TALLINN UNIVERSITY OF TECHNOLOGY
School of Business and Governance
Department of Economic and Finance

Leo Lievonen

EMPIRICAL INVESTIGATION ON THE PERFORMANCE OF COPY-PORTFOLIOS ON E-TORO PLATFORM

Bachelor's thesis
International Business Administration, Finance and Accounting

Supervisor: Mari-Liis Kukk, MA

Tallinn 2020

I hereby declare that I have compiled the thesis independently
and all works, important standpoints and data by other authors
have been properly referenced and the same paper
has not been previously presented for grading.
The document length is 9440 words from the introduction to the end of conclusion.

Leo Lievonen ……
(signature, date)
Student code: 177429TVTB
Student e-mail address: leo.lievonen@gmail.com

Supervisor: Mari-Liis Kukk, MA:
The paper conforms to requirements in force

……
(signature, date)

Chairman of the Defence Committee:
Permitted to the defence
……
(name, signature, date)

ABSTRACT

The rise of social networks and online communities has given birth to a new form of investing called social trading. Social trading primarily provides a novel method of investing in financial assets to retail investors, who have less capital and less knowledge of financial markets than professional investors. This novel method of investing allows investors to copy the transactions of other investors based on set rules, and commands relatively small transaction fees for these actions. While it is understood that social trading provides greater access to financial markets for smaller, less equipped investors, there is little understanding of how well social trading portfolios perform. As such, the aim of this paper is to analyze if it is possible to outperform the market by using social trading to choose investments. The sample of this research obtained 28 hand-collected copy-portfolios from the social trading platform eToro and used monthly data ranking between January 2017 until January 2020. These were regressed by implementing the Ordinary Least Squares method to estimate Jensen's alpha for each copy-portfolio. The study found that 21 copy-portfolios resulted with positive alphas and 7 copy-portfolios resulted with negative alphas. The results shows that a large proportion of copy-portfolios outperform the market benchmark.

Keywords: Social trading, copy-portfolio, investment returns, Jensen's alpha

INTRODUCTION

Market traders and investment professionals have always had to be fully cognizant of macroeconomic trends and company-specific news. As a result, trading in equities, bonds, commodities, and currencies has long been the domain of more affluent people who can pay investment professionals for their work. With the rise of social networks and online communities, this exclusivity has gradually eroded, giving birth to social trading. Social trading allows investors to observe how the best investors in the market invest and to imitate their investment activities. Social trading platforms are attracting users with their low fees and easy-to-use investing opportunities that can be used anywhere and anytime. As such, social trading is perceived to have a democratizing effect on investing in financial assets, by virtue of increasing access for those individuals that are less knowledgeable about investing and have lesser resources at hand.

The development of such a novel investing mechanism posits several interesting directions for academic research. For instance, it would be particularly interesting to understand whether social trading enables small, less knowledgeable investors to receive investment returns that are comparable to those achieved by more traditional investors on financial markets. Alternatively, it would be intriguing to know whether social trading may even enable investors to receive investment returns that are consistenly larger than returns shown by market indices. Accordingly, the aim of this thesis is to analyze if it is possible to outperform the market by using social trading to choose investments.

Portfolio performance evaluation, in general, is a popular area of academic research. It provides useful information to investors by attempting to determine whether some investment strategies lead to larger risk-adjusted returns than others. This information is of value to investors for choosing their optimal portfolio composition. The existing literature on the performance of portfolios has focused on how well mutual funds perform. To the authors´ knowledge, there is no study available on how social trading portfolios have performed. This matter acts as a motivator for selecting this topic. The objective of this research is to look at how well the portfolios available

on social trading platforms have performed in current market conditions. The research questions which are aimed to be answered are the following:

1) Does social trading provide investors the possibility to achieve above-market returns from their investments?
2) Do some social trading portfolios perform consistently better than others, taking into account characteristics such as investment strategy?
3) How well do the portfolios perform?
4) What are the risks of the portfolios and what level of risk is involved?

The focus of this study is on evaluating the performance of the social trading portfolios available on eToro, which is the largest social trading and investment platform in the world with over 12 million users. eToro enables its users to invest in so-called copy-portfolios, which are divided into three categories: top-trader, market, and partner portfolios. Each of these portfolios are constructed based on different principles, which provides an interesting opportunity to compare which type of portfolios perform the best. The copy-portfolios included in the empircial analysis of this paper were hand-picked from the eToro social trading platform. The original sample size included 34 copy-portfolios, but because of the lack of sufficiently lengthy time-series data, the final sample size consists of 28 copy-portfolios from three previous years. The empirical analysis of this paper uses the ordinary least squares method to estimate Jensen's alpha for each copy portfolio over a three year period between January 2017 until January 2020. This measurement will provide an opportunity to compare the investment returns of the social trading portfolios included in the sample to eachother, as well as to the overall market.

The rest of the paper is structured as follows. Section one discusses the insights into the nature and formation of social trading and copy-portfolios. The second section provides a literature review focusing on measuring portfolio performance. Section three unveils the methods used in this paper, describes the data and the definitions of the variables. The empirical analysis and interpretation of the results are reported in section four.

1. INSIGHTS INTO THE NATURE AND FORMATION OF SOCIAL TRADING AND COPY-PORTFOLIOS

1.1. Social trading

Social trading is a new investment form where investors can follow the trading behaviour of others and copy their investment strategies (Pelster & Hofmann 2018, 75; Lee & Ma, 2015, 188). However, Gemayel (2016, 14) noted that social trading as a concept is not a new phenomenon as there have always been social interactions. Communication and physical contact have always been part of financial decisions. On the other hand, Lee and Ma pointed out that social trading is a new investment form as it differs from the classical investment methods. According to their study, classical methods investigate the market to consider content to the portfolio while in social trading a user follows advanced traders and automatically imitates their trades, rather than considering every single trade. Therefore, social trading portfolios' content is more people-based (2015, 188).

Social trading platforms are referred to as platforms that combine social media features with online trading (Gemayel & Preda, 2018, 1144; Glaser & Risius 2018, 19). This allows users to buy and sell assets with low barriers of entry (Pelster & Hofmann, 2018, 75). Additionally, the social trading platforms provide a display of a user to other users in a similar fashion as other social networks. The information displayed shows the risks and performance of the user (Glaser & Risius, 2018, 20). All the users in the social trading platform have access to other users´ trading decisions. The social trading platforms allow the users to communicate, share trading strategies and even imitate one another in a real-time, using a mirror trading algorithm (Gemayel & Preda, 2018, 1145; Oehler, Horn, and Wendt, 2016, 202-210). These combinations together result in a highly transparent trading marketplace (Gemayel & Preda 2018, 1145).

Social trading was started by an Israel based company called Tradency, which invented the mirror trading in 2005 (Crunchbase). The mirror trader provided users an automated trading system. The system operates in way that users could show their trading strategy, as long as they handed over records of the performance of their trading strategy. After which the strategy had been approved,

other users had the opportunity to study the strategy and mirror the approved account. Later on, eToro and Zulutrade improved social trading in a way that users did not have to approve their trading strategies. Users only had to create a trading account and their actions on the platform would be recorded and made accessible to other users (Carlo 2020).

Even though the earliest platform date back to the early 2000s (Ammann & Schaub 2016, 5), there is no research been made that would outline the size of the entire social trading landscape. The author found the website socialtradingguru.com, which listed 31 leading social trading platforms and networks. This gives us a sense of how large the social trading landscape is. The biggest player in social trading is eToro, a multi-asset brokerage company, which has been described as the "Amazon of finance" by Kelly (2020). eToro has the most users on their platform as it has over 7 million users worldwide (Brand 2017). Other big players in social trading are Tradency which has more than 2 million users, ZuluTrade with more than 1.5 million users, and ayondo with around 200 thousand users (Ibid).

Table 1 Overview of four social trading platforms from 2017

Platform	Founded	Number of users in millions
eToro	2007	>7
Tradency	2005	>2
ZuluTrade	2007	>1.5
Ayondo	2008	~ 0.2

Source: Brand (2017)

The platforms shown in Table 1 have some differences in their services, as there are three popular forms in social trading platforms: mirror trading, copy trading and social trading (Rhodes 2020). Mirror trading gives investors the opportunity to mimic other investors by doing the same trades as the other traders (Scott 2020). Copy trading gives the investor more possibilities than mirror trading. For instance, in copy trading the investors can manage their risks by placing a stop loss limit on the trades (Pylarinou 2015). Social trading gives investors the ability to get information, to communicate and share their investment ideas with other investors (Pylarinou 2015).

Tradency is a mirror trading platform, in mirror trading an investor simply mirrors some other traders´ transactions and automatically replicates them (Brand 2017). eToro, ZuluTrade and Ayondo have little differences with each other as all of them provide social trading and copy

trading, the main differences are related to the costs that the platform charges. eToro is the most expensive as it has on average higher trading costs and withdrawing fee is 25 dollars (Scott 2019).

Social trading platforms has been criticized on their hidden fees. For instance, eToro provides commission free trading services. However, it charges for overnight holds and the fees triple during the weekends (Scott 2020). It is also interesting to point out that the social trading platforms make most of their revenues from CFD (contract for difference) trades (Kelly 2020).

A CFD is a type of financial contract which allows investors to trade in the movement of a stock without owning an actual stock (Chen 2020). CFDs are bets that an assets price is going to rise or fall (Ibid). CFD is an agreement between the investor and the broker, which obligates the broker to pay the investor the difference between the current price of the asset and the price at the time the contract is concluded (Sijoitustieto 2017). It is important to note that CFDs are complex financial instruments, which bears a lot of risks (Pepi 2020). Therefore, social trading platforms which offer CFDs must display a warning about the risks and the likelihood of losing money (Kelly 2020).

The key character of the social trading platforms is the copy-trading mechanism which allows user to automatically implement investment strategies (Doering, Neumann and Paul 2015). Döring, Neumann and Paul (2015), categorized the users into two groups on social trading platforms: signal providers and signal followers. Unlike the previous authors, Gemayel and Preda (2018, 1145) categorized the users as trade leaders and copiers. Nevertheless the two types of user roles are similar regardless of whichever terms are used.

The signal providers share their strategies, trade concepts and ideas within the platform. Furthermore, the signal providers most likely are experienced traders that manage the fund for a small fee (Gemayel & Preda 2018,1145). The signal followers are users that can follow the signal providers. They have the ability to follow multiple signal providers at the same time. Oehler, Horn and Wendt (2016, 202) pointed out the signal followers´ role can be described as herd behaviour, as they are doing what others are doing rather than following their own instinct.

The social trading platform provides detailed information on a manager´s historical transactions, risks that are involved in the portfolio and standardized real-time track records for the signal providers. Thus, these features make the social trading platforms highly transparent (Doering,

Neumann, & Paul, 2015, 3; Glaser & Risius 2018, 20). When investors follow a signal provider, investors can reduce costs that arise from gathering and processing information. Rather than analysing multiple different investment opportunities on their own, investors can copy a signal provider. This can decrease investors´ information and choice overload when they are planning to invest (Oehler, Horn & Wendt 2016, 202).

On social trading platforms, everyone can become a signal provider as there are no entry requirements. Huddart (1999) pointed out in his study that when the entry requirements are low in the mutual fund markets, unknowledgeable advisors come in and are willing to take high risks to build a solid track record. Huddart (1999) also pointed out that even though signal providers may offer detailed information on their past trades, it does not guarantee that the past performance was due to their skills. Thus, the trades of the signal providers are not transparent unless they provide information on their decision process. Furthermore, Gemayel (2016, 21) mentioned that it is important to remember that the relationship between the signal provider and the signal taker is unofficial, meaning that there are no official sanctions if the signal provider goes rogue, and does not use its advertised strategy and lose the followers money.

1.2. Describing Copy-portfolios

Copy-portfolios are a thematic investment approach that help users reduce risk, diversify their portfolios, and take advantage of the market´s momentum (eToro 2020a). In other words, the copy-portfolios are a portfolio management product. The thematic investment approach focuses on broader investment themes that a fund manager can use to identify strong companies (FTAdviser 2013). It enables the investor to invest their money directly into a fund rather than copying a specific trader (Say 2019). The copy-portfolios follow a specific industry or a range of traders that are combined into one portfolio (Greenspan 2019). The trading strategy of these portfolios are predetermined and serves as a long-term investment tool (eToro 2020b).

There are general conditions for the copy-portfolios which are: the minimum amount to invest is 5,000 dollars, the default stop loss for a copy-portfolio is set to 10% and the allocation weight of the portfolio can change over time (eToro 2020c). There are three categories of copy-portfolios, the Market Portfolio, Top Trader Portfolio, and the Partner Portfolio.

The Market Copy-portfolios combine assets into a single portfolio and are following a fixed market strategy or are focusing on a more specific industry (eToro 2020c). The market copy-portfolios have been described by Say (2019) as "something along the lines of an ETF [exchange traded fund] and are created to take advantage of a specific investment thesis". The professionals at eToro determine the composition of each portfolio, in combination with a machine-learning algorithm programmed to reduce the risks and increase profits (eToro 2020c). The market copy-portfolios allows the investors to diversify within a specific industry of their interest by acquiring multiple companies at once, this way the investor can minimize company-specific risk (eToro 2020d).

The Top Trader Copy-portfolios are leaning on a CopyTrader tool. The portfolios group together already successful traders in different portfolios. The top trader copy-portfolio similarity to the market copy-portfolio is that the traders in the portfolio are selected by eToro´s investment committee and a state-of-the-art algorithm that looks for precise trading attributes that are optimizing profits (eToro 2020c).

With the Top trader copy-portfolios, the investor has full exposure to investors from the eToro community (eToro 2020e). An example of a Top Trade copy-portfolio is Top Active Trader which allows users to copy various investors simultaneously. The traders in the portfolio are selected by an algorithm that is implemented in the eToro database (Ibid). With this type of portfolio, the investor can benefit from the crowd wisdom (Ibid). Crowd wisdom is described as a "phenomenon in which the collective knowledge of a community is greater than the knowledge of any individual" by Marbach et al. (2012).

The Partner Copy-portfolio is a partnership between eToro and financial institutions/professional traders. These portfolios are built and maintained by the partnered financial institutions, eToro simply provides them with a support system and a new range of investors. The securities and assets are selected by the professional. However, some of the portfolios are back-tested to prove that the strategy is profitable (Greenspan, 2019)

With partner copy-portfolio, the investor can invest like a professional. One of the eToro´s partners is Tip-Ranks that has built a copy-portfolio that has the same allocation of securities as Warren Buffett or Carl Icahn, by their SEC filings (eToro 2020f).

As mentioned above market copy-portfolios follow a specific sector. Thus, picking the stocks for the portfolio does not really demand skills as the portfolios pick the stocks within a specific sector. When looking over the data of the market portfolios a large number of the portfolios have a beta greater than one. This means that the market copy-portfolios are more volatile and a riskier investment than the stock market as a whole (Streissguth 2019). However, a high beta may offer higher returns on the investment if an investor is willing to bear the risk. From this, it can be expected that market copy-portfolio returns are only a product of systematic risk and should not be able to beat the market in the long term. However, in top trader and partner copy-portfolios the portfolios are either grouped together from already successful traders into one specific portfolio or the portfolios are built by financial institutions/professional traders, which are trying to beat the market. Therefore, an alpha or skills could be recorded from these copy-portfolios if the market is inefficient and the copy-portfolio traders are able to pick better investments.

The positive side of all of these copy-portfolios is that they are fully transparent. Investors can see the historical performance of the portfolios and how the portfolios are allocated. Furthermore, the investors can close their positions at any point-of-time (Ant 2017). A negative aspect which occurs in all of the copy-portfolio is the removal of the invested capital. In the copy-portfolios it is not possible to remove a portion of the invested capital. Instead the whole investment has to be closed altogther (Hayes 2020). Furthermore, the withdrawal fees are high and slow (Korpos 2019).

2. LITERATURE REVIEW ON PORTFOLIO PERFORMANCE

This section gives an overview of the various methods used to measure portfolio performance previously along with examples of how and in what settings these methods have been employed.

2.1. Theoretical background

2.1.1 Modern Portfolio Theory

This section is an overview of the Modern Portfolio Theory as an investment decision tool. The author brings out the aspects that apply to social trading under modern portfolio theory.

The modern portfolio theory was originally presented by Harry Markowitz in 1952 in his paper "Portfolio selection". For six decades it has been a widely used financial theory, that is relevant today in both modern finance theory and practice. Modern portfolio theory presents a framework where a rational investor constructs a portfolio in which expected return is
maximized based on a certain level of market risk. This means that a rational investor will choose the investment alternative which will give the highest return at a certain level of risk or lowest possible risk given its level of expected return. The model presented the mean return as the portfolio return. The portfolio risk is defined as the portfolio variance, which is not a weighted average of individual assets variance (Nguyen Nhat Minh 2018).

In his paper, Markowitz (1952) pointed out that the portfolio is not well diversified if the portfolio consists only of stocks from the same industry. Markowitz used railway companies as an example in his paper. To have a diversified portfolio, the investments should be done by investing in different industries that have different economic characteristics as they have lower covariances than firms in the same industry.

The market copy-portfolio falls to the diversification within the industry which makes it a risky investment. The investors should invest in multiple different portfolios so that they would have a lower covariance, just as in the Markowitz example of the railway companies mentioned above. The risk of social trading when considering the modern portfolio theory is that the novice investor

does not know the skill level of the investor who has constructed the copy-portfolio, which can be seen as a risk. Therefore the investors should diversify their investments among a larger number of portfolios to reduce the risk an of inefficient fund manager.

Ever since Markowitz introduced the modern portfolio theory it became the theoretical pillar for several research papers. One of them is the Capital Asset Pricing Model, which was followed by the Fama-French Three-Factor model and Carhart Four-Factor Model.

2.1.2 Outperforming the market

The efficient market hypothesis was widely accepted by financial economists in the 1970s. The securities market was belived to reflect information about individual stocks and the stock market as a whole. The recognized view was that when new information occurs the news spreads quickly and is incorporated into securities prices without delay (Malkiel 2003, 3).

Hence, neither technical analysis, which is a study of past stock prices and tries to predict future prices, nor fundamental analysis, which is an analysis of financial information that helps investors to choose undervalued stocks, would enable an investor to attain a greater return than those that could be obtained by holding a randomly selected portfolio of individual stocks with comparable risk. (Ibid)

According to Fama (1970) efficient prices follow a random walk. This term is loosely used in the finance literature to describe a price series in which all subsequent price changes represent deviations from previous prices (Malkiel 2003, 3). The logic of this is that if the information flow is not blocked and the information is immediately reflected in stock prices, tomorrow´s price change will only reflect tomorrow´s news and will be independent of today´s price changes (Ibid.).

In Fama's (1970) paper on market efficiency, he categorized markets into three categories: weak, semi-strong and strong form efficient. For starters, if the information only includes historical prices it is considered as a weak form. Semi-strong form is an efficient securities market where the prices efficiently adjust to other information that are publicly available. This publicly available information contains announcements of annual earnings, stock splits, and so on. Finally, if investors or other groups have private access to any information which is relevant for the price formation it is considered as a strong form (Fama 1969, 383).

Even though Malkiel´s (2003) main point in his article was that the markets are efficient, he also noted two cases where the market was inefficient by behaviourists. First case of inefficiency was the market crash of October 1987, where the market lost around one-third of its value in October 1987 whithout changing the general economic environment. According to behavoiurists this can be explained by psychological considerations as the basic elements of valuation equation did not change rapidly during that period. (Malkiel 2003, 24-27)

The second case of inefficiency was the Internet bubble of the late 1990s, where it was believed that the pricing of internet stocks could be explained by the behaviour of irrational investors. The valuation of those high-tech companies seemed rational, even respected analyst recommended those stocks as fairly valued. Additionally, pension and mutual funds over-weighted their portfolios with those hich-tech stocks. Now it is certain that there was no arbitrage opportunities available to the rational investors before the bubble bursted. Therefore, it is now clear that the stock market may have failed temporarily in its role as an efficient allocator of equity capital. (Malkiel 2003, 27-29)

Malkiel concluded that as long as stock markets exists the investors will sometimes make mistakes. Therefore, the pricing irregularities and predictable patters of the returns in stocks can prevail overtime and even persist for short periods. Additionally, in their paper Grossman and Stigliz (1980) stressed that the market cannot be perfectly efficient because then there would be no incentives for professional to uncover the information, which reflects rapidly in the market prices (Malkiel 2003, 33). It may be possible that the markets are not always perfectly efficient and some fund managers that have skills or the ability to predict the movement of security prices. Thus, the fund managers may be able to outperform the market on a consistent basis.

2.2. Measuring fund performance

2.2.1 Jensen´s Alpha

Jensen´s Alpha is a risk-adjusted performance measure that was introduced by Michael C. Jensen (1968). The model tries to determine whether the funds were able to forecast returns and whether the funds outperform the market. The Jensen´s alpha measure defines not only the overall return of the fund but the investment return it should have earned considering all the risks it takes. If the

excess return has a positive outcome the fund is beating the market, meaning its return has earned more than expected, considering the risks it took. However, if the excess return is negative the fund has not earned enough return given the risks it takes (Chen 2019). The excess return on the portfolio is defined as alpha and the Jensen measure is written as follows (Stewart, Piros, Heisler 2019, 519):

$$\alpha_i = R_i - E[R_i] = R_i - \{R_f + \beta_i(R_m - R_f)\} \quad (2.1)$$

Where α_i is the excess return of the fund after adjusting for the market, R_i is the realized return of the portfolio, $E[R_i]$ is the expectation of the portfolio return, R_m is the realized return of the appropriate market index, R_f is the risk-free rate of return for the time period and β_i is the beta, which represents the systematic risk, of the portfolio of investment.

Jensen´s alpha method is based on CAPM to measure predicted returns of the fund. Jensen uses the CAPM models market portfolio to defend Jensen´s alpha (Garyn-Tal & Lauterbach 2011). The Jensen´s alpha measures the performance of the fund that is higher or lower than what was predicted by the CAPM. The alpha implies the fund managers´ ability to forecast stock prices (Pilbeam & Preston 2019, 6). Positive alpha means the fund´s returns are greater than expectations on the CAPM, and in contrast, if the alpha is negative it means that the fund´s returns fall short of expectations on the CAPM. Later studies have suggested other ways to measure alpha. These measures are discussed in more detail in section 2.2.

In Jensen´s (1968) study he evaluated 115 open-end mutual funds in the time period of 1945-1964. The result of his study was that on average the 115 mutual funds were not able to predict prices well enough to outperform the market, additionally, there was little evidence that individual funds were able to do significantly better than that of what was expected from random chance. Pilbeam and Preston (2018) investigated the performance of 355 actively managed Japanese mutual funds, between April 2011 and April 2016. The result of the study showed strong evidence that the Japanese Mutual Funds failed to outperform the market. Abdel-Kader and Qing (2007) examinated the performance of 30 Hong Kong mutual funds, between August 1995 and July 2005. The evidence of their study concluded that the Hong Kong mutual funds underperformed the market.

2.3. Measuring predicted returns

This section goes through some of the models that measure the predicted returns of portfolios. The overview focuses on the Capital Asset Pricing Model (CAPM), which is a relatively simple and efficient method for measuring predicted returns. The CAPM model is also used for the empirical analysis in this paper. The section also provides a short overview of two alternative measures, namely the Fama-French three factor model and the Carhart four-factor model.

2.3.1. Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) was developed by Sharpe (1964) and Lintner (1965). CAPM bases its foundation on the Market Portfolio Theory of Markowitz (1952). Later on, in 1990 The Royal Swedish Academy of Science awarded Markowitz for developing the theory of portfolio choice and Sharpe for his contribution to the CAPM, which demonstrate the financial assets theory of price formation called the CAPM, with the Alfred Nobel Memorial Prize in Economic Sciences (Nobel Media 1990).

The expected return as measured by the Capital Asset Pricing Model formula (Baker, Filbeck 2017, 32):

$$E[R_i] = R_f + \beta_i\big(E[R_m] - R_f\big) \tag{2.2}$$

Where

$E[R_i]$ – expected return

R_f – riskless rate of return

β_i – beta

$E[R_m]$ – expected market return

$(E[R_m] - R_f)$ – the risk premium

The beta can be calculated by using this formula:

$$\beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)} \quad (2.3)$$

Where

β_i – beta

$Cov(R_i, R_m)$ – covariance of the asset return and market return

$Var(R_m)$ – variance of the market return over a time period

The beta coefficient is used as a measure of the volatility, and systematic risk, of a portfolio in relation to the market. The systematic risk is a risk which cannot be avoided. The unsystematic risk is a risk that can be minimized by diversifying the portfolio. If the beta is high, the higher the expected return will be.

The CAPM model was the first model to evaluate the performance of a portfolio while adjusting for the porfolio´s level of risk. CAPM expresses the relationship between risk and the expected return of an asset. The main idea of the CAPM is that not all risk should affect asset prices. Therefore, the CAPM provides insight into the kind of risk that is related to return, namely the systematic risk. CAPM adds two specialized and major assumptions to the Markowitz model. For starters, all the investors do not have a limit for borrowing-lending at the risk-free rate of interest (Sharpe 1964). Second, investors have consistent expectations, because they agree on different investment characteristics, such as expected values, standard deviations and correlation coefficient (Sharpe 1964).

Being the first model to evaluate the performance of a portfolio, CAPM has received criticism from many scholars that argue that the CAPM is based on unrealistic assumptions. For example, Roll (1977) noted that CAPM researches are practically invalid as all stock exchange indices are only a partial measure of the real global market portfolio. Roll proved his point by demonstrating that changing the S&P 500 to the Wilshire 5000 could fastly change a security's expected return as forecasted by the CAPM.

2.3.2 Alternative measurements of performance

Eugene Fama and Kenneth French (1992) created the Fama-French three-factor model which is an extension of the CAPM and it seeks to better explain the expected portfolio return. It aims to

express the portfolio returns through three factors: market risk, the outperformance of small-cap companies compared to the large-cap companies and the outperformance of high-book-to-market value companies compared to the low-book-to-market value.

Carhart (1997) expanded the Fama-French risk-return framework. Carhart added the cross-sectional momentum factor as a fourth systematic risk factor to the three-factor model. Carhart did not come up with the cross-sectional momentum, as its originality comes from Jeagadeesh and Titman (1993). However, Carhart presented that the cross-sectional momentum can be added to the Fama-French Three-Factor model, which would improve the explanatory power of the multifactor model and giving a more accurate measurement of portfolio performance.

3. DATA AND METHODOLOGY

The following section will disclose the method used in this paper. The author starts with describing the data selection criteria and where it was found. Next, the author discusses the methodology and the performance measurement used in the paper. The empirical analysis focuses on the performance of social trading portfolios that are open to investors on the eToro platform. The data used in the empirical analysis has been hand-collected from eToro´s website.

3.1. Overview of the data and eToro platform

In this section, the author provides a comprehensive overview of eToro platform and the data collection process.

eToro is the world´s largest social trading and multi-asset brokerage company, which was founded in 2007 in Tel Aviv by brothers Yoni Assia and Ronen Assia together with David Ring. Currently, eToro has more that 12 million registered users worldwide (eToro 2020g). It has registered offices in Cyprus, Israel, the United Kingdom, the United States, and Australia (eToro 2020h). eToro OpenBook social investment platform, along with its "CopyTrading" feature, was released in 2010. The platform attracted global attention, winning Finovate Europe Best of Show in 2011(eToro 2020i). In 2012, the eToro mobile app was released. Both WebTrader and OpenBook were made available via a handy mobile app (ibid). Using their Apple or Android smartphone, clients could perform any action on the platform on the go.

On eToro´s platform users can trade varieties of assets such as commodities, currencies, ETFs, indices, and contract for difference stocks, further known as CFDs (eToro 2020j). In addition, eToro offers a feature to its users known as open book which gives the users the ability to access other users´ trading information (eToro 2020i). The trading information includes the users´ risk level, return, monthly performance and the trades the user has made in the past. In other words, the platform connects traders with each other and allows users to automatically copy other users´ portfolios.

The data presented on the website comprises of various performance and risk metrics for each portfolio, as well as portfolio characteristics, such as their asset allocation and the methodology based on which the portfolios are constructed. The website lists monthly data on the performance of 34 copy-portfolios, dating back to 2014 when the first copy-portfolio was introduced. Hence, the time series of the data ranks from 2014 − 2020.

The data for this thesis was gathered only on one social trading platform so that the study would have a more focused view. eToro was selected as the platform for collecting the data, as it provides a range of different kinds of copy-portfolios. The copy-portfolios at the eToro platforms give an investor the ability to invest in a specific industry or the ability to have the same portfolio allocation as, for instance, Warren Buffett. This wide choice of portfolios makes the study of the copy-portfolios more intriguing, as it is possible to compare the results of various types of portfolios to each other. Also, the other platforms did not provide this kind of opportunity as they only have single users that can be copied. Furthermore, the reputation of eToro and the simplicity of the platform played a role to focus on eToros copy-portfolios.

The copy-portfolios are a rather new phenomenon. Thus, there is a limited number of portfolios available for empirical analysis. Regarding this, the selection criteria of the data were to collect all the copy-portfolios available.

3.2. Methodology for measuring portfolio performance

As mentioned above in section 3.1 the original sample size of this study was 34 copy-portfolios. This included 4 top trader copy-portfolios, 22 market copy-portfolios and 8 partner copy-portfolios. However, as the sample had to include three years worth of data to have a comparable time series with all the portfolios, the sample size decreased into 28 copy-portfolios. Out of these 28 copy-portfolios, in total there were 13 portfolios which included backtested data: 12 market portfolios and 1 partner portfolio. Back-tested data refers to the portfolios which have included the returns the portfolios would have made if the portfolios had been running at the time (Minalto 2017). The final sample included 4 top trader copy-portfolios, 21 market copy-portfolios and 3 partner copy-portfolios. The final sample´s time series is from January 2017 to January 2020. The

data of the copy-portfolios was directly gathered into an Excel file, so that the necessary calculations could be made.

The research method used in this thesis will be quantitative as the research attempts to evaluate the performance of 28 different copy-portfolios. The most common risk-adjusted measured used in academic literature include the Sharpe ratio (1966), Jensen alpha (1968) and Treynor index (1965). This study will be using the Jensen´s alpha to measure the performance of the selected portfolios in the empirical analysis. Jensen´s alpha is a risk-adjusted performance measure that will represent the average excess return of a portfolio. With the Jensen´s alpha, it is possible to evaluate the difference of how much a portfolio returns versus the overall market, providing a clear indicator of whether an investment strategy has provided superior returns to the market over the selected period. The Jensen´s alpha is described in more detail in the section 2.1.

The expected portfolio returns within the calculations for Jensen's alpha were measured using the CAPM model. The rationale behind using the CAPM model comes from its simplicity when calculating the risk adjusted returns of securities and portfolios. On the other hand, one could have used a wider and insightful model than the conventional CAPM-model to provide supplementary factors to explain the risk-adjusted returns. The reason why these models like the Fama-French three-factor model or Carhart four-factor model were excluded from the measurement of the risk-adjusted returns is that the author could not extract the dynamic values for size or valuation from the sample data available.

The author chose the Standard and Poor´s 500, also known as the S&P 500, index to be the benchmark of the study to measure the market returns. This index is a market cap-weighted index which includes 500 public companies and represents around three quarters of the U.S. stock market capitalization (Frankel 2018). Furthermore the S&P 500 index gives an overview of the whole stock market (Ibid). For the copy-portfolios, eToros´ website had already calculated the monthly performance of the portfolios. In order to have a comparison of the returns of the copy-portfolios to the market it was necessary to calculate the monthly performance of the S&P 500 index the same manner.

After the calculations of the monthly performance of the portfolios and the market portfolio were completed, the author needed to calculate the excess returns. The excess return was calculated from both of the market and copy-portfolio returns where the risk-free rate is subtracted from the

nominal return of the portfolios. Pilbeam and Preston (2018) used the one-month US treasury bill rate for the risk-free return. As this thesis dataset is from monthly returns, the author decided to use the same measure of one-month US treasury bill rates as the risk-free rate. The risk-free rates were obtained from the Kenneth R. French data library.

To find the values of alpha for each copy-portfolio included in the sample, the author used an ordinary least squares (OLS) regression model to estimate the following equation using Gretl software. The form of the equation follows that what was used by Pilbeam and Preston (2018) for a similar analysis on Japanese mutual funds.

$$\left(R_{it} - R_{ft}\right) = \alpha_i + \beta_i\left(R_{mt} - R_{ft}\right) + \varepsilon_{it} \quad (3.1)$$

Where

$\left(R_{it} - R_{ft}\right)$ – portfolio excess return at time *t*

α_i – Jensen's alpha for the portfolio

β_i – beta measure for the portfolio

$\left(R_{mt} - R_{ft}\right)$ – market excess return at time t

ε_{it} – the error term.

To be able to have the models results for each copy-portfolio, the above formula needed to be estimated using the Gretl software separately for all portfolios. The empirical models used in this study use portfolio excess return as the dependent variable and the market excess return as the regressor. The author used heteroskedasticity and autocorrelation consistent standard errors to make sure that the models are not prone to econometric problems. In addition, to ascertain that there are no econometric problems with the models, the author ran a White´s test for heteroskedasticity and a Breuch-Godfrey test for autocorrelation just in case.

4. PERFORMANCE EVALUATION OF COPY-PORTFOLIOS OPERATING ON THE E-TORO PLATFORM

The aim of this section is to introduce the findings of the empirical analysis and discuss how these findings contribute to research on social trading in general, and copy-portfolios in particular. The analyis provides initial understanding on how individual investors may be able to use social trading to construct their investment portfolios and how this form of investing competes with more traditional methods of investing, in terms of returns and the risk involved. The first subsection introduces the results of the empirical analysis, while the second subsection focuses on the interpretation of these results and provides inference. The second subsection also discusses the limitations of the empirical analysis provided in this study and suggests potential avenues for future research.

4.1. Returns of Copy-portfolios

As explained in the previous section, Jensen´s alpha is used to measure the risk-adjusted returns of the copy-portfolios. Since Jensen´s alpha assesses each portfolio separately, the interpretation of alpha becomes whether each specific fund's managers have the ability to forecast security prices and outperform the wider market. Positive values for alpha indicate that the fund manager was able to showcase monthly risk-adjusted returns that were on average higher than the corresponding return from the S&P 500 market index, which was selected as the benchmark for this study. Negative values for alpha, on the contrary, indicate that the fund's monthly risk-adjusted returns were on average lower than the market return. Table 2 below presents the distribution of these alphas. The table also shows how many alpha estimates are significant for each range of the alpha estimates, as well as how many of those significant estimates for alpha were exhibited by top-trader, market and partner portfolios, respectively. The full table reporting each portfolio´s alpha coefficient and statistical significance, as well as the portfolio type, is provided in Appendix 1.

Table 2. Distribution of Jensen´s alpha estimates across 28 copy-portfolios between January 2017 and January 2020

Estimated alpha	Frequency	Total significant alpha estimates	Top-trader portfolios with significant alpha estimates	Market portfolios with significant alpha estimates	Partner portfolios with significant alpha estimates
$\alpha \leq -0.012$	1	1	0	1	0
$-0.012 < \alpha \leq -0.010$	0	0	0	0	0
$-0.010 < \alpha \leq -0.008$	1	1	0	1	0
$-0.008 < \alpha \leq -0.006$	1	1	0	1	0
$-0.006 < \alpha \leq -0.004$	1	0	0	0	0
$-0.004 < \alpha \leq -0.002$	1	0	0	0	0
$-0.002 < \alpha \leq 0.000$	2	0	0	0	0
$0.000 < \alpha \leq 0.002$	5	0	0	0	0
$0.002 < \alpha \leq 0.004$	3	0	0	0	0
$0.004 < \alpha \leq 0.006$	2	0	0	0	0
$0.006 < \alpha \leq 0.008$	5	2	1	1	0
$0.008 < \alpha \leq 0.010$	1	1	0	1	0
$0.010 < \alpha \leq 0.012$	2	1	0	1	0
$\alpha > 0.012$	3	2	1	1	0
Total	28	9	2	7	0

Source: Compiled by the author

Of the 28 estimates for alpha, 7 (25%) were negative and 21 (75%) were positive, indicating that, on average, the eToro copy-portfolios provided higher monthly risk-adjusted returns than the market in general. The negative alpha estimates contained 4 market portfolios, 2 partner portfolios and 1 top-trader portfolio. From the postive alpha estimates, 17 were market portfolios, 3 were top-trader portfolios and only one was a partner porfolio.

To ensure that the estimated alphas differ significantly from the returns offered by the benchmark portfolio, the author extracted the p-values of the 28 alpha esimates. Out of these 28 estimates for the coefficient capturing alpha, only 9 (32.1%) were statistically significant at a 10% significance level. Still, out of the estimates that provided statistically significant coefficients for alpha, six (66.7%) were positive and three (33.3%) were negative. Similarly to the entire range of alpha estimates, these results seem to indicate that, on average, the copy-portfolios on eToro provided above-market monthly risk-adjusted returns.

Out of the portfolios exhibiting statistically significant positive coefficients for alpha, 7 were market portfolios. From these, 4 portfolios had a statistically significant positive coefficient for alpha, while 3 portfolios had a statistically significant negative coefficient for alpha. This is a somewhat unexpected result, because as explained earlier, the market porfolios simply follow a predetermined investment strategy with the simple aim of providing investors with concentrated exposure to certain investment themes. As such, there is no stock picking involved in constructing these portfolios, and accordingly, the portfolios do not aim to achieve any deviation from market returns that is captured by alpha.

These results can be explained in two ways. First, the high number of market portfolios exhibiting statistically significant coefficients for alpha may simply reflect the high concentration of market portfolios among the sample of this study. Out of the 28 portfolios included in the analysis, 21 (75%) were market portfolios. This means that around a third of the market portfolios exhibited statistically significant coefficients for alpha. Second, these results may point to a fundamental weakness of the CAPM model to measure expected returns. As explained in section 2.3.1, the CAPM model is highly sensitive to which market index is used to measure market returns. Since these market portfolios are focused on capturing returns from specific investment themes, it could be possible that the S&P 500 index is too broad of a benchmark to measure expected returns for these portfolios, and substituting this with a more specific market index may remove the statistical significance from the coefficients for market portfolio alphas.

While there were no partner portfolios exhibiting statistically significant coefficients for alpha in the study sample, it is interesting to note that 2 out of 4 top-trader portfolios produced statistically significant coefficients for alpha, and for both, these coefficients were positive. Indeed, when looking at the other two top-trader portfolios that had statistically insignificant coefficients for alpha, one also had a positive coefficient while the other had a coefficient that was only minimally below zero. Overall, top-trader portfolios seemed to perform rather well in terms of providing risk-adjusted returns that were above market returns.

Ultimately, there seems to be some evidence that the copy-portfolios were more likely to outperform the benchmark model. While 21 estimates for alpha were not statistically different from zero, meaning that the returns form these copy-portfolios were very similar to the returns from diversified portfolio, the coefficients for these portfolios were still mostly positive. It may be

possible that evaluating the returns of these portfolios over a longer time period may provide a higher number of portfolios exhibiting statistically significant positive coefficients for alpha. Additionally, there were some portfolios, notably among the top-trader portfolios, that also exhibited statistically significant positive coefficients for alpha over the relatively short time period under consideration in this study. These findings are in contrast to most existing literature focusing on measuring portfolio returns, since positive alphas were rarely detected from mutual funds.

4.2 Discussion of Results, Limitations and Future Research

The objective of this research is to evaluate how well the copy-portfolios have performed in current market conditions. The research questions which are aimed to be answered are the following:

1) Does social trading provide investors the possibility to achieve above-market returns from their investments?
2) Do some social trading portfolios perform consistently better than others, taking into account characteristics such as investment strategy?
3) How well do the portfolios perform?
4) What are the risks of the portfolios and what level of risk is involved?

Regarding the first research question, the empirical evidence seems to suggest that social trading portfolios, on average, are rather capable of providing at least as good, if not better, investment returns than the market on average. The results described above indicated that the portfolios performed relatively well, as 21 copy-portfolios out of the 28 copy-portfolios resulted with a positive alpha. This means that 75% of the copy-portfolios included in the sample of this study performed better than the market benchmark used to compare the portfolios to. A potential caveat to this result is that only 6 portfolios with positive alphas obtained statistically significant coefficients in the regressions, while 3 portfolios with negative alphas obtained statistically significant coefficients. As such, there is ample cause for further research, as expanding the period under review and testing for alternative specifications may result in statistically stronger results. However, the fact that a large proportion of alphas for the portfolios obtained positive coefficients does provide positive reassurance to an investor thinking of using copy-portfolios.

Regarding the comparison between the different types of copy-portfolios, the evidence seems to indicate that the market portfolios may be better than the other portfolios, as out of those 21 portfolios with positive alphas, 17 where market portfolios. However, it is worth pointing out that there were more market portfolios than other portfolios in this study. Hence, the large difference. In addition, only 7 of those 17 portfolios had statistically significant coefficients, out of which 4 were positive and 3 were negative. As such, it is possible that the coefficient values indicated returns differing from the market return mainly because of the benchmark chosen in this study. Because these market portfolios focus on specific investment themes, the benchmark in this study may be too broad to capture those specific returns. Regarding further research, it would be interesting to test whether applying portfolio-specific market benchmarks in the regression models would alter the results.

Considering the question of whether some themes are better than others, the author noticed that the portfolios exhibiting mostly significant alpha were market portfolios which invested into technology or future payment methods. Hence, we could say that the portfolios which invested into technology and future payment methods had the better theme. The technology and the payment sector have been growing rapidly for these past few years, which has potentially resulted in greater returns. However, this result does not reflect that there is more skill involved in compiling these copy-portfolios, but that focusing on such themes has, on average over the period under review in this study, provided above-market returns regardless of investment vehicle.

One of the aims of this research was to answer questions regarding the risk profile of the copy-portfolios. As assumed above in section 2.1.1, the market copy-portfolios increase risk as a result of less diversification within and between the industries. The risk arises here from the fact that the sectors in which the portfolios are focused on have similar economic characteristics and higher covariance. Furthermore a novice investor takes risk based on trusting the knowledge of the investor who has constructed the copy-portfolio. Even though the copy-portfolio investor can evaluate the person who has constructed the copy-portfolio and the resulting historical returns of the portfolios, this does not guarantee the future performance of the portfolios.

According to the CAPM model the correct measure of risk for stock is its beta, which evaluates the correlation between the returns of the financial assets and the return of the market as a whole. When considerting beta as the risk measurement in this study, the level of risk involved in the copy-portfolios are quite high. From the 28 copy-portfolios included in this study, 11 copy-

portfolios had a beta greater than one, which indicates there is relatively high systematic risk involved in investing in these portfolios. The high values for beta indicate that social trading portfolios tend to exhibit rather more volatile returns than the market benchmark. As such, the value of the investments may fluctuate considerably when using social trading portfolios as the investment vehicle.

While the study provides insightful and interesting findings on the performance of eToros copy-portfolios, it would be a good idea to conduct robustness checks, which may limit some of the analytical capabilities of the models. For example the CAPM may not be the optimal model to measure the expected returns, since the CAPM model is highly sensitive to which market index is used to measure the market returns. As these copy-portfolios focus on capturing returns on a certain investment topics, there is a possibility that the S&P 500 index is too broad of a benchmark to measure the expected returns. By replacing S&P 500 with more accurate or more tailored market indexes could remove the statistical significance from some portfolios.

Possible future research regarding copy-portfolios could include a longer time period as three years is a relatively short time period to evaluate the performance of portfolios. Evaluating the returns of these portfolios over a longer time period could provide a higher number of portfolios exhibiting statistically significant positive coefficients for alpha. Additionally, future research could use a bigger sample size and use portfolios from other social trading platforms to have broader analysis on the performance of social trading portfolios.

CONCLUSION

Social trading is a novel form of investing, where investors are provided with the opportunity to follow the trading of other investors and copy their investment strategies (Pelster & Hofmann 2018, 75; Lee & Ma, 2015, 188). Social trading is attracting users with low investment fees and easy-to-use interfaces, which can be used anywhere anytime. In particular, this provides added access to financial markets for smaller and less knowledgable investors, who can start investing with smaller amounts of initial capital and without having to spend a lot of time to perform research on potential investments. This novel approach to investing provides an interesting field of research, as it is of high value to understand what level investment returns can be expected from using these investment vehicles and what are the risks involved in doing so.

The main aim of this study was to measure the risk-adjusted performance of social trading portfolios, compared to the returns of the overall market, and evaluate whether social trading portfolios were able to consistently outperform the wider market. This research focus was selected due to the lack of studies on this specific topic. To achieve the main aim of this paper, the study empirically analyzed the investment returns of so-called copy-portfolios available on the social trading platform eToro. The copy portfolios included in the study were hand-collected from the platform, along with data on their investment returns, portfolio type, investment themes and several metrics provided by the platform. While the original sample size included 34 copy portfolios, due to the lack of sufficiently long time series data, the final sample size consists of 28 copy portfolios from the previous three years. The investment returns were evaluated by estimating Jensen's alpha for each copy portfolio separately over a three year period between January 2017 until January 2020, using an ordinary least squares (OLS) regression based on the Capital Asset Pricing Model (CAPM).

An added value to the study was that eToro offers three kinds of copy-portfolios to its customers: top-trader, market and partner portfolios. Each of the portfolios are built on different principles, with some being operated by investment managers, while others choose investments based on specific rules using machine learning algorithms. This enabled the author to additionally analyze

the performance of the social trading portfolios included in this study by differentiating between the type of social trading portfolios involved.

The empirical analysis showed that out of the 28 copy-portfolio estimates for alpha, 75% were positive and 25% were negative. These results indicate that, on average, the copy portfolios available on eToro provided higher monthly risk adjusted returns than the market in general. Thus, the copy-portfolios were able to outperform the market benchmark over the period under review. This finding could be considered supportive of using social trading platforms for investing in financial assets, as the copy-portfolios perform as well, if not better, than the market in general.

However, it is important to note that 19 out of the 28 estimates for alpha were not statistically different from zero, meaning that the statistical evidence for copy-portfolio outperformance is rather weak. At the same time, out of the statistically significant coefficients for alpha, 6 were positive while 3 were negative. As such, there is still some evidence that, in general, copy-portfolios perform rather well when compared to the overall market benchmark. It is also interesting to note that all 3 negative coefficients for alpha were estimated for market portfolios, which could be due to the sensitivity of the CAPM model with regard to the benchmark used, as market portfolios rely on specific rules and do not involve active picking of financial assets. According to theory, without active picking of investments, values for alpha should not differ from zero. While overall, the largest number of positive coefficients for alpha were also recorded for market portfolios, this may be because of the relatively large proportion of market portfolios in the study sample. At the same time, all top-trader portfolios, which include active picking of investments, exhibited either statistically significant positive or statistically non-significant coefficients.

With regard to the risks involved in using social trading platforms, the results indicated that 11 out of 28 copy-portfolios analyzed exhibited beta values above one. This seems to suggest that the social trading portfolios included in this study exhibited rather volatile returns when compared to the market benchmark. As such, investments made on social trading platforms may exhibit rather large fluctuations in value. However, such added volatility may be the result of the copy-portfolios being less diversified, which opens them up to more focused industry-specific risk factors. In addition, users of social trading platforms must be aware that while it is possible to analyze the portfolio manager and his or her previous investment returns, these do not guarantee future performance of the investments.

The results of this study may prove to be valuable for small investors who lack the knowledge or time to conduct thorough analysis needed to invest in financial markets, or for those who have limited initial capital to make investments and are thus considering using social trading platforms to invest in financial assets. The study provides positive reassurance that social trading portfolios are, on average, capable of providing comparable, if not better, investment returns, in relation to the overall market returns.

Future research could aim to add to the analysis provided in this study. It would be interesting to test whether substituting the CAPM model for a different method of measuring predicted returns would alter the results of the study. Furthermore, it would be interesting to repeat the study once it becomes possible to focus on a longer time period for evaluating the performance of these copy-portfolios. Future research could also include a bigger data sample and use social trading portfolios obtained from other social trading platforms, thus giving a broader analysis of these novel vehicles for making investments.

LIST OF REFERENCES

Abdel-Kader, M., & Qing, K. Y. (2007). Risk-adjusted performance, selectivity, timing ability, and performance persistence of Hong Kong mutual funds. Journal of Asia-Pacific Business, 8(2), 25-58.

Ant. (2017). Are etoro´s CopyPortfolios Profitable. Retrieved from https://thecashdiaries.com/2017/06/27/are-etoros-copyfunds-profitable/ 27.03.2020

Baker, K.H., Filbeck, G (2017). Hedge Funds: Structure, strategies and performance. New York, USA: Oxford University Press

Brand, T. (2017, Oct 19). What´s going on in the social trading and investing space? [Blog post]. Retrieved from http://blog.thomasbrand.xyz/2017/10/19/what-does-social-trading-and-investing-mean-in-practice/, 01.04.2020.

Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. Journal of Finance, vol. 52, pp. 57-82.

Carlo (2020). What is Social Trading and How it works – 2020 Definitive Guide. Retrieved from: https://investingoal.com/social-trading/#the-history-of-social-trading, 25.03.2020

Chen J. (2019). Jensen´s Measure. Retrieved from https://www.investopedia.com/terms/j/jensensmeasure.asp 18.03.2020

Chen J. (2020). Contract for Differences (CFD) https://www.investopedia.com/terms/c/contractfordifferences.asp 01.04.2020

Crunchbase. Tradency. Retrieved from https://www.crunchbase.com/organization/tradency#section-overview 24.03.2020

Doering, P., Neumann, S., & Paul, S. (2015, May). A primer on social trading networks–institutional aspects and empirical evidence. In EFMA annual meetings.

eToro. Invest in CopyPortfolios. Retrieved from: https://www.etoro.com/discover/copyportfolios, 26.02.2020

eToro. (2015). The new user stats page is here: cleaner, simpler and more informative! Retrieved from https://www.etoro.com/blog/from-etoro/new-user-stats-page/, 10.04.2020

eToro (2020a). What are CopyPortfolios? Retrieved from: https://www.etoro.com/customer-service/help/955033442/what-are-copyportfolios/, 26.03.2020

eToro. (2020b) ShoppingCart Copyportfolio-An eToro Investment Strategy. Retrieved from https://content.etoro.com/lp/pdf/eToro_e-commerce_EN.pdf, 26.03.2020

eToro. (2020c). eToro Copy Systems Explained. Retrieved from: https://www.etoro.com/copytrader/how-it-works/, 26.03.2020

eToro (2020d). CopyPortfolios: The next generation investment product. Retrieved from eToro https://www.etoro.com/blog/from-etoro/copyportfolios-the-next-generation-investment-product/ 26.03.2020

eToro (2020e) ActiveTraders CopyPortfolio - Top Active Traders. Retrieved from: https://content.etoro.com/lp/pdf/eToro_ActiveTraders_term_sheets_EN.pdf, 25.03.2020

eToro (2020f). CarlIcahn-CF. Retrieved from: https://www.etoro.com/copyportfolios/carlicahn-cf/stats, 26.03.2020

eToro (2020g). About eToro. Retrieved from https://www.etoro.com/about/media-center/, 31.03.2020

eToro. (2020h). Our offices. Retrieved from https://www.etoro.com/about/our-offices/, 25.03.2020

eToro. (2020i). Why Choose eToro- Here's why millions of users trade and invest with us. Retrieved from https://www.etoro.com/about/why-choose-us/, 25.03.2020

eToro.(2020j). Trade Markets on eToro. Retrieved from https://www.etoro.com/trading/markets/, 21.03.2020

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. the Journal of Finance, 47(2), 427-465.

Fama, E.F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. The Journal of Finance, 25(2), 383-417. doi:10.2307/2325486

Frankel M. (2018). Why is the S&P 500 used as a benchmark for market performance so often? Ask a Fool. Retrieved from https://eu.usatoday.com/story/money/markets/2018/06/14/why-is-sp500-used-as-benchmark-for-performance/35582081/, 08.04.2020

FTAdviser. (2013). What is thematic investing? Retrieved from https://www.ftadviser.com/2013/05/20/investments/equities/what-is-thematic-investing-w3LiWXr0dAGoXq0NByI3rI/article.html, 03.03.2020

Garyn-Tal, S., & Lauterbach, B. (2011). Evaluating Mutual Fund's Alpha via Alternative Frameworks: Some New Evidence and Insights.

Gemayel, R. (2016). Social trading: an analysis of herding behavior, the disposition effect, and informed trading among traders under a scopic regime (Doctoral dissertation, King's College London).

Gemayel, R., & Preda, A. (2018). Does a scopic regime produce conformism? Herding behavior among trade leaders on social trading platforms. The European Journal of Finance, 24(14), 1144-1175.

Glaser, F., & Risius, M. (2018). Effects of transparency: analyzing social biases on trader performance in social trading. Journal of Information Technology, 33(1), 19-30.

Greenspan, (2019). Investing with CopyPortfolios™.Retrieved from: https://www.etoro.com/investing/guides/fintech/investing-with-copyportfolios/, 24.03.2020

Hayes A. (2020). eToro Review 2020 - New Platform for U.S. Investors. Retrieved from https://www.doughroller.net/investing/etoro-review-new-platform-for-us-investors/, 31.03.2020

Huddart, Steven (1999). Reputation and Performance Fee Effects on Portfolio Choice by Investment Advisers, Journal of Financial Markets 2(3), pp. 227-271.

Jegadeesh, N. & Titman, S. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. Journal of Finance, vol. 48, no. 1, pp. 65-91.

Jensen, Michael C. (1968). The Performance of Mutual Funds in the Period 1945–1964. The Journal of Finance 23: 389–416

Kelly J. (2020). When “commission-free trading” isn’t (really) free. Retrieved from http://webcache.googleusercontent.com/search?q=cache:3VvydJyqdpEJ:ftalphaville.ft.com/2020/02/13/1581604348000/When--commission-free-trading--isn-t--really--free/+&cd=1&hl=et&ct=clnk&gl=ee, 31.03.2020

Korpos G. (2020). eToro Review 2020. Retrieved from https://brokerchooser.com/broker-reviews/etoro-review, 02.04.2020

Lee, W., & Ma, Q. (2015, October). Whom to follow on social trading services? A system to support discovering expert traders. In 2015 Tenth International Conference on Digital Information Management (ICDIM) (pp. 188-193). IEEE.

Malkiel, B. G. (2003). The efficient market hypothesis and its critics. Journal of economic perspectives, 17(1), 59-82.

Marbach, D., Costello, J. C., Küffner, R., Vega, N. M., Prill, R. J., Camacho, D. M., ... & Collins, J. J. (2012). Wisdom of crowds for robust gene network inference. Nature methods, 9(8), 796.

Markowitz, H. (1952). ´Portfolio selection´, Journal of Finance, Vol. 7, No. 1, pp.77- 99

Nguyen Nhat Minh (2018). An empirical test of the Fama-French Five-Factor Model: Applicability to equitized State-Owned Enterprises in Vietnam. Retrieved from https://aaltodoc.aalto.fi/bitstream/handle/123456789/36425/master_Nguyen_Nhat_2018.pdf?sequence=1&isAllowed=y

Nobel Media. (1990). Press release. Retrieved from https://www.nobelprize.org/prizes/economic-sciences/1990/press-release/, 12.03.2020

Oehler, A., Horn, M., & Wendt, S. (2016). Benefits from social trading? Empirical evidence for certificates on wikifolios. International Review of Financial Analysis, 46, 202-210.

Pelster, M., & Hofmann, A. (2018). About the fear of reputational loss: Social trading and the disposition effect. Journal of Banking & Finance, 94, 75-88.

Pepi K. (2020). eToro Review: Online Broker for CFDs With Social Copy Trading. Retrieved from https://moneycheck.com/etoro-review/, 01.04.2020

Pilbeam, K., & Preston, H. (2019). An empirical investigation of the performance of Japanese mutual funds: Skill or luck?. International Journal of Financial Studies, 7(1), 6.

Pylarinou E. (2015). FX trading: Mirror, mirror on the wall, who is the juiciest of them all? Retrieved from https://dailyfintech.com/2015/04/20/fx-trading-mirror-mirror-on-the-wall-who-is-the-juiciest-of-them-all/, 05.04.2020

Rhodes D. (2020). Social Trading vs Copy Trading vs Mirror Trading. Retrieved from https://www.blockfer.com/trading/social-trading-vs-copy-trading-vs-mirror-trading/, 01.04.2020

Roll, R. (1977). `A Critique of the asset pricing theory´s tests – part 1: on past and potential testability of the theory´, Journal of Financial Economics, Vol. 4, No. 1, pp.129-176

Say N. (2019). What is Copy Trading? Complete eToro Copy Trading Guide. Retrieved from https://blockonomi.com/etoro-copy-trading-guide/, 26.03.2020

Scott G. (2019). eToro Review - eToro offers a good fit for beginning traders with limited time. Retrieved from https://www.investopedia.com/etoro-review-4587896, 01.04.2020

Scott G. (2020). Mirror Trading. Retrieved from https://www.investopedia.com/terms/m/mirror-trading.asp, 05.04.2020

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. The journal of finance, 19(3), 425-442.

Sijoitustieto (2017). Kaupankäynti CFD-sopimuksilla ja CFD-sopimusten verotus Suomessa. Retrieved from https://www.sijoitustieto.fi/sijoitusartikkelit/kaupankaynti-cfd-sopimuksilla-ja-cfd-sopimusten-verotus-suomessa, 01.04.2020

Social Trading Guru, Top Social Trading Networks and Platforms. Retrieved from https://socialtradingguru.com/networks 19.03.2020

Stewart, S.D., Piros, C.D., Heisler, J.C., (2011). Portfolio Management: Theory and Practice. (2nd ed.) New Jersey USA: John Wiley & Sons, Inc

Streissguth T. (2019). Is a Negative Beta Coefficient More Risky Than a Positive in the Stock Market? Retrieved from https://finance.zacks.com/negative-beta-coefficient-risky-positive-stock-market-7596.html, 07.04.2020

APPENDICES

Appendix 1. Additional table

Table 1: Results of individual copy-portfolios

Copy-portfolios name	Alpha	P value		Backtested copy-portfolios	Type of copy-portfolios
GainersQr	0.00662	0.0381	**		Top-trader
Sharp trader	0.01209	0.0322	**		Top-trader
Active Traders	0.00451	0.1933			Top-trader
AI Trader50	-0.00072	0.8554			Top-trader
FoodDrink	0.00656	0.1656			Market
InTheGame	0.00690	0.2611			Market
FuturePayments	0.14599	0.0519	*	x	Market
5GRevolution	-0.00637	0.0513	*	x	Market
ShoppingCart	0.00392	0.6377		x	Market
RenewableEnergy	0.00693	0.2468		x	Market
TravelKit	0.00274	0.3693			Market
Diabetes-Med	0.00516	0.2336		x	Market
BigTech	0.00946	0.0059	***		Market
Driverless	0.00049	0.9278		x	Market
FoodTech	0.00062	0.8697		x	Market
TheBigBanks	-0.00825	0.0480	**		Market
DroneTech	0.00094	0.8238		x	Market
GoldenEnergy	-0.01202	0.0068	***		Market
MobilePayments	0.01003	0.0093	***		Market
CryptoPortfolio	0.10304	0.1216		x	Market
CRISPR-Tech	-0.00468	0.5880			Market
CyberSecurity	0.00330	0.5036		x	Market
OutSmartNSDQ	0.01010	0.2405		x	Market
Dividend Growth	0.00169	0.4856		x	Market
PanicMode	0.00702	0.0827	*		Market
WarrenBuffet-CF	-0.00383	0.2404			Partner
CarlIcahn-CF	-0.00163	0.7959			Partner
ALTIA-Investment	0.00147	0.5965		x	Partner

Note: *, **, *** notions after P-values measure the statistical significance at 10%, 5% and 1% level respectively.

Source: Compiled by the author

Appendix 2. Non-exclusive licence

A non-exclusive licence for reproduction and for granting public access to the graduation thesis[1]

I Leo Lievonen

1. Give Tallinn University of Technology a permission (non-exclusive licence) to use free of charge my creation Empirical investigation on the performance of copy-portfolios on e-Toro platform, supervised by Mari-Liis Kukk.

1.1. to reproduce with the purpose of keeping and publishing electronically, including for the purpose of supplementing the digital collection of TalTech library until the copyright expires;

1.2. to make available to the public through the web environment of Tallinn University of Technology, including through the digital collection of TalTech library until the copyright expires.

2. I am aware that the author will also retain the rights provided in Section 1.

3. I confirm that by granting the non-exclusive licence no infringement is committed to the third persons' intellectual property rights or to the rights arising from the personal data protection act and other legislation.

---

[1] *The non-exclusive licence is not valid during the access restriction period with the exception of the right of the university to reproduce the graduation thesis only for the purposes of preservation.*