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Can new technology outperform the responsibility

Profitability comparison

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ABSTRACT:

This study uses empirical analysis to compare two different types of Exchange-traded funds and examine which has the higher Alpha and the risk-adjusted return. The data is from the Datastream, and the time period is from the beginning of the year 2019 to the end of the year 2020. Besides, this study will introduce the different S.R.I. strategies, blockchain technology, and what unites these two different topics.

Blockchain technology has proliferated, and more companies are using the technology in their primary business to support the business or have made the blockchain technology at their primary business. Socially responsible investing has become a new megatrend of the investing styles and gained many supporters worldwide; the Blockchain is still new and slightly niche compared to the S.R.I. This study's main reason was to find whether these two topics could be united and seen at the same side of the Responsibility discussion. Besides, how could be the new technology support the S.R.I. and also the E.S.G. measuring? Blockchain could be in the future be a part of the transparency of the companies and institutions.

This thesis's empirical part will provide directional advice for possible investors considering whether to invest in S.R.I. or Blockchain Exchange Traded Funds. The results will be direction-al because of the small number of Blockchain funds available; the results cannot be considered absolute truth. The time period will be from April 2019 to October 2020, and the comparison will be examined using methods like Sharpe, Jensen Alpha and other factor models. Besides, this study will also be examined the volatility of these two different kinds of funds.

This study will provide results that support the hypothesis that Blockchain ETF's has gained more risk-adjusted returns and has a higher Alpha than the Socially Responsible Investing based funds. As mentioned, the result should be taken more directional than absolute truth because of the short time frame and the lack of several exchange-traded funds, whether investing in cryptocurrencies or investing in companies in their primary business, the block-chain technology.

KEYWORDS: Socially responsible investing (SRI), Blockchain, Exchange-Traded Funds (ETF), Environmental, Social, Governance (ESG), Modern Portfolio Theory

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1 Introduction

Blockchain and Socially responsible investing (S.R.I.), two megatrends of this century. The S.R.I. has been a trend at the beginning of the 21st -century, and it has grown to a mainstream ideology on the financial side. More and more companies and institutions promise "green loans," S.R.I. investment style in their portfolios and providing transparency with the E.S.G. factors and reporting. In the modern world, the information is readily available, and for this reason, the companies are more transparent than ever; the problems in the E.S.G. -factors can be quickly founded by the investors, which could lead to the situation of losing some of the investors. For those reasons, the S.R.I. and E.S.G. factors are essential for the companies as for the institutions investing the companies.

Blockchain technology was invented in 2009 by a mysterious person Sakashi Nakamoto, Sakashi has never been identified, but there have been many allocations, the Takashi Nakamoto's true identity at this day there is no truth available. Bitcoin was the first to use Blockchain technology and it needed its currency to "pay" for the people and computers to secure the transactions in the Blockchain. Therefore, the Bitcoin Cryptocurrency was invented in 2020; Bitcoin is more related to "digital gold," and the value of Bitcoin is based more on theoretical value than the value of Bitcoin's Blockchain technology. This study is more focused on Bitcoin's blockchain technology because it is more easily understood and explained.

Bitcoin and Blockchain technology have been accused of a lot of energy waste that this technology is producing when the transactions are secured and about the blockchain technology's inefficiency, how it will use a lot of computational power and electricity. Besides, the allegations about how Bitcoin is used for criminal payments, money laundering and other black-market payment will place the Blockchain technology and Bitcoin on the opposite side of the S.R.I. and ESG-measures. It should see this way, or could it be in the future that blockchain technology could answer the ESG-problems such as Supply Chain traceability, Renewable Energy Distribution, Anti-money laundering, Proxy Voting, Cyber Security, and many more.

1.1 Purpose of the study

The purpose of this study is to examine whether the Blockchain Exchange-traded Funds (ETF) has gained more risk-adjusted profit than the SRI ETF's at the given timetable; besides, is the Blockchain ETF's more volatile than the S.R.I. funds. This research will also discuss the opposite nature of these two different types of funds and how in the future, maybe the new technology could help the responsibility and be the critical tool to help companies in their E.S.G. problems.

This study's research hypothesis is that Blockchain ETF's has gained more risk-adjusted returns than the SRI ETF's and have a higher Alpha. The second hypothesis is that Socially responsible strategies followed ETF's are less volatile than Blockchain funds. This will give a directional result to whether the blockchain technology will outperform the Socially responsible investing followed ETF's.

This study will introduce theory in the background and after that introduction to the Blockchain technology to give a more accurate definition about what Blockchain is and how idyllist could be used in the future. The study will then continue to the Socially responsible investing theory and introduce the strategies behind this investment style. Then will be introduced the Exchange-traded funds (ETF) and then the data and methodology. The last in the study will be open up the results and conclusion of the study.

2 Theoretical framework

This chapter will introduce the theoretical framework of the research, and it will be more focused on Fama's (1970) efficient market hypothesis, which will bring a view for the reader to understand more how the comparison of these two different ETF's could be made.

2.1 Efficient market hypothesis

Fama (1970) released the study based on efficient capital markets. Simply the capital market's primary mission is to allocate money from the ownership to a company's investments. The ideal situation would tell by the price which firm is making sound investments and which are not. All stock prices would be "fully reflect," and those would reflect all available information and that market where this hypothesis is true is an efficient market. (Fama 1970).

Fama (1970) divides the efficient markets into three levels of efficiency: weak-form-efficiency, semi-strong- and strong-term efficiency. The Weak-form efficiency says that the market prices contain all the available information from the past. The weak form means using past information and using technical analysis, which should be useless. (Fama 1970)

The semi-strong efficient market is based on that same as in weak form efficiency, that all historical information is available and all information about the company and the stock. (Fama 1970). Semi-strong efficiency includes that this information from the past, the stock, and the company should reflect the stock price. In many studies, it has been claimed that semi-strong efficiency is not available as a whole in the stock market.

The strong form of efficiency contains all the historical information and all information about the company and the stock and all private information. There would be all information available, private, historical, and the public, in solid form, and it all would be

reflected in the stock price. (Fama 1970) This would mean that even some information from inside the company could not give an investor an advantage. (Fama 1991)

2.2 Performance measurement

2.2.1 CAPM

The Capital Asset Pricing Model was developed by Sharpe (1964) and Litner (1965); the model's main point is a theory of systematic risk that will affect the stock price. CAPM tells the link between the stock price and its risk. Only systematic risk is the only source of risk, so in this model, that is what is to be priced, and the investor wants their risk to be priced.

$$E(r_i) = r_f + \beta_i(E(r_m) - r_f)$$

Where E(ri) is the expected return for stock i, rf is the risk-free interest rate, Bi is the Beta of stock i, and E(rm) is the expected return of the market (Puttonen & Knüpfer 2009).

2.2.2 Jensen alpha

Jensen (1968) used the Capital Asset Pricing Model approach in developing the recognized measure of risk-adjusted performance assessment, the Jensen's Alpha. Jensen alpha can be defined as the abnormal return on a portfolio measured as the difference between the actual average return yielded by the portfolio and the equilibrium return that the portfolio should have earned given the market conditions and the portfolio's risk level. For a given portfolio, the Jensen's Alpha is its deviation from the security market line that is the CAPM's graphical representatives'. A positive deviation can be attributed to outperforming returns, while negative deviations imply inferior 21 performance.

$$R_{pt} - R_{ft} = a_p + B_p\left(R_{mt} - R_{ft}\right) + e_{pt}$$

Where α_p is the excess return on the portfolio after adjusting for the market, R_{pt} is the return on the portfolio p at time t, R_{ft} is the risk-free interest rate, R_{mt} is the return on the market portfolio at time t and β_p is portfolio beta, i.e., the sensitivity of the excess return on the portfolio p with the excess return on the market.

2.2.3 The Sharpe ratio

Sharpe's ratio measures the success of a portfolio, and William F. Sharpe has invented it. Sharpe is worth of mention to understand the portfolios of ETF profitability and how to compare them. In the indicator, the numerator tells how much the portfolio has produced over the risk-free rate. The denominator tells the mean derivation of the portfolio, which is in proportion to the portfolio's profits. So, in this indicator, the portfolio profits are proportional to the risk of the portfolio. With this indicator usually is calculated risk-adjusted profits of portfolios. Portfolios that have a high Sharpe ratio are usually produced better returns than lower Sharpe ratio portfolios. (Bodie et al. 2014)

(1) $$S = \frac{r_p - r_f}{\sigma_p}$$

Where $\mathrm{r_p}$ is portfolios return and $\mathrm{r_f}$ is risk-free rate, which is in the U.S stock market 4 weeks T-bill and σ_p is volatility of portfolio, as the same is mean derivation for the portfolio return. (Bodie et al. 2014)

2.2.4 Fama and French three factor

The three-factor model was designed and discovered by Fama and French (1993) was the big step for all asset pricing models. It is the second grade of the C.A.P. model. C.A.P. model could not explain some companies' average returns, and for that reason, the three-factor model was invented. (Bodie et al., 2014). The three-factor model idea comes from a one-factor model or, in other words, the A.P.T. model. The ATP was more like the C.A.P. model, but it noticed the difference between non-diversifiable risk (factor risk) and diversifiable risk. It came to an idea that non-diversifiable risk needs gain the risk premium and diversifiable risk doesn't. (Bodie et al., 2014)

The three-factor model includes three risk factors. The first is a market risk, the second is the performance of small companies versus big companies, and the third one is the performance of high book to market versus low book to market. The first one simply risks premium multiplied with Beta. The second one is expected returns of small companies minus expected returns of big companies. The third one is the same as the second one, but it casts these on book value. (Fama & French 1993)

$$R_i = R_f + \beta_i(r_m - r_f) + s_i SMB + h_i HML + e_i$$

Where R_i is the return of the stock/portfolio i, R_f is the risk-free rate, ai is the intercept, $b_i(r_m\text{-}r_f)$ is the factor beta for market returns multiplied by market index returns, $_{si}SMB$ "Small-Minus-Big" represents a portfolio that is long small stocks and short, big stocks to capture the "size" effect, $_{hi}HML$ "High-Minus-Low" represents a portfolio that is long high book-to-price stocks and short low book-to-markets representing "value" investing. (Fama & French 1996).

2.2.5 Fama and French five factor

The five-factor model adds two more factors to the three-factor model. The first one is profitability. In this case, it means the companies' returns with good profitability versus

the returns of companies with weak profitability. The second one is investment patterns which in this model is assumed to come from; returns of the conservative companies versus aggressively investing companies. Comparing these two models were shown that in a general way, the Five-factor model regression accumulated cutting was closer to zero than the three-factor model. For that reason, the Five-factor model is a preferable model to the three-factor model. (Fama & French 2015)

The five-factor model has been tried to explain some of the anomalies, and it has been used in anomalies studies. Fama and French suggest using the four-factor model, which is the same as the five-factor model, but it doesn't include a High book to markets versus Low book to markets (H.M.L.). Because the H.M.L. factor is not necessary for pricing assets. (Fama & French 2015)

$$R_i - R_f = \alpha_i + \beta_i(r_m - r_f) + s_i SMB + h_i HML + r_i RMW + c_i CMA + e_i$$

Where R_i is the return of the stock/portfolio i, R_f is the risk free rate, a_i is the intercept, $b_i(r_m - r_f)$ is the factor beta for market returns multiplied by market index returns, $s_i SMB$ "Small-Minus-Big" represents a portfolio that is long small stocks and short big stocks to capture the "size" effect, $h_i HML$ "High-Minus-Low" represents a portfolio that is long high book-to-price stocks and short low book-to-markets representing "value" investing., $r_i RMW$ is the factor beta for robust minus weak (portfolio) multiplied by returns of robust minus weak, $c_i CMA$ is the factor beta for conservative minus aggressive multiplied by the returns of conservative minus aggressive, e_i is the influence of other fac-tors affecting the stock's/portfolio's price (Fama & French 2015)

2.2.6 Carhart 4-factor model

However, more recent empirical studies have shown that the Fama-French three-factor model fails to capture the momentum effect first documented by Jegadeesh et al. (1993) and later on by numerous studies. Consequently, the Fama-French risk-return framework was further developed by Carhart (1997), who added a price momentum factor as the fourth systematic risk factor. The momentum strategy's price momentum factor states that stocks with recent negative returns tend to earn negative future returns, and stocks with positive recent returns tend to yield positive future returns (Bello 2008).

$$r_i - r_f = a_i + b_i\left(r_m + r_f\right) + s_i(SMB) + h_i(HML) + m_i(MOM) + \varepsilon_i$$

Where the price momentum factor denoted as (MOM) is the average return on securities with the highest 11-month return lagged by one month minus the average return on securities with the lowest corresponding return. Consequently, the MOM factor is often referred to as “WML” factor that stands for winners minus losers.

3 Blockchain

This chapter will describe what Blockchain- technology is. The chapter will open up the features the technology has. There are many variations from Blockchain, and therefore, to explain the main point of Blockchain, In this study, it will use maybe the most famous Blockchain, Bitcoins blockchain, to describe the technology after that in this chapter will open up private blockchains and in which ways these are better. This chapter will also provide information about decentralized Finance and how blockchain technology can boost the Finance sector.

3.1 Blockchain in General

Open and public Blockchain as Bitcoin means that everyone can join the Blockchain and exit from the Blockchain whenever they like. This is an excellent choice to store some basic information but maybe not for needs, including much privacy for the person; it is not so good and secure choice yet. Therefore, the main interest in Blockchain is going more to private blockchains and subject to license. These private blockchains provide better protection and efficiency. (Dinh, Wang, Chen, Liu, Ooi & Tan 2017; Bradbury 2015). These private blockchains will be introduced later in this chapter but first in this chapter will be open up the public Blockchain to explain the idea better.

The two most common program systems are the centralized and distributed system. In the centralized system, users are connected with the one leading operator (usually the admin), but in the distributed system, the users are connected, and there is no primary operator (or admin). A peer-to-peer network is one of the distributed systems cases, where it is built by single computers, nods, which builds the network's computing ability without any leading operator or admin. The network users are all in an equal position when it comes to their rights and role in users. Peer-to-peer networks and Blockchain technology bond when the network needs blockchain technology to confirm the information's reliability. (Drescher 2017, 11, 14-15, 24.)

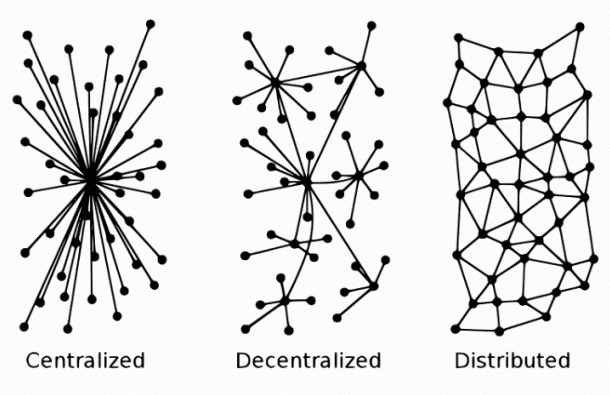

Figure 1

Centralized, Decentralizes and distributed systems. (Martin Kleppmann, 2017)

Blockchain technology could be described as a distributed and transparent diary of transactions. It is a database, which is shared online at the request of the users. The "miners will update it," and everyone has the right to supervise the mining process. Miners will be rewarded for the work they have done (for example, by bitcoin). There is no owner of the database nor it has any controller admin. It is like a giant interactive spreadsheet, where everyone has access and rights to update and confirm the digital transactions. (Swan, 2015, 1.) Blockchain includes all the completed transactions right from the beginning to this date. The most secret blockchain variation is private Blockchain and permissioned. This kind of Blockchain has the most extensive interest in companies wide the industries; these could be used in Finance, shops, and accounting. This would guarantee faster processes and better security. (Drescher 2017, 217.)

Blockchain is described as an electronic general ledger about digital saves, transactions, and functions, which have been cryptographically distributed, confirmed and maintained by users of the shared network. When the general ledger is one operator's document of all its financial transactions, Blockchain is a list of all users' transactions. However, unlike the standard general ledger of one operator, Blockchain has distributed thousands of computers worldwide. All these computers confirm and maintain the distributed network at the same time. To make an ad to the Blockchain, it will need the confirmation of

more than 50% of the users, making the ad from the past extremely hard. (Condos, Sorrell & Donegan 2016.)

Nowadays, transactions between two are confirmed by using a third party (for example bank), confirming and executing the transaction. (Yli-Huumo et, al. 2016). This causes a large number of expenses and also takes time. Blockchain technology has gained much recognition because it allows the system to run without the primary operator (admin), where all the users rely on. Without the leading operator, it means a faster, cost-efficient and secured transaction between two parties. (Zheng, Xie, Dai, Chen & Wang 2017; Christidis & Devetsikiotis 2016.)

3.2 Information summaries

Blockchain technology uses compaction (synopsis) of information to store the information in a change-sensitive way, where every transaction has its fingerprint, and making a change in the chain would be very expensive because of the need for computation power. (Drescher 2017, 92).

Synopsis functions are like small computer programs which change every kind of digital information to a character string. A significant group in synopsis function are cryptographical synopsis functions, which swiftly creates the digital fingerprint to every digital information. (Drescher 2017, 72.). Besides, they will create the same information, always the same summary. (Antonopoulos 2017). Synopsis functions change the random length information to a specific type of character string. This leads to that, in theory, there is the possibility that two completely different pieces of information have the same summary and, therefore, a character string. Synopsis function is a one-way function and for that reason, is not able to get information about the original data or information. (Al-Kuwari et. Al. 2010; Drescher 2017, 73).

The main focus of summaries in Blockchain is to compare information; it is used as a "tool" to compare two kinds of information and those validations. The point is to contrast

information, transactions etc. However, instead of contrasting the whole files, here are contrasting the summaries. It is a more efficient and easier way to compare two-character signs than two whole files. (Drescher 2017, 81.) Constantly when comparing two files, these files are changed to summaries with synopsis functions, and if summaries are identical, it can be agreed that the file hasn't changed. (Swan 2015, 39.)

One of the summaries' applications is the reference, which point is to refer to the information that has saved elsewhere, for example, the computer's hard drive. And also, secure that this information has been unchanged. Summary reference creates a united summary about the cryptographical summary and the original information location. If one of these files' changes, Further more reference will change, and therefore the original summary reference will become worthless. In Blockchain technology, these summary references are used widely, and they can also bring more security to the chain. (Drescher 2017, 83-84.)

The most critical part of summary references is cryptographical synopsis functions, which can be seen as a unique fingerprint. It is extremely unlikely that two different kinds of information would have the same summary, even though that would be theoretically possible. Because of the summary reference, the information can be saved swiftly, and if there is a change in data, it will be noted quickly, as the reference has changed. (Drescher 2017, 86.)

Original ways to save information using summary references are chain-model and tree-model. Chain-model forms when every information includes the same summary reference to before information also. The chain model has shown in Figure 1. In the tree-model summary, references have been linked to each other with the structure, which reminds a tree. (Figure 2.) (Drescher 2017, 86-88.)

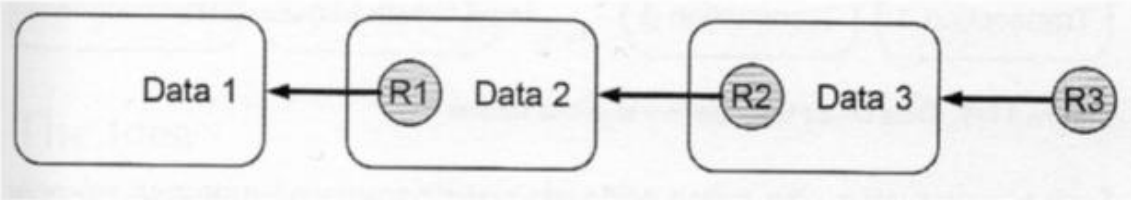

Figure 2

Chain-model (Drescher 2017, 87)

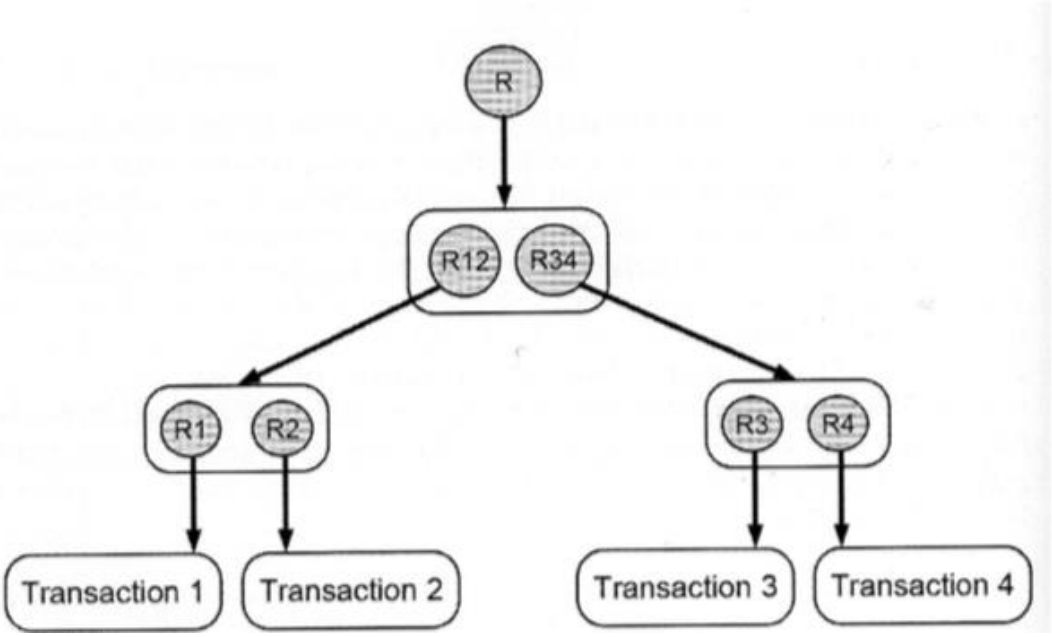

Figure 3

Tree-model (Drescher 2017, 88)

These two ways to store information change sensitivity. It means that if the information is changed after the summary reference has been created, then the summary reference will become worthless. This means that there have been changes after the summary reference was created. With summaries can be challenged, other computers to solve mathematical summary exercises. Summary exercise is also called Proof of Work (PoW). It is an essential part of blockchain technology. Its mission is to solve problems that take much computational power. Summary exercise cannot be solved by information based on general knowledge or storage data, but it should only be based on computational

power and work to solve it. (Crosby, Nachiappan, Pattanayak, Verma & Kalyanaraman 2016; Drescher 2017, 89.)

PoW can be seen as an electronic replacement for a combination lock, which demands a certain number of numbers in a specific order that the lock opens. The numbers can be zeros, ones, whatever, but in the correct order and right amount. Exercises can be at various levels. These levels are called levels of difficulty in Blockchain, these are measured by a number, between one to ten usually. The difficulty level one describes easy and means it only has one zero before the beginning of the summary.
On the other hand, number ten is used for the hard difficulty, and it also means that there are ten zeros before the summary. The higher the number is, the more complex the exercise is. (Drescher 2017, 91; Crosby et al. 2016.)

One of the main points of PoW is that the Synopsis functions are one-way functions. Therefore, it is impossible to solve the PoW by marking out the restriction of the function, and after solving restrictions, solving the exercise in a reverse direction. This is not possible in PoW, so to solve the exercise will just need a pure computation ability. The level of difficulty will also affect how much ability is needed. For example, if the difficulty level is 10, it will take a lot more time to solve the exercise than difficulty level 1. Difficulty level, therefore, affects the number of attempts usually needs for solving the exercise. (Drescher 2017, 91-92.)

There is a possibility in the Proof of Work method that two chains are created simultaneously, creating steam in the Blockchain. One of these chains is accepted as part of the Blockchain if it has many new blocks following (six blocks usually). This sometimes creates problems because you can disturb the Blockchain if you only maintain 25% of the computing ability. Besides, it is possible to create new blocks and therefore add false information. This has been the main problem in public and open Blockchains. PoW method is also expensive and therefore not an excellent choice for industries with a vast number of transactions. (Dinh et. Al 2017).

Public and open blockchains mean that everyone can create a connection to it and creates new transaction by self. It is not so reasonable that everyone would have access to everyone's information. Therefore, dealing with the information or an asset, access to transfer this information should only be allowed to the person whom information/asset is transferring. (Drescher 2017, 94.) The first idea of Cryptographic is to secure information from operators that doesn't have access to that. For example, Facebook is giving our data and information to retails, but we could sell this information directly to retail in Blockchain's case. With cryptographing, this information can be sealed and secured, and it only can be opened with the rightful person with access. If the information is tried to open with a wrong code without access, it will only provide a random number of mixed numbers and letters. (Drescher 2017, 95-96.)

Blockchain technology utilizes unsymmetric cryptography, where is used two different keys protection and reversal of the protection. In unsymmetric cryptography, two keys, public and private, have linked to each other so that with another key, secured information will only be reversed. (Christidis & Devetsikiotis 2016). With this key, the operators and users are identified and secured that only the rightful owner will access the data or asset. Blockchain technology transactions are the only way to clarify and secure the asset or data owner. The way to secure that the rightful owner can transfer assets to others is an electronic method, which can be related to the digital signature. The mission is to identify the account user and secure the owner's willingness to confirm the transaction. This digital signing is used in environments where there is a lack of trust between the parties. (Drescher 2017, 104.)

3.3 Stocking and sharing information

Blockchain technology can store the whole chain of the transaction, right from the first transaction. The challenge in this technology is to store this transaction in the correct order and where it is possible to see which transaction was before another. Besides, it is necessary to verify whether there are changes in the chain or not, so it could be sure

that his chain is valid and can be avoided by manipulating the chains. (Drescher 2017, 112.) Blockchain is like a transaction register, where all the information is saved and stored in the blocks. Block is built by block header and block body. Block header includes the summary reference of the last block header. Block header's summary references create the Blockchain and the linear structure. (Dinh et. Al 2017; Drescher 2017, 120). All the transactions in one block are seemed to happen precisely at the same time. Therefore, these transactions will get the same time pass. (Crosby et al., 2016).

If someone in the Blockchain wanted to change some of the transactions, that would be led into a situation wherein the Blockchain would need to change transaction details, Merkle's tree summary references and all these blocks summary references. All the changes which haven't linked to the end of the chain will cause the Blockchain to be worthless. (Drescher 2017, 132-133.) It is vital that the blockchains' transaction history always describes the truth and makes its trustworthy source of information. Challenge, especially in the public blockchains, where every operator has rights, is that these operators, users, are changing this information to benefit themselves. (Drescher 2017, 136-137.) The transaction history of Blockchain must describe the truthful information because it needs to be a trusted information source. Challenge in public Blockchain is that operators will try to create information to their benefit. This kind of user or operator must be banned or sanctioned by the community. (Drescher 2017, 136-137.)

Changing the data or information in Blockchain has made it expensive, so changing the information is challenging, expensive, and takes time. Changing the transaction history includes three elements. The first element is that saving the data is change-sensitive, which means that all the minor changes will be seen in the transaction history. In the Blockchain, this will be seen that the Blockchain will become worthless immediately after the change. Second, changing the data demands that everything related to this data will also be changed; besides, in the Blockchain, every data related to the changed data will also need to be changed. Third, adding and changing is extremely expensive, and it

takes a lot of time and computational power. (Drescher 2017, 137-138.) Computers of single operators maintain the system and their summaries of transactions, the computers will be operated as a witness, making sure that the transaction happened. This is just to make sure that the data which have come to Blockchain is truthful and reliable. (Drescher 2017, 146.)

Creating the public and open Blockchain, the best and most efficient way to create it is to create a peer-to-peer network. The new operator will connect to several different operators simultaneously because working with only one connection is risky because the connection could cut off whenever another user is not connected to the network. This will secure that single users can not affect another's. (Drescher 2017, 149.) The basic element in the Blockchain is to share the new data with other users or operators. Challenge in public, open Blockchain is that there is no admin to share the information with everyone. This has been solved with a system where all the users share the data forward to users involved with the data. When the data is correct and reliable, these users will forward it to a third person. The cycle goes on and on; in the end, every single user has got the information. If the data is not correct, the user can always deny it and not send it forward. (Christidis & Devetsikiotis 2016.) In the other case, information sharing is happening when the users who have not been connected to the system get a transaction that has happened since they were "offline" and will approve it and forward it. The third case is where new users become part of the system and receive all the data and transactions, which have happened beginning of the chain. (Drescher 2017, 150; Witte 2016).

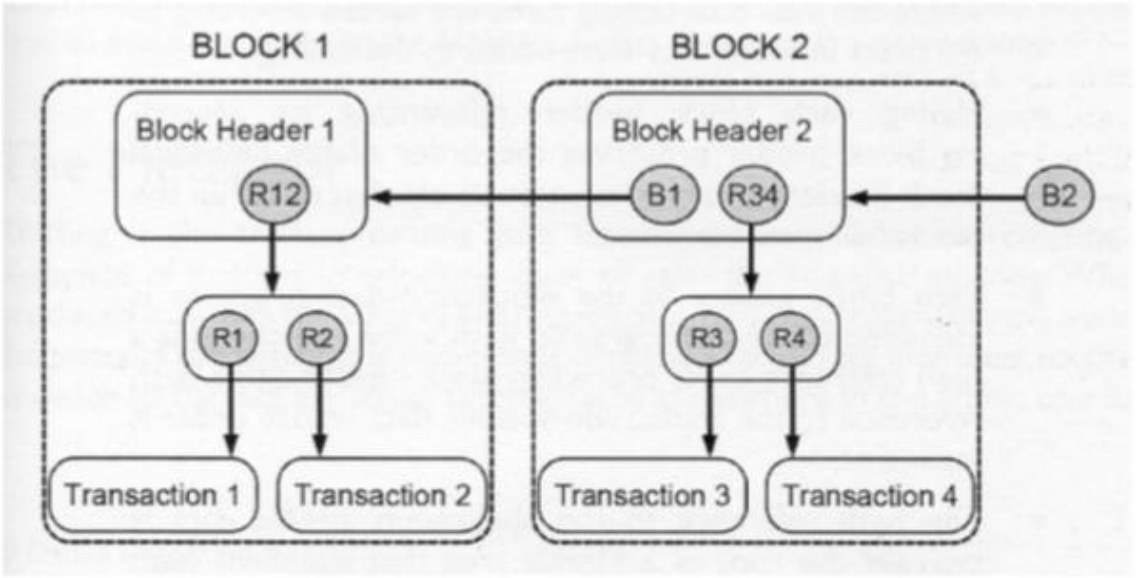

Figure 4

Structure of Blockchain (Drescher 2017, 121)

3.4 Adding new data to Blockchain

The main point of Blockchain is that every operator can add reliable data transactions to the chain, and this will only happen if the data has proven to be valid by other operators. Challenge in this system is openness, where dishonest users could add some false data to the transactions, and therefore they can create trust issues for the system. The main problem and challenge in the Blockchain are how to keep the data and transactions added by the truth. One solution to this problem is that honesty rewards users, they will verify correct data or transactions, and they will get rewarded for it. So, for this reason, no users are willing to add false information. (Drescher 2017, 155.) If the new chain is not valid, all users will deny it and start to create the same exercise summary again. Therefore, the data will be saved, and all valid transactions are safe. If the other users verify the transaction and they will add other transactions to it, and it will be found afterward that this block was not valid, all the transaction after that will be again come back to users to verify, if it comes valid, they will have the award, and if not valid they will lose the award. (Drescher, 159-162.)

The idea of reliable Blockchain is that it will only contain correct data and transactions, containing data that the other users verify. Verifying the data and transaction will use computational power, and it will take time and money, so it is needed to give a reward for this kind of sacrifice to the user or operator. The reward will also be a motivator to verify the transaction and add the correct data because users will lose the reward if the data is incorrect. Besides the reward, there is a penalty for creating and verifying false information, which means losing the award if the block needs to be removed afterward. Rewarding the users by their actions is the main point of the whole Blockchain, but it is no need to reward useless users because it takes many resources. (Drescher 2017, 157, 175.)

Rewarding and the penalties are the tools to secure the reliability of the Blockchain. They will work because there is no reason why the users should turn down the offer where they are rewarded. If the added block is not reliable, it will be removed from the chain and, all those users who have verified that will lose their reward. Even if the Blockchain would be in an open and public network, there could be problems that the reward is priced differently in different countries. (Drescher 2017, 185.) The reward must be in digital form because otherwise, that can be added to Blockchain. For this reason, Blockchain must be supporting cryptocurrencies. (Christidis & Devetsikiotis 2016). The reward must also be an acceptable way of payment because if not no financial benefit, there is no benefit then at all. It should also be easy to change the owner and not be restricted in any way. It should have a stable value, and it should be reliable because if it is not reliable, no user wants a reward that is not known what it is worth. It also cannot be controlled by any admin or operator because it will lose the point of a decentralized system. (Drescher 2017, 186.)

3.5 Choice of the suitable Blockchain

The main point of Blockchain is to store and hold the list of transactions from the beginning, and to store this information, it needs a massive amount of computing power to secure that result is the same, not depending on that whom the information has come from. This means that adding new information to the Blockchain is dependent on the computing power of the network. This new information can be lost, delayed or come in random order in the Blockchain. The challenge is to find a secured and straightforward transaction list in the open and public Blockchain where no mistakes are made. This is why Blockchain is more used in the private and limited blockchains, where the computing power is higher, and there are only a few admins that add the information. (Drescher 2017, 166.)

Single user blockchains can differ from the main Blockchain, which will cause ramification of the chain and denied chains because the information will not agree on the main Blockchain. All the Blockchain, which are not part of the actual chain, will be deleted and denied chains and they are useless, and they will be handled as they have never happened, but if there will be new information (which the most of the user 2/3 agree) that these chains could be added to the main Blockchain again, so, therefore, they will not be deleted. (Christidis & Devetsikiotis 2016).

The ramification is happening when many users are solving the exercise summaries, and two or more users can get it solved almost at the same time. The following exercise summaries will solve these crotches, and they will be removed from the main Blockchain as mentioned earlier. The user will solve the exercise summary and have the longer Blockchain – this will be the main Blockchain, at least for the length to be found. (Drescher 2017, 176; Zheng et al. 2017) Below the picture to understand the process.

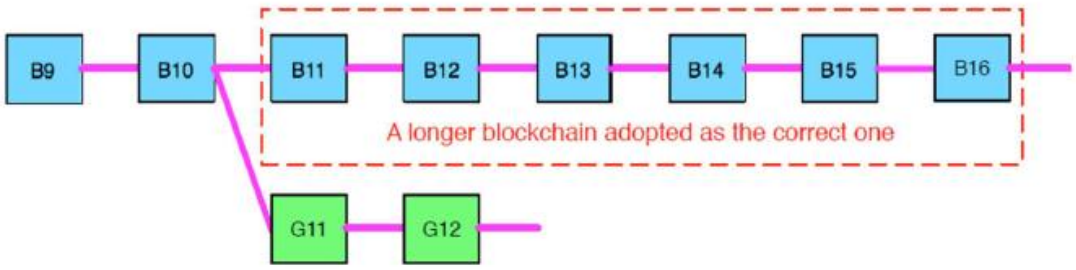

Figure 5

Choose of the right blockchain, in the longest blockchain model. (Zheng et, al. 2017)

The choosing of the suitable Blockchain and creating one depends on the network's computational power and how this network has divided the power. Creating a new chain on top of the old one will need more than two or a third of the network's computational power. So far, the rightful users will use more than two of the third power the Blockchain will function exceptionally well, but if the "attacker" has the majority of the power, it can affect the transparency and function of the Blockchain. The Blockchain's reliability is based on the theory that no company or user can have most of the computational power. (Drescher 2017, 179).

As mentioned in the earlier chapter, the proof of Work (PoW) is reliable and helpful in using the advantage of computational power. The newer and different way to secure the blockchain function is the Proof of Stake method (PoS), PoS differs from the PoW method, where the acceptance of the new Blockchain is not based on the computational power. Instead, it is based on the investment/bet and therefore is avoided misusing the computational power because the bet or investment is lost if the false user tries to benefit from some situation. The poS method will also have some troubles in the function. If one or more users have more value of the stake – they can be having more power to change the information/transactions in the Blockchain. (Vasin 2014.)

The second problem, which is related to the PoS method, is the trustworthy users' actions. These users do not have any dishonest goals, but they will keep their cryptocurrencies from the network and only bet when they will get a reward from their effort. For

this reason, the system will increase the users to keep their cryptocurrencies of the Blockchain and only use them when the reward is big enough and after that exiting from the Blockchain again. This problem can be solved by removing the time weight of the cryptocurrency. (Vasin 2014.)

Besides the Proof of Work (PoW) and Proof of Stake (PoS) methods, there is the Proof of Authority method (PoA), which is based on the user's status which it has gained from the admin and for some time, the status author can be adding the new information to the Blockchain. PoA will only work in the restricted and private Blockchain, this method is efficient and will function exceptionally well in the private blockchains, but in the open and public Blockchain, this method will not be secure and vulnerable. (De Angelis et al., 2018).

3.6 Private Blockchain

The problems of public and open blockchains are more or less related to security, privacy and efficiency. There has been criticism because these problems are based on game theory and rewarding the verifiers and miners. The problem with the open system is that anyone can join the system and create the information they want. These are also slow, expensive and hard to maintain. (Setty, Basu, Zhou, Roberts & Venkatesan 2017.) For this and many other reasons, the last few years have been a hot topic for private blockchains, ideas, and companies based on private blockchains. Private is strictly controlled and changing the information or creating and changing the information is restricted, still retaining the technology's benefits. (Buterin 2015)

Private Blockchain is centralized- or consortium Blockchains; in the centralized blockchains is one main admin who controls the service, and the admin is usually the service provider. Only the service provider can change the Blockchain information; users (other operators) usually have the right to read the information but not the right to change or create new information. For this reason, the privacy and security in the private Blockchain are excellent, and all this without losing the benefits of the technology. There are

several admins and service providers in the Consortium Blockchain, which has all the same rights together. This means that the information can be changed or added in the Blockchain after most of the (usually 2/3) admins have accepted the transaction or new data. (Buterin 2015). The new chain's acceptance will be achieved in the public Blockchain and among the users, usually with the PoW (Proof of Work) or PoS (Proof of Stake) – methods. In the Consortium blockchain, the consortium (a group of service providers) has the right to choose which blocks are accepted. In the private Blockchain, the service provider's acceptance process will be done who has created the service in the first place. (Zheng et al. 2018) Depending on what protocol is used the Blockchain is using, users usually have more limited access to change the information in the private blockchains.

Public and private blockchains have a significant difference in the rights of the users. For the public Blockchain, anyone can join and add new data or create the block changes, only needed most of the users to confirm the data or transaction. Everyone in the public Blockchain has read access to data. Private Blockchain is different in this; it has to be a right to read and see the data. The service provider can grant these accesses. (Zheng et al. 2018) Creating a new block or changing the public Blockchain data is almost impossible because all the data has been shared worldwide through the network. Private blockchains have benefits in changing the information because, in private Blockchain, the service providers can change the information when and to whatever they want. This can be useful if the dishonest user has created some false transaction to benefit himself, and it needs to be removed immediately. In this case, the admins can easily remove the transaction from the block and no need for most users to verify this. The benefits of the private Blockchain are that the users have trust in the service provider. (Buterin 2015)

The private Blockchain is no threat to "over 51" attacks because users have no right to change the data; only the service provider could do that. "Over 51" attacks mean that more than half of the users are used by dishonest users or users. In this case, it is possible to change data and transactions in the public and open Blockchain. This is one of the biggest problems in public blockchains. (Zheng et al., 2018). Changing the information

also shows the efficiency of the chain. Public and open blockchains need to use secure technology to secure and verify the transactions. Therefore, public and open are usually slow, inefficient, and time-wasting compared to private and closed networks. There are many more verifiers in the public network than in private (where could be only one). This takes time, wastes energy and is not efficient. Besides, private network users are linked to the Blockchain more closely, so the error and disinformation could be easily seen. (Buterin 2015.) Table 1 is the difference between the different systems.

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Property	*Public blockchain*	*Consortium blockchain*	*Private blockchain*
Consensus determination	All miners	Selected set of nodes	One organisation
Read permission	Public	Could be public or restricted	Could be public or restricted
Immutability	Nearly impossible to tamper	Could be tampered	Could be tampered
Efficiency	Low	High	High
Centralised	No	Partial	Yes
Consensus process	Permissionless	Permissioned	Permissioned

Table 1

Comparisons among public blockchain, consortium blockchain and private blockchain Zheng et, al (2018)

Private blockchains are closed and need the author to solve problems more efficiently than the open and public and still tolerate dishonest users. Like in the public Blockchain, there can be trust issues between the users and the private Blockchain. Even if the users have been identified before getting access to the system, it can be possible to use more efficient PoW methods, increasing the whole Blockchain's speed and efficiency. Trying to benefit the PoW in the small, private and closed Blockchain could be problematic because if one of the users has benefited from the computational power, for example, has a more efficient computer than the rest of the users, this could lead to that this one user could verify all the transaction by itself. Therefore, it is necessary to secure that no user has this kind of benefit by themselves. (Greenspan 2015.)

3.7 Problems of the Blockchain

Like many other new technologies, Blockchain has its problems and struggles for the beginning, but the future of the new technology seems bright, and like every new technology, they use to find a way to avoid these problems. In this subchapter, I will open up the Blockchain problems and their opportunities in the view of ESG-factors and how the Blockchain's future could be hand in hand with S.R.I. investment strategies.

Even though Blockchain has millions of ways to make better networks, transparency, and faster and more secure – it has its fails. These problems could be avoided when the technology has found its full potential, but today, as the Blockchain is used, these are the main problems of the Blockchain (Sneyd, 2019):

1. *Extremely high energy use*

To every user on the network to solve the summary exercise and use the computational power to secure the transaction and adding the data to the network or mining the data, this requires a massive amount of energy to use all these powers to solve simple transaction as especially in the open and public Blockchain where more power is needed. One estimate was that the only bitcoin network is using (2018) just over 23 terawatt-hours annually, which is more than Denmark has used at the same period of time. (Sneyd, 2019) The amount of wasted energy is crossing the idea of Blockchain being a Socially responsible choice of investment, but like mentioned, these problems have been noticed, and the project of efficient blockchain use is up and running.

2. *Unregulated environment*

To this day, there are not many regulations for the Blockchain, and there is no direct regulation to the crypto wallets about the Know Your Customer information (KYC). This invests Cryptocurrencies riskier, and this also allows money laundering – if the wallet owners have not been identified, the transaction can be happening anonymously. (Sneyd,

2019) However, for example, U.S.A. has been directed at the beginning of 2021 that all the crypto wallets have to be in the round of KYC processing. So this problem could be avoided soon.

3. *Relatively slow*

Today's applications using blockchain technology are still relatively slow and take vast amounts of time and computational power to secure transactions. For example, Bitcoin secures only seven transactions a second, where the payment company MasterCard is allowed to secure more than 44 000 payments per second. (Sneyd, 2019)

4. *Problems with the GDPR*

The European Union's General Data Protection Regulations (GDPR) suggest that all the user information can be deleted if the user wants its data to be removed. This can be pretty challenging in the Blockchain, where "all the transaction" are guaranteed to be saved, and nothing is removed. (Sneyd, 2019) This is a known problem, and in the new networks, the data owner is available to "hide" the data or transaction that is more sensitive.

3.8 Blockchain solutions to ESG problems

Mentioning the Blockchain problems and how the new technology differs from being socially responsible, it is also crucial to tell the good side of the Blockchain and how these problems could be avoided and turn these problems into better solutions, safer and efficient Blockchain. Here are some points how the technology could help E.S.G. problems (Sneyd, 2019):

1. *Collaborative*

Because in the Blockchain, no central admin or author is needed to control and secure the transactions, which means that the transaction can be work with just two parties and no middlemen needed for the transaction. This will reduce the transaction costs and expenses which come when the middlemen are involved. (Sneyd, 2019)

2. *Supply Chain Traceability*

As mentioned earlier, the Blockchain will not remove any data or transactions in the network, so it has all the supply chain in the network, and it can be easy to find where it began and where it ended. This can provide the companies a benefit to secure that the product has been delivered under the E.S.G. factors. Also, the customer could see the chain, and this can be a competitive advantage. (Sneyd, 2019)

3. *Renewable Energy Distribution*

Blockchain can be used as an Energy distributor, and it could let the small energy producers, for example, the private person using or sharing their electricity with others or some of them even producing it by themselves (solar power etc.). By using Blockchain technology, this could be automatized, and with smart contracts, the best option would be accepted by the computer, and the electricity would be coming from the local produce, reducing the Energy waste by an enormous amount. (Sneyd, 2019)

4. *Anti-Money laundering*

For the European and banks worldwide, the "Know Your Customer" (KYC) process is taking much time and resources from the bank and not giving any returns to the bank. The banks have a responsibility to identify their customers and detect fraud, money laundering or corruption. With Blockchain Technology, the whole monitoring process could be done automatically, and this would free a massive number of resources related to the KYC process as it would also upgrade the system. Blockchain information would be

adding new, more timely information to the process, and also, because all the ledgers and the wallets would be in the same system, it would be easier to detect those transactions and follow them and where they came from. (Sneyd, 2019)

5. Proxy Voting

The current Proxy voting system is not allowing the auditing of the shareholder's meeting, and the system itself is not efficient; sometimes, voters are disconnecting with the inefficient brokers. Blockchain could be adding value to this problem also. For example, in 2018, we were using Blockchain technology in the first-ever shareholders meeting; by using the new technology, the institution created a distributed ledger for each meeting, and all the members had the right to vote. This would be efficient because everyone would be in the same system, and every vote/transaction would leave a trace, and this could be identified where it came from. (Sneyd, 2019)

6. Cybersecurity

Protecting the data of private persons has become more and more critical to companies. As the General Data Protection Regulation states that companies have the responsibility to secure the Data of single persons, it has become a popular theme, and the excess of this regulation is pointed out in the media quite aggressively. Nevertheless, luckily with the Blockchain, the data can be stored across the network to the ledgers, and all the data would be distributed, which would be extremely hard for hackers to steal or corrupt the data. (Sneyd, 2019)

4 Socially Responsible Investing

This chapter will open up the concept of Socially responsible investing and what it means in theory. The problem of determining the concept of S.R.I. is problematic because there is no unique, globally accepted and just one concept of what is S.R.I. in general. This chapter will bring the most popular ones of these concepts and the most notable S.R.I. strategies that are used worldwide.

4.1 Background of SRI

There are several definitions of Socially responsible investing (S.R.I.), and there is no absolute and one concept to S.R.I. Schwartz (2003) defines S.R.I. that it is an investment style where you analyze the profitability and the social, ethical and environmental factors. The Finnish Socially responsible investing association Finsif defines the S.R.I. as noticing the E.S.G. factors when investing in a stock or another asset (Finsif, 2019). E.S.G. comes from words Environmental, Social and Governance. Environmental stands for taking notice of how the company affects its environment, for example, not investing company that has a considerable carbon footprint, or on the other hand investing in companies that are creating new renewable energy source, etc. Social comes from noticing the humane perspective of the investment. For example, how the company has the code of Conduct made or how the employees are treated. Also, our company using any subcontractor that is using slavery. This has been a significant problem, especially in Xinjiang, China. Where companies are using uguiry minority to do work without getting paid, in the concentration camps. (Guardian, 2020) Governance means the company's code of Conduct, how the company has internal control, and how the key persons are rewarded. (Finsif, 2019.)

The finance sector is becoming, as it also is already, more and more aware of the S.R.I. and how, with the Sri strategy, it is possible to make profitable investments. The finance sector is primarily using E.S.G. -factors to examine a single investment or company's responsibility. In 2019, socially responsible invested money was around 29 billion dollars.

(Finsif 2019). Even that Sri has gained a lot of its attention after the 21st -century, it has a history with a long way. Thousands of years ago, Jews had directives that made it possible to invest only ethically. For example, they had directives that guided people to invest ethically, for the greater good or investments bringing some help to the community. The first same kind of directive got accepted to the modern world in 1928 when American Pioneer-fund refused to invest in liquor and tobacco companies. This kind of exclusive strategy is called the exclusion strategy. (Schueth, 2003; Schwartz, 2003.)

4.2 Different ways to estimate SRI

At the beginning of the 21st century, socially responsible investing has grown an enormous amount, and it is most notable happening has been 2006 when the U.N. launched the principles of Socially responsible investing. United Nations Principles made these principles for Responsible (UNPRI) investment society is not under the U.N., even though it has a more or less reminding name than the other. This organization works independently out of the U.N., but the U.N. has two board places at the UNPRI.

There are six different principles, and over 2000 organizations have committed to follow these principles in the year 2019. The sound of over 2000 organizations sound minor, but these 2000 organizations' funds are more than 90 billion Euros. The funds have been rapidly growing past few years. (Hyrske, Lönnroth, Savilaakso ja Sievänen, 2012, s. 26–28; P.R.I., 2018.) The first principle is:

1. *We will incorporate ESG issues into investment analysis and decision-making processes.*

Investing organizations must mention ESG-related affairs in their investment policy and support the tools, statistics, and analyses of the ESG-factors. Analyze the company's internal and external treasure's ability to adapt to the ESG-factors. Also, promote the academic research about the E.S.G. related studies and offer training to saving specialists in their organization. (UNPRI, 2020)

2. *We will be active owners and incorporate ESG issues into our ownership policies and practices.*

The second is to develop and actively bring out the ownership, which is in line with the principle. This can be with using the right of the vote or supervising that the right of vote is happening in the company. Becoming an owner of the company gives you a right to vote, and if you use this for the company to make better and ethical choices, this principle is fulfilled. Therefore, owners of the company have the right and responsibility to make the company beware of the E.S.G. factors. (UNPRI, 2020)

3. *We will seek appropriate disclosure on ESG issues by the entities in which we invest.*

This third principle aims to promote investment targets ESG-factors reporting, for example, using G.R.I. (Global Reporting Initiative) conduct. This report is also regularized and unified to be more similar to the annual accounting standards. Furthermore, for this principle, it is essential to suggest the companies follow these international norms and acts, and therefore unify their code of Conduct and internal reporting to be much as UNPRI principles and keep in mind the ESG-factors. (UNPRI, 2020)

4. *We will promote acceptance and implementation of the Principles within the investment industry.*

For the fourth principle, the main point is to take advantage of the responsibility principles and line the investing mandate control, performance-based rewarding and bonus fee control. All this to make sure that investment institutions are doing their best to understand the ESG-factors better. Besides, also be involved with developing the ESG-tools, bringing the ESG-factors to investors' knowledge and maintaining these principles'

regulatory. UNPRI secures that these principles comply with and are giving attention to those that do not follow this principle. (UNPRI, 2020)

5. *We will work together to enhance our effectiveness in implementing the Principles.*

The fifth principle is to work as a guideline to institutions to attempt the events where investors share the information, knowledge and experience about Socially responsible investing. The main point is to talk about the hot topics and how the S.R.I. could be better. (UNPRI, 2020)

6. *We will each report on our activities and progress towards implementing the Principles.*

The sixth principle is a guideline to bring the ESG-factors to people's knowledge and plans. Disclose active ownership activities (voting, engagement, and policy dialogue), also communicate with beneficiaries about E.S.G. issues and the Principles. Also, report on progress and achievements relating to the Principles using a comply-or-explain approach. The main point of all these principles is to gain attention about S.R.I. and give investors knowledge, experience and facts about Socially responsible investing.

Many of the institutions have been accepted these principles; for example, in Finland, "Osuuspankki" has accepted these principles, and they use these principles exemplary. Op has signed the Socially responsible investing principles over 12 years ago, in 2008. O.P.'s financial management brings out exceptionally well the importance of the reports, principles and ESG-factors. Op reports their investments and acts annually and measuring those with ESG-factors. This kind of textbook working with the S.R.I. is giving O.P. more attention nowadays, and it has been an excellent way to find market space in the investor's choices. about institutions. (O.P. Financial management, 2018.)

4.3 U.N Global Compact – Conduct

Some guidelines are not so directly attached with the S.R.I., the six principles of S.R.I. are more mounted to the finance side, but there are also other guidelines and principles. The U.N. has already published 2000 corporate responsibility related Global Compact – Conduct, which is based only voluntary and has no directs or sanctions. It has ten different principles, and these ten make it whole Conduct. This Conduct is meant to be the general guideline to corporates about human rights, well-being at work, environmental and corruption-related things. The U.N. mission with this Conduct is to achieve a more sustainable society by offering corporates Conduct which principles can be integrated into their businesses and strategy. It will also promote the point of collaboration, and this also helps the mission of the U.N. The U.N. has the support of many countries, and therefore, the Global Compact – Conduct has been supported in many countries, and organizations can sign the Conduct, and it is based on the voluntary.

In the investment styles, it is possible to apply principles, but using the socially responsible principles is the more accurate way. Global Compact ten principles will be shown in the catalog below. (OECD, 2005; U.N. Global Compact, 2017.)

1. *Human Rights*

Businesses should do all the necessary actions and support and respect to protect international proclaimed human rights and make sure that they are not complicit in or involved in any human rights abuses.

2. *Labor*

Businesses should firmly uphold the freedom of association and the effective recognition of the right to collective bargaining. Businesses should also protect the elimination of all forms of forced and compulsory labor. Also, the effective abolition of child labor and the elimination of discrimination regarding employment and occupation.

3. Environment

Corporates and companies should, in all matters, support a precautionary approach to environmental challenges and undertake initiatives to promote greater environmental responsibility in any way possible. Also, encourage the development and diffusion of environmentally friendly technologies and ways to do business.

4. Anti-Corruption

Corporates and companies should work against corruption in all its forms, including extortion and bribery. Also, businesses should avoid businesses with companies that have any relations in corruption cases or have a past with corruption.

4.4 Corporate responsibility reporting

Every analyst or observer views the company's responsibility, and evaluation itself is a subjective process. This process affects many things, for example, the company's interest, what kind of content they publish, and how they handle their relations to their stakeholders. Some companies will put more value on the environment, and others can rely more on their code of Conduct. This can lead to different evaluations about the company's responsibility. The significance of these reports has been questioned, and these reports have been claimed to be company's good reputation fishing and also unnecessary published information. Companies report their responsibility voluntarily, and there are many tools to support this. One of these kinds of report tools is the G.R.I. report, which has been verified as the most comparable tool to compare different companies and industries in S.R.I. In 2012 about 20% of all listed companies worldwide had made the report by themselves. (Hyrske et al., 2012, p. 140−141.)

The reports voluntarily create doubts about the company's interest to give exaggerated information about the S.R.I. Regularly published annual and quarterly reports include valuable information for investors about ESG-factors and how the company has its code

of Conduct. This kind of information is mandatory for all public companies, and it helps investors find the ESG-factors. Even though voluntary reporting comes with direct costs, it has been proven to be helpful. Vanstraelen, Zarzeski ja Robb (2003) states in their research. That non-financial reports add accuracy to the evaluation of the company's future performance. With these reports, the company's transparency will increase, which usually causes better valuations from the analysts. (Vanstraelen, Zarzeski and Robb (2003)).

G.R.I. organization has been created in the year 1997 by two American non-profit seeking organizations. Even the G.R.I. was initially established in the United States, its head office is located in the Netherlands and operates entirely independently. G.R.I.'s mission is to help companies and governments worldwide understand and take notice of responsible themes like Climate Change, Human rights, Codes of Conducts and the social health of employees. The principles and standards of G.R.I. are used in over 100 countries worldwide. G.R.I. report also includes industry-based statistics, which increase the value of the information done by the report. (G.R.I., 2020; Hyrske et al., 2012, p. 140−141.)

4.5 SRI -strategies

Socially responsible investing as a concept enables different types of interpretations of how to practice responsible investing. Noticing the responsible in the investment decision is sometimes quite complex and challenging. Especially ESG-factors and how to integrate them with the decisions are hard to evaluate. Luckily, the European Socially responsible investing association (Eurosif) shared S.R.I. strategies to seven different processes, which have summaries to the one table. These process definitions describe only the socially responsible Conduct, not why these strategies are followed and how accurate. (Eurosif, 2012.)

Based on the research Eurosif made in 2018, the most popular investment strategy is exclusion. This strategy is based on denying and, in this case marking out investment or industry options not selected as Socially responsible. Even single countries can be

focused on exclusion; for example, countries or countries that do not have an excellent human right can be excluded from the options. Many industries are classified as Irresponsible industries, for example, gun, tobacco, alcohol, betting-industries. Also, industries that are using animal testing can be avoided and classified as irresponsible industries. The exclusion strategy is also called ethical or value-based investing because exclusion is usually personal choices. Because the reasons are personal, there are also as many criteria's for Socially responsible investing as there are persons. (Eurosif, 2012.)

The second popular investment strategy in the year 2018 was active ownership and voting. Using actively the right to vote is necessary; it is the only way to impact its policy and actions. This strategy aims to use the votes to drive forward responsible things and acts in the company's decision-making, not driving more dividends for the owners. This strategy and process requires commitment, ownership, and acts to change the company's policy and decisions to a more responsible and ethical way. (Eurosif, 2012.)

The ESG-integration means bringing ESG-factors and criteria closer to the investment decision making and noticing the ESG-factors, not only the profitability of the investment. This strategy has become more and more popular, and in the 2018 research made by Eurosif, it has been overgrowing since the U.N. socially responsible principles (UN PRI) was started using in the finance sector. These are the six principles that were opened in the earlier chapter. The natural integration of the principles has been criticized for the complex measuring and verification of the strategy. The strategy's point is to give E.S.G. -factors measurable price indicators which can be negative or positive. The strategy has also been criticized for not noticing the not financial factors widely, and therefore the complete analysis of the response strategy is not always accurate. (Eurosif, 2012.)

The norm-based screening is based on complying with the norms and agreements of responsible investing. The strategy is similar to exclusion, which was mentioned earlier. In this strategy, the point is to exclude the companies that are not obeying international standards' rules. The most popular screening factor used in the norm-based screening is

the U.N. Global impact conduct, which was introduced earlier in this chapter. This strategy is evaluated the U.N. ten principal fulfillments in the companies, and if there are violations by the companies, these companies will be excluded from the portfolio. The critical view is based on the ethical eye of the treasurer or fund manager, so these can be separated from the other people's view quite a lot. (Eurosif, 2012.)

Best-in-Class strategy's main point is to line companies in rank order by designated ESG-measures. Criteria could be, for example, a made-up measuring system for responsible or using own analysis to rank up these companies. This positive screening is an alternative strategy for exclusion, in which the main point is to score investment targets by the same criteria as the exclusion strategy but focus on the point that which company has completed best inside these measures. Typical criteria are the principles in the U.N. Global Impact -conduct our well-being at work, environmental and human rights. Best-in-class and positive screening strategy is examined to bring better returns than negative screening (exclusion). (Eurosif, 2012; Kempf & Osthoff, 2007.)

Sustainability-themed investment strategies are, as they are named, improving sustainability and are focused on sustainability-themed topics. Especially more focused on the focused environmental themes, like environmental and political factors are trendy topics, in sustainability-themed strategies nowadays. Most of the topics are renewable energy sources, clean technology, climate change, clean water, forest, and ecology. The last of the seven strategies is Impact Investing strategy; Impact investments are investments made into companies, organizations, and funds to generate social and environmental impact alongside a financial return. Impact investments can be made in both emerging and developed markets and target a range of returns from below market-to-market rate, depending upon the circumstances. (Eurosif, 2012.)

Table 2

Summary of the SRI strategies. (Eurosif 2012)

Best-in-Class	"An approach where leading or best-performing investments within a universe, category, or class are selected or weighted based on ESG criteria. "
Engagement and Voting	"Engagement activities and active ownership through voting of shares and engagement with companies on ESG matters."
ESG -integration	"The explicit inclusion by asset managers of ESG risks and opportunities into traditional financial analysis and investment decisions based on a systematic process and appropriate research sources."
Exclusions	"An approach that excludes specific investments or classes of investment from the investible universe such as companies, sectors, or countries."
Impact Investing	"Impact Investments are investments made into companies, organisations and funds with the intention to generate social and environmental impact alongside a financial return."
Norm-based screening	"Screening of investments according to their compliance with international standards and norms."
Sustainability -themed	"Investment in themes or assets linked to the development of sustainability."

5 ETF

This chapter will open up the general knowledge about ETF-funds, how they are operating, functioning, and the benefits of investing in those. There are many similarities in the average funds; in this chapter, the differences between the ETF and equity funds will be opened and opened up the ETF's functions.

5.1 General

Exchange-traded funds (ETF) are operating almost at the same as average equity funds, that there is a fund manager who picks and chooses where to invest and takes care of the fund in general. ETFs are also similar to index funds, but the difference is that the ETF's are being changed in the international marketplaces. The price will be following the market price in real-time. The index-part value is creating in the same way as the index related, the main point of ETF is very similar to the index funds, that the index parts are trying to invest their funds to the index which is describing the markets well. For example, using the S&P 500 index and ETF's are using benchmark the S&P 500 group. (Rowland, 2009.)

ETF's are not noted traditionally with the fund companies, as the treasury funds are noted, nowadays the trading is taking in place in the internet marketplace, and it is easy to sell and buy these ETF's in real-time on the internet. It is also possible to diversify your investment with many ETF's with different weights on different funds. Many ETF providers have a general index part or fund, which diversifies the assets worldwide, for example, "All-world-ETF" or" SRI-ETF", which investments strategy is one of the presented earlier chapters. (Rowland 2009.) These ETF's can be related to other themes also, and as in this study can also be seen new technology as Blockchain can be benchmarked with the ETF's.

Some of the ETF's are typically giving owners dividends monthly, quarterly or annually. This will be increasing the direct cost to the investor, and therefore the investment will

not be able to grow the fund-part. For this kind of situation and the long-term investor, the best way is that the fund will automatically invest the dividends forward, and therefore the investors fund part will be growing, and compound interest will gain interest to the investor. So, the best option ETF is where the dividends are invested in again for the long-term investor. (Erola 2016: 161.)

5.2 Benefits and risks of ETF`s

ETF investing gives an easy benefit to diversifying as it also gives the tax efficiency of an index fund, the costs are minimalist, and it is easy to invest in ETF's. At below there are a few of the benefits to gain when investing in ETF's.

1. *Low costs.* ETF's usually contains low management fees compared to index funds or average equity funds. The U.S. company Morgan Stanley made research where they conducted that ETF has an average of 0,5 percent management fees, and the fees can be low as 0.1 percent annually. However, the whole fee amount can be more than that because of the trading and the commission fees.
2. *Flexibility of trading.* ETF's can be traded every day when the market is open, the same as stocks. The price will be determined from the market price. Buying and selling is the same kind as doing it with stocks.
3. *Transparency.* All the information, the indexes, how it has been diversified and what index it will follow are public and open information.
4. *Efficient diversifying.* For one buy, it is possible to get same diversifying as thousand stocks, if investing abroad from home country it is possible with much lower cost and also it has been made a lot easier. Index ETF`s can be used when wanted to diversify with country, area or industry related factors. (Erola, 2016)

ETF investing generally has the same risks as investing in any kind of fund. Professional investing and gaining profits will need initiative information work from the investor and keeping up with the markets because the ETF's are quoted in the international market-places. According to Bewley, R. (2016), the risk of ETF's can be classified as followingly:

1. *Content risk.* This risk can come up when country diversifying is applied or when the ETF is following some international index. When using the international index, the information is not maybe available, or it is hard to find, so there could be problem about investing in something you do not even recognize what it is. When investing abroad, it is recommendable to read the ETF instructions and specifics before investing.
2. *Liquidation risk.* Even though the ETF markets are comparable to normal stock markets and investing, changing the share to cash could be hard sometimes, especially in short timeline. In some cases, valuing the share price of the ETF can be hard, especially in the markets where is not so high volume, there could be price effects from example if there is large selling in the shares of the ETF, this could lead to price going down. The liquidation risk is related more to the synthetic ETF`s, where the ask or demand is low, this means that when there is sudden shock in ask or demand – this will lead to shock in the price also.
3. *Active Risk.* The return of the ETF can differ from the exact index, usually this is risk is small and the difference in the returns is low. But it is still necessary, because the investor has the idea of reaching the actual index returns and this is possible denying this from the investor. Negative risk is usually from the high managing fees, transaction fees, etc.
4. *Counterparty risk.* This risk is generally related to all kind of fund investing, for example using shareowner loan agreement and/or other outside services. This risk means the risk that the other side of the agreement is not performing their obligation – what comes to the agreement. The risk is more related to the

derivate ETF`s, where the portfolio has been built with index derivates. This risk can be mostly avoided with collaterals – this usually will add the fees.

As the risk and benefits have been introduced, it will be the investor's own decision to find the ETF investing exciting and good choice with the stock investing or choice. All these risks and profits seeing, ETF investing is an excellent choice for the investor who is not able or wanted to follow the stock market so actively. Long-term investing in low-cost ETF's will accumulate profits in the future.

6 Data and methodology

This research's primary purpose is to examine the profitability comparison between Exchange Traded Fund's investing in Blockchain or companies using Blockchain in their primary business to Socially responsible investing ETF's. Methodologies used in this study are the same kind of methodologies used in other studies where profitability comparison is similar. An essential point in this study is how to determine the S.R.I. and Blockchain ETF's successfully.

6.1 Data

The data used in this research has been collected from the DataStream database. There are 5 "Blockchain" ETF's in the data and five randomly picked "S.R.I." ETF's in the research. The small amount of the Blockchain ETF's will produce some problems with the significance of the results, but for this reason, this research should be used more directional than absolute truth. The ETF's time period is from the beginning of the year 2019 to the end of the year 2020. The schedule is also short because Blockchain ETF's are extremely rare still, and most of the ETF's collected for this research were not established before the year 2019. This study will also include S&P 500 daily returns for benchmarking these two ETF's. The short time period of the data and the during the time period was the 13.3.2020 "black Thursday" when the whole market went down by 20% in a week, the data in this study can not be as the absolute truth.

The residences of the ETF's are worldwide, and for Blockchain ETF's there are four in Ireland and five in Canada, and the rest are in the United States. The four in Ireland are valued against Euro, the ETF in Canada against the Canadian Dollar and the ETF in the U.S.A. is naturally valued against Dollar. The SRI ETF's are more diversified all over the world because of the more significant amount of the funds. There are 40 in Europe, 25 in U.S.A. and 6 in Asia. The S.R.I. funds have been in the market longer than the Blockchain funds, but to collect more accurate data to compare, the timetable for the S.R.I.

funds will be the same. From the 71 funds, only five were randomly picked for this study to make the comparison easier for these two different funds.

The whole timetable for the SRI ETF's had 218 609 observation points, but for the limited timetable which Blockchain funds had (15.4.2019 – 2.10.2020), the observation points for Sri funds collected are 383. For the blockchain funds, the observation points naturally are lower with the sum of 382 daily observation returns. Also, the whole observations used in this study are 968 points. For the small number of Blockchain funds, the whole observation points tend to be slightly low for the accurate empirical analysis, but as mentioned earlier, this study should be more directional than taken as absolute truth.

The definitions of the funds are essential information for this research, and for the blockchain ETF's there are two main definitions. The first one is that these are funds that invest in companies involved with transforming business applications through the development and use of blockchain technology. Furthermore, the second one is that These are funds that invest in futures and options pegged to the performance of Bitcoin, Ether, and other cryptocurrencies, or in cryptocurrency investment products offered by asset managers like Grayscale or Bitwise. For the Sri funds, the primary definition is that they have signed the U.N. socially responsible investing principles, and the companies invested in are reporting the E.S.G. measures in the same that the whole ETF is transparent.

Also, to compare these two different kinds of ETFs, there should be a benchmark group to compare the excess returns. Therefore, the benchmark group is added to this study. The benchmark group will be the S&P 500 index, which will indicate what kind of returns the "market" has gained.

6.2 Methodology

The research data is based on ETF's and for the daily returns of these funds, so it is more than advisable to use research methods suitable for funds. This research will also be used two regression, factor models, and other methods to examine the ETF's possible excess

returns. For the first method, this research will be used to compare the fund's features and profits, and for this, Sharpe's (1966) invented Sharpe Figure, which will tell the risk-fixed profit for the fund. The Sharpe will be calculated as below.

$$S = \frac{r_p - r_f}{\sigma_p}$$

Where r_p is portfolios return and r_f is risk-free rate, which is in the U.S stock market 4 weeks T-bill and σ_p is volatility of portfolio, as the same is mean derivation for the portfolio return. (Bodie et al. 2014)

The second method is to examine possible excess earnings that these funds are profiting. With this method, it can be shown whether the fund is gaining any excess profits or not. This will tell the possible investor that it should be invested and possibly gain some excess returns compared to the market. For this kind of analysis, the excellent method is Jensen's (1968) Alpha, and the Jensen alpha will be calculated below.

$$R_{pt} - R_{ft} = a_p + B_p\left(R_{mt} - R_{ft}\right) + e_{pt}$$

Where α_p is the excess return on the portfolio after adjusting for the market, R_{pt} is the return on the portfolio p at time t, R_{ft} is the risk-free interest rate, R_{mt} is the return on the market portfolio at time t and β_p is portfolio beta, i.e., the sensitivity of the excess return on the portfolio p with the excess return on the market.

After examining the excess returns of the ETF's it will be time to examine the returns on the regression model, and for this study, it is most suitable to use methods that are explained in the earlier chapters, and these models will be Fama & French three- and five-factor models. These models are explained shortly below:

$$R_i = R_f + \beta_i(r_m - r_f) + s_i SMB + h_i HML + e_i$$

Where R_i is the return of the stock/portfolio i, R_f is the risk-free rate, ai is the intercept, $b_i(r_m\text{-}r_f)$ is the factor beta for market returns multiplied by market index returns, s_iSMB "Small-Minus-Big" represents a portfolio that is long small stocks and short, big stocks to capture the "size" effect, h_iHML "High-Minus-Low" represents a portfolio that is long high book-to-price stocks and short low book-to-markets representing "value" investing. (Fama & French 1996).

$$R_i - R_f = \alpha_i + \beta_i(r_m - r_f) + s_i SMB + h_i HML + r_i RMW + c_i CMA + e_i$$

Where R_i is the return of the stock/portfolio i, R_f is the risk free rate, a_i is the intercept, $b_i(r_m\text{-}r_f)$is the factor beta for market returns multiplied by market index returns, s_iSMB "Small-Minus-Big" represents a portfolio that is long small stocks and short big stocks to capture the "size" effect, h_iHML "High-Minus-Low" represents a portfolio that is long high book-to-price stocks and short low book-to-markets representing "value" investing., r_iRMW is the factor beta for robust minus weak (portfolio) multiplied by returns of robust minus weak, c_iCMA is the factor beta for conservative minus aggressive multiplied by the returns of conservative minus aggressive, e_i is the influence of other fac-tors affecting the stock's/portfolio's price (Fama & French 2015)

In this study, it would have been possible to use other regressions and methods to examine the excess returns. For example, the Carhart four-factor model, C.A.P. -model and many others. The regressions and models used in this case have been picked out for being the most suitable for comparing two different kinds of ETF's.

7 Results

This chapter will present the study's empirical results, and these results were created by using data and methods presented in the previous chapter. First in this chapter is presented the key measures and daily returns of these two funds, after that, the results of Fama & French factor models and the last will be presented the daily return data analysis based on the empirical part.

First to be presented are the daily returns of these two different types of funds, and for the given time period, the Blockchain funds outperformed the S&P 500 and the S.R.I. funds.

Figure 6

Daily returns of the ETF`s

As seen in figure 6, the Blockchain ETF's were before the pandemic starts almost at the same returns as the S.R.I., but after the pandemic started, there has been an enormous bull market to Blockchain and also in the crypto market. Also, we can examine that

before the pandemic, these two kinds of funds were correlated to each other and followed less the market trend generally. The time period of the study was quite different from the ideal circumstances to examine profitability. This can also be seen in Table 3. Where are showed the critical measures of these two different kinds of funds? This table will also show critical measures of the S&P 500 index during the examined time period.

Portfolio key measures, S&P 500 as bench mark

15.4.2019-2.10.2020

	SRI	Blockchain	s&p 500
CAGR	8,82 %	35,02 %	10,14 %
RFR	1,40 %	1,40 %	1,40 %
Annual vol	0,22	0,20	0,28
S_ratio	0,34	1,64	0,31
Beta	0,81	1,15	1,00
Treynor	0,09	0,29	0,09
J Alpha	0,003	0,236	0,000

Table 3

Portfolio Key Measures

Table 3. shows that the Blockchain fund has outperformed the S.R.I. and outperformed the market as well. Blockchain ETF's has made a vast 23,6% excess returns compared to the market. These results indicate that Blockchain ETF has been an excellent choice for investors during the time period. Also, the Blockchain funds' annual volatility has been lower than the market volatility and the S.R.I. funds volatility. Before taking any conclusions about the blockchain ETF's superiority, it should be looked at the circumstances behind these numbers. First, the given time period was in extreme circumstances during the pandemic and witnessed a slight market crash in March 2020. All this raises the market's whole volatility and, therefore, the volatility of SRI ETF's. Also, there is a massive bull market for Blockchain technology-related stocks, funds, and cryptocurrencies; this could also explain the blockchain ETF's outperformance.

The subsequent tables will present the Blockchain and Sri fund results, using the Fama & French three-factor method to examine the Alpha and whether these two different kinds of funds outperformed the market. The model has examined using the monthly returns of the funds. Also, the market presented as rm – rf in the model is taken from one monthly T-bill rate, and the rm is from the value-weighted of all CRSP firms incorporated in the U.S. and listed in the NYSE, AMEC or NASQAD. The table is presented below.

Fama&French 3 factor model

SRI

SUMMARY

Regression Characteristic	
Multiple R	0,976
R Square	0,953
Adjusted R Squared	0,943
Standard error	1,294
Observations	18

ANOVA

	df	*SS*	*KN*	*F*	*Significance F*
Regression	3	472,47	157,49	94,11	0,000000002
Residual	14	23,43	1,67		
Total	17	495,90			

	Coefficients	*Standard error*	*t statistic*	*P-value*	*Lower 95%*	*High 95%*	*Lower 95.0%*	*High 95.0%*
Intercept	0,367	0,398	0,923	0,372	-0,486	1,220	-0,486	1,220
Mkt-RF	0,703	0,064	10,943	0,000	0,565	0,840	0,565	0,840
SMB	0,336	0,168	2,004	0,065	-0,024	0,696	-0,024	0,696
HML	0,072	0,097	0,750	0,466	-0,135	0,280	-0,135	0,280

Table 4

Fama & French Three-factor model SRI ETF`s

Fama&French 3 factor model
BLOCK
SUMMARY

Regression Characteristic	
Multiple R	0,783
R Square	0,614
Adjusted R Squared	0,531
Standard error	6,537
Observations	18

ANOVA

	df	*SS*	*KN*	*F*	*Significance F*
Regression	3	950,19	316,73	7,41	0,00328
Residual	14	598,19	42,73		
Total	17	1548,39			

	Coefficients	*Standard error*	*t statistic*	*P-value*	*Lower 95%*	*High 95%*	*Lower 95.0%*	*High 95.0%*
Intercept	0,911	2,010	0,454	0,657	-3,399	5,222	-3,399	5,222
Mkt-RF	1,277	0,324	3,935	0,001	0,581	1,972	0,581	1,972
SMB	-0,636	0,848	-0,750	0,466	-2,455	1,183	-2,455	1,183
HML	0,133	0,488	0,274	0,788	-0,913	1,180	-0,913	1,180

Table 5

Fama & French Three-factor model Blockchain ETF`s

The Fama & French method indicates the same results as the Sharpe and Jensen Alpha. In Table 4. the intercept (alpha) in the SRI ETF's is 0,367, which indicates that the SRI ETF's has gained 0,367% monthly excess returns compared to the market, this in the other hand is not statistically significant because of the high value of p, so, therefore, this results can only be taken as directional. What comes to Blockchain ETF is the results also support the Sharpe and Jensen alpha which were examined in the earlier methods; for the three-factor model, the Blockchain funds has made 0,91% excess returns compared to the market benchmark, again this is not significant because the high p-value, so, therefore, this could not be taken as absolute truth. he t-ratios are presented in the brackets below the corresponding sensitivity factor. The multiple R measures the models' explanatory power and therefore represents the model's goodness of fit. Finally, the standard error presents the precision of the estimate of the coefficient and therefore demonstrates the precision of the alpha.

The last method in this research uses the Fama & French five-factor model, and the results support the earlier results taken as different methods.

Fama&French 5 factor model

SRI

SUMMARY

Regression Characteristic	
Multiple R	0,976
R Square	0,953
Adjusted R Squared	0,933
Standard error	1,396
Observations	18

ANOVA

	df	*SS*	*KN*	*F*	*Significance F*
Regression	5	472,51	94,50	48,48	0,0000002
Residual	12	23,39	1,95		
Total	17	495,90			

	Coefficients	*Standard error*	*t statistic*	*P-value*	*Lower 95%*	*High 95%*	*Lower 95.0%*	*High 95.0%*
Intercept	0,372	0,431	0,863	0,405	-0,567	1,311	-0,567	1,311
Mkt-RF	0,711	0,093	7,675	0,000	0,509	0,913	0,509	0,913
SMB	0,335	0,199	1,679	0,119	-0,100	0,769	-0,100	0,769
HML	0,071	0,128	0,552	0,591	-0,209	0,351	-0,209	0,351
RMW	-0,041	0,311	-0,133	0,896	-0,719	0,636	-0,719	0,636
CMA	0,016	0,243	0,065	0,949	-0,514	0,546	-0,514	0,546

Table 6

Fama & French Five-factor model SRI ETF

Fama&French 5 factor model
BLOCK
SUMMARY

Regression Characteristic	
Multiple R	0,841
R Square	0,707
Adjusted R Squared	0,585
Standard error	6,146
Observations	18

ANOVA

	df	*SS*	*KN*	*F*	*Significance F*
Regression	5	1095,04	219,01	5,80	0,00599
Residual	12	453,35	37,78		
Total	17	1548,39			

	Coefficients	*Standard error*	*t statistic*	*P-value*	*Lower 95%*	*High 95%*	*Lower 95.0%*	*High 95.0%*
Intercept	1,131	1,898	0,596	0,562	-3,004	5,266	-3,004	5,266
Mkt-RF	1,772	0,408	4,344	0,001	0,883	2,661	0,883	2,661
SMB	-0,509	0,878	-0,580	0,573	-2,422	1,404	-2,422	1,404
HML	-0,156	0,565	-0,277	0,787	-1,388	1,076	-1,388	1,076
RMW	-2,145	1,369	-1,567	0,143	-5,126	0,837	-5,126	0,837
CMA	1,498	1,071	1,399	0,187	-0,836	3,831	-0,836	3,831

Table 7

Fama & French Five-factor model Blockchain ETF

Table 6 results from the SRI ETF's results in the five-factor model, and these results support the earlier results as the intercept (alpha) in the model is 0,372, which indicates that the S.R.I. funds have gained 0,372% excess returns monthly compared to the market benchmark. Also, the p-value is exceptionally high, which tells that this result is not statistically significant.

In table 7 are the results of the Blockchain ETF's and the intercept (alha) in this regression is 1,31, which is higher than in the three-factor model; this is the reason for two more factors (C.M.A. & R.M.W.) that are creating more value to the Blockchain funds alpha. The high value of P again is indicating that these results are not significant and can be only taken as directional. The multiple R measures the models' explanatory power and therefore represents the model's goodness of fit. Finally, the standard error presents the precision of the estimate of the coefficient and therefore demonstrates the precision of the alpha. As, also seen in the table 6 and 7, the results indicates that the that the Blockchain ETF`s are outperforming the SRI ETF`s.

The factor model results can only be taken as directional because of the lack of significance of the results; this is why the short time period, a small amount of data available, and the different kinds of circumstances at the given time period. These results can be taken for further research and examine the possible reason behind the outperforming of the Blockchain funds. For the end of the empirical research, it is presented the Data analysis, which presents the Mean of the data, as well it is telling the Median of these two different types of funds. Also, the analysis presents the Skewness and Kurtosis of the data and the estimates of these two. This table can be used to analyzing the data and the results of the methods used in this empirical research.

Data analysis

Mean	0,90	2,87
Median	1,73	2,95
Skew	-0,87	1,09
Kurtosis	3,2	2,7
Skew arvio	Negative High	Positive High
Kurt arvio	Normal	Normal

Table 8

Data analysis

8 Conclusions

Socially responsible investing is not a short-term trend, and the responsibility and E.S.G. -factors are now highly urgent, and many companies and institutions have made choices for the future based on the responsibility and ethical view. On the financial side, the notable indicator is U.N. Socially responsible principles, which were invented in 2006 (P.R.I., 2018). The principles ten Conduct are giving an excellent guideline to companies to follow the responsibility of their investments. The G.R.I. – the report is the most used report to companies to voluntarily report their responsibility, which gives transparency and comparable number to within the companies.

The definition of Socially responsible investing is challenging, and therefore, the S.R.I. strategies are quite different. The favorite strategy is the exclusion strategy, which excludes certain companies or industries for the investment option. This kind of exclusion is easy to use for a small investor as for the institutional investor; for Example, Nordea claims that the investment portfolio will be totally "green" by the year 2035, and this will need an exclusion strategy in their road to this project. Also, Nordea has made the year 2021 new product, Green loans, and these loans are focused on the Sustainable business and companies, which means that these companies will have better negotiable power and more likely inexpensive loan margin.

For now, the Blockchain and S.R.I. are maybe not so united and not viewed as on the same side, more or less because the energy waste blockchain and especially Bitcoin is creating. Also, Bitcoin is used at least some point for criminal acts and money laundering, and other black-market transactions; therefore, the impacts of E.S.G. factors are inevitable. As mentioned earlier, this could be changed in the future, the possibilities for Blockchain to help in the E.S.G. problems, such as renewable energy distribution, Anti-money laundering, Proxy Voting, Supply Chain Traceability and much more. When the KYC directives are included in the Crypto wallets, that will add more to the cryptocurrencies' transparency. Furthermore, for these reasons, the idea is not to see these two as an opposition of each other, but as complementary for each other in the future.

The empirical part of the study examined whether the Blockchain funds had gained more risk-adjusted profits at the given timetable and how the volatility of the two different kinds of ETF's was affecting the profits. The results were surprisingly high for the Blockchain returns in all categories, and Blockchain has gained higher returns in the given timetable, has gained excess returns, and has a better Sharpe than S.R.I. funds. As mentioned earlier, these results can not be taken as truth because of the short time period, generally high volatility in the market, and the high bull market, which Blockchain has a current time period. However, these results can still be directional and in the future, when more data available can be examined, more truthful research about the returns of these two different kinds of funds.

The results of this study can be used as giving the direction of how these two different kinds of ETF's are conducting, but as mentioned earlier, because of the small amount of the blockchain funds, given time period and the other factors, this research cannot be taken as absolute truth in any circumstances. The S.R.I. definition of the funds is based on the fund's information and its responsibility. Also, this study can be hopefully used in the further research of the blockchain and S.R.I. comparison.

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