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**The empirical investigation of the difference
between socially responsible and vice investing
returns**

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Abstract:

Socially responsible investing has increased significantly in recent years due to the increased demand. The ideology of socially responsible investing is to invest in businesses that support sustainable and ethical choices. Alongside it has developed an opposite vice investing strategy. In the vice investing strategy, the investors see that the related assets are undervalued due to their reputation and possible risks.

This research examines the difference between the risk-adjusted returns of socially responsible- and vice investing strategies in the United States from 2018 to 2021. The performance evaluation is done by the Capital Asset Pricing Model, Fama & French three- & five-factor models, Carhart's four-factor model, Jensen's alpha, and the Sharpe ratio.

The research results indicate that the socially responsible investing strategy outperforms the vice investing in all models. The results are not statistically significant. Thus, the academic evidence of the findings is weak. However, the research offers a solid ground for future studies.

Keywords Finto: <http://finto.fi/yso/fi/?clang=fi&anylang=on>

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Acronyms

AMEX	The American Stock Exchange
AP	Authorized Participant
CAPM	Capital Asset Pricing Model
ESG	Environmental, Social, Governance
ETF	Exchange Traded Fund
MPT	Modern Portfolio Theory
NASDAQ	National Association of Securities Dealers Automated Quotations
NAV	Net Asset Value
NAVi	Net Asset Value intraday
NYSE	New York Stock Exchange
SPDR	Standard and Poor's Depository Receipts
SRI	Socially Responsible Investing
UK	The United Kingdom
US	The United States

1 Introduction

Social responsibility as a topic seems to be more critical for individuals than ever before. It may cause hard choices for individuals. For example, whether to make sustainable activities that support sustainability and whether it should affect individuals' investment decisions. Consequently, the market capitalization of socially responsible investments (SRI) has increased significantly in recent years and, therefore, it cannot be avoided in the academic discussion.

In a turn of SRI- funds, the opposite, vice investing has also become alternative option. The assumption is that the vice investing strategy is more or less a consequence of the confrontation of the socially responsible- and vice investing strategies. The opposite alternatives usually always make individuals choose their side. Thus, individuals who do not support socially responsible investing may choose vice investing because they see it as an alternative to SRI. Therefore, vice investing offers an excellent option for socially responsible investing and vice versa.

However, the shared driver for both investment strategies for increased market capitalization has been the development of the financial markets as the supply of socially responsible and vice securities has increased significantly in recent years. The effect is related to the increased supply of exchange-traded funds, which provides an easy way for investors to invest in socially responsible and vice-related securities. Nonetheless, the market capitalization of vice investments is still considerably smaller than the size of socially responsible investments.

1.1 Purpose of the research

In short, the drivers of socially responsible investing rely on argument that ethical choices reflect in long-term returns. The primary purpose is to avoid possible risks caused by the unethical decisions made by the companies. Thus, the idea is to support ethical and sustainable businesses. In comparison, investors using a vice strategy usually

believe that the companies' market valuation is too low because some investors are avoiding them. However, this research will examine the opposites mentioned above from a neutral perspective.

The purpose of the research is to empirically investigate the difference between socially responsible investing and vice investing. Thus, the results indicate whether the socially responsible investing outperform the vice investing, vice versa or does it make any difference.

The research includes data from seven socially responsible and vice exchange-traded funds (ETF) from the United States from 2018 to 2021. The socially responsible exchange-traded funds are randomly selected. The vice exchange-traded funds include the primary vice industries based on the general opinion of the vice industries. The study does not examine the costs of ETFs since the focus is on risk-adjusted returns. The research period includes the time of the Corona pandemic. Therefore, the research results indicate how the opposites perform in specific market conditions, as in the Coronavirus pandemic or an in a similar market environment.

1.2 Hypothesis

The topics such as socially responsible- and vice investing exchange-traded funds are still novel. Especially the vice exchange-traded funds have become more familiar in the 2010s as their supply has increased significantly. However, the number of vice-related previous studies is still weak. Former studies about socially responsible investing, presented in more detail in chapter 5, have been made by mostly comparing socially responsible investing funds to conventional mutual funds. Hence, due to ETFs and the confrontation of vice and socially responsible investing strategies, this research essentially differs from the previous studies.

The results of former studies of the socially responsible investing strategy are for and against the SRIs. The primary variable of the results from the previous studies is the

research period. The second variable is the performance evaluating method. Therefore, the general finding is unknown, and the results depend on research period and performance evaluation methods. Moreover, as noted above, most former studies have not directly compared the socially responsible- and vice investing.

According to the heterogenous SRI and vice investing, as they represent opposites of each other's, there could be a statistically significant difference between them. There is no assumption on which one of the opposites will outperform the other if there is any difference. The hypotheses are presented below:

H_0 : *There is no statistically significant difference between the socially responsible and vice investing returns*

H_1 : *There is statistically a significant difference between the socially responsible and vice investing returns*

If the results are not statistically significant, the null hypothesis remains valid, and the H_1 is rejected.

1.3 Structure of the research

The research includes eight sections: introduction, exchange-traded funds, socially responsible investing, vice investing, literature review, data & methodology, results, and conclusions & discussion. The subchapters are related to the sections but are more detailed. The chapters have been distributed as far as possible to do the research as clearly as possible. The order of the sections has been implemented in an introductory way. Thus, the research reader has the ability for a sufficient understanding of the topic covered in each section.

The chapter two about ETFs is presented before the Vice & SRI chapters because the study uses the exchange-traded fund's data. Thus, the research reader has better knowledge about the exchange-traded funds after the ETF part and, therefore, the ability

to understand the empirical part of the research. Hence, understanding the mechanism of exchange-traded funds is essential.

The data & methodology part presents the research data used and the methodology. Thus, the section demonstrates how the research is executed. The results section presents the performance evaluation. The research uses the single-factor and multi-factor models as Jensen's alpha, Capital Asset Pricing Model, Fama & French three- and five-factor model, Carhart's four-factor model, and Sharpe ratio.

Finally, after all the previous chapters is the conclusions and discussion. The conclusion summarises the study's findings and discusses the possible factors that may affect the research and could be considered in future studies.

2 Exchange-traded funds (ETFs)

As a natural continuation, ETFs have become a revolutionary invention during the 21st century, and their popularity is expected to grow further. In 1993 the first ETF, Standard and Poor's Depository Receipts (SPDR), which purpose is to track S & P 500 index, were released by State Street and listed on the American Stock exchange (AMEX) (Lettau, M. & Madhavan, A. 2018). Due to the low costs, tax benefits, and transparency, the market share growth of s ETFs has been significant (Madhavan, A., & Sobczyk, A, 2016). At the beginning of the 21st century, the total number of ETFs was only a few dozen, but in 2020 the total amount was over 7600 ETFs (Statista 2021). Furthermore, the market capitalization of ETFs has increased from the millions to the trillions (Mahdavan et al., 2016). The development of the ETFs is presented in the figure 1 below. Data of the figure is from Statista (2021).

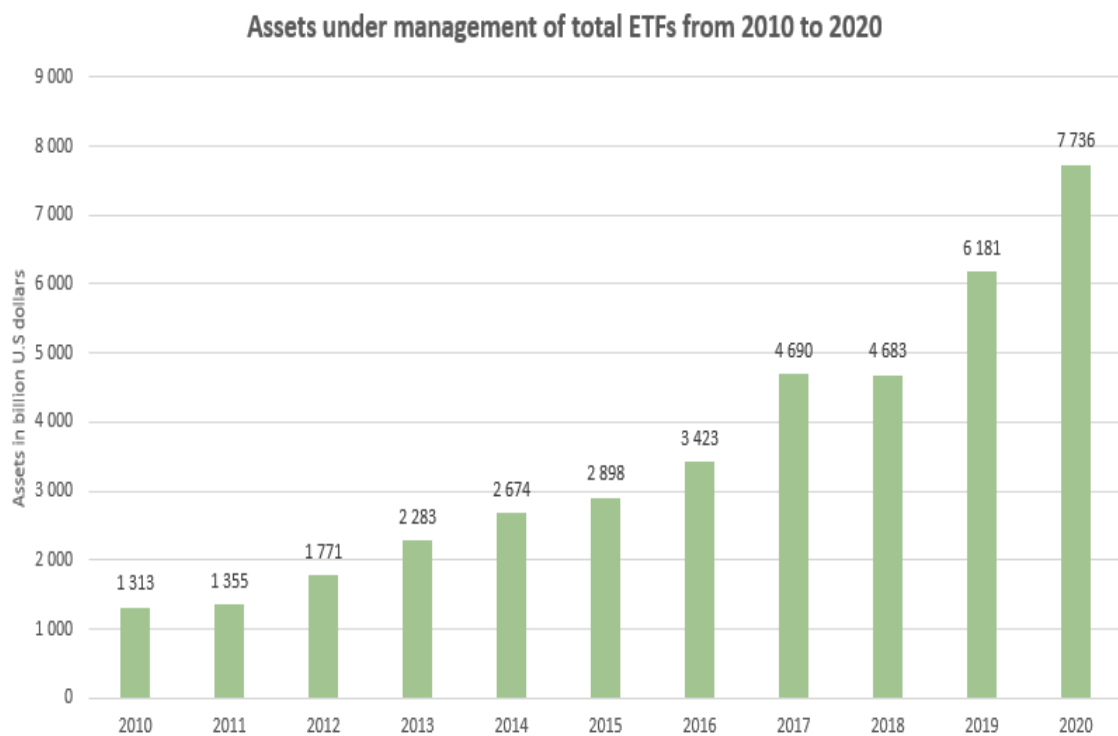


Figure 1. Exchange traded funds development (Statista, 2021)

The ETFs are exchange-traded funds managed as traditional mutual funds, especially index funds. ETFs can be very different from conventional mutual funds due to their rules. For example, ETFs can be actively or passively managed and have any other benchmark or track any index. Thus, the most significant differentiating factor between the ETF and conventional fund is that the ETFs can be traded in the exchange. The holder of the ETF indirectly owns the investment instruments it contains, such as shares, bonds, derivatives and other investment securities.

Furthermore, ETFs can be traditional or synthetic. (Ferri, R. A. 2009). However, most ETFs are passive and track the selected Index (Lettau et al. I, 2019). All the ETFs used in this research are passive and traditional ones.

The ETFs can be considered a bucket full of securities, such as stocks, which can be traded in the marketplace. Although ETF's history in the financial markets is not very long yet, ETFs are considered transparent investment security. Market demand has grown significantly due to the structure of ETFs and third-party assistance (Lettau et al., 2019).

2.1 Basic introduction of the ETFs structure

As noted, ETFs can be considered, for example, as the bucket of stocks. However, it is worth looking more closely at how the price of an ETF is generally constructed on exchange and why it is tracking the underlying index without a long-term pricing difference, which is called tracking error. Understanding this is essential, as otherwise, there could be ongoing tracking errors in the marketplace if the pricing were based on the bid and ask prices of directly traded ETFs without any third-party assistance (Ferri, 2009). The purpose of the research is not to focus on ETFs more than it is essential. However, it is necessary to open the credibility of the ETFs because the research uses ETFs' data. Therefore, only the main elements of the structure are presented below.

2.2 Net Asset Value (NAV)

One of the critical financials for exchange traded funds is the net asset value (NAV). The net asset value is the total sum of all the securities of the ETF after reducing all the liabilities of the ETF's underlying securities. Therefore, the NAV can be seen as an actual value of the exchange traded fund. The market value of the ETF is the current value. The NAV is typically calculated once a day, usually after the trading hours, whereas the net asset value intraday (NAVi) is calculated every fifteen seconds (ETF, 2022). The formula of the NAV is presented below in formula 1:

$$\text{Net Asset value (NAV)} = \frac{\text{Underlying value of a fund}}{\text{Number of shares outstanding}} \quad (1)$$

The task of the exchange traded fund manager is to track the underlying index as good as possible. Thus, the fund manager has performed well if the tracking error is minimal and vice versa. NAV is the actual value of the ETF. However, NAV is calculated once daily, therefore, minor tracking errors are not unusual. The tracking error refers to a price difference of the assets inside the exchange traded fund and market price of the ETF. If the exchange traded fund NAV is higher as the market price of the ETF is trading on discount. If the NAV is less as the market price, the ETF is trading on discount (ETF, 2022).

Furthermore, tracking error refers to the difference between the standard deviation of the return differences (Elia, M. 2012). Hence, the wider the tracking error is, the more the ETF price differs from the underlying index and vice versa (Ferri, 2009). Thus, the amount of tracking error measures how sensitively the ETF manager can follow the underlying index. The equation "NAV Tracking Error" defined by Picotti (2014) is presented below as:

$$\text{NAV Tracking Error (TE}_{i,t}) = (r_{i,t}^{\text{NAV}} - r_{i,t}^{\text{Index}}) \times 100, \quad (2)$$

Where $r_{i,t}^{NAV}$ describes arithmetic returns of the securities inside the ETF. The $r_{i,t}^{Index}$ represents the return of the index that the ETF is following. Thus, if the $r_{i,t}^{NAV} = r_{i,t}^{Index}$ there is not any difference between the NAV and the underlying index.

However, Farinella J & Kubicki, R, study (2018) provides evidence that the tracking errors are usually minimal and the "arbitrage mechanism" works. The main focus of this research is the ETF's long-term correlation with the underlying index and not the possible daily trading spreads and fees. Authorised participants (AP's), presented later in this chapter, have significant responsibility for the functioning of the market mechanism. Thus, the possible NAV tracking errors should not be worried about in that case.

2.3 Authorised participants

Due to authorized participants, which typically are specialists, brokerage firms and other market makers, the liquidity of the ETFs remains at a reasonable level, which is essential that the ETF market is operating efficiently (Lettau et al. | 2019). Thus, AP's attendance is critical due to the ETF's long-term return differences to match the actual price of the underlying index. Understanding this is essential because the data used later in the study is based on ETFs. Thus, the functioning of the ETF market is an integral part (Madhavan et al. |, 2016).

Based on the demand for the ETF, APs are constantly increasing or decreasing the total number of outstanding shares. The idea of increasing takes place by buying securities included in ETFs from the market and swapping them into new ETFs. Vice versa, decreasing is achieved by selling the securities included in the ETF. If the NAV price differs from the market price of ETF, the APs will use the opportunity and take advantage of the arbitrage by obtaining a risk-free return equal to the sum of the tracking error. Thus, the tracking error remains low, and therefore, the ETFs are priced according to the underlying index (Madhavan et al., 2016). The ETF Architecture by Lettau, et al. (2018) is presented below:

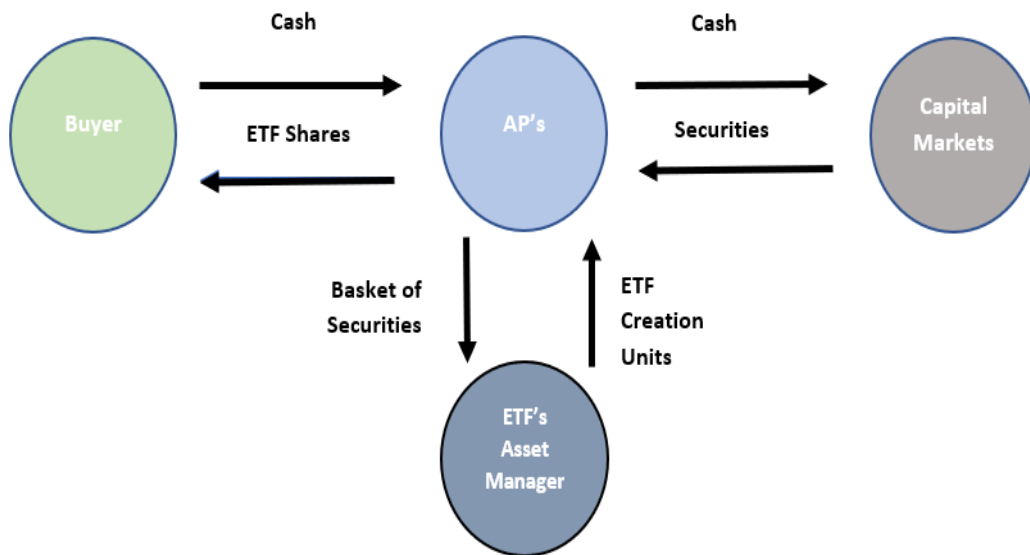


Figure 2. The exchange traded funds architecture (Lettau, et al., 2018)

3 Socially responsible investing

Due to the novelty of SRI- investing, the term is not yet fully established in colloquial language, and the term might be often used as a synonym for ethical investing. As noted in the introduction part, the demand for the SRI- investing has increased significantly in recent years. The primary driver for the increased demand is that the investors changed requirements from social, environmental, and ethical perspectives. Thus, some investors are unwilling to invest only for the best alternative return because the ethical perspective is also considered (Bauer, R, Koedijk, K, & Otten, R, 2005). Later in this chapter, the socially responsible investing strategy, including the background, current stage, and criticism of the SRI- investing.

3.1 Background of socially responsible investing

Although SRI has increased significantly in recent years, the history of SRI- investing is long as might be expected. The first signs of socially responsible investing were hundreds of years ago, although the difference for the current stage is high. Socially responsible investments were mostly based on religious matters (Renneboog, L, Ter Horst, J, & Zhang, C, 2008).

3.1.1 The rise of SRI investments

The drivers of SRI- investing popularity is related to the world's events in different eras, associated with the individual's mindset and awareness. For example, in the 1960s, the Vietnam war affected individuals' opinions to support the military industry. In contrast, in the 1980s, the increased environmental disasters such as the oil catastrophe in Exxon Valdez and Chernobyl nuclear power plant explosion affected the individual's awareness of environmental issues (Renneboog et al. I, 2008). Thus, the worldwide historical events can be seen as boosters for individuals' socially responsible awareness.

It is not entirely sure where the first socially responsible mutual fund was established. The modern SRI- investments are assumed to be born in the 1960s. Some of the studies argue that the first SRI- funds were established in the United States (US), and some are pointing out Europe, more closely in Sweden. The first Swedish SRI fund was called AktieAnsvar aktiefond. Hence, the AktieAnsvar aktiefond is the first SRI fund in more detail which history is known (Bengtsson, E., 2008).

Since the 1990s, the popularity of the SRI- investing has increased significantly in recent years. Some of the drivers are increased awareness due to the increased accessibility of the information. Furthermore, so-called sustainable spending has also become more popular. In sustainable spending, individuals are paying more attention to what they are buying and, therefore, are willing to choose sustainable alternatives if some are available. However, the price of the regular product would be higher. Thus, the customers are willing to pay a premium for the sustainable option. As might be expected, individuals' sustainable behaviour has also reflected the financial markets and is one of the critical drivers of the nowadays popularity of SRI investing (Renneboog et al., 2008).

As noted, the capital invested in sustainable companies has increased significantly. In 2014, the amount invested in the U.S was 6,5 trillion U.S dollars. In 2020, the amount was over 17 trillion U.S dollars, which means over a 260 % increase in six years (Statista, 2022). For perspective, globally the U.S SRI assets include around half of the world's SRI assets. The European Union (EU) is second significant market because around third of the total SRI assets are in EU. The figure 3 below presents the rapid growth of sustainable assets in the U.S from 2014 to 2020. The Figure 4 below the figure 3 presents the worldwide diversification by region from 2014 to 2020. The data of the figures is from Statista (2022).

Value of Sustainable investment assets in U.S from 2014 to 2020

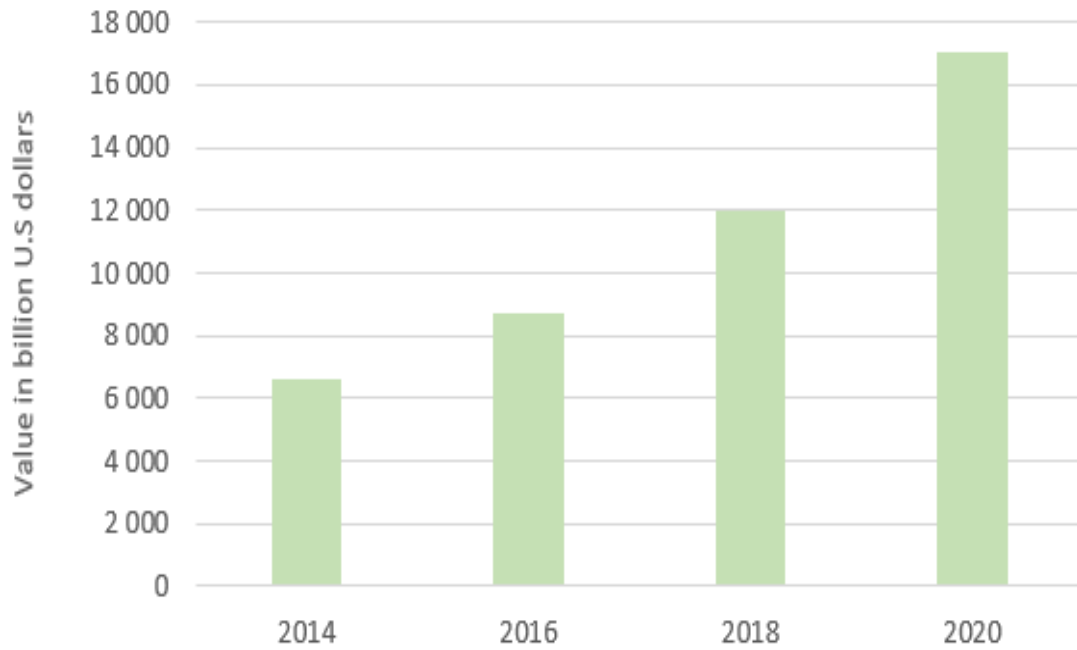


Figure 3. Value of sustainable investment assets in U.S from 2014 to 2020 (Statista, 2022)

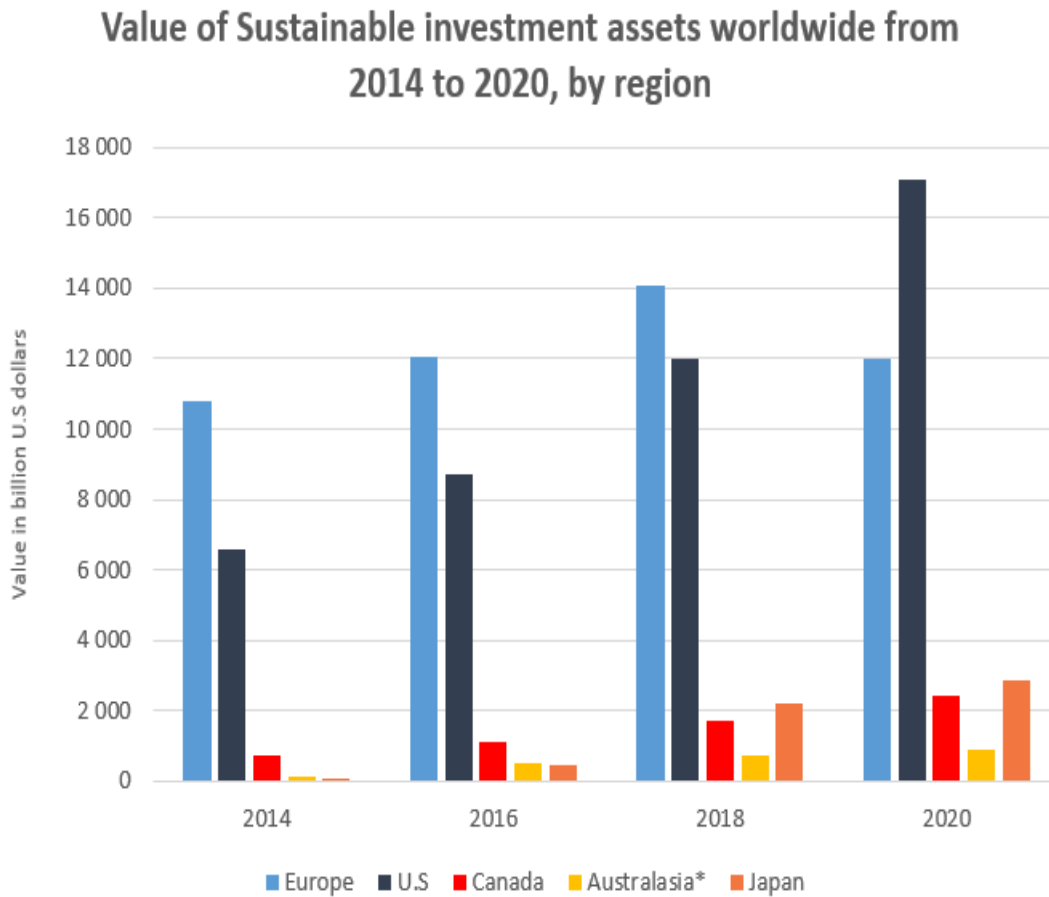


Figure 4. Value of Sustainable assets worldwide from 2014 to 2020, by region (Statista, 2022)

As can be seen from the figure 4, the U.S and Europe include over 80 % of the worlds total SRI assets. Thus, U.S and Europe can be seen as key regions of the SRI assets. However, the figure shows that market share of the other regions has also increased in recent years. Nevertheless, this study focuses on U.S markets.

3.2 Socially responsible investing strategy

Investors and mutual funds may use different activities while running the socially responsible investing strategy, and socially responsible investing criteria may change in other locations. For example, although the SRI funds are generally considered homogeneous, they are not the same and might be very heterogeneous. The U.S SRI

funds are not following the same rules as the European SRI- funds, and vice versa. In the U.S, the SRI- definition is based mainly on values. Thus, the values are the origin of SRI- investing. Therefore, if the values change during the time, it can be assumed that the SRI- funds are changing in the same direction due to the high correlation with individuals' values. Thus, the U.S SRI funds follow the U.S-based values and the European SRI funds follow the European values. (Sandberg, J., Juravle, C., Hedesström, T. M., & Hamilton, I., 2009). In addition, it can be assumed that all individuals have their own ethical values, which may also change over time.

3.2.1 Negative and positive strategy

The SRI- funds are typically using a negative or positive strategy. The investments are ranked via ESG criteria by industries in a positive strategy, and the top ranked ones are chosen (Revelli, C., 2017). The negative description refers to a situation where the SRI- investing strategy is executed by avoiding some businesses or industries, called screening. Thus, as simplified, investors are screening out investments that are not seen as socially responsible. The rules of screening out are called sin issues. As might be expected, the sin issues are changing over time and are connected to the ongoing era. Hence, the holding of SRI- ETFs might change over time if the sin issues change (Waddock, S., 2003).

3.2.2 General socially responsible investments

SRI- investments focus on environmentally good companies, supporting human rights, equality, and sustainability. (Hamilton, S., Jo, H., & Statman, M., 1993). Thus, for example, clean energy businesses can often be seen as socially responsible. Therefore, in this research, ETFs selected are primarily from the clean energy industry, including solar and wind power. However, as noted in the introduction part, the purpose of the research is not to take a stand on what is ethical and vice versa.

3.3 Key economic arguments for socially responsible investing

Firstly, it is argued that companies that are forced to operate socially responsibly might improve their performance due to the new innovations which compensate for the possible higher other expenses (Porter, M. E, & Van der Linde, C., 1995). Secondly, Nofsinger & Varma (2014) argue that companies may have better risk-and return relation because they might avoid adverse events more than regular companies. For example, socially responsible companies may avoid legal activities and reputational damage more than regular companies due to unethical activities.

3.4 Criticism of the socially responsible investing

The criticism of socially responsible investing has been the subject of academic debate for a very long time. Some theories are indirectly related to socially responsible investing, and some are directly related to it. In addition, the arguments against socially responsible investing are strongly incidental to the ongoing era. Therefore, those may not take a direct position in today's business environment. However, the ideology of a few academic arguments is presented in this part.

The standard argument against socially responsible investing is that by avoiding some businesses, the portfolios and investors cannot achieve the best alternative financial outcome because the diversification is limited, which affects the portfolio's risk-adjusted returns. Hence, if some businesses are left out, good investment opportunities might be missed and replaced by worse alternatives or more limited diversification. Thus, according to the argument, the non-SRI portfolio should outperform the SRI- portfolio (Nofsinger et al. I, 2014).

Milton Friedman introduced the argument in the 1970s that all companies and investors should only focus on providing as maximal returns as possible without avoiding specific businesses. The idea behind the statement is that the free-market system should take

care of the social and environmental issues, and there is no need for acts by investors (Friedman, M., 2007).

The third argument is based on Adam Smith's (1776) invisible hand theory. The theory assumes that individuals should focus on achieving the best alternative outcome. The ideology argues that achieving the best possible outcome will help the world more as the ethical choices. Thus, the ideology expects that companies should also attempt the best economic profit. Therefore, the total utility is more important than the single act (Renneborg et al., 2008).

4 Vice investing

The opposite of SRI- investing is known as vice investing. Vice stocks are a synonym for sin stocks. As socially responsible investing focuses on companies that are contributing ethically correct, in vice- investing, the strategy is to select the securities that seem opposite, in other words, unethical. Thus, the vice- funds select securities deemed unethical depending on the fund rules.

As in SRI- investing, the purpose of the research is not to take opinions on what is ethical and what is not. Therefore, individuals may have their own opinion on what is unethical and ethical, and therefore, the study does not take a stand on any side. The three most well-known vice- industries in general are tobacco-, alcohol and gambling industries (Hong, H, & Kacperczyk, M., 2009). Thus, vice- investing data may differ between the academic studies depending on what is considered a vice Investments.

As a continuation of former studies, including tobacco, alcohol and gambling industries, the research also includes the cannabis, gaming, leisure & entertainment, food & beverage industries, and the consumer discretionary select sector. According to NASDAQ, the above-mentioned industries are considered vice investments. However, to make this research more relevant to the current time, there are more vice industries selected in this research.

4.1 New industries

The new industries included in the research are presented in this chapter.

4.1.1 Gaming

The number of gaming consoles and internet-based games has grown significantly in recent years. Hence, it is no surprise that the gaming industry has also increased significantly. However, gaming is considered a vice industry due to its addictive

consequences, based on academic evidence (Kurniasanti, K. S, Assandi, P, Ismail, R. I., Nasrun, M. W. S. & Wiguna, T, 2019). The increase in the gaming industry is presented below in the figure 5, and the data is from EvolveEtf (2019). The amounts are in billions.

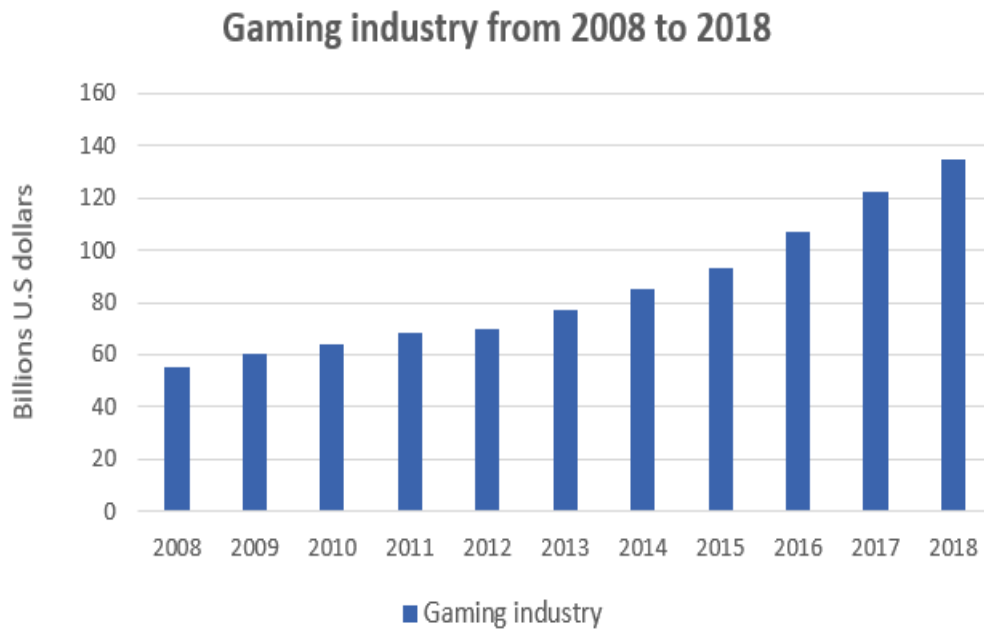


Figure 5. Gaming industry (Evolveetfs, 2019).

4.1.2 Cannabis

The second new industry is the Harvest industry, more familiar, the cannabis industry. The opinions about cannabis are probably most sensitive because it is classified as a drug in most parts. However, in recent years some countries, for example, Canada and some parts of the U.S, have legalised cannabis which has led to the commercialisation of the industry (Hammond, D, Goodman, S, Wadsworth, E, Rynard, V, Boudreau, C, & Hall, W, 2020). Due to the adverse effects of cannabis, for example, addiction and physical adverse effects, the industry is also considered a vice investment (Hall, W, & Solowij, N, 1998). The Cannabis industry is expected to increase. The forecast of global cannabis market size made by the Fortune Business Insights is presented below:

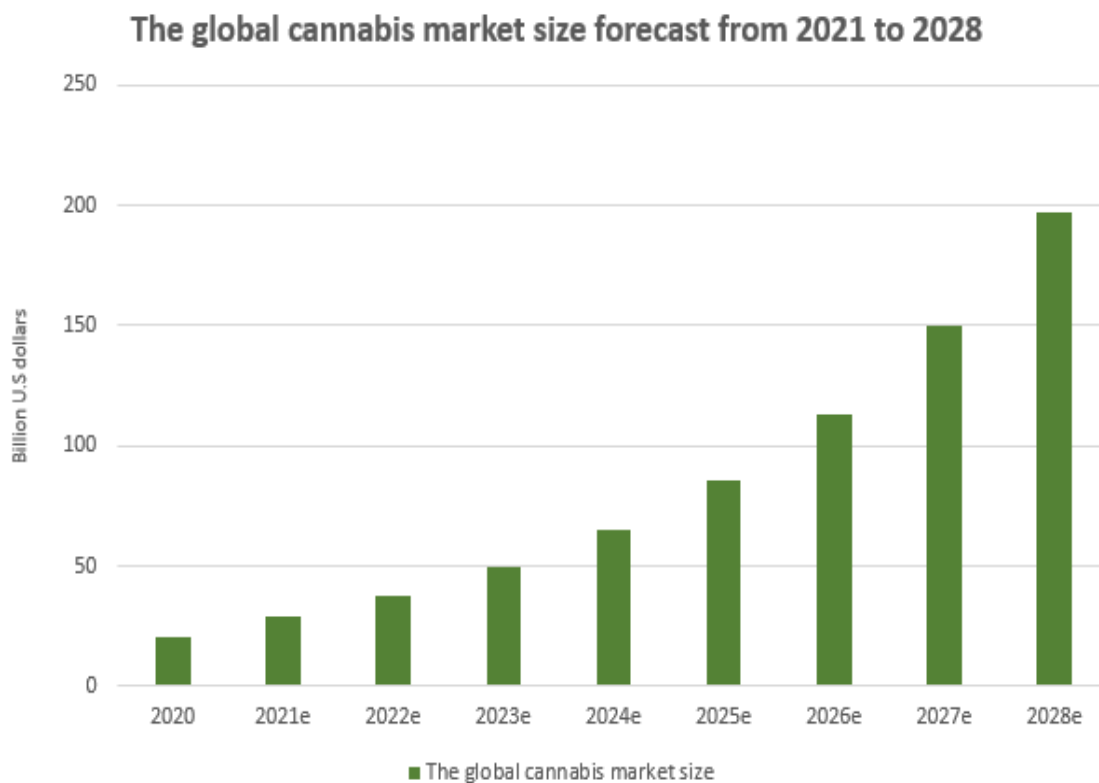


Figure 6. The global cannabis market size estimation from 2020 to 2028 (fortunebusinessinsights, 2020)

4.1.3 Leisure and entertainment

The third new industry included in the research is the leisure and entertainment industry. The sector consists of, for example, amusement parks, streaming services, and hotels (NASDAQ, 2021). The sector is considered a Vice investment due to the possible addictive consequences, such as addiction to the streaming services (Singh, S, Singh, N, Kalinić, Z, & Liébana-Cabanillas, F. J, 2021).

4.1.4 Consumer discretionary select sector

The fourth new industry is the consumer discretionary select sector. The sector refers to products that are seen as non-essential for everyday life. Individuals tend to spend more money on non-essential products during economic growth. The sector is seen as a Vice investment due to its non-essential need (NASDAQ, 2021).

4.1.5 Food and Beverages

The last Vice industry included the study of Food and Beverages. Food and beverages are considered a Vice investment due to the adverse health effects. For example, sugar, which beverages include, may cause health issues (Ludwig, D, S, Peterson, K. E, & Gortmaker, S. L, 2001)

5 Literature review

As noted in the introduction part, the SRI- and Vice-investing ETFs are relatively new, and therefore, the number of studies using the ETF- data is slight. Furthermore, most SRI- or Vice-related studies evaluate the performance against the market index. In addition, the studies have different research periods. Thus, the previous studies are not homogenous to this research. However, previous studies and results provide a reasonable basis for this research, although research methods are slightly different.

5.1 Former studies of SRIs which include the ETF data

In 2011, Sabbaghi examined the performance of SRI ETFs during the sample period from 2005 to 2009 in U.S. The study included data of the 15 different SRI- ETFs, all listed in the U.S. The study found evidence that socially responsible companies tend to be less volatile and significantly generate better risk and return relations when market volatility increases. Furthermore, the study found that socially responsible companies still include the market risk and are not immune to market declines (Sabbaghi, O., 2011).

Meziani (2014) examined whether environmental, social, and governance (ESG) based ETFs outperform conventional mutual funds. The study included data from all the U.S ETFs, and the research period was from 2009 to 2013. The study's results were mixed, and therefore, no conclusion can be drawn from it (Meziani, A. S., 2014).

5.2 Other SRI studies

Hamilton et al. (1993) examined if the SRI- funds' risk-adjusted returns differ significantly from the conventional funds. The sample period was from 1981 to 1990, and it included data from 32 socially responsible funds and 320 conventional funds. Performance was evaluated by the Jensen's alpha. The results were that there is no statistically significant difference between SRI's and conventional mutual funds. (Hamilton et al., 1993).

In 2000 Statman examined the difference between the SRI- and conventional mutual funds in the U.S from 1990 to 1998. The study included 32 SRI funds and 62 conventional funds. The performance evaluation was made by Jensen's alpha and the Sharpe ratio. The results were indicated that SRI funds outperformed the market return. However, the results were statistically insignificant. (Statman, M., 2000).

Bauer et al. (2005) examined the difference of the socially responsible- and non-SRI funds. The research period was from 1990 to 2001. The study included 103 SRI- funds and 4383 conventional mutual funds. Unlike the above studies, the study included funds from the U.S, United Kingdom (UK), and Germany. The performance evaluation was made by Jensen's alpha, Capital Asset Pricing Model, Fama & French three-factor model, and Carhart four-factor model. The research results were insignificant, and therefore, there was no difference between the risk-adjusted returns. However, the study found that conventional funds outperformed the SRI- funds from 1990 to 1993, and from 1998 to 2001, the SRI- funds outperformed the conventional funds. Furthermore, Bauer et al., (2005) argued that multi-factor models are better for evaluating performance than single-factor models.

In 2010, Gil-Bazo studied the difference of the SRI- and conventional mutual funds through fund management companies in United States. The research includes data from 86 SRI- funds and 1761 conventional funds, and the sample period is from 1997 to 2005. The performance evaluation was made with Jensen's alpha and Carhart's four-factor model. The results were that the SRI- outperformed the conventional funds by over 2,7 % annual alpha after the expenses. However, the study indicates also that the SRI- funds that the passive funds are not outperforming the conventional funds (Gil-Bazo, J., Ruiz-Verdú, P., & Santos, A., A., 2010). Thus, passive index-based socially responsible investing is not proven to outperform conventional funds. Hence, fund management companies specializing in socially responsible investing by over 50 per cent share in the company's total assets, socially responsible investments were classified on SRI- side.

Nofsinger & Varma presented their latest findings in 2014. The study examines the performance of socially responsible funds against the U.S mutual funds, focusing on market crises. The sample period of the research is from 2000 to 2011, and it includes 240 environmental and social governance (ESG) funds and three conventional funds. The performance evaluation methods were CAPM, three-factor model, and Carhart's-four factor model. Results indicate that SRI- funds tend to outperform the conventional funds during quick market movements, as in the financial crisis in 2008 and in IT crash. However, conventional funds tend to outperform socially responsible funds (Nofsinger et al., 2014).

5.3 Previous vice investing related studies

Jo, H., Saha, T., Sharma, R., & Wright, S. (2010) examined the difference between socially responsible funds and Vice funds in the U.S. The study was made using the market return as a benchmark index, and the sample period was from 2002 to 2009. The results were that the vice- investments outperformed the socially responsible funds in the long run. Furthermore, the results discovered that the Vice- funds outperformed the market index (Jo, et al, 2010).

In 2016 Soler-Domínguez & Matallín-Sáez examined the performance of the VICEX exchange traded fund, which is considered a Vice investment against the socially responsible funds in the U.S. The sample period was from 2001 to 2013. The results were that the Vice investments outperform the socially responsible funds during the bull market, whereas in the bear market, the socially responsible funds outperform the VICEX (Soler-Domínguez, A., Matallín-Sáez, J. C., 2016). However, the study has been made using only one fund, VICEX, and therefore, no conclusion can be drawn from the results of the previous studies.

5.4 The conclusion of the previous studies

The results of the former SRI related studies vary depending on the sample period and performance evaluating method. There was no significant difference between the

returns of socially responsible investing and market returns. Thus, the socially responsible funds did not outperform the market in the long run. However, in some studies, the socially responsible funds outperformed the market in rapid market movements or in specific market conditions. Hence, the general result was that the socially responsible funds outperform the market returns in some circumstances, such as financial crises, but not in general.

However, the previous SRI studies mainly compare the SRI returns to the market index. Moreover, the research periods differ from this research. Thus, the results may vary from the previous studies. Therefore, the results of the previous studies are not comparable to this research.

The results of vice investing are interesting. In both studies presented, vice investing outperformed the benchmark index at some point in the sample period. Moreover, in the study by Jo et al. (2010), vice investing outperformed the market index and socially responsible investing. Although not too many conclusions can be drawn from the results because the research is done by using only one ETF (VICEX). The results indicate that vice investing may outperform the socially responsible investing. Although vice-related studies are not as academically known as socially responsible investing studies, they directly compare vice investing to the SRI. Therefore, they are relevant from the perspective of this research.

In the conclusion of former studies, the evolution of performance evaluation and factor models can be seen. Jensen's alpha was the primary performance evaluation method in the oldest studies presented. In older studies, the Sharpe ratio and Capital Asset Pricing Model were the most used. However, due to academic development, most recent studies evaluated the performance by the multi-factor models. For example, Carhart's four-factor model and Fama & French's three-factor model were widely used. Hence, both the single-factor and the multi-factor models will be used to evaluate this research's

performance. The models used in performance evaluating of this research are presented in the next chapter in more detail.

6 Data and Methodology

This section discusses about the empirical part of the research. The empirical part includes data & methodology of the study. The data part that examines what data has been used and its source. The methodology part demonstrates which empirical models have been used to evaluate the performance of SRI- and vice strategies and explains them.

The research aims to determine whether the vice or SRI strategies outperform each other or does the investing strategy makes any significant difference between the returns. The research is done by making two portfolios, vice, and SRI. Both portfolios include the current strategy related ETFs. Both portfolios include seven different ETFs, and the weight of each ETF is equal throughout the period. The benchmark index used in the research is the return of all the NYSE, AMEX, and NASDAQ stocks, which are also used as a market return by the Fama and French. However, focus of the research is not to examine if the other investing strategy generates alpha compared to the market index, even though it might be seen in results. As mentioned, purpose of the research is to study difference of SRI- and vice investing strategies. Thus, the market index is used as a neutral measure of the performance of the SRI- and vice portfolios, allowing strategies to be compared.

As for evaluating the performance of vice- and SRI portfolios, the research uses the capital asset pricing model (CAPM), the Fama and French 3- and 5-factor model (Fama, E. & French, K., 2015), the Carhart 4-factor model (Carhart, 1997), Jensen's Alpha (Jensen, 1968), and the Sharpe ratio (Sharpe, 1966). The models mentioned above have been chosen as the former studies use them, and the academical evidence is proven. Furthermore, the study has added other models to make it more comprehensive. However, the most weight is given to the CAPM, Fama & French 3- and 5 factor model, and Carhart's 4-factor model. Therefore, the least weight is given to Jensen's alpha and Sharpe ratio.

6.1 Data

The daily data of the SRI- and Vice exchange-traded funds is acquired from the DataStream database. Furthermore, the daily data of the explanatory variables and the risk-free rate used in factor models is from the Kenneth R. French data library. All ETFs used are from the U.S because it is the largest and most liquid ETF market, and vice ETFs are otherwise listed there. Thus, the SRI ETFs used in the research are also listed in the United States to avoid possible currency and market differences. Nevertheless, U.S listed ETFs may still include global assets. However, this research focuses mainly on U.S markets.

Part of vice-ETFs has been established in recent years, so research would otherwise have had to be compromised on the number of vice industries, which was not possible. However, due to the novelty of vice-ETFs, the sample period in this research is roughly three years, 23.10.2018-15.9.2021. As a result, the study uses the daily closing prices at all the securities included to make it as accurate as possible despite the shortness of the sample period. The excess returns are determined from daily returns by reducing the daily risk-free rate. The portfolios include 721 daily observation points.

6.1.1 Vice- & SRI- Portfolios

The research uses seven different ETFs by each side. Hence, all the exchange traded funds are found by manually identifying them from a DataStream database, including thousands of ETFs daily closing prices.

The assumption is that the research covers most of the vice ETFs available because the supply is still limited. However, more vice ETFs may be available but not included in this research. In addition, the main reason why the examination period does not start until 2018 is due to the inclusion of new vice ETFs. Since ETFs are not often presented as unethical, the vice investing strategy in this research has been implemented with ETFs

related to generally considered vice industries. Thus, it is also possible that vice data differs from other studies in what are the Vice industries.

To make the confrontation equal, the amount of SRI ETFs is also seven, and therefore, it does not include all the available SRI- ETFs. Furthermore, the SRI- ETFs are selected randomly to avoid picking the best or worst performers, which may significantly affect results. In addition, to maximise the diversification of the portfolio, the SRI- ETFs are from different industries or use various investment strategies with each other. As in the vice industries, the data contained in ETFs considered socially sustainable may differ between other studies depending on what is considered socially sustainable.

6.2 Methodology

"Do not keep all your eggs in one basket" is probably a well-known phrase globally (Afik, 2015). In finance, the expression can be linked to the Modern Portfolio Theory (MPT) (Markowitz, H. 1952). The MPT can be seen more or less as the origin of all empirical models used in this research. The empirical models used to evaluate the portfolio's performance are presented in more detail in this part.

6.2.1 Capital Asset Pricing Model

The CAPM was developed by Sharpe, W. (1964), Litner, J. (1965) & Mossin, J. (1966). The CAPM assumes that investors should get a premium for their risk. Thus, the riskiness of the investment should affect its price. Furthermore, according to the CAPM, investors can control the risk of their portfolio via diversification. In CAPM, the beta of the portfolio describes the risk of the investment.

The CAPM has been criticised for being unrealistic because it assumes too theoretical circumstances (Abbas, Q, Ayub, U & Saeed, S.K, 2011). Moreover, the CAPM believes that all the risks should not affect price (Perold, A.F, 2004). However, due to the constant use of the CAPM in former studies, the model cannot be left out of this research. Therefore,

it will be used to evaluate the portfolio performances. The formula of the Capital Asset Pricing Model is presented below:

$$E(r) = r_f + \beta(r_m - r_f), \quad (1)$$

Whereas the $E(r)$ describes the expected return of investment. The r_f describes risk-free return, and the beta is described by the β . The r_m is the market return. Thus, equation assumes that expected return is the sum of risk-free return and investments risk premium (Sharpe, W, 1963).

$$\beta = \frac{Cov(r_i, r_m)}{\sigma_m^2} \quad (2)$$

Whereas the $Cov(r_i, r_m)$ describes the covariance between the portfolio and the market return. The σ_m^2 describes the market portfolios variance. The beta describes the assets relation to the market. The beta of the market is 1.0. Thus, beta > 1 indicates that the asset is more volatile than the market, beta < 1 indicates that the asset is less volatile than the market, and the beta equal to one indicates that the asset is as equal volatile to the market (Bodie, Z., Kane, A., Marcus, A.J., & Mohanty, P., 2014)

6.2.2 Fama & French three-factor model

Fama, E & French, K (1996) published the three-factor as a continuation for the CAPM. CAPM explained the returns only via market risk, whereas the three-factor model also considers the size and book-to-market ratio of the companies. The book-to-market ratio describes the difference in returns between the portfolio of high and low book-to-market ratio stocks. The book-to-market ratio is calculated by dividing the shareholder's equity by the market capitalization (Fama et al., 1996). The formula is presented below:

$$R_{it} - R_{Ft} = \alpha_i + b_i(R_{Mt} - R_{Ft}) + s_iSMB_t + h_iHML_t + e_{it}, \quad (3)$$

Whereas R_{it} describes the return on portfolio i , R_{Ft} describes a risk-free return. Therefore, $R_{it} - R_{Ft}$ = excess return of the portfolio, α_i describes the alpha of the portfolio, other words, the abnormal return of the portfolio, SMB_t is the size factor, HML_t is the book-to-market or the value factor premium, furthermore, b_i, s_i , and h_i are the factor coefficients (Fama et al., 1996).

6.2.3 Fama & French five-factor model

Fama and French introduced the five-factor model as an extension of the three-factor model in 2014. The five-factor model has empirical evidence that it explains asset pricing better than the three-model due to the two new factors. The two new factors were robust minus weak and conservative minus aggressive. The robust describes the diversified portfolio full of robust companies, and the weak describes the diversified portfolio full of weak companies. The robust minus weak factor is determined from the corporate's financial statement and the companies included in the portfolios. The conservative describes the portfolio of conservative companies, and the aggressive describes the portfolio full of aggressive companies. In other words, the conservative describes that companies included in the portfolio have low investment policy and aggressive vice versa (Fama E, & French, K, 2015). The equation is presented below:

$$R_{it} - R_{Ft} = \alpha_i + b_i(R_{Mt} - R_{Ft}) + s_iSMB + h_iHML_t + r_iRMW_t + c_iCMA_t + e_{it}, \quad (4)$$

The difference in returns of robust and weak profitability company portfolios is described as RMW_t . The CMA is the difference between the returns of portfolios with companies that have low or high investment policies. Low indicates the conservative companies and high aggressive companies (Fama et al., 2015).

6.2.4 Carhart four-factor model

Carhart expanded the 3-factor model by including a momentum factor to it in 1997. In short, momentum strategy is based on the anomaly that companies that have performed well, will perform better in the future than opposites. Therefore, the model also considers the continuation of the companies. The previous twelve-month returns calculate the performance. (Carhart, M., 1997). The equation is presented below:

$$R_{it} - R_{Ft} = \alpha_i + b_i(R_{Mt} - R_{Ft}) + s_iSMB_t + h_iHML_t + p_iWML_t + e_{it}, \quad (5)$$

In the equation, the WML_t describes the one-year momentum factor. The p_i is a coefficient. As noted, WML describes the performance of the diversified portfolio return from the latest twelve-month period (Carhart, 1997).

6.2.5 Jensen's alpha

Jensen's alpha (Jensen, M.C, 1968) measures the abnormal returns of the portfolio. Abnormal return is described as the alpha of the portfolio. Abnormal returns exist when the portfolio's risk-adjusted returns are higher than the risk-adjusted market return. Hence, if the portfolio alpha is positive, the portfolio can generate higher returns as predicted by pricing model, and vice versa if the alpha is negative. Furthermore, the equation includes the beta. Therefore, Jensen's alpha also assumes that higher risk increases the yield requirement and vice versa (Jensen, 1968). The equation is presented below:

$$\alpha_p = \bar{R}_p - [\bar{R}_f + \beta_p(\bar{R}_M - \bar{R}_f)], \quad (6)$$

In the equation the α_p describes the abnormal return of the portfolio, \bar{R}_p describes the historical return of the portfolio, β_p describes beta, which was introduced in equation 4. Furthermore, \bar{R}_M describes the market portfolio's historical return (Jensen, 1968).

6.2.6 Sharpe ratio

As noted in the empirical part of this research, the Sharpe ratio is given the least weight by evaluating the portfolio performances because the Sharpe ratio was not used in former studies. However, due to the short period of the daily returns, it was also included to evaluate the performance to make the research results more comprehensive. The Sharpe ratio was presented in 1966 by William Sharpe. The Sharpe ratio evaluates the portfolio's performance depending on its risk, measured by the standard deviation (Sharpe, W, 1966). In this research, the Sharpe ratio is used to evaluate past returns and, therefore, is not used to predict future returns.

$$\text{Sharpe ratio} = \frac{R_p - R_f}{\sigma_p} \quad (7)$$

In the equation of this research, R_p describes the realised return of the portfolio, R_f describes the realized risk-free rate, and the σ_p describes the realized standard deviation of the portfolio's excess returns (Sharpe, 1966).

7 Results of the research

This part presents the results of the research. Results have been achieved from the performance evaluating models presented in the previous chapter. The results of each model are presented individually. The order of the models presented is the same as in the last chapter. Therefore, the order of the models does not affect the importance of the model. The results are statistically significant at a 5 % significance level in all regression-based models.

7.1 Capital Asset Pricing Model results

The first results which are presented are from the CAPM model. The alpha is calculated from both portfolios, vice and SRI. Furthermore, p-values and t-ratios are presented in regression tables. Results of the CAPM are presented below:

Table 1. Regression results from the capital asset pricing model

Portfolio	Annual alpha %	P-value	T-stat
SRI Portfolio	10,89	0,132	1,508
Vice Portfolio	-1,72	0,731	-0,344

Note: Significance level presented as ***(0,01), ** (0,05), and * (0,1)

As shown in table 1, the annual alpha of the SRI- portfolio is 10,89 % in the sample period and, therefore, outperforms the Vice portfolio, which annual alpha is negative. However, neither result from the SRI and vice portfolios are statistically insignificant. Therefore, the results are not trustworthy. Nevertheless, the results indicate that the socially responsible portfolio has outperformed the vice portfolio.

7.2 Fama & French three-factor model results

The second results are from the Fama and French three-factor model. Results are from both SRI- and Vice portfolios. As noted, significance levels are the same in every regression table in the research. In addition, p-values and t-ratios are presented in regression tables. The table is presented below:

Table 2. Regression results from three-factor model.

Portfolio	Annual alpha %	P-value	t-stat
SRI- Portfolio	9,67	0,154	1,428
Vice- Portfolio	-1,02	0,822	-0,224

Note: Significance level presented as ***(0,01), ** (0,05), and * (0,1)

As in Capital Asset Pricing model, the SRI- portfolio outperforms the Vice-portfolio because the annual alpha of the SRI- portfolio is 9,67 %, and the alpha of the Vice-portfolio is negative. However, as in CAPM, both results are insignificant. Therefore, the results are not trustworthy. Nevertheless, the findings indicate that socially responsible portfolio has outperformed the vice portfolio.

7.3 Fama and French five-factor model results

Thirdly, the results from the Fama & French five-factor model are presented. As in CAPM and three-factor model results, p-values and t-ratios are shown in the table of the five-factor model results.

Table 3. Regression results from the five-factor model.

Portfolio	Annual alpha %	P-value	t-stat
SRI- Portfolio	11,63*	0,0836	1,732*
Vice- Portfolio	-0,49	0,914	-0,108

Note: Significance level presented as ***(0,01), ** (0,05), and * (0,1)

As in Capital Asset Pricing Model and the three-factor model, the socially responsible investing portfolio outperformed the vice portfolio with an annual alpha of 11,63 %. Furthermore, the alpha of the vice portfolio is negative. The annual alpha of the socially responsible investing portfolio is significant at the 10 % level, which can be seen in the results. However, the statistically significant level of the research is 5 % **, and therefore, results are not seen as significant. Moreover, the vice- portfolio results are not significant at any level. Thus, the creditability of the results is weak. The above findings indicate that socially responsible portfolio has outperformed the vice portfolio.

7.4 Carhart's four-factor model results

Fourthly, the results of Carhart's four-factor model are presented. As in CAPM, three-factor, and five-factor models, the annualised alpha, p-value and t-stat are presented from both portfolios. The results table of the Carhart model is presented below:

Table 4. Carhart's four-factor model results

Portfolio	Annual alpha %	P-value	t-stat
SRI- Portfolio	10,37	0,128	1,524
Vice- Portfolio	-0,02	0,996	-0,005

Note: Significance level presented as ***(0,01), ** (0,05), and * (0,1)

As expected, due to the results of former models, the SRI portfolio outperformed the vice portfolio with an annual alpha of 10,37 %. As in other models, the findings are insignificant and are not entirely trustworthy. Furthermore, vice- portfolios alpha was negative, as in other models. Still, the socially responsible portfolio performed better than the vice portfolio.

7.5 Jensen's alpha results

After the regression models, the results of Jensen's alpha are presented. The table of Jensen's alpha includes the annual return, beta, and annual return. Jensen's alpha is annualised in the table. The table is below:

Table 5. Jensen's alpha results

Portfolio	Annual return %	Beta	Jensen's alpha
SRI- Portfolio	28,54	0,81	12,1
Vice- Portfolio	13,25	0,75	-1,9

As assumed, the SRI- portfolio outperformed the Vice portfolio, as in other models, due to the higher Jensen's alpha. The beta was a bit higher in SRI- portfolio, but the return was significantly higher, and therefore, the outcome was much better.

7.6 Sharpe ratio results

The last model presented is the Sharpe ratio. As noted in the previous chapter, the Sharpe ratio measures the risk-adjusted returns via standard deviation. The portfolio standard deviation is calculated using the covariance-variance matrix. Therefore, the correlation between the assets inside the portfolio has been considered in the results (Jöreskog, 1970). Thus, the results table shows the annual return, standard deviation, and results. The results table of the Sharpe ratio are presented below:

Table 6. Sharpe ratio results

Portfolio	Annual return %	Standard deviation	Sharpe ratio
SRI- Portfolio	28,54	22,40 %	1,26
Vice- Portfolio	13,25	21,50 %	0,60

As expected, the SRI- portfolio also outperformed the Vice portfolio in the Sharpe ratio. The standard deviation of the SRI- portfolio was a bit higher, but due to the significant difference in annualised return, the overall result of 1,26 was much better in SRI- portfolio, as in the Vice- portfolio, in which the Sharpe ratio was 0,6.

7.7 Summary of the results

In summary, the SRI- portfolio outperformed the Vice- portfolio in all the models: CAPM, Fama and French three- and five-factor models, Carhart's four-factor model, Jensen's alpha, and the Sharpe ratio. According to the former studies, Carhart's four-factor model

and Jensen's alpha were given the most attention. However, the regression-based models did not provide significant results. The most relevant results came from the Fama & French five-factor model because the results were significant at the 10 % level. However, the line for the significant level is 5 % in this research. Therefore, the results are insignificant. All results are presented below in the table:

Table 7. All the results

Model & Portfolio	Annual alpha	p-value	t-stat
CAPM			
SRI- portfolio	10,89	0,132	1,508
Vice- portfolio	-1,72	0,731	-0,344
Fama & French 3-factor model			
SRI-portfolio	9,67	0,154	1,428
Vice portfolio	-1,02	0,822	-0,224
Fama & French 5-factor model			
SRI- portfolio	11,63*	0,084	1,732*
Vice- portfolio	-0,49	0,914	-0,108
Carhart's 4-factor model			
SRI-portfolio	10,37	0,128	1,524
Vice- portfolio	-0,02	0,996	-0,005
Model & Portfolio	Annual result		
Jensen's alpha			
SRI- Portfolio	12,1		
Vice- Portfolio	-1,9		
Sharpe ratio			
SRI- portfolio	1,26		
Vice- portfolio	0,60		

Note: Significance level presented as ***(0,01), ** (0,05), and * (0,1)

8 Conclusion and discussion

Although the results of the regression-based models were not statistically significant, the findings were in line with each other's for all models, and the socially responsible portfolio outperformed the vice portfolio in all models. The *H1* that there is a statistical difference between socially responsible investing and vice investing returns does not have enough academic evidence because the results were statistically insignificant. Therefore, the null hypothesis remains valid. However, the socially responsible portfolio outperformed the vice portfolio in returns in all models used. Thus, the research suggests that socially responsive investing outperforms vice investing in a similar market environment.

As noted in the literature review section, SRI tends to outperform vice investing in market crashes. On the other hand, in some studies, vice investing outperforms socially responsible investing in the bear market. In this case, the coronavirus pandemic was a relatively new variable for the market environment and may affect on results. In the coronavirus pandemic, the market indexes rapidly decreased and recovered extremely fast. Thus, the market conditions were unique compared to the previous studies. Therefore, according to the results, the finding could be that socially responsible investing outperforms vice investing in research periods that include market crash and a quick recovery.

The sample period was roughly three years. The research period tends to impact the research results significantly. Hence, the primary assumption is that the most influential factor for the weak statistical creditability was the shortness of the sample period. Therefore, as an improvement for future studies, the study's academic evidence could be more trustworthy by increasing the research period.

However, the research provides a solid ground for future studies. The vice and SRI ETFs are still relatively new, and therefore, as the research period increases, the reliability of the results increases. Furthermore, the assumption is that the current trend will

continue. In that case, the number of SRI and Vice ETFs will increase significantly and provide more research data, improving the trustworthiness of the possible findings. Moreover, as the number of SRI and vice ETFs increases, the knowledge about ethical choices increases even more. Thus, the importance of the social questions will become even more critical in the future. However, it is still unclear how it affects socially responsible and vice investments stock market returns.

As a challenge for future studies, it is more or less speculation what will generally be classified as a socially responsible or vice industry in the long run. It can be well-argued that individuals did not know 2020s general ethical opinions in the 1900s. Thus, the future may change the nature of the current sustainable actions made by individuals. Thus, the data used for the vice- and SRI-related studies may differ significantly for future studies. Therefore, it would be necessary for future studies to be homogeneous with each other to be as comparable as possible if the primary purpose is to continue this research. On the other hand, if the primary goal is to compress the socially responsible and vice investing, the investments can change as long as the assets are classified as socially responsible or vice investments.

Finally, as noted, due to the results, the study suggests that, in future studies, it is assumed that socially responsive investing outperforms vice investing if the market environment of the research is similar. Therefore, there could be a statistically significant difference between the returns of SRI and vice investments.

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