finds -0.282% monthly abnormal return for the low ESG-rated funds. The FF5 model has the second highest R-squared followed by FF3 model and then CAPM. The intercepts for the FF5, FF3 and CAPM are -0.302, -0.265 and -0.235, respectively. Based on these findings the H2 can be accepted as all the used models find statistically significant negative abnormal returns for the low ESG funds. As stated earlier in this study, if either of the alternative hypotheses are accepted the null hypothesis will be rejected. Therefore, as there are findings of significant abnormal returns and alternative hypotheses H2 is accepted, H0: "Incorporating ESG criteria in mutual fund selection does not lead to abnormal returns" can be rejected.

The regression results from the spread between high and low ESG returns are similar for all of the used models. The models find positive alphas that are statistically significant at the 1% level. The monthly alphas for the high-low ESG return for CAPM, FF3, FF5 and FF5

models are 0.378, 0.374, 0.415 and 0.416, respectively. This indicates that high ESG mutual funds outperform the low ESG mutual funds on average. Based on these findings, H4: "High ESG mutual funds have higher risk-adjusted returns than low ESG mutual funds", can be accepted.

Continuing with analysis of the additional beta coefficients to intercept in the OLS regressions, similarities in the models can be observed. For all the models on both high ESG funds and low ESG funds the market factor is positive and statistically significant at the 1% level. This implicates that for the high ESG funds as well as for the low ESG funds, market factor is significant driver of returns. Similar observation can be made for the size factor, SMB, as the size factor is positive and significant in all the models for high and low ESG funds. Therefore, this implicates that both portfolios are exposed to small stocks. The coefficient for value factor, HML, for the high ESG funds are not statistically significant for the used models. However, for the low ESG fund portfolio FF3 model and FF5 model have significant positive value factor coefficients at the 1% and 10% levels, respectively. This indicates that the low ESG fund portfolio has more exposure to value stocks. This is supporting the previously presented Morningstar investing style box data that showed that low ESG fund portfolio was more allocated to the value companies than growth companies whereas the focus for high ESG funds was leaned towards growth companies. For the profitability factor, RMW, and investment factor, CMA, the coefficients in the models are not statistically significant expect for FF6 model on low ESG portfolio. The RMW loadings are positive for both high ESG and low ESG portfolios. The CMA loadings are negative for the high ESG portfolio whereas the CMA loadings for the low ESG portfolio are negative. This indicates that the low ESG portfolio includes firms that invest more conservatively compared to the high ESG portfolio. The FF6 model's momentum factor is statistically significant and negative for both low and high ESG portfolios.

In the previous findings no statistically significant abnormal returns for the positive ESG screened funds can be found. This finding supports the efficient market hypothesis

where publicly available ESG information should not lead to positive abnormal returns as this information is already reflected to the stock prices. The finding is also supported by the views of shareholder theory, where only actions that benefit the shareholders should be focused on. This study also finds that low ESG funds produce negative abnormal returns. Additionally, the thesis finds that high ESG mutual funds outperform low ESG mutual funds These findings support previous studies, such as Hoepner et al. (2019), Ihan et al. (2019) and Verwijmeren and Derwall (2010), which find that companies with weak ESG practices have larger downside-risk as well as the ESG risk-channel as well as the previously presented ESG transmission channels theory of Giese, Lee, Nagy and Nishikawa (2019).

6.2 Market downturns

	Alpha	Mkt-Rf	SMB	HML	RMW	CMA	MOM	R2
High ESG								
(1)	0.387	1.008***	0.400**	-0.127	0.208	0.104	-0.156*	0.806
	[0.28]	[5.10]	[2.73]	[-1.14]	[1.18]	[0.53]	[-2.07]	
(2)	1.167	1.146***	0.266*	-0.040	0.175	-0.002		0.762
	[0.82]	[6.88]	[1.88]	[-0.36]	[0.93]	[-0.01]		
(3)	1.359	1.110***	0.246*	0.030				0.750
	[0.98]	[6.10]	[1.82]	[0.445]				
(4)	1.778	1.200***						0.695
	[1.23]	[7.39]						
Low ESG								
(1)	0.090	1.103***	0.404***	-0.039	0.333*	0.061	-0.065	0.843
	[0.07]	[6.81]	[2.87]	[-0.36]	[1.97]	[0.31]	[-0.90]	
(2)	0.416	1.161***	0.348**	-0.002	0.319*	0.017		0.837
	[0.33]	[7.85]	[2.77]	[-0.02]	[1.90]	[0.09]		
(3)	0.779	1.093***	0.308**	0.133*				0.800
	[0.59]	[7.18]	[2.38]	[2.05]				
(4)	1.655	1.247***						0.653
	[1.00]	[6.72]						
High - Low								
(1)	0.297	-0.095	-0.004	-0.088	-0.125	0.043	-0.091*	0.492
	[0.36]	[-0.95]	[-0.05]	[-1.34]	[-1.20]	[0.36]	[-2.03]	
(2)	0.751	-0.015	-0.082	-0.037	-0.144	-0.018		0.382
	[0.89]	[-0.15]	[-0.98]	[-0.57]	[-1.29]	[-0.15]		
(3)	0.580	0.017	-0.062	-0.102*				0.314
	[0.69]	[0.18]	[-0.76]	[-2.50]				
(4)	0.122	-0.047						0.008
	[0.13]	[-0.44]						

Table 6.) The OLS regression results from January 1999 to October 2020 with market downturn dummy that takes value of 1 during lowest 10% market returns and value of 0 otherwise. The dummy is introduced to the (1) Fama and French six-factor model, (2) Fama and French five-factor model, (3) Fama and French three-factor model and (4) the capital asset pricing model. Alpha represents the abnormal returns that cannot be explained by the factors. Mkt-Rf, SMB, HML, RMW, CMA and MOM represent the factor loadings of the beta coefficients. R2 is the R-squared of the regression indicating the goodness-of-fit of the models. T-statistics are presented in brackets under the results. *, ** and *** show the statistical significance at the 10%, 5% and 1%, respectively.

When investigating the regression results for the crisis period few observations can be made. For the factor models the R-squared rises when more factors are added to the models. In other words, for the high and low ESG portfolios FF6 factor model has the highest R2 of the used factor models which implicates that it has the best fit out of the used models. When examining the results for the models with market downturn dummy variables few observations can be made. The high ESG portfolio has positive alphas across all the used models. However, these alphas are not statistically significant. The alphas of the high ESG portfolio for the FF6, FF5, FF3 and CAPM are 0.387, 1.167, 1.359 and 1.778, respectively. Similarly, the low ESG portfolio has positive alphas that are not statistically significant for any of the models. Low ESG portfolio alphas for the FF6, FF5, FF3 and CAPM are 0.090, 0.416, 0.779 and 1.655, respectively. The alpha spread of high minus Low ESG portfolio returns is positive for all the models. This would suggest that high ESG portfolio outperforms low ESG portfolio during market downturns. However, the high minus low ESG alphas are not statistically significant. When examining these results under H3 "High ESG mutual funds have positive abnormal returns during market downturns", the H3 cannot be accepted as the alphas for the used models are not statistically significant.

This thesis cannot find similar statistically significant abnormal returns for high ESG funds during market downturn as for example Nofsinger and Varma (2014). These findings of ESG implications during market downturns support the view of efficient market theory that predicts that abnormal returns cannot be achieved with using ESG criteria in investment decision.

6.3   Summary of the results

This chapter summarizes the results of this thesis and further analyses the OLS regression results. Four regression models are used in this thesis, the CAPM, Fama-French three factor model (FF3), Fama-French five factor model (FF5) and Fama-French six factor model (FF6). The regression is run on sample time period of 1999 to 2020.

Additionally, market downturn dummy is added to the models to investigate the implications of ESG during market downturns. The investigated portfolios are formed by best-in-class and worst-in-class approach by taking the bottom 20% and top 20% of US equity mutual funds based on their historical Morningstar ESG rating also known as Morningstar sustainability rating (MRS).

6.3.1 CAPM

The Capital asset pricing model has only one factor, the market factor $(E(R_m) - R_f)$. Therefore, as expected in the CAPM regression results the market factor is positive and significant for high ESG and low ESG portfolios during hole sample 1999-2020 and sub-sample 1999-2010. The model's goodness-of-fit measure, R-squared, of the CAPM is the lowest of the four factor models used in this thesis in all the portfolios and time samples. For the 1999-2020 sample period the CAPM produces significant negative alpha for the low ESG rated portfolio and non-statistically significant positive alpha for high ESG portfolio. Therefore, according to the CAPM low ESG funds have negative abnormal returns and high ESG funds do not have abnormal returns. The alpha for the high minus low ESG portfolio returns is statistically significant and positive. This suggest that according to the CAPM high ESG funds outperform low ESG funds in the thesis sample. The CAPM with the market downturn dummy variable finds positive alphas for the high ESG portfolio and low ESG portfolio but the alphas are not statistically significant. The spread of high minus low ESG for the dummy variable model is positive and not statistically significant.

6.3.2 FF3

Fama and French (1993) three factor model adds size factor (SMB) and value factor (HML) to the CAPM's market factor $(E(R_m) - R_f)$. Similar to the CAPM, the FF3 model's market factor is positive and significant in both portfolios. Moreover, the same finding is made with the size factor implicating that both portfolios are exposed to small stocks. However, the value factor is statistically significant only in the low ESG portfolio

suggesting that low ESG portfolio lean more towards funds that hold value companies. The R-Squared of the FF3 is the second lowest after CAPM in all the portfolios. In the hole time sample FF3 model's alphas are in line with CAPM. The FF3 finds significant negative abnormal return for the low ESG funds and finds no abnormal return with high ESG funds. The high minus low ESG return spread is positive and statistically significant for the FF3 model again suggesting that high ESG funds outperform low ESG funds. When introducing the market downturn dummy variable to the FF3 model positive alphas are produce for both portfolios. However, the alphas are not statistically significant. The spread of the high and low ESG alphas are positive and not statistically significant for the FF3 with dummy variable.

6.3.3   FF5

The Fama and French (2015) five-factor model adds robustness (RMW) and investment factor (CMA) to the FF3 model. The FF5 model has the second highest R-squared in both high and low ESG portfolios, excluding results of high ESG portfolio where FF5 model has the highest R-squared. This implicates that adding factors to the CAPM and FF3 improves the amount of variance the model can explain and thus producing more accurate results. The spread of (high minus low) ESG loadings of CMA and RMW are negative. This suggest that high ESG funds are more exposed to firms that invest more aggressively compared to low ESG funds, and low ESG funds are more exposed to more profitable firms compared to high ESG funds. FF5 model cannot find any statistically significant abnormal returns in the high ESG portfolio. However, the model finds, similarly to the other models, negative abnormal returns for the low ESG funds. When analysing the spread of high minus low ESG the model finds statistically significant and positive alpha suggesting outperformance in high ESG portfolio compared to the low ESG portfolio. When introducing the market downturn dummy variable to the model it finds positive alpha for the high ESG portfolio as well as the low ESG portfolio. The high minus low ESG alpha is also positive. However, the alphas for the FF5 with the dummy variable are not statistically significant.

6.3.4 FF6

The Fama and French (2018) six-factor model adds momentum factor (UMD) to the previous five-factor model. As previously mentioned, the FF6 model has the highest R-square in all portfolios and time periods except in high ESG funds during the hole sample period. The added momentum factor is statistically significant and negative. This suggest that the high and low ESG portfolios are not exposed to momentum stocks. The FF6 model finds significant negative abnormal returns in the low ESG funds. The model does not find any statistically significant abnormal returns in the high ESG portfolio. For the spread of high minus low ESG the model finds statistically significant positive returns. This implicates that according to the FF6 high ESG portfolio outperforms the low ESG portfolio. Adding the market downturn dummy variable to the FF6 model produces positive alphas for high ESG portfolio and low ESG portfolio as well as for the high minus low ESG. However, these alphas are not statistically significant in the regression analysis.

7   Conclusions

The purpose of this thesis is to investigate the effect of ESG criteria on mutual fund performance. The thesis concentrates on US based equity mutual funds that have received ESG rating from Morningstar. For fund to receive a Morningstar ESG rating minimum of 67% of asset their holding must have been ESG analysed. The study is conducted on these funds between January 1999 and October 2020.

Different economic theories predict different relationships between ESG criteria and fund performance. Efficient market theory predicts that ESG rating of a fund should not impact fund's returns. In the other hand, adaptive market theory predicts that it is possible that abnormal returns occur with different ESG ratings. Moreover, shareholder theory views that socially responsible efforts are distraction from the main purpose of the companies, maximizing the shareholder profits. Contrarily, stakeholder theory views that maximizing profits for all the stakeholders maximizes the value of the company and thus good ESG practices that benefit for example employees and the community is seen to benefit the company.

As demonstrated by Friede, Bush and Bassem (2015) in their meta-analysis study of 2200 previous SRI performance studies the portfolio level results on ESG incorporations implication on performance are mixed. Revelli and Viviani (2015) argue that the nature of mixed results of previous SRI literature on portfolio performance is driven by differences in methodologies, for example thematic approach and investment horizon. Moreover, Giese, Lee, Nagy and Nishikawa (2019) identify transmission channels between ESG and company's performance using discounted cash flow (DCF) framework. They argue that strong ESG profile of a company lowers the probability of severe negative incidents as well as the tail risk of the company which can lead to superior performance during uncertain market conditions such as during crises. Nofsinger and Varma (2014) find evidence supporting this theory as they find that SRI funds overperform conventional funds during market crises. This thesis aims to add to the SRI literature by evaluating the main SRI strategy of modern SRI, ESG corporations, performance by using ESG rating analysis

from Morningstar and the newest factor models. The returns of the formed ESG portfolios are evaluated with OSL regression analysis using the CAPM, and Fama and French three-, five-, and six-factor models.

The methodology of this thesis follows previous SRI performance literature, such as Nofsinger and Varma (2014), Renneboog et al. (2008) and Halbritter and Dorfleitner (2015). All the previously mentioned studies use factor models, such as Fama and French (1993) three-factor model to evaluate the performance for possible abnormal returns. This thesis adds newer versions of Fama and French factor models, Fama and French five-factor model (2015) and Fama and French six-factor model (2018), to the analysis. Furthermore, this thesis uses similar best-in-class and worst-in-class approach as Halbritter and Dorfleitner (2015). In this thesis high (low) ESG portfolio is formed from top (bottom) 20% US based mutual funds based on their historical Morningstar ESG rating. OLS regression analysis is conducted on monthly returns of the formed ESG portfolios during 1999-2020. Additionally, to evaluate the implication of ESG criteria during market downturns, dummy variable for market downturns is introduced to the models similarly to Nofsinger and Varma (2014). The dummy variable used in this thesis takes value of 1 for 10% of lowest market returns and 0 otherwise.

This thesis finds that low ESG funds have statistically significant negative abnormal returns between 1999 and 2020. The CAPM, FF3, FF5 and FF6 models all find negative alphas for the low ESG fund portfolio at the 1% significance level. Fama and French six-factor model (2018) has the highest R^2 of 0,88 and it finds monthly negative abnormal return of -0,28%. This finding supports Giese et al. (2019) ESG risk transmission channel theory which predicts that companies with weak ESG profile leads to higher tail risk. Moreover, the results are in line with Hoepner et.al (2019) and Ihan et al. (2019) who find that companies with lower engagement in ESG issues have bigger downside risk. For the high ESG fund portfolio statistically significant abnormal returns cannot be found with any of the factor models used in this thesis. This lack of found abnormal returns supports the efficient market theory which predicts that ESG criteria is already reflected

into the price and thus no positive abnormal returns can be achieved using ESG integration when investing in funds. When comparing the returns of high and low ESG portfolios this thesis finds evidence that high ESG funds outperform low ESG funds. All of the used models find statistically significant positive alphas for high minus low ESG returns. The monthly alphas for high minus low ESG with FF6, FF5, FF3 and CAPM are 0.416%, 0.415%, 0.374% and 0.378%, respectively. The finding of high ESG funds outperforming low ESG funds supports the ESG transmission channel theory of Giese, Lee, Nagy and Nishikawa (2019). They argue that strong ESG profile leads to lower tail risk and to higher valuation.

To investigate previous findings and theory of ESG criteria effecting the performance during market downturns, dummy variable depicting the lowest 10% of market returns is introduced to the models. The high ESG portfolio has positive alphas across all the used models with market downturn dummy variables. However, these alphas are not statistically significant. The alphas of the high ESG portfolio for the FF6, FF5, FF3 and CAPM are 0.387, 1.167, 1.359 and 1.778, respectively. Similarly, the low ESG portfolio has positive alphas that are not statistically significant for any of the models. Low ESG portfolio alphas for the FF6, FF5, FF3 and CAPM are 0.090, 0.416, 0.779 and 1.655, respectively. The alpha spread of high minus low ESG portfolio returns is positive for all the models. This would suggest that high ESG portfolio outperforms low ESG portfolio during market downturns. However, the high minus low ESG alphas are not statistically significant and therefore this thesis does not find statistically significant abnormal returns during market downturns. From theorical standpoint, this finding supports the efficient market theory on ESG criteria's value creation in the markets.

This thesis finds evidence that for a mutual fund investor it can be beneficial to take ESG criteria into account in investment decision. Even though, this thesis could not find statistically significant abnormal returns for the high ESG funds, it finds that high ESG funds outperform low ESG funds. The Morningstar ESG fund ratings are publicly available and therefore the investors can easily obtain ESG information for funds.

Regarding the future SRI research, with the recent introduction of public ESG ratings, such as one provided my Morningstar, this opens an avenue to research on the many possible implications of these ratings. For example, research on the ESG ratings' impact on fund flows or difference of ESG ratings between different rating providers could offer interesting research results.

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