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QUANTITATIVE VALUE INVESTING APPROACH: EVIDENCE FROM TURKISH STOCK MARKET

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NİCEL DEĞER YAKLAŞIMI: TÜRKİYE HİSSE SENEDİ PİYASASINDAN BİR KANIT

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ABSTRACT

This thesis constructs an actively managed portfolio using a quantitative investing approach on selected publicly listed stocks in Istanbul Stock Exchange. After looking at available literature on alpha generating portfolio strategies, the thesis builds a new investment strategy based on stock selection criteria which includes several operational filters applied to all stock universe between 2010 and 2020. The regression results prove that this investment technique is an alpha generating strategy which beats the benchmark index's performance as well as other comparable Turkish funds' performance for the given period.

ÖZET

Bu tez, İstanbul Menkul Kıymetler Borsası'nda seçilmiş halka açık hisse senetleri üzerinde kantitatif bir yatırım yaklaşımı kullanarak aktif olarak yönetilen bir portföy oluşturur. Pozitif Alfa katsayısı üreten portföy stratejileri hakkındaki mevcut literatüre baktıktan sonra, tez, 2010 ve 2020 yılları arasında tüm hisse senedi evrenine uygulanan çeşitli operasyonel filtreleri içeren hisse senedi seçim kriterlerine dayalı yeni bir yatırım stratejisi oluşturur. Regresyon sonucu olarak karşılaştırma endeksinin performansını ve diğer karşılaştırılabilir Türk fonlarının söz konusu dönemdeki performansını geride bırakmıştır.

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1. Introduction

Efficient market hypothesis as introduced by Eugene Fama claims that price of a stock reflects all available information and that it is not possible to beat the market returns unless there is a factor of chance. The theory states that skill is not enough to beat the market. Passive managers believe in the efficient market hypothesis and so construct portfolios which follow the market index. Active managers believe that markets are inefficient and that there is a way to get excess returns through investment strategies based on skill. Their goal is essentially to generate alpha, which is the excess return achieved compared to a benchmark index. The assets selected in the portfolio can be either bonds or equities and the weights of these assets in the portfolio are determined by the decision of the management team of the actively managed fund. The focus of this thesis will be on active equity investment.

In order to generate alpha, active equity managers use fundamental or technical analysis on stocks (CFA Institute, 2020). Fundamental analysis involves looking at more qualitative factors which may affect the performance of the stock. For example, a change in the organizational structure of the company or a disruptive force in the industry where the company operates are factors which fundamental analysts would analyse when making decisions to long or short stocks. They believe that these exogenous or qualitative events are the major driver of a stock's performance. Technical analyst in contrast will analyse more quantitative factors and metrics such as the historical performance of the stock and try to predict the nature of the future performance of the stock based on this. Technical analysts believe that rule-based stock selection criteria will generate weak or superior returns in the future. This thesis will use both technical analysis and fundamental analysis to construct an active management strategy for equities.

In this thesis the goal is to test the hypothesis that there is inefficiency in Turkish stock market and that it is possible to create excess returns. To this end, an actively managed fund portfolio is created by applying quantitative investing approach to stocks trading in Turkish market. First, the research available on active equity management and examples of actively managed funds and their performance are analysed. Second, a

quantitative stock selection criteria is applied to stocks listed in Istanbul Stock Exchange from 2010 to 2019 and the fund's performance is compared with the performance of the benchmark index , BIST:100 to understand the returns and ability to generate alpha.

The results of the analysis show that Turkish stock market is inefficient and that there is an opportunity to create excess returns above the market when an active investment strategy is used. The stock selection criteria of the proposed fund were able to generate alpha consistently (for 8 years out of the 10-year analysis period.)

The remainder of the thesis is structured as follows: Section 2 provides a theoretical background addressing past research related to active and passive investing. A summary of the available literature on active management including its comparison with passive management, different styles and approaches of constructing an active equity portfolio and various ways of how the performance of a fund portfolio can be measured are provided. Furthermore, real life examples of active fund managers are given to show that there is a wide range of active investment strategies available in the market. These cases are then used to build a new active management fund in the following chapters.

Section 3 presents the data used for the analysis. Section 4 outlines the active investment methodology employed in this study. After showing the strategy, Section 5 presents the results of the analysis. Section 6 concludes by summarizing the main results of the analysis.

2. Theoretical Background

According to Fama (1969), efficient market hypothesis is based on the theory that the price of a stock contains all available information in the public and private market and that it is not possible to beat the market returns unless there is a factor of chance. Additionally, the theory states that skill (technical or fundamental analysis) is not enough to beat the market. Fama further (1969) states that "the ideal is a market in which prices provide accurate signals for resource allocation: that is, a market in which firms can make production-investment decisions and investors can choose among securities that represent ownership of firms' activities under the assumption that security prices at any time "fully reflect" all available information."

There are three forms of market efficiency. First is the weak form of EMH which states that technical analysis employed on past financials and performance will not produce accurate forecasts about the future behaviour of the stock's performance. In other words, above market returns cannot be achieved through technical analysis of past performance.

The second hypothesis is the semi-strong form of market efficiency. This hypothesis encompasses the weak-form hypothesis. This states that stock prices reflect all public information and that investors who make investment decisions based on new important information related to that stock cannot derive above the market profits from their investments. Here, it is also important to define public information as both market and non-market information which is available to the investor such as stock price, trading volume, rates of return, earnings and dividend announcements, price-to-earnings (P/E) ratios, dividend-yield (D/P) ratios, price-book value (P/BV) ratios, stock splits, fundamental data on the firm's product line, quality of management, patents held, news about the economy, and political news. So returns above market cannot be achieved by an investor with fundamental analysis according to the semi-strong form hypothesis.

The third hypothesis is the strong form of market efficiency which encompasses both weak and semi-strong form of market efficiency. This means that current stock prices are reflective of all types of information, ie fully take into account both public and private information. Even the investors who have any additional insider or private

information or insights about the stock's performance are not capable of beating the market consistently and generating above the market returns.

If an investor were able to beat the market returns with his investment strategy this means that the market is not efficient. However, to prove that the market is really inefficient, an investor will need to consistently beat market returns which means that they will need to show above market returns for a substantial number of periods. Generally passive managers will believe that the markets are perfect or efficient and that it is not possible to create excess returns with technical or fundamental analysis. In contrast, active managers believe that markets are inefficient and that there is a way to beat the market through skill.

2.1 Active vs passive management

William Sharpe (1991) defines passive investor as the investor who "always holds every security from the market, with each represented in the same manner as in the market…[]...Equivalently, a passive manager will hold the same percentage of the total outstanding amount of each security in the market.".

The first passive investment index was created in the early 1970s and there are close to three million passive indices globally today (van Loo & Molander, 2020). Mutual funds and exchange traded funds (ETF) are examples of passive funds and they hold the market index. There are also some mutual funds which have active investment strategies. Some popular and largest passive funds in the market are Vanguard 500 Index Fund, S&P 500 ETF and Fidelity 500 Index Fund. Someone who is investing in these funds will hold the market index. Some mutual fund indexes can be grouped according to sectors or countries or geographies. In Turkey some examples of passive funds are BIST-100 and BIST-30. The portfolios of these funds are constructed based on stocks with highest market capitalization trading in Turkish stock market.

Active investor's portfolio on the other hand "will differ from that of the passive managers at some or all times. Because active managers usually act on perceptions of mispricing, and because such misperceptions change very frequently, such managers tend to trade fairly frequently -- hence the term 'active.'". (Sharpe, 1991) In short passive management is about holding the market portfolio or index whereas active

management is deviating from the market. A passive manager believes the Efficient Market Hypothesis and thinks that any return above market is because of chance or luck. Active asset management is based on the theory that market is not efficient and thus there is potential to generate alpha if the investor or fund manager is "skilled". Famous investor Benjamin Graham calls active investor as aggressive investor compared to a defensive investor and shows the difference between aggressive and defensive investor: "Our enterprising security buyer, of course, will desire and expect to attain better overall results than his defensive or passive companion. But first he must make sure that his results will not be worse. It is no difficult trick to bring a great deal of energy, study and native ability into Wall Street and to end up with losses instead of profits." (Graham, 2006). Also according to Graham, returns which are higher than the market can be obtained with three different methods. First method is called "Trading in the market". This means that we buy equity stocks when the market is going upward (bull market) and selling them when the market is going downward direction (bear market). The second method is called "Short term selectivity". This means that we choose stocks which are showing or expected to show in the near term good earning results. So a positive news or development in the market or sector mean that the stock is attractive for the investor. Third and last method is "Long term selectivity". This means that we look into past performance of an equity to see if it has performed well (topline revenue growth, improvement in profitability metrics, etc) and assume that this good performance will also continue into future. Graham gives examples of some sectors or industries where new developments happen such as technology, drugs, software etc. He believes that because there are changes or new developments in them, companies will continue to be attractive or "promising" for investors. (Graham, 2006)

Active managers essentially take advantage of market anomalies as they present good opportunities for investing. Market anomaly can be defined as "systematically predictable security price patterns that are exploitable through investment strategies." (Meier, 2014) There have been many studies both in developed and developing market stocks to understand how anomalies manifest in stock market. Some of the most popular market anomalies can be listed as "day-of-the-week effect", "January effect", "value effect", "size effect" and "momentum effect". According to the adoptive-efficient market hypothesis, once an anomaly is detected by an investor, it should

correct itself and market (or stock prices) will return to its efficient state. Other empirical evidence shows that "Some anomalies (day-of-the-week, January, and size effect) seem to disappear over time, whereas others (value and momentum effects) do not." (Meier, 2014)

Calendar effects such as day-of-the week and January effect argue that stocks tend to outperform in certain days of the week or in a certain month of the year. Looking into January effect more closely, it essentially argues that stocks which underperformed in the last quarter of the year, tend to perform much better in January. There is a logical reason why this trend is observed in the market. Companies will look into selling some stocks which had underperformed towards the end of the year so that they can use the losses to save on corporate taxes for that year. This is also called as "tax-loss-selling" hypothesis. According to Meier, there are some empirical findings proving this hypothesis based on research made in 1980's and 1990's: "Haugan and Lakonishok (1988) find abnormally high stock returns in January, predominantly for small firms. Reinganum (1983) points out that early January returns are particularly high for small firms whose stocks declined in December. Analogously, Roll (1983) finds high January returns for small firms and provides a possible explanation for the January effect. That is, firms might realize capital loss before the end of the fiscal year in order to report lower taxable income." (Meier, 2014) One important and recent research by Michael Okonkwo (2015) builds on Roll's research and methodology to show that the January effect indeed exists. Okonkwo seeks to understand the reliability of January effect for the 16-year period between 1998 and 2014 for all stocks trading in S&P 500. The result of this analysis is that "there is an annual pattern in stock returns that are similar to the results found in Roll (1983) that uses data from 1963-1980. In general, our cross-sectional tests show a significant negative relation between returns during the year and returns at the end of the year (t+5)." (Okonkwo, 2015) The author of the research explains this phenomenon with a combination of factors but tax loss selling seems to be biggest factor.

Similarly, size effect argues that companies with smaller market capitalization tend to outperform those with larger market capitalization. Smaller companies usually have much higher topline growth rates compared to larger firms which have reached their

maturity levels. One of the first research explaining the relationship between return and market value of stocks was done by Rolf Banz (1980). The analysis was applied to common stocks between 1936 and 1975 period through the application of generalized asset pricing model. Banz concludes that in the analysis period the common stock of small firms on average had higher risk-adjusted returns than that of large firms (ie higher market capitalization.) Furthermore, the size effect came about to be non-linear, that is the effect occurs mainly in very small firms (very low market capitalization) while for medium or large sized firms no difference in return are observed. (Banz, 1980) Meier (2014) points out some additional research that prove the existence this effect: "Hawawini and Keim (1995) find evidence for a size effect in European markets and in Japan. Malkiel (2003) reviews empirical findings of the size effect, that smaller firms yield higher returns without increasing the stocks' betas (Fama and French, 1993; Keim, 1983)" (Meier, 2014)

Value effect is defined as the relationship between an asset's return and ratio of its long-run (or book) value relative to its market value and essentially argues that stocks with below average price to book ratios are expected to outperform the market. In other words, stock which are cheap are attractive for investors and should revert to their normal market price eventually, implying a weak market anomaly for investors. Momentum effect, on the other hand, is defined as the relationship between an asset's return and its recent performance track record. Put differently, stock prices follows a trend whether downward or upward and should follow the same trend in the near future. Thus, if a stock's price has been increasing in the near past, then the same increasing trend should follow. A recent study by Asness et al (2012) has looked into the returns of value and momentum strategies across eight diverse markets and asset classes. The findings of the research is that there is premia in value and momentum strategies which have been used together across all asset classes: "Value and momentum are more positively correlated across asset classes than passive exposures to the asset classes themselves. However, value and momentum are negatively correlated both within and across asset classes." (Asness & Moskowitz, 2012) In another research, a study has been done on Latin American emerging stock markets to understand the size patterns in value and momentum strategies separately for the period spanning 2006 and 2015. First finding was that value and momentum existed in all four countries of the analysis; but momentum premiums were not observed in one country. Second important finding

of the research is that value and momentum have a higher impact on small stocks compared to big stocks; with all results turning out to be statistically significant except for one country for value effect. (Vuong, 2017)

French was one of the first researchers to investigate the weekend effect (1980). The French (1980) research is conducted on the index of S&P 500 largest firms returns on years between 1953-1977. French tried to explain about the difference in returns came about over the weekend and how it is conducted. French developed two hypothesis, these are : the Calendar Time Hypothesis and the Processing Time Hypothesis. The calendar time hypothesis suggests that stock returns are on track and they are in nature process. Causing by the weekend effect since from Friday to Monday there has been two days, Monday price returns are expected to be higher by three times relatively to the other days. The trading time hypothesis suggests that the stock market returns are expected to be same percentage in every trading day. Therefore, Trading Time Hypothesis stock returns are expected in Monday should be same as much as other days returns.

Other one of the research conduct by (Samuel, 2018) in Latin America. He explores the presence of weekend effect in Latin America emerging market economies (Argentina, Brazil, Chile, Colombia, Mexico and Peru) by looking into correlation between the weekend effect and stock characteristics such as size or Price to Book ratio. In order to show this effect, Frenchs1980, it can be seen on the above, model is enhanced with two additional variables: Momentum and and country risk. The results of the shows that four of the six countries in the study had Friday effect (That is, returns were much higher on this day, compared to other days of the week). One of the countries, Chile demonstrated “Thursday Effect” meaning that returns were higher on Thursday, not on Friday as predicted. Furthermore, there is a negative correlation between the size of (or market capitalization) and the degree of weekend effect. This means that stocks with smaller market presence are more likely to demonstrate weekend effect and vice versa. For price to book ratio metric, a negative correlation was observed only for three markets (Peru, Brazil and Mexico). In this case, stocks which had a lower Price to book ratio, were likely to show weekend effect. Given this relationship, Mongrut suggests that investors in Latin America emerging markets

countries to buy stock in the beginning of the week and sell them on Friday in order to get additional returns.

Since this paper is about Borsa Istanbul, on literature review there are papers about evidence from Borsa Istanbul. Recently a study related to weekend effect has also been conducted for Turkish Stock Market by Cengiz et al (2017). The analysis consisted of understanding Monday effect in BIST-100 for 289 stocks spanning 2010 to 2014 period. The stocks were classified according to their sectors and then daily stock returns of each week analysed to see if any one day had a particular effect on Monday, by keeping the Monday returns constant . The purpose of this research was to re-examine Monday Effect in Turkish stock market and prove the existence of the effect with more updated data and a much larger stock universe. Based on the results, the stock returns on Monday were impacted by other days of the week. The relationship turned out to be negative and varied according to type of stocks and also sectors where they belong to. Thursday and Friday had the most impact on returns observed in Monday, while Tuesday seemed to have the least impact on stock returns. Similar to the results seen in Latin America market, Turkish Stock Market also seems to have market anomaly and investors can take advantage of this by selling stock on Thursday or Friday. (Cengiz et al, 2017)

In addition, the French wanted to know with the detail about the nature of Monday's negative return. French investigated whether this was indeed a weekend effect or whether these negative returns occurred after any day the market closed. The French conclusion's that "Weekend Effect" is real. The reason is and most obvious explanation is time factor. Since safe investors always seeks for lower risk for the same return or avoid from higher risk for immaterial return they sell on weekends, Fridays and buys on Mondays. This also can be refer to governance choice of day for announcing the bad news about related company for avoiding panic sales towards following day. Unfavorable news can be effect on quoted stock by mispricing. With alternative investment instrument, the one who sells the stock and take the cash rich position by Friday also can use the money for weekend on other instrument like time deposit.

French also tried to conduct a trading strategy. Related inefficiency of the market, who could buy it on Monday and can sell it on Friday and with the returns the one can make money. Holding cash and profits over the weekend seems profitable, but with

transaction commission fee return can be not as much as expected one. French's last recommendation was that with the weekend effect known, investors should change the timing of their transactions to increase their amount of overall profit from trading. (French, 1980)

Earnings over price for firms are important when they compare with the each other for trading strategies. BASU examine the over 300 stock in the NYSE stock exchange companies in two ways, with high E/P listed firms and low E/P listed firms. In the research data is used within the 1975 and 1977, similar to Banz (1980) related research also conducted by firms size but also with the another independent but relatively dependent ratio; E/P ratio which can be read by price to earnings ratio or earning per share ratio. Firm size and P/E ratio both variables have significantly greater impact on expected returns within the more complex than previously documented in the literature researches. With the use of CAPM for measurement of selected equities, lower cap NYSE equities have higher risk-adjusted returns on average compare to higher cap NYSE equities. As a conclusion with the low P/E ratio companies expected to have on average, earned a higher and risk-adjusted rates of return than the high P/E equities (BASU, 1981)

Overreact of investor tested on related research. Monthly NYSE equity return data used for analysing investors overreact for some of the news about company an/or country situation with both about foreign policy and internal updates. Between January 1982 and December 1983 for 85 months annually weighed arithmetic average rate of return used as data list. Causing by the arising problems from using daily returns for related test, in research monthly researched used. For the bad news investor reacts with the higher effect than receiving good news. Using CAPM for returns and with the 35 number of stocks, portfolio has been, on average, outperform the market by roughly %20, however for the good news investor who overreacted to the news, on average, beaten by the market by %5. The result means that overreact percentage and amount for the bad news is higher than overreact for good news. As a distribution through months, most of the excess returns conducted on January with %8 on average. Third result from the research is that most of the overreaction occurred on second and third year of the test period as Benjamin Graham claims. As a result losing stock have earned

roughly %25 more than the winners stock, on average, during the 36 months (De Bondt, 1985).

With the earning announced of a stock or for a stocks portfolio as in cumulative term. As we all predict if a company announced high return on earnings investors who seeks to make profit will buy the related equity if he/she dictate investment by it's profits. On overall after 60 days through following announcement date, long positions have tend to make a return about to %25 comparing to short positions before commission fees. This makes whether companies earnings are announced higher than the expectation or investor seeks for an announcement to invest or wait for the volatility during the announcement. CAPM used for measurement of abnormal returns for the related research. When the abnormal return during the expectation of high return makes the asset more risky and expectation of low return makes the asset less risky. During the examination NYSE and AMEX quoted equities were used for determining the stocks abnormal return before it's announced to the investors and go public. SRM (security-return model) based model sued to estimate the abnormal returns in subsequent 60 day return after earnings announced. There are %86 of trading days conducted by either good or bad news, other %14 there is no available informations for the public. Over 50-quarter period between 1974 and 1985. Total annualized returns for good news firms were about to %36,5. Total the overall sample, the 40 trading day return was only %10,4 or %1,9 higher than average T -bill rate for related period. For the two months following to related announcement the difference between them is not higher as much as for 40 days (Bernard and Thomas, 1989).

Post-earnings announcement by the analyst estimates can effect common equities differently, when the earnings are reported as high, as we all know stock return will higher when compare to the low earnings announcements. When related topic comes to the todays agenda Givoly and Lakonishok 1979) comes to the mind. In the related research, professors are examined the data conduct by NYSE and S&P 500 quoted list. The purpose of the research is to see the subsequent returns after the earnings announced which can be categorized as post-earnings. However the key unit is here dependent to big brokerage houses and analysts earnings projections and estimations on EPS. Conclusion is represented for only FAF the First American Corporation for the years between 1967 and 1974. On the calculation T-0 which means month zero

excluded from research, with the buy and hold policy investor who buy and hold for four month the stock within the %5 upward revision of an analyst or institution receives an abnormal return by %4,7 an roughly %50 of abnormal return, by %2,7 comes from the following two months after revision announced. (Givoly and Lakonishok, 1979)

One of the well-known market calendar anomalies conducted by before holiday returns and effect. In some studies it can also be seen as before 1987 in US stock market, holiday effect consist of the total market anomalies by %30-%50 on average. (Lakonishok and Smidt 1988). Because of the high spirit and holiday euphoria of the investors, they tend to buy stock before the holiday. They found average pre-holiday like labor-day, thanksgiving, memorial-day, President's day and New years day, Christmas and etc. returns are, on average %22 higher than the normal day, with %1 of normal day returns through years. In the research used data is between Sept 1996 and Nov 2006 with the more than 2600 inputs. Exchange is ASX which is Australian Stock Exchange and stock are classified as All Ordinaries; all ordinary stock with no specialities, ASX/SP 500 industry with selected ones; banking, diversified financials, energy, healthcare, insurance, materials, media, retailing, telecommunications and transportation. Finally healthcare indexes; One of them is providers for related sector and second one is owners and operators on related industry. Regression based approach, CAPM uses for calculating the returns for related period. As a result, in all ordinary market index pre-holiday return is %11,29 comparing with the other normal day, return by %2,3. For small cap equities this number is %11,88 for pre-holiday and %1,66 for other normal days. As a conclusion for all sectors, during 1996 and 2006 pre-holiday stocks outperform the normal day by %9-10. (Worthington, 2009)

Related research is about momentum strategies. Momentum strategy is known for the expectation of stocks that outperform or beat the market for a past period, can also beat the market in the future period. Reason of momentum can expected on a period coming from the research's main idea of the strategy, which is about market's underreaction for the past news like earnings hike for a quarter or many. Also with the security analysts forecast for the earnings respond to past news. In the research stocks quoted on NYSE, AMEX and NASDAQ used as a data. Funds, Real Estate Investments Funds (REIT's), trusts companies, American Depository Receipts (ADRs), and foreign stocks

are excluded from data. Data transform as monthly between Jan 1977- Jan 1993 for 22 years and 264 months. In the research two way analysis used: one of them is for price momentum which is reacts for past price movement and the other one is for earnings momentum which is reacts for past earnings movement. As a result there are several profitable periods for a short run. Period like six months long , on average , return by %8,8 for the following six months. With the earnings amount period like six months long, on average, have a return by %7,7 for the following six months. Comparing of two in general price momentum has more value than earnings momentum. On average %41 of the superior performance is occur in the first six months when earning news announced. The purpose of this article is to trace the sources of predictability. Future stock returns based on past returns. As research figures natural to look at the earnings and try to understand movements in stock prices, so the research look this way to rationalize the existence of momentum of price especially. This article specifically deals with: Evidence on the momentum in stock prices is evidence of the under-react about to market for the earnings info announced. Bernard and Thomas (1989), given on the above, when the firms that reported unexpectedly high earnings are outperforms the benchmark of S&P 500 Returns and T-bill rates on return and also the firms that report unexpectedly low earnings. By doing so, research decompose the firms that overreacted by investors for the subsequent 60 trading day by the returns. The uutstanding performance continues for approximately six months after earnings are announced. Givoly and Lakonishok (1979) research is conducted by a slightly new response of prices of projection for earnings made by analysts estimates. Accordingly a probability is exactly what the profitability of momentum strategies the component of the medium period returns on news about this earnings. There will be no momentum strategies if the related approach is correct, after accounting for past occurrence in earnings and earnings projections.

In the research based on historical returns or historical returns gain surprises (research named the latter "gain momentum" strategies) are possible strategies market exploitation in response to different pieces of information. For example, While a gain momentum strategy can benefit from overreacted response to information about short-term expected earnings, a price momentum strategy taking advantage of the slow response of the market to a spread the set of information, including long-term period profitability. In this case each momentum strategies are successful by individually

terms and this single effect covered by the other. Real economic returns are measured imperfectly: accounting amount, so even if earnings that reported are currently weak the expectations of the company are increasing. If the stock price includes other resources upon learning about future profitability, there may be acceleration of stock prices, even with low reported earnings. In addition to linking support of price momentum with support of earnings momentum, related research contributes to the existing literature in several ways. Research provide a detailed analysis of different gain momentum strategies in a common dataset. These strategies differ according to the earnings. surprises are measured and each adds a different perspective. In the related field of finance in the literature, the most common way to measure earnings surprises is standardized ratio of unexpected earnings but this with need of a variable model Expected gains and therefore risk of feature failure according to the research. (Chan, 1996)

Research is conducted to test the whether January anomaly in stock exchange is occur or not. In the past decades small cap firms have outperform when compared to big market cap firms. Since the efficient market form means prices are determined by random walk it is impossible to predict. However every January market outperform on average through years. Data used for S&P 500 between 1975 and 2000 with the confidence level of %95. Monthly returns are compared on the research and for the January average monthly capital return is %1,90 and average monthly total return %2,63 while other months average return is %0,86 and 1,22 and the other months are 0,9530 and 1,3471. (Kampman, 2012)

An important question to address is whether active managers can really outperform the market. According to Sharpe (1991) active managers cannot beat the market on average. This is because active management has some operational costs such as performance and management fees which lead to lower returns than the market when subtracted from the gross returns of the fund: “Properly measured, the average actively managed dollar must underperform the average passively managed dollar, net of costs”. (Sharpe, 1991) On the other hand, some active managers can outperform other active managers because active management is actually a “zero-sum game” where some funds beat the market and some lose to the market. (Warren, 2020) In summary we can say

that while active managers underperform on average compared to their passive benchmarks there are some “skilled” active managers who are able to beat the market. The share of active managers who can beat the market is quite small. For example, Warren Buffet is one of the active managers who was successful in beating the market returns in Berkshire Hathaway fund. His fund’s performance is discussed in the next section. Buffet claims that majority of active managers are bound to be unsuccessful or perform worse than a market following index fund and praises Jack Bogle, the founder of Vanguard Asset Management and his passive index strategy: "lf a statue is ever erected to honor the person who has done the most far American investors, the hands-down choice should be Jack Bogle. For decades, Jack has urged investors to invest in ultra-low-cost index funds. in his crusade, he amassed only a tiny percentage of the wealth that has typically flowed to managers who have promised their investors large rewards while delivering them nothing - or, as in our bet, less than nothing - of added value." (Berkshire Hathaway, 2016) Despite having great success with his active fund management strategy, Buffett himself recommends to investors the simple strategy of following a low-cost S&P 500 index fund due to the high management costs involved in active funds.

Buffett overall argues that in the perspective of an individual investor finding an active manager who is able to beat the market is quite difficult and if that fund is indeed found it is usually due to luck. (Forbes, 2017) And even if that successful active manager is found long term success is not guaranteed: "Finally, there are three connected realities that cause investing success to breed failure. First, a good record quickly attracts a torrent of money. Second, huge sums invariably act as an anchor on investment performance ... Third, most managers will nevertheless seek new money because of their personal equation - namely, the more funds they have under management, the more thejr fees". (Berkshire Hathaway, 2016)

According to Matos the chance of choosing an outperforming fund is very across different geographies, also including US. (Matos, 2017) Globally, the share of outperfoming funds is lower than 25% looking into the performances of funds for one year. Japan seems to be the highest performer with the share of outperforming funds almost reaching 50%. Observing the same share for periods spanning 5 and 10-year, once again outperforming funds are again lower than 50%. This is in line with Warren

Buffet's argument and demonstrates that overall it is hard to beat the market with an active management strategy.

In addition to the performance fees of the team overseeing the actively managed fund, taxation is another issue that should be taken into when evaluating the performance of an actively managed fund. lndividual investors get taxed when the stocks traded appreciate in value and this tax is applied on the capital gain on the investor's income and tax statements for that year. This taxation rate is dependent on the country or jurisdiction in which the fund is operating. A passive fund usually follows a "buy and hold" strategy and therefore is expected to get taxed less frequently than an actively managed fund. Furthermore, in an actively managed fund where the portfolio strategy involves both longing and selling, taxation is expected to happen more frequently than an actively managed fund whose strategy is long-only. The taxation will be even higher when the selling occurs frequently in accordance with the fund's strategy: "Short-term capital gains receive much less favorable capital gain treatment than long-term capital gains. Short- term capital gains (gains on assets held less than one year) are taxed at ordinary rates while long-term capital gains (gains on assets held more than one year) receive more favorable tax treatment. Unfortunately, actively-traded funds are most often guilty of spinning off short-term gains to investors which are then taxed at unfavorable rates." (Atlas Capital Advisors, 2020). Therefore, an individual may consider choosing investing in a passive index vs an actively managed fund, if he wants to avoid paying high tax costs related to his investment. Some active fund managers may proactively take actions to ensure that the portfolio is more tax efficient and that investors do not face tax burden too often.

There are many other research that compares the historical performance of active investment funds with passive investment funds. For example, in their study AQR has looked at the active manager performances in five investment universes (mutual funds, institutional equities, institutional fixed income, hedge funds and private equity) and compared their equivalent equity benchmarks for the period between 2007 and 2017. The results of this analysis show that average manager in all of these categories had positive net returns (simple excess return over benchmark after subtracting management fees). Moreover, this analysis shows that institutional equities

outperformed mutual fund equities and hedge funds in the same period. Highest performers were hedge funds and and private equity firms; the reason behind their overperformance can be explained by being subject to fewer economic constraints, hiring less costly talent, focus on less competitive markets and selection bias (proper randomization is not achieved due to small number of funds in the universe) (AQR, 2020).

Another important question asked by AQR in their analysis is in which markets or conditions can active fund managers find success: “The classic answer is that dusty corners of financial markets, characterized by few active managers and fewer fundamental analysts are less efficiently priced. Candidates include small/micro caps, emerging / frontier markets, less liquid fixed income markets, private assets and the short-side of long/short strategies.” (AQR, 2020) There is evidence that emerging market and non-US equity managers achieved higher returns compared to US managers. AQR’s own analysis shows that US small cap and non-US funds had higher active returns when performances within each group were further analysed in detail.

At the same time AQR notes that performance of active managers has been worse in the past decade compared to the preceding decade except for active fixed income managers in the US. This can be partly explained by environmental reasons (ie worsening macro conditions). Furthermore, there is now higher tendency for passive managers in the market; in other words the active investing trend is reversing in favour of passive investing. Blomberg data shows that 2019 was the first year when passive investors made much more investments in terms of value than active funds due most likely to “higher cost and risk associated with active investing” (van Loo & Molander, 2020). So this is forcing most active managers to lower their management fees and become more competitive against the threat of passive investors.

Active managers are able to beat/outperform the market by generating alpha and/or offering diversification and exposure compared to market indexes. At the same time, they need to keep the operational costs at an appropriate level. Both alpha and beta are risk ratios that investors use to calculate returns but they are actually different from each other. Beta measures the systematic risk of a stock compared to the market and so is an indicator of volatility. It is a risk related to the whole market (macro risks) and cannot be diversified away. On the other hand, alpha is the excess return on a stock

compared to the return on a benchmark index. So when an active manager is talking about having achieved "x" alpha, the number is the deviation from a benchmark index (for example either S&P or NASDAQ). This implies that alpha can differ depending on the benchmark chosen by the active manager. Active managers usually use alpha to indicate the performance of their funds. The common goal of active managers is to beat the market index and go above market alpha. Active managers will try to seek any mispricing (stocks which are trading significantly below than what they should be trading at) that they can see in the market.

2.2 Measurement of an active fund's performance

There are several ways to measure the performance of an actively managed fund. Performance measurement helps investors understand how well the fund is performing compared to the benchmark and also what types of risk the fund management is taking. In other words, it allows us to understand diversification and exposure of the fund. Furthermore, it can give us an idea of the operational costs and fees. Below an overview of two popular methods on how to measure the performance of a fund will be discussed.

a. Holding based approach:

   This approach looks at the weights of each individual asset in a fund portfolio and gives an overall score based on the weighted averages. So in all equity fund, we need to know the individual weights of each stock before we can measure the performance of the fund. The methodology of this approach is described as the following: "Holdings-based style metrics assign a style and a size score to individual stocks within a portfolio. The size score reflects the relative market capitalization of a particular security, while the style score indicates a stock's orientation towards value or growth investment strategies based on certain financial characteristics (price/earnings ratio, price-to-book ratio, dividend yield, five-year sales growth, five-year earnings growth, and five-year average return on equity). The overall portfolio style and size scores are calculated by weighting individual security scores by their appropriate portfolio weights." (Beacon Pointe Advisors, 2002)

b. Regression (return) based approach:

If we do not have access to portfolio weights of the fund, then we can simply use CAPM or multifactor models to measure the performance of a fund. Before moving on with this discussion, it is important to understand the basic model in which these approaches have been built.

This model is the famous "Capital Asset Pricing Model" or "CAPM" which has been developed by William Sharpe and John Lintner in 1960's (Fama & French, 2004). The CAPM model itself has been inspired by Markowitz's model of "mean-variance efficient" portfolios. This model assumes that investors either "minimize the variance of portfolio return, given an expected return" or "maximize expected return, given variance". The result of these choices is the "minimum variance frontier" for risky assets; a curve which shows all possible opportunities of risk and return allocations for an investor. In the curve, expected return is shown on the vertical axis and portfolio risk (standard deviation of portfolio) is given in the horizontal axis. One critical assumption made in this model is that no risk-free borrowing or lending is allowed.

CAPM builds on this model to create relationship between risk and return for investors, especially in the stock market. To summarize, the model states that the expected return on an investment should be the sum of the risk free rate and another factor (beta times market risk premium). Here the risk free rate represents the time value of money and the latter component represents the additional risk that the investor is taking. In other words, CAPM builds on Markowitz's model by adding the possibility of risk free borrowing and lending for the investor. (Fama & French, 2004) The portfolios which are available for the investor with the addition of borrowing and lending stand on a straight line that starts with the risk free rate on the vertical axis and goes tangent to the "minimum variance frontier" and is referred as the "Capital Market Line" or "Security Market Line". Any portfolio or combination of risk-return which are on this line is better than any other risk-return combination to the right of that line.

It is also important to understand the meaning of beta in the capital asset pricing model as it is different from alpha in its measurement of performance. First and foremost, as the slope in the capital market line, beta "measures the sensitivity of the asset's return to variation in the market return." (Fama & French, 2004) Fama and French (2004) gives an additional explanation to beta: "The risk of the market portfolio, as measured by the variance of its return (the denominator of β_{im}), is a weighted average of the

covariance risks of the assets in M (the numerators of β_{im} for different assets). Thus β_{im} is the covariance risk of asset i in M measured relative to the average covariance risk of asset i in M measured relative to the average covariance risk of assets, which is just the variance of the market return." (Fama & French, 2004) Beta is an effective tool in estimating "systematic risk of any individual security or of an unmanaged portfolio" but is not adequate for understanding the performance of an actively managed fund or portfolio as beta alone will not take into account the systematic selectivity skills of the portfolio manager (Jensen, 1967).

Many models which measure the performance of a portfolio/fund have been developed following the introduction of Markowitz's mean-variance model and CAPM. Fama and French's models are especially important because they further introduce alpha which is critical in the assessment of active portfolio investors. Alpha was first introduced by Michael Jensen in 1968 and came to be known as "Jensen's Alpha". This metric measures the risk-adjusted abnormal or superior performance of a portfolio as the intercept of the intercept of the risk-return regression. This is the result of the selectivity skills of the portfolio manager, as discussed earlier. Jensen's alpha is an additional coefficient or parameter added to the right hand side of the capital asset pricing model.

Here alpha coefficient shows how much the manager has returned additionally above the performance of the benchmark. In his paper, Jensen looks at the predictive ability of 115 mutual fund managers in the US for the period between 1945 and 1964. Jensen describes predictive ability as "ability to earn returns through successful prediction of security prices which are higher than those which could expect given the level of riskiness of his portfolio." (Jensen, 1967) After applying the regression model with alpha to this data set, Jensen observed that "these 115 mutual funds were on average not able to predict security prices well enough to outperform a buy-the-market-and-hold policy, but also that there is very little evidence that any individual fund was able to do significantly better than that which we expected from mere random chance". Furthermore, these findings are based on net returns after taking into account management expenses over gross returns. This means that the mutual funds which Jensen looked at underperformed so much so that they were not even able to recover their management or brokerage costs.

Based on Fama and French's factor model, the asset price can be explained by a combination of different factors. The model simply adds different factors on to Jensen's regression model to better understand the returns of an active manager. The first model which was developed by Fama and French was a three-factor model dependent on market premium, size premium and value premium (Hayes, 2020). Alpha, as discussed above, gives us how much the manager has returned additionally above the performance of the benchmark.

The important thing to show in Fama and French's model is the three factors used which are excess return on market, firm size (SMB, small minus big) and book to market values (HML, high minus low). SMB is the portfolio of historic excess returns of small-cap companies over large-cap companies. HML is the portfolio of historic excess returns of value stocks over growth stocks. In 2014, Fama and French advanced this model by incorporating two additional factors to explain excess return on the market index and renamed their 2010 model as "Five Factor Model" (Hayes, 2020).

To understand the meaning these coefficients, a regression can be run based on the three-factor model. Let's assume for example that we obtained negative beta coefficients on all three factors and only HML coefficient which we obtained was statistically significant (this is indicated by a t-stat which is higher than a certain number depending on the sample size when we run a regression. For example, when the sample size is 30 then the t-stat is 2.042 etc). A negative beta on book-to-market value would mean that the portfolio has higher expected returns if high book-to-market stock underperform low book-to-market stocks. We can conclude that the portfolio consists mostly of growth stocks and performance depends largely on the performance of the growth stocks selected. If the market return coefficient also turned out to be statistically significant, then the negative beta would mean that the portfolio moves in the opposite direction of the market (in other words when the stock market is giving negative returns, then the portfolio is expected to give positive returns). To summarize, when market return and HML betas are statistically significant and are both negative, it is hard to predict the performance of the fund. To go back to the efficient market theory, if CAPM were valid we would observe that alpha would be zero and beta would be statistically significant in the traditional CAPM model. Fama and French model

proved that CAPM was way better in understanding portfolio returns and performance by introducing different factors such as size and value which can affect performance.

There are other factor models developed by economists following Fama and French. Carhart developed in 1997 a four-factor model which included the three factors in Fama and French's three factor model and also a new "momentum factor" to evaluate the performance of mutual funds: "Carhart also based his work on Jegadeesh and Titman´s (1993) paper. Jegadeesh and Titman uncovered a tendency for good and bad performances of stocks to persist over several months, in other words a momentum effect." (Rehnby, 2014) This new factor was named as "WML" called the return of the momentum factor, winners minus losers. Here winner stocks were the top performing 30% percentile of the stock data and loser stocks were the worst-performing 30% percentile of the data. There are also other factors developed by others. Some added macroeconomic variables to their factor model: "Jagannathan and Wang (1996) and Reyfman (1997) use labour income. Chen et al. (1986) test whether innovations in several macroeconomic variables are risks that are rewarded in the stock market. Included variables are: the spread between long and short interest rate, expected and unexpected inflation, industrial production, the spread between high and low-grade bonds, market portfolio, aggregate consumption and oil price." (Ericsson & Karlsson, 2004)

Market timing models are also used to understand fund performances. Similar to factor models, these models are also built on the capital asset pricing model. Market timing strategy involves selecting the best time to make an investment: "This strategy refers to predicting whether the market will be bullish or bearish. An investor using this strategy is trying to outwit the market most of the time. In other words, this strategy implies that an investor is forecasting the direction of future market trends." (Skrinjaric, 2013)

There are two main market timing models: Treynor and Mazuy's 1966 market timing model and Henriksson-Merton's 1981 model. Both models introduce new coefficients to the capital asset pricing model in order to evaluate market timing in the context of making investments (Hubner, 2011). Where the additional coefficient, Υ, allows the investor to change portfolio's beta based on the sign of the market return. An investor

with good market timing abilities would increase the exposure to the market when the market return as indicated by $(R_{m,t} - R_{f,t})$ is positive and then decrease the exposure to the market when the market return is negative. The coefficient alpha once again provide a measure for the excess return of an active investor with market timing abilities.

In the case of Treynor and Mazuy's model, with the addition of a coefficient, the one-factor capital asset pricing model equation becomes a quadratic equation: "The coefficient of this term reflects the convexity achieved by managers in their exposure to the market portfolio. If it is positive, the manager gradually increases her beta as the market goes up, indicating that they display good timing abilities" (Hubner, 2011). In comparing the two models, Hubner concludes that a negative value of gamma coefficient indicates negative market timing: "The HM model translates the behavior of a manager who succeeds in switching his market beta from a high level equal to βHM when the market return exceeds the risk-free rate to a low level of (βHM − γHM) otherwise..[…] under the standard assumption of a joint normal distribution of asset returns, the TM model is consistent with a manager whose target beta varies linearly with his forecast for the expected market rate of return.

In this section, a comprehensive review of the different factor-based approaches used to evaluate fund's performance has been given. Looking into these different models since the introduction of the capital asset pricing model, we can conclude that regression/return based approaches for performance measurement are constantly improving and changing and that they are a good way to measure returns of an active investor when portfolio weights are not available or applicable.

Active managers try to generate alpha by using different investment strategies using fundamental or quantitative approaches. In the remaining section, some alpha generating strategies are analysed through examples of real-life active asset managers who successfully use these techniques.

2.3 Active equity investment strategies and approaches

There are two different approaches to active equity management: fundamental and quantitative (also known as technical) approaches. First one is fundamental approach and here investors depend on their intuition and judgement to make an investment

decision (for example longing and shorting certain stocks). Second approach to active investment is quantitative (or technical) approach where investor uses certain rules and technical models to construct an equity portfolio. Fundamental approach and quantitative approach are also called “discretionary” and “systematic” respectively. (CFA Institute, 2020)

There are some characteristic differences between fundamental and quantitative approaches to equity investing. These differences can be described as the following (CFA Institute, 2020).

First difference is the subjective vs objective decision making process. In quantitative approach to equity investing the investor relies on the findings and outputs of technical models and therefore the investment decision must be objective and unbiased.

Second difference is research vs data as information source. Investors who employ fundamental analysis use research and market intelligence related to stock and also wider macroeconomic conditions and also quantitative factors such as company culture, management team etc while those who employ quantitative analysis will look at available historical data (earnings report, stock market performance etc) to come to a conclusion about the stock’s future performance.

Third and final difference is forward looking vs backward looking approach. A quantitative analyst will look at past data to predict future performance of a stock. A fundamental analyst will try to predict macro or company-specific events that can directly impact the performance of a stock and so is always forward looking.

There are some advantages and disadvantages in both types of approaches. For example, a fundamental analyst may become overly biased towards one stock compared to another after spending too much time analysing it. On the other hand, the fundamental analyst will have more insights into some immeasurable company characteristics such as culture, organization and reputation. In comparison, a quantitative analyst will not be taking into consideration these factors. Furthermore, if the historical data is not complete or wrong, the future predictions are also likely to come out wrong. Still, quantitative analyst holds the benefit of effectively narrowing down from a large list of stocks using data-driven performance filters.

Fundamental and quantitative approaches also differ in investment processes. Fundamental investor will "define the investment universe; prescreen the universe; understand the industry and business; forecast the company's financial performance; convert forecasts into a target price; construct the portfolio with the desired risk profile; and rebalance the portfolio according to a buy and sell discipline." (CFA Institute, 2020) Quantitative investor will, on the other hand, "define the investment thesis; acquire, clean, and process the data; backtest the strategy; evaluate the strategy; and construct an efficient portfolio using risk and trading cost models." (CFA Institute, 2020)

When making an investment decision, it would be best to use both fundamental and quantitative approaches because both have their own advantages and disadvantages and when used together can create a better picture for active investors.

Active equity management strategies can be grouped into four: bottom-up, top-down, factor-based and activist strategies (CFA Institute, 2020). An overview of each strategy is provided in the following. First strategy is bottom-up strategy. The investor will try to understand the intrinsic value of the company and whether it is overvalued (opportunity to short) or undervalued (opportunity to go long) compared to the market price by focusing on the company. Second strategy is top-down strategy. The investor will look at macroeconomic conditions and also the performance and outlook of the industry in which the company is operating in. This strategy is helpful in filtering a specific industry or geography and so makes stock-picking much easier for the investor. When doing top-down strategy, some attractive themes may also come up and the investor may want to deep dive into stocks which belong to this theme. Third strategy is factor based strategy. The investor will seek to choose stocks which are filtered based on different factors that have increased stock prices in the past. This is a technique which is used often by quantitative active managers since factors are determined from analysing historical data. Value, growth and momentum are the main grouping factors used by investors as mentioned in the previous section when discussing factor-based models.

The final strategy is activist strategy. Activist equity investors usually invest in equities and aim to create value by making changes on the management team, organizational structure, leverage ratio or business model. The fundamental belief of activist investors

is that market will react positively to a change in the company when it is executed by an outside investor. (CFA Institute, 2020)

2.4 Examples of actively managed funds

In this section, examples of some popular actively managed funds which employ value and momentum strategies and their detailed performance are shown.

There are agencies or financial service companies that provide investment research and investment advisory to individual investors and also advisors so that they are better educated and informed when making investments in a fund. These agencies typically track the performance of various types of funds and then give positive or negative recommendation or "ratings" for each. A high rating would indicate to the investor that the fund in question is expected to be perform well in the near future, while a low rating would indicate that the fund will be a low performer. In this manner, these agencies actually hold significant power in equity management industry with their ability to shape investor decisions based on their analysis.

Morningstar is the most widely known and recognized investment advisory firm in the world today and has products and services to both investors and asset managers. For investors, they offer in-depth analysis of companies and funds, training on various investment products and periodic newsletters about market developments that can have an impact on their investment decision. For advisors, they also offer a suite of services that allow asset managers ta understand investors needs and market developments. (Morningstar, 2020) Under equity asset class, investors can view the performance of any actively or passively managed fund classified based on their size {large, mid-cap, small), country (US vs international) and strategy (value, blend or growth). Here growth is defined based on "fast growth (high growth rates far earnings, sales, book value, and cash flow) and high valuations (high price ratios and low dividend yields)". Value, on the other hand, is defined as "based on low valuations (low price ratios and high dividend yields) and slow growth (low growth rates far earnings, sales, book value, and cash flow)." Blend is usually a mix between value and growth types: "The blend style is assigned to portfolios where neither growth nor value characteristics predominate. These portfolios tend to invest across the spectrum of U.S. industries, and

owing to their broad exposure, the portfolios' returns are often similar to those of the S&P 500 lndex." (Morningstar, 2020) Under each fund category, Morningstar then gives a list of each available fund and basic information on their performance such as adjusted expense ratio, 12-month yield, return rank in 3-5-10 year performance, expense ratio, manager tenure etc. An investor with a premium account would then have access to more detailed info about the performance of the fund including recommendation and rating.

Morningstar also provides the aggregate performance of funds in these categories on a periodic basis. The analysis also provides an active / passive barometer which compares the performance of an active fund with index fund. Based on the analysis made far data until June 2020, active funds do not seem to be better or worse in terms of performance categorically during the first half of 2020: "The coronavirus sell-off and subsequent rebound tested the narrative that active funds can navigate market volatility better than their index peers. The midyear installment of the Morningstar Active/Passive Barometer looks at active funds' performance through the first half of 2020 and shows that there's little merit to this notion." (Morningstar, 2020). Similarly, when the active and passive returns are compared for each category for the 10 year period, it can be seen that the fund did not necessarily fare better than their passive counterparts on an equal weighted basis.

Morningstar gives the performance analysis of funds on a periodic basis and it is especially interesting to see the performance of active funds in comparison to passive ones and also the market during the first half of 2020 where the market was very volatile due to to coronavirus outbreak. According to Morningstar, "about two-thirds of the more than 1,700 actively managed funds... delivered negative returns this year, meaning investors have lost money" and furthermore, majority of the active funds actually underperformed markets considerably.

2.4.1 Berkshire Hathaway Fund

Berkshire Hathaway Fund is an actively managed fund controlled by Warren Buffett who was a strong believer in Benjamin Graham’s theories on investing. The fund

performed very well since its establishment: "A dollar invested in Berkshire Hathaway in October 1976…would have been worth more than $3,685 in March 2017…. Over this time period, Berkshire realized an average annual return of 18.6% in excess of the T-Bill rate, significantly outperforming the general stock market's average excess return of 7.5%." (Frazzini, Kabiller, & Pedersen, 2019) The return of Berkshire Hathaway Fund between 1976 and 2017 was 18.6% and this return was much higher when compared to public US stocks and private holdings and overall stock market. The fund had a Sharpe ratio of 0.79 which is the expected return on the stock minus the risk free rate divided by the standard deviation on the stock. This ratio was higher than the Sharpe ratio of public US stocks and private holdings in the same period.

The paper of Frazzini, Kabiller and Pedersen argue that "Buffett's success is neither luck nor magic, but reward for a successful implementation of value and quality exposures that have historically produced high returns". (Frazzini, Kabiller, & Pedersen, 2019) They believe that Buffett invested in "safe, high-quality and cheap" stocks and combined this investment skill with leverage. Furthermore, the leverage ratio of the fund was higher than the other benchmarks in the same period. Because debt is always cheaper than equity this made the returns to be bigger for the fund. Also the fund had both publicly traded funds and private companies. So Buffett was both good at selecting stocks in the public market and managing private companies (making them operationally better, improving their financial performance etc).

2.4.2 Vanguard Global Momentum Factor Fund

Vanguard is an American asset manager which has active and passive funds both in its product offering. The fund uses the momentum factor when choosing stocks to put into the portfolio. As explained before momentum strategy believes that stocks which have performed well in the past will continue performing well in the future and stocks which have not performed well in the past will fail in the future. Vanguard uses three techniques to select stocks for the portfolio (Vanguard Asset Management Limited , 2015):

First technique is active management whereby the fund does not follow a passive investment strategy by tracking a market index and so does not do rebalancing.

"Portfolio managers use quantitative models to assess a share's suitability and build the portfolio. The models determine an equity's momentum characteristics and assign a momentum factor score. Only the highest-scoring stocks are included in the portfolio and their weight in the portfolio is determined by their factor score, subject to a given set of risk controls." (Vanguard Asset Management Limited , 2015) This means that the fund manager can buy shares when the momentum score is high and sell shares when the momentum score is low. The second technique is low cost whereby the fund manager is charging 0.22% for the active management of the portfolio to the investor. The third and final technique is exposure to global equities. The fund looks at different regions and countries in the world to provide diversification to the investors.

2.4.3 Fidelity Investments

Fidelity Investments is another American asset management firm. In addition to passive mutual funds the asset manager offers some actively managed funds and some of them have been performing very well in the past few years. Aaron Levitt shortlisted three of the actively managed Fidelity funds which have been performing very well or should perform well (Levitt, 2018). Two of the funds which Levitt recommends in his paper are as follows: Firstly, there is Fidelity low priced stock fund (FLPSX). This fund is actively managed by Joel Tillinghast since 1989. This fund selects stocks which have a price lower than 35$ when buying the stock for the first time. This means that the portfolio consists of small to medium sized companies stocks and also means that the portfolio mostly have value stocks (stocks that are undervalued and have potential to grow). According to Levitt, the performance of this fund has been very good: "When looking at mid-cap value mutual funds over the last ten years, FLPSX has managed to beat the category average by about 1-percentage-point-per-year in annual returns. Moreover, moving down the market-cap ladder, the Fidelity fund has beaten the Russell 2000 index by about 3.5-percentage-points-per-year." (Levitt, 2018) The performance fee for the fund is 0.68%.

The second fund of Fidelity is Fidelity event driven opportunities. This fund invests in small to medium sized stocks that are expected to go through certain events such as organizational changes, capital restructuring, etc. This fund began its operations in 2013 and is again managed by Tillinghast who also manages the low priced stock fund. Based on Fidelity's fund description, the fund is good for "Someone who is seeking

the potential for long-term share-price appreciation and, secondarily, dividend income. Someone who is seeking both growth- and value-style investments and who is willing to accept the generally greater volatility of investments in smaller companies." (Fidelity, 2020) The fund has an expense ratio of 1.05% in gross terms. The performance of the fund compared to the Russell 3000 benchmark shows that the actively managed fund was actually not performing well since 2018 and only beat the benchmark index for some period in 2017 and 2018.

To conclude, this section gave an overview of active management and related strategies by understanding (i) the difference between active and passive management (ii) the measurement of an active fund's performance starting from capital asset pricing model and ending with various factor-based models which evolved over time (iii) the different active management techniques and strategies including a discussion of fundamental and qualitative strategies and finally (iv) real-life examples of actively managed portfolios from around the world and their performance over the years.

Given the above literature review regarding active investment strategies, an active investment strategy for the Turkish stock market is developed in the next section.

3. Data

The geographic exposure of our active investment fund is Turkey. We use stocks as the only asset class and exclude bonds and other investment instruments. Analysis is made on publicly traded stocks listed in BIST between 2010-2019. Horizon of investing is one year beginning from Q1 end for each stock. The benchmark index for the Fund has been chosen as BIST-100.

There are currently 405 companies listed on the Borsa Istanbul. Our sample begins with 333 companies as of January 2010 and reached 410 in 2018. Table 4.1 shows the annual number of stocks and the number of stocks we examined listed on the Borsa Istanbul

at the end of each year from 2010 to 2020. We include all stocks that have traded through our sample period. Stocks that are now dead were included when they were alive.

Year	Stock Amount	Examined Number of Equity
2010	333	256
2011	361	275
2012	403	300
2013	407	315
2014	401	326
2015	423	332
2016	413	343
2017	406	337
2018	410	353
2019	409	346
2020	405	352

Table 1 Stocks quoted on BIST vs examined stocks

3.1 Investment Strategy

The investing type is active equity management which means that the ultimate goal is to generate alpha in Turkish equity market. Long-only investing is used (either buy or do nothing). Quantitative approach is applied instead of fundamental analysis. A combination of value (buying low and selling high) and momentum investing techniques are applied to form portfolios every year.

An active quantitative investment approach is performed to all stocks in BIST-100 for the period between 2009 and 2020 and a factor based strategy is applied to shortlist best performing stocks for each year. The factor based strategy filters stocks based on different factors; these factors / selection criteria will be mentioned in the following section. Because this stock selection is applied for every year for the past 10 years, a momentum strategy will also be present (the portfolio composition changes every year in the end of first quarter. Therefore, the active investment strategy is a combination of value and momentum strategies.

As an active asset manager, the Fund be applying a 2% and 20% compensation structure just like the majority of hedge funds around the world. This compensation

structure consists of two separate fees. One is a fixed management fee of 2% which is calculated on the total assets under management. This fee will be distributed among the investors based on their capital contribution to the fund. The second fee is a 20% fee on the net profits of the portfolio and gives an incentive for the asset manager. The fund will be available for both retail and institutional investors in both Turkey and globally.

Finnet has been used to obtain all the relevant stock data needed for this stock selection analysis. Finnet is a Turkish software which provides financial analysis tools to investment professionals. After obtaining raw data of stock information, the analysis is conducted on excel to construct a portfolio and evaluate performance of the Fund.

3.1.1 Exemptions

Some stocks in specific industries and sectors are excluded from the analysis. First industry is conglomerates. These contain more than one company and are usually exposed to different sectors and therefore different market dynamics and risks. Second exempt industry is financial institutions, insurance, brokerage and other financial services companies: The companies in these sectors have very different business models and therefore different balance sheets. Their performance and operational metrics are quite different from other industries. For example for banks, metrics related to book value are the most relevant performance indicators. Banks do not have a conventional income statement (eg they do not have net sales but consumer and commercial loans) so it will be difficult to compare them against other companies with conventional income statement and balance sheets.

Another exempt industry is real estate and REIT (GMYOs). These types of companies work on a project basis and these projects are usually long term (3-5 years) until they are completed. The cash inflows from the project are not reflected into the income statements according to IFRS standards until the project is completed. Therefore, they don’t have a steady and consistent income statement, balance sheet and cash flow which we can study and value.

Companies which are exposed to political risk are also excluded from the analysis. Companies which are known to be affiliated with the Turkish government have been identified and excluded since they have much higher volatility than other stocks.

Additionally, BIST-100 has a categorization named “VBTS” where stocks which are identified to be volatile and which have very small transaction volume (small liquidity) are included. The stocks named in this category have also been excluded as well.

4. Methodology

A quantitative stock selection methodology on all BIST stocks, except for those which have been identified as exemptions in the previous section, is developed. The stock filtering is laid out in detail.

Firstly, the stocks which have been identified to exist in “exempt” sectors and industries as discussed in the previous section are filtered out.

Secondly, net current asset value (NCAV) for each stock is calculated and stocks with NCAV larger than 1.5 are selected. NCAV is a ratio which is calculated by dividing net current asset value with market capitalization of the stock. Net current asset value is found by subtracting total liabilities from total current assets. Total liabilities are the sum of short and long term liabilities in the balance sheet. Market capitalization is found by multiplying shares outstanding with the share price of a stock. The formula for NCAV ratio is given below:

$$\text{NCAV}=\frac{Total\ current\ assets-total\ liabilities}{Market\ capitalization\ (equity\ value)}$$

When net current asset value (which is the numerator in the above equation) is bigger than the market capitalization, then the NCAV ratio is bigger than 1. A NCAV ratio bigger than 1 implies that the stock we are looking at is undervalued (trading below its underlying value and so can provide returns for its investor). Benjamin Graham, an American economist, professor and widely known as the "father of value investing", also used this ratio as one of this value investing strategies to find stocks which were

trading below their value: "Graham's NCAV strategy calls for buying stocks trading at two-thirds or less of their net current asset value and selling when the share price is close to its NCAV. This is a very stringent requirement because NCAV is usually negative for most companies. Even though it is positive, NCAV per share will be rarely greater than the market price. Graham was looking for firms trading so cheap that there was a little chance of falling further (An, Cheh, & Kim, 2015). In this stock selection analysis a ratio of 1.5 is used to keep the stock universe large enough as there aren't many stocks trading in BIST-100 when compared with the US stock market or other global markets (ie Turkish stock market does not have enough depth).

Thirdly, stocks which have EBITDA margin higher than 5% are identified. Here an operational performance filter by choosing stocks which have an EBITDA margin higher than 5% is applied. EBITDA margin is a profitability metric which is calculated with the formula below:

$$\text{EBITDA margin \%} = \frac{EBITDA}{Net\ sales}$$

This means that the stock portfolio includes stocks which are profitable. The margin levels and ranges of stocks are different according to their industries and sectors.

As the last step, stocks which are trading below their industry multiples are calculated. In this filter, various multiples including P/E, P/B, EV/EBITDA and EV/ Sales multiples of each stock are analysed. Explanation of abbreviations are shown below. P/E and P/B are two multiples based on the equity values of a stock. The last two are multiples depending on the enterprise value of a stock (includes net debt or cash).

$$P/E = \frac{price\ per\ share}{Earnings\ per\ share}$$

$$P/B = \frac{price\ per\ share}{Book\ value\ per\ share}$$

$$EV/EBITDA = \frac{Enterprise\ value}{EBITDA}$$

$$EV/Sales = \frac{Enterprise\ value}{Sales}$$

Separately the average multiples for each industry in the analysis are calculated. Then it is determined if the stock's multiples are lower or higher than the industry's average multiples. If 3 or more are lower than the industry averages then those are included in the actively managed fund portfolio. This way it is ensured that there are stocks that are trading below than their potential in the market included in the portfolio.

This analysis is done from 2010 to 2019 for every year. Because the stock selection will change every year dynamically based on this criteria, this momentum strategy will be applied on top of value investing.

Based on the proposed stock selection methodology, there was only one stock selected for the portfolio, Pergamon Dış Ticaret (PSDTC), in 2018. Generally, companies' financial performance deteriorated in this year possibly due to macro reasons such as market conditions and political environment. Having only one stock in the portfolio in one year carries very high specific risk and therefore we had two options to eliminate this risk: Fist was to completely take out this year (not invest in any stock) and second was to change the stock selection criteria. We choose to slightly alter the filtering methodology for this year. All of the stock selection filters remained the same expect for the EBITDA margin filter, which was pulled from %5 to %1 to account for this exceptional year. With the application of this new filer, there were 6 stocks selected for the portfolio.

4.1 Descriptive Statistics

In this subsection, how the stock selection works is illustrated through tables with selected examples. This sample analysis is based on the stocks trading at BIST-100 as at 2020 end of first quarter and starts the analysis with 2019 first quarter. Firstly, stocks which are in FIG, real estate and insurance sectors and also volatile stocks given in BIST-100 are removed from the stock universe. Then, all the ratios and metrics as identified in stock selection criteria of the previous section are calculated. To reiterate, these ratios and metrics are NCAV ratio, EBITDA margin, trading multiples (PE, PB, EV/EBITDA and EV/Sales). After calculating these metrics for each stock, the filters which were defined in the previous sections are applied. A shortlist of stocks for 2019-2020 period to include in my dynamic portfolio is produced. The tables shown in the remaining of this section give sample calculations for 2019. As part of the momentum quantitative strategy discussed previously, the same steps were done yearly and historically for the past ten years, starting from 2010 and ending in the first quarter of 2020.

In Figure 11, the stock portfolio of 2019 is given. It is assumed that the retail or institutional investors will commit a capital of 100,000 TRY at the beginning (2010) and will reinvest the invested capital and plus gains for that year the following year. This pattern will repeat every year. There will be no other capital inflows or outflows (isolated system). The capital from investors are distributed along stocks based on their number of market cap.

INSTRUMENT NAME	CLOSING PRICE	SHARE OUTSTANDING	MARKET CAP	CURRENT ASSETS	TOTAL LIABILITES	NCAV RATIO
A.V.O.D Gıda Ve Tarım	1,86	90.000.000	167.400.000	166.440.838	56.800.285	0,65
Acıpayam Selüloz	6,37	10.721.700	68.297.229	18.628.141	583.930	0,26
Adana Çimento (A)	9,71	88.178.885	856.216.975	143.578.877	6.642.718	0,16
Adana Çimento (B)	7,13	82.667.705	589.420.736	134.605.197	6.227.548	0,22
Adana Çimento (C)	2,23	165.335.410	368.697.964	269.210.394	12.455.097	0,70
Adel Kalemcilik	15,70	23.625.000	370.912.500	261.640.000	2.853.000	0,70
Adese Alışveriş Ticaret	1,43	126.000.000	179.964.878	442.073.000	16.358.000	2,37

Table 2 Calculation of NCAV ratio (First filter)

INSTRUMENT NAME	EBITDA MARGİN	EARNİNGS	EBITDA	SALES	DEBT	CASH
A.V.O.D Gıda Ve Tarım	10,58	16.686.078	18.929.411	178.963.204	76.846.473	29.157.608
Acıpayam Selüloz	12,78	9.305.763	5.486.952	42.939.006	47.788	2.274.716
Adana Çimento (A)	12,98	57.424.844	41.347.269	318.636.779	22.483.981	68.318.005
Adana Çimento (B)	12,98	38.283.229	27.564.846	212.424.519	21.078.733	64.048.130
Adana Çimento (C)	12,98	10.634.230	7.656.902	59.006.811	42.157.465	128.096.259
Adel Kalemcilik	20,03	-14.673.000	69.528.000	347.114.000	176.970.000	23.063.000
Adese Alışveriş Ticaret	-16,12	-499.000	-32.084.000	198.985.000	445.484.000	20.353.000

Table 3 Calculation of EBITDA margin (Second Filter)

INSTRUMENT NAME	BV	EPS	P/E	P/B	EV/EBITDA	EV/SALES
A.V.O.D Gıda Ve Tarım	5,39	0,19	10,03	0,34	11,36	1,20
Acıpayam Selüloz	1,15	0,87	7,34	5,53	12,04	1,54
Adana Çimento (A)	1,54	0,65	14,91	6,32	19,60	2,54
Adana Çimento (B)	2,16	0,46	15,40	3,30	19,82	2,57
Adana Çimento (C)	15,55	0,06	34,67	0,14	36,93	4,79
Adel Kalemcilik	- 1,61	- 0,62	- 25,28	- 9,75	7,55	1,51
Adese Alışveriş Ticaret	- 252,51	- 0,00	- 360,65	- 0,01	- 18,86	3,04

Table 4 Calculation of trading multiples (Third filter)

INDUSTRIES	P/E	P/B	EV/EBITDA	EV/SALES
Gıda, İçecek ve Tütün	11,25	2,09	7,60	1,04
Kimya İlaç Petrol Lastik ve Plastik Ürünler	10,99	5,13	8,12	1,07
Taş ve Toprağa Dayalı	6,52	1,22	8,21	1,79
Diğer İmalat Sanayii	-25,28	-9,75	7,55	1,51
Perakende Ticaret	-3,11	-0,01	3,77	0,47
Elektrik Gaz ve Su	5,66	1,00	10,16	2,70
İdari Destek Hizmet Faaliyetleri	9,25	-0,40	-9,77	2,35
Tekstil, Giyim Eşyası ve Deri	8,45	1,74	8,56	0,97
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	11,46	2,63	8,75	1,09
Bilişim ve Telekomünikasyon ve Teknoloji	9,84	6,87	9,09	0,91

Kağıt ve Kağıt Ürünleri, Basım ve Yayın	2,06	-0,02	7,92	1,01
Lokanta ve Oteller	10,20	0,00	5,99	3,15
İnşaat ve Bayındırlık	8,08	0,62	4,65	2,22
Savunma Sanayi	19,61	31,72	45,05	6,32
Ulaştırma ve Depolama	12,43	13,62	6,84	2,01
Ana Metal Sanayi	10,82	0,72	10,42	1,06
Orman Ürünleri ve Mobilya	10,50	-0,11	11,29	1,10
Toptan Ticaret	6,18	3,46	4,01	0,59
Madencilik ve Taş Ocakçılığı	4,29	49,23	1,64	1,06
Tarım ve Hayvancılık	1,17	0,21	10,82	0,72
İnsan Sağlığı ve Sosyal Hizmetler	35,89	3,49	6,40	1,10
Havacılık Faaliyetleri	4,40	180,61	4,22	1,12
Petrol Tedarik Faaliyetleri	-23,80	-0,30	104,55	27,63
Haberleşme	9,99	12,81	2,69	1,23

Table 5 Calculation of industry average multiples

					COMPANY RATIOS

INSTRUMENT NAME	CLOSING PRICE	Status	Score		P/E	P/B	EV/EBITDA	EV/SALES
Alkim Kimya	6,20	**Long**	3		1,09	35,22	0,31	0,08
Emek Elektrik	1,59	**Long**	4		-33,84	-0,07	7,07	0,77
İpek Doğal Enerji	7,72	**Long**	3		1,13	52,64	-1,50	-0,93
Mega Polietilen	2,20	**Long**	4		3,15	1,54	2,01	0,15
Pergamon Dış Ticaret	7,74	**Long**	3		6,29	9,52	2,88	0,86
Teknosa İç ve Dış Ticaret	4,20	**Long**	4		-3,11	-5,68	2,76	0,21
TGS Dış Ticaret	4,67	Do Nothing	0		6,06	3,60	4,28	2,45
Uşak Seramik	1,69	Do Nothing	2		15,86	0,18	4,75	1,15

Table 6 Stock Portfolio for 2019

The returns of my proposed fund for each year will be shown and compared with the benchmark index return that was identified, BIST-100. In addition, we employ statistical test to see whether my proposed fund is statistically greater than the mean of the benchmark index. To this end, we assume that both samples are randomly and independently drawn. Both populations are normally distributed. We also assume that both population variances are unknown and they are unequal. Since the population variances are assumed unequal, so a pooled variance is not appropriate. We use a *t* value with ν degrees of freedom, where

$$\nu = \frac{[(\frac{S_x^2}{n_x}) + (\frac{S_y^2}{n_y})]}{\left(\frac{S_x^2}{n_x}\right)/(n_x - 1) + \left(\frac{S_y^2}{n_y}\right)/(n_y - 1)}$$

The test statistic for

H_O: $\mu 1 - \mu 2 \ll 0$

$$t = \frac{(\bar{x} - \bar{y})}{\sqrt{\frac{S_x^2}{n_x} + \frac{S_y^2}{n_y}}}$$

We test, at the 5% level, the null hypothesis that the mean of my proposed fund is greater than the mean of the benchmark index. We form our hypotheses as below:

H_O: μ_1 (market return of ECT Fund)-m2(market return of XU100) ≤ 0

H_1: μ_1 (market return of ECT Fund)-m2(market return of XU100) > 0

After statistically testing the differences in mean returns between my funds and benchmark index funds, we, also perform regression analysis to show if the fund's investment strategy were able to generate alpha (if the fund were able to beat the market's performance). For the regression analysis, we employ Jensen (1969) model as below:

$$R_{p,t} - R_{f,t} = \beta_1(R_{m,t} - R_{f,t}) + \alpha_{i,t}$$

Here Rp is the return of the portfolio, rm is the return on the market portfolio. For convenience risk free rate assumed zero (Investmentcache, 2019). The returns of the constructed portfolio are regressed against the returns of the benchmark index, BIST-100. Then the beta (β_1) and alpha (α) coefficient results are assessed to understand whether the portfolio were able to generate excess returns for the investor.

5. Results

The stock selection criteria discussed in the previous section was applied to all stocks within BIST for each year of the 10-year investment period. The stocks selected for each year are provided in the appendix.

The number of stocks chosen for each period are different due to the nature of the stock selection criteria. Stocks which are in the portfolios dynamically constructed each year can be different from one year to the next. For example, Pergamon Dis Ticaret's stock is in the portfolios of the last three years but is not chosen in the portfolio constructed for 2016. This is because the portfolio is constructed based on momentum investing and is therefore dynamic. The summary of the returns for each year is given in the table below.

Year	ECT Fund	Xu100
2010	42%	19%
2011	154%	-14%
2012	-5%	47%
2013	69%	31%
2014	-12%	34%
2015	60%	-5%
2016	114%	48%
2017	48%	-14%
2018	113%	11%
2019	81%	-13%

Table 7 Yearly fund returns: ECT vs BIST (2010-2019)

The results show that my proposed fund which is constructed according to the stock selection criteria outperform the benchmark index BIST-100 for all years except for 2012 and 2014. In these years ECT gave a year over year returns of -5% and -12% when BIST-100 was able to give returns of 47% and 34%. In the remaining years the Fund was able to beat the benchmark index returns.

Nevertheless, as mentioned in previous section, we employ statistical test to see whether my proposed fund is statistically greater than the mean of the benchmark index. When moving to the results, we find that our test statistic value is 2.96. We will compare this test statistic value with the critical *t* value. The critical *t* value has two parameters namely; ν and α. We employ α =0.05 and from the above formula we find ν value as 11. Thus, our critical *t* value for this test is found to be 1.796. Since our test statistic value, (2.96), is greater than the critical value (1.796) we can reject the null hypothesis. Therefore, we can say that our proposed fund has significantly higher mean than the mean of the benchmark index.

The visual comparison of the returns can also be seen in the below figure as well.

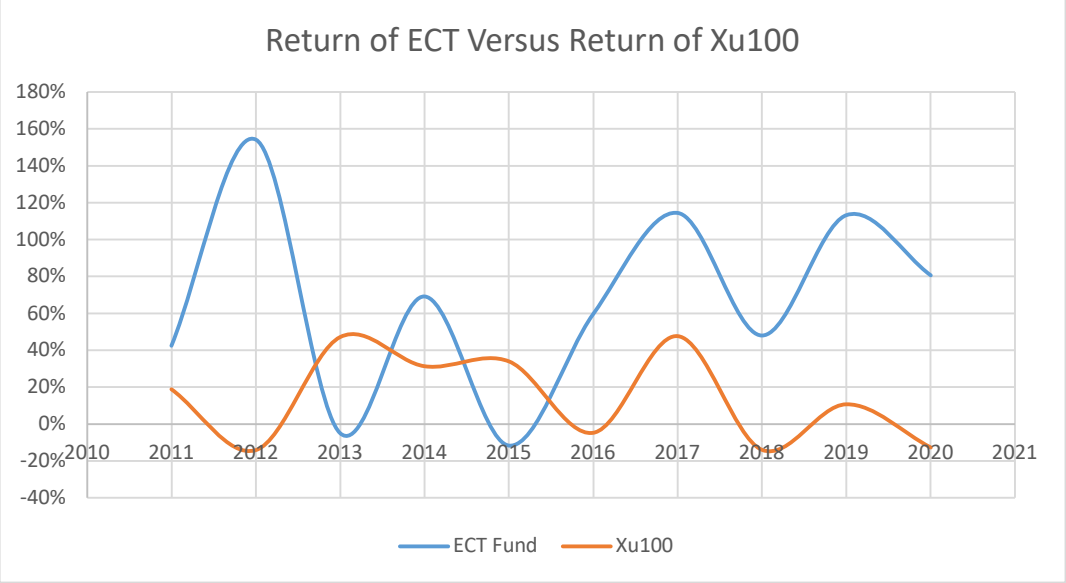

Figure 1 ECT vs BIST-100 fund returns comparison

For the end of 2019 I also look at the cumulative returns achieved for ECT fund which can be seen in the figure below.

Calculated based on 26.05.2020 prices	
2020	
INSTRUMENT SERIES CODE	**Actual Returns In TRY**
Alkim Kimya	1.017.664
Emek Elektrik	163.594
İpek Doğal Enerji	11.728.697
Mega Polietilen	172.115
Pergamon Dış Ticaret	207.529
Teknosa İç ve Dış Ticaret	2.534.009
Total	**15.823.607**
Return (%)	**12%**
XU100 Return (%)	**-10%**
Diff.	**22%**
Return (1+r)	1,12
Cumulative Return	158,24
Return (1+r)	0,90
Cumulative Return	3,19
Fiver Years Cum. Return	30,81
Fon Toplam Değeri	15.823.607
Pay (Adet)	100.000
Son Fiyat (TL)	158,2361

	1 TRY Invested In ECT Fund	1 TRY Invested In XU100

Total ECT Fund Return (%)	157,24	2,19
Total XU100 Return (%)	15724%	219%
Market Beaten By	72x	

Table 8 Cumulative returns for ECT Fund

Since 2010, one TRY invested in ECT fund became 157,24 and one TRY invested in BIST-100 returned 3,19 TRY. So ECT fund were able to beat the benchmark index by 72x since 2010. The cumulative returns since 2010 for each year are shown in appendix.

After having tested the differences between the means we now present results from a regression analysis.

	Coefficients	**t-statistic**
Intercept	1,02387	3.89
beta	-1,1449	0,95

Table 9 Regression Analysis

The regression analysis results show that the alpha of the portfolio is 1.02 which means that we were able to beat the market with this strategy. Furthermore, alpha generated is statistically significant with a t-stat of 3.89 which is higher than the critical t value of 2.30 (based on the degrees of freedom which is equal to 8, and $\alpha/2$). Therefore, we can conclude that this quantitative long-only investment strategy is successful at beating the market returns with a positive alpha.

The regression results also gave us negative beta which means that the ECT portfolio moves in the opposite direction of the market. However, the t-stat is only 0.95 which means that this coefficient's estimate is not statistically significant. This does not affect our results since our main goal is to generate alpha; beta alone is not meaningful unless it is compared to the beta of other stocks. As mentioned above the resulting alpha is statistically significant. Based on the t-statistic so it can again be concluded that the

proposed active investment strategy made use of the inefficiency of the Turkish stock market and gave higher than market returns.

ECT fund consists of equities listed on BIST. In this thesis, we don't only compare the returns of ECT Fund with BIST100, but also with the returns of other funds or indexes composed of the equities listed in BIST-100. These funds are either equity funds of banks or funds managed by asset management companies. Source of the financials of these funds is TEFAS which stands for the "Turkey Electronic Fund Distribution Platform". Due to availability of data (TEFAS is the only archive for the historical financials of these fund) charts begin from 31.12.2015. Returns are shown year on year except for 31.12.2019-26.05.2020. The figure 2 below shows that ECT fund has outperformed these funds for the given period.

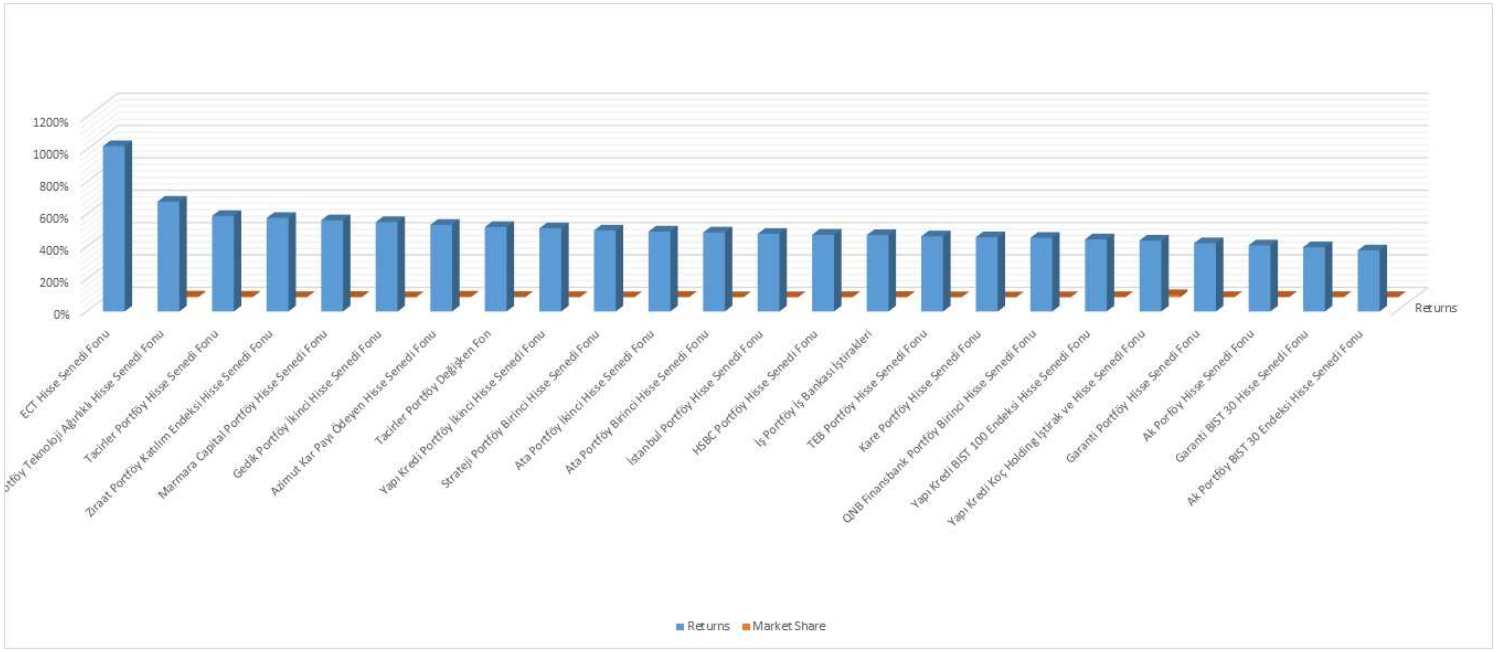

Figure 2 Comparison of returns between ECT and other Turkish equity funds (2015 upto May 2020)

5.1 Discussion

There are some risks involved with this active investment strategy. Some of the major risks involved are as follows. First and foremost, one must take into account the political and economical risk in Turkey: Stocks markets in Turkey have been quite volatile in the past 10 years and companies are being affected greatly by the changes in interest rates and exchange rates. Inflation is also an important factor. Interest rates are important because they effect the companies in their borrowing and ability to pay back debt. My stock selection criteria does not have a debt or leverage filter and focuses on the operational performance of the companies only. So if the companies take on debt and have difficulty paying them back this will also affect their stock market performance in the future. The depreciation in Turkish lira is also very important because if the companies are doing business with foreign currencies any drop in the value of Turkish lira have a negative impact on their business and profitability. For example, if we are looking at the stock of a manufacturing company and one of their raw materials is brought from Europe then a significant decrease in Turkish lira will largely increase their cost of goods sold and also their profitability bottom line. My stock selection criteria does not look into these macro economic factors in Turkey since we cannot predict their affects on companies performance in advance.

Secondly, the size of the stocks also pose a problem. The majority of the stocks in BIST are small sized stocks. My stock selection criteria does not filter out small sized stocks. I am looking at the whole stock universe in BIST. Small – cap stocks are generally more volatile than larger cap stocks as they are affected by macro events much easily. In order to eliminate the risk of small stocks we can add an extra filter to the stock selection criteria such as first choosing the largest one third of stocks in BIST. But since the number of publicly traded stocks is already very small, this will make the universe of stocks even smaller.

6. Conclusion

This thesis constructs an alpha generating portfolio by using active investment strategy. Active investors believe that they can generate higher than market returns by applying their skills in stock selection. While there are some successful active fund managers who are able to beat the market, there is no evidence that active management can consistently beat the market on a long-term basis.

The active investment strategy used in this paper is long-only quantitative equity investment approach using several operational filters such as NCAV and EBITDA margin. Furthermore, each stock's multiples with industry average multiples are compared to see if they were undervalued or overvalued. This investment strategy is applied every year starting from 2010 and ending on 2019 to the stocks in BIST-100 (except for some stocks which have been kept exempt from the analysis). The purpose of this analysis was to see if active management strategy could result in returns above the market in Turkey. Active management is not common in Turkish market similar to other developing markets due to the illiquidity of the market compared to the developed markets.

To assess the performance of the fund, initially, the returns achieved each year through the Fund are compared visually with the returns of BIST-100 for the same period. Then we employ statistical test to see whether my proposed fund is statistically greater than the mean of the benchmark index. Furthermore, regression analysis is also performed to see if the beta and alpha achieved are statistically significant. We find that our fund is able beat the benchmark index BIST-100 returns consistently for every year since 2014 and portfolio generated positive alpha.

We can conclude that Istanbul Stock Exchange is not efficient in the sense of semi-strong form of market efficiency. There are some risks involved in this strategy such as political risk in Turkey and the inclusion of small stocks in BIST but in general the results prove that this is an effective strategy to generate higher than market returns in Turkey.

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APPENDIX

Appendix I: Stock selection for 2010-2019

2010

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT SERIES CODE	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Taş ve Toprağa Dayalı	AFYON	Afyon Çimento	2,64	Long	3.000.000	3.810
Tekstil, Giyim Eşyası ve Deri	DERIM	Derimod	1,48	Long	5.400.000	6.858
Ana Metal Sanayi	ERBOS	Erbosan	2,45	Long	5.220.000	6.630
Orman Ürünleri ve Mobilya	GENTS	Gentaş	0,51	Long	58.631.040	74.464
Bilişim ve Telekomünikasyon ve Teknoloji	NETAS	Netaş Telekom.	5,76	Long	6.486.480	8.238
						100.000

2011

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT SERIES CODE	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	ASUZU	Anadolu Isuzu	1,89	Long	25.419.707	4.034
Ana Metal Sanayi	BRSAN	Borusan Mannesmann	2,97	Long	28.350.000	4.499
Tekstil, Giyim Eşyası ve Deri	BOSSA	Bossa	0,73	Long	108.000.000	17.138
Tekstil, Giyim Eşyası ve Deri	DERIM	Derimod	1,10	Long	5.400.000	857
Tekstil, Giyim Eşyası ve Deri	DESA	Desa Deri	0,85	Long	49.221.970	7.811
Bilişim ve Telekomünikasyon ve Teknoloji	DESPC	Despec Bilgisayar	0,90	Long	23.000.000	3.650
Taş ve Toprağa Dayalı	EGSER	Ege Seramik	0,86	Long	75.000.000	11.901
Ana Metal Sanayi	ERBOS	Erbosan	3,78	Long	5.220.000	828
Madencilik ve Taş Ocakçılığı	IPEKE	İpek Doğal Enerji	1,40	Long	259.786.000	41.223
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	SILVR	Silverline Endüstri	0,73	Long	30.400.000	4.824
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	VESBE	Vestel Beyaz Eşya	0,98	Long	190.000.000	30.149
						126.913

2012

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT SERIES CODE	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Taş ve Toprağa Dayalı	AFYON	Afyon Çimento	0,98	Long	3.000.000	612
Kimya İlaç Petrol Lastik ve Plastik Ürünler	ALKIM	Alkim Kimya	1,43	Long	24.725.000	5.041
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	ASUZU	Anadolu Isuzu	5,12	Long	25.419.707	5.182
İnşaat ve Bayındırlık	ANELE	Anel Elektrik	1,87	Long	110.000.000	22.425
Ana Metal Sanayi	DMSAS	Demısaş Döküm	0,75	Long	35.000.000	7.135
Tekstil, Giyim Eşyası ve Deri	DERIM	Derimod	1,20	Long	5.400.000	1.101
Bilişim ve Telekomünikasyon ve Teknoloji	DESPC	Despec Bilgisayar	1,21	Long	23.000.000	4.689
Taş ve Toprağa Dayalı	EGSER	Ege Seramik	1,33	Long	75.000.000	15.290
Ana Metal Sanayi	ERBOS	Erbosan	4,43	Long	5.220.000	1.064
Kimya İlaç Petrol Lastik ve Plastik Ürünler	GOODY	Good-Year	2,33	Long	11.917.664	2.430
Kimya İlaç Petrol Lastik ve Plastik Ürünler	GUBRF	Gübre Fabrik.	3,26	Long	83.500.000	17.023
Kimya İlaç Petrol Lastik ve Plastik Ürünler	HEKTS	Hektaş	0,46	Long	75.857.033	15.465
Gıda, İçecek ve Tütün	KNFRT	Konfrut Gıda	2,27	Long	6.600.000	1.346
Taş ve Toprağa Dayalı	KUTPO	Kütahya Porselen	2,02	Long	39.916.800	8.138
Kimya İlaç Petrol Lastik ve Plastik Ürünler	SASA	Sasa Polyester	0,28	Long	216.300.000	44.096
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	SILVR	Silverline Endüstri	0,70	Long	30.400.000	6.198
Kimya İlaç Petrol Lastik ve Plastik Ürünler	SODA	Soda Sanayii	0,77	Long	425.000.000	86.643
Toptan Ticaret	TGSAS	TGS Dış Ticaret	1,52	Long	7.500.000	1.529
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	VESBE	Vestel Beyaz Eşya	1,55	Long	190.000.000	38.734
Tekstil, Giyim Eşyası ve Deri	YATAS	Yataş	0,34	Long	42.799.695	8.725
						292.864

2013

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT SERIES CODE	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Taş ve Toprağa Dayalı	ADNAC	Adana Çimento (C)	0,31	Long	165.335.410	18.680
Taş ve Toprağa Dayalı	AFYON	Afyon Çimento	0,73	Long	3.000.000	339
Kimya İlaç Petrol Lastik ve Plastik Ürünler	ALKIM	Alkim Kimya	1,72	Long	24.725.000	2.794
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	ASUZU	Anadolu Isuzu	4,05	Long	25.419.707	2.872
Gıda, İçecek ve Tütün	BANVT	Banvit	2,08	Long	100.023.579	11.301
Tekstil, Giyim Eşyası ve Deri	DAGI	Dagi Giyim	0,72	Long	29.000.000	3.277
Ana Metal Sanayi	DMSAS	Demısaş Döküm	0,69	Long	35.000.000	3.954
Bilişim ve Telekomünikasyon ve Teknoloji	DESPC	Despec Bilgisayar	0,83	Long	23.000.000	2.599
Ana Metal Sanayi	ERBOS	Erbosan	4,30	Long	5.220.000	590
Kimya İlaç Petrol Lastik ve Plastik Ürünler	GOODY	Good-Year	1,80	Long	11.917.664	1.347
Kimya İlaç Petrol Lastik ve Plastik Ürünler	HEKTS	Hektaş	0,45	Long	75.857.033	8.571
Madencilik ve Taş Ocakçılığı	IPEKE	İpek Doğal Enerji	3,12	Long	259.786.000	29.352
Gıda, İçecek ve Tütün	KNFRT	Konfrut Gıda	1,44	Long	6.600.000	746
Madencilik ve Taş Ocakçılığı	KOZAA	Koza Madencilik	2,42	Long	388.080.000	43.847
Taş ve Toprağa Dayalı	KUTPO	Kütahya Porselen	1,90	Long	39.916.800	4.510
İnşaat ve Bayındırlık	ORGE	Orge Enerji Elektrik	0,67	Long	10.000.000	1.130
Kimya İlaç Petrol Lastik ve Plastik Ürünler	SASA	Sasa Polyester	0,21	Long	216.300.000	24.439
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	SILVR	Silverline Endüstri	0,55	Long	30.400.000	3.435
Kimya İlaç Petrol Lastik ve Plastik Ürünler	SODA	Soda Sanayii	0,91	Long	503.000.000	56.831
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	VESTL	Vestel	1,55	Long	335.456.000	37.901
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	VESBE	Vestel Beyaz Eşya	1,77	Long	190.000.000	21.467
Tekstil, Giyim Eşyası ve Deri	YATAS	Yataş	0,24	Long	42.799.695	4.836
Tekstil, Giyim Eşyası ve Deri	YUNSA	Yünsa	3,10	Long	29.160.000	3.295
						288.110

2014

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT SERIES CODE	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Taş ve Toprağa Dayalı	ADNAC	Adana Çimento (C)	0,38	Long	165.335.410	66.823
Taş ve Toprağa Dayalı	AFYON	Afyon Çimento	2,26	Long	3.000.000	1.213
Kimya İlaç Petrol Lastik ve Plastik Ürünler	ALKIM	Alkim Kimya	1,93	Long	24.725.000	9.993
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	ASUZU	Anadolu Isuzu	6,49	Long	25.419.707	10.274
Ana Metal Sanayi	DMSAS	Demısaş Döküm	0,86	Long	35.000.000	14.146
Bilişim ve Telekomünikasyon ve Teknoloji	DESPC	Despec Bilgisayar	1,61	Long	23.000.000	9.296
Ana Metal Sanayi	ERBOS	Erbosan	9,30	Long	5.220.000	2.110
Kimya İlaç Petrol Lastik ve Plastik Ürünler	GOODY	Good-Year	3,55	Long	11.917.664	4.817
Kimya İlaç Petrol Lastik ve Plastik Ürünler	HEKTS	Hektaş	0,73	Long	75.857.033	30.659
Madencilik ve Taş Ocakçılığı	IPEKE	İpek Doğal Enerji	1,57	Long	259.786.000	104.997
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	KATMR	Katmerciler Ekipman	1,91	Long	25.000.000	10.104
Gıda, İçecek ve Tütün	KNFRT	Konfrut Gıda	2,81	Long	6.600.000	2.668
Madencilik ve Taş Ocakçılığı	KOZAA	Koza Madencilik	1,66	Long	388.080.000	156.849
İnşaat ve Bayındırlık	ORGE	Orge Enerji Elektrik	0,79	Long	10.000.000	4.042
Toptan Ticaret	PSDTC	Pergamon Dış Ticaret	2,53	Long	4.500.000	1.819
Kimya İlaç Petrol Lastik ve Plastik Ürünler	RTALB	RTA Laboratuvarları	2,26	Long	5.900.000	2.385
Kimya İlaç Petrol Lastik ve Plastik Ürünler	SASA	Sasa Polyester	0,46	Long	216.300.000	87.421
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	SILVR	Silverline Endüstri	0,74	Long	30.400.000	12.287
Tekstil, Giyim Eşyası ve Deri	YATAS	Yataş	0,40	Long	42.799.695	17.298
						549.199

2015:

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT SERIES CODE	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Taş ve Toprağa Dayalı	ADNAC	Adana Çimento (C)	0,41	Long	165.335.410	56.290
Kimya İlaç Petrol Lastik ve Plastik Ürünler	ALKIM	Alkim Kimya	1,72	Long	24.725.000	8.418
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	ASUZU	Anadolu Isuzu	5,21	Long	25.419.707	8.654
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	BNTAS	Bantaş Ambalaj	1,00	Long	21.500.000	7.320
Ana Metal Sanayi	DMSAS	Demısaş Döküm	0,85	Long	35.000.000	11.916
Tekstil, Giyim Eşyası ve Deri	DERIM	Derimod	2,01	Long	5.400.000	1.838
Ana Metal Sanayi	ERBOS	Erbosan	7,78	Long	5.220.000	1.777
Kimya İlaç Petrol Lastik ve Plastik Ürünler	GOODY	Good-Year	3,02	Long	11.917.664	4.057
Kimya İlaç Petrol Lastik ve Plastik Ürünler	HEKTS	Hektaş	0,82	Long	75.857.033	25.826
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	IHEVA	İhlas Ev Aletleri	0,30	Long	191.370.001	65.153
Madencilik ve Taş Ocakçılığı	IPEKE	İpek Doğal Enerji	1,23	Long	259.786.000	88.446
Gıda, İçecek ve Tütün	KNFRT	Konfrut Gıda	2,67	Long	6.600.000	2.247
Madencilik ve Taş Ocakçılığı	KOZAA	Koza Madencilik	1,21	Long	388.080.000	132.125
İnşaat ve Bayındırlık	ORGE	Orge Enerji Elektrik	1,50	Long	20.000.000	6.809
Toptan Ticaret	PSDTC	Pergamon Dış Ticaret	1,45	Long	4.500.000	1.532
Kimya İlaç Petrol Lastik ve Plastik Ürünler	RTALB	RTA Laboratuvarları	2,68	Long	5.900.000	2.009
Kimya İlaç Petrol Lastik ve Plastik Ürünler	SASA	Sasa Polyester	0,49	Long	216.300.000	73.641
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	SILVR	Silverline Endüstri	0,68	Long	30.400.000	10.350
Tekstil, Giyim Eşyası ve Deri	YATAS	Yataş	0,65	Long	42.799.695	14.571
						522.981

2016:

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT NAME	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Kimya İlaç Petrol Lastik ve Plastik Ürünler	ALKIM	Alkim Kimya	2,44	Long	24.725.000	19.452
Taş ve Toprağa Dayalı	ANACM	Anadolu Cam	1,41	Long	444.000.000	349.318
Kimya İlaç Petrol Lastik ve Plastik Ürünler	HEKTS	Hektaş	1,11	Long	75.857.033	59.681
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	IHEVA	İhlas Ev Aletleri	0,29	Long	191.370.001	150.561
Madencilik ve Taş Ocakçılığı	IPEKE	İpek Doğal Enerji	2,10	Long	259.785.561	204.387
Kimya İlaç Petrol Lastik ve Plastik Ürünler	IZFAS	İzmir Fırça	1,03	Long	11.250.000	8.851
Kağıt ve Kağıt Ürünleri, Basım ve Yayın	KAPLM	Kaplamin	0,97	Long	20.000.000	15.735
Gıda, İçecek ve Tütün	KERVT	Kerevitaş Gıda	1,28	Long	6.244.000	4.912
Gıda, İçecek ve Tütün	KNFRT	Konfrut Gıda	2,46	Long	6.600.000	5.193
Kimya İlaç Petrol Lastik ve Plastik Ürünler	RTALB	RTA Laboratuvarları	1,87	Long	5.900.000	4.642
Taş ve Toprağa Dayalı	USAK	Uşak Seramik	1,12	Long	43.335.931	34.095
						856.827

2017:

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT NAME	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Toptan Ticaret	PSDTC	Pergamon Dış Ticaret	2,52	Long	7.425.000	1.791.122
						1.791.122

2018:

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT SERIES CO	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Kimya İlaç Petrol Lastik ve Plastik Ürünler	ALKIM	Alkim Kimya	3,49	Long	24.725.000	89.821
Taş ve Toprağa Dayalı	BUCIM	Bursa Çimento	2,83	Long	105.815.808	384.408
Taş ve Toprağa Dayalı	DENCM	Denizli Cam	5,21	Long	6.000.000	21.797
Bilişim ve Telekomünikasyon ve Teknoloji	DESPC	Despec Bilgisayar	2,73	Long	23.000.000	83.554
Ana Metal Sanayi	ERBOS	Erbosan	15,20	Long	5.220.000	18.963
Kimya İlaç Petrol Lastik ve Plastik Ürünler	GUBRF	Gübre Fabrik.	2,96	Long	334.000.000	1.213.356
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	IHEVA	İhlas Ev Aletleri	0,33	Long	191.370.001	695.210
Madencilik ve Taş Ocakçılığı	IPEKE	İpek Doğal Enerji	5,37	Long	259.785.561	943.750
Gıda, İçecek ve Tütün	KNFRT	Konfrut Gıda	4,78	Long	6.600.000	23.977
Toptan Ticaret	PSDTC	Pergamon Dış Ticaret	5,89	Long	7.425.000	26.974
Kimya İlaç Petrol Lastik ve Plastik Ürünler	SANFM	Sanifoam Sünger	1,25	Long	13.202.124	47.961
Kağıt ve Kağıt Ürünleri, Basım ve Yayın	SAMAT	Saray Matbaacılık	1,00	Long	18.300.000	66.480
Toptan Ticaret	TGSAS	TGS Dış Ticaret	2,28	Long	15.000.000	54.492
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	PRKAB	Türk Prysmian Kablo	1,35	Long	141.733.652	514.891
						4.185.634

2019:

INDUSTRY	INSTRUMENT SERIES CODE	INSTRUMENT NAME	CLOSING PRICE	Status	Outstanding Share	Distribution of Capital
Kimya İlaç Petrol Lastik ve Plastik Ürünler	ALKIM	Alkim Kimya	6,20	Long	24.725.000	793.636
Metal Eşya Makine Elektrikli Cihazlar ve Ulaşım Araçları	EMKEL	Emek Elektrik	1,59	Long	24.300.000	779.994
Madencilik ve Taş Ocakçılığı	IPEKE	İpek Doğal Enerji	7,72	Long	259.785.561	8.338.734
Kimya İlaç Petrol Lastik ve Plastik Ürünler	MEGAP	Mega Polietilen	2,20	Long	13.221.450	424.389
Toptan Ticaret	PSDTC	Pergamon Dış Ticaret	7,74	Long	7.425.000	238.332
Perakende Ticaret	TKNSA	Teknosa İç ve Dış Ticare	4,20	Long	110.000.000	3.530.838
						14.105.923

Appendix II: Cumulative returns since 2010

CAPITAL	100.000
2011	
INSTRUMENT SERIES CODE	Actual Returns In TRY
Afyon Çimento	1.809
Derimod	5.061
Erbosan	10.242
Gentaş	94.519
Netaş Telekom.	15.281
Total	**126.913**
Return (%)	**27%**
XU100 Return (%)	**19%**
Diff.	**8%**
Return (1+r)	1,27
Cumulative Return	1,27
Return (1+r)	1,19
Cumulative Return	1,19
Fon Toplam Değeri	126.913
Pay (Adet)	100.000
Son Fiyat (TL)	1,2691

2012	
INSTRUMENT SERIES CODE	Actual Returns In TRY
Anadolu Isuzu	10.922
Borusan Mannesmann	6.047
Bossa	15.306
Derimod	938
Desa Deri	7.203
Despec Bilgisayar	4.921
Ege Seramik	18.405
Erbosan	970
İpek Doğal Enerji	176.078
Silverline Endüstri	4.621
Vestel Beyaz Eşya	47.454
Total	**292.864**
Return (%)	**131%**
XU100 Return (%)	**-14%**
Diff.	**145%**
Return (1+r)	2,31
Cumulative Return	2,93
Return (1+r)	0,86
Cumulative Return	1,02
Fon Toplam Değeri	292.864
Pay (Adet)	100.000
Son Fiyat (TL)	2,9286

2013	
INSTRUMENT SERIES CODE	**Actual Returns In TRY**
Afyon Çimento	456
Alkim Kimya	6.076
Anadolu Isuzu	4.103
Anel Elektrik	10.528
Demısaş Döküm	6.550
Derimod	1.773
Despec Bilgisayar	3.194
Ege Seramik	22.334
Erbosan	1.033
Good-Year	1.872
Gübre Fabrik.	13.235
Hektaş	15.303
Konfrut Gıda	854
Kütahya Porselen	7.652
Sasa Polyester	32.609
Silverline Endüstri	4.835
Soda Sanayii	103.059
TGS Dış Ticaret	2.092
Vestel Beyaz Eşya	44.268
Yataş	6.285
Total	**288.110**
Return (%)	**-2%**
XU100 Return (%)	**47%**
Diff.	**-49%**
Return (1+r)	0,98
Cumulative Return	2,88
Return (1+r)	1,47
Cumulative Return	1,50
Fon Toplam Değeri	288.110
Pay (Adet)	100.000
Son Fiyat (TL)	2,8811

2014	
INSTRUMENT SERIES CODE	**Actual Returns In TRY**
Adana Çimento (C)	22.896
Afyon Çimento	1.045
Alkim Kimya	3.127
Anadolu Isuzu	4.602
Banvit	16.028
Dagi Giyim	5.673
Demısaş Döküm	4.943
Despec Bilgisayar	5.057
Erbosan	1.275
Good-Year	2.664
Hektaş	13.895
İpek Doğal Enerji	14.770
Konfrut Gıda	1.455
Koza Madencilik	30.077
Kütahya Porselen	8.474
Orge Enerji Elektrik	1.334
Sasa Polyester	54.154
Silverline Endüstri	4.644
Soda Sanayii	105.957
Vestel	155.273
Vestel Beyaz Eşya	79.078
Yataş	7.965
Yünsa	4.813
Total	**549.199**
Return (%)	**91%**
XU100 Return (%)	**31%**
Diff.	**59%**
Return (1+r)	1,91
Cumulative Return	5,49
Return (1+r)	1,31
Cumulative Return	1,97
Fon Toplam Değeri	549.199
Pay (Adet)	100.000
Son Fiyat (TL)	5,4920

2015	
INSTRUMENT SERIES CODE	**Actual Returns In TRY**
Adana Çimento (C)	71.450
Afyon Çimento	1.196
Alkim Kimya	8.910
Anadolu Isuzu	8.251
Demısaş Döküm	13.993
Despec Bilgisayar	11.994
Erbosan	1.765
Good-Year	4.091
Hektaş	34.467
İpek Doğal Enerji	82.259
Katmerciler Ekipman	23.703
Konfrut Gıda	2.533
Koza Madencilik	114.330
Orge Enerji Elektrik	7.686
Pergamon Dış Ticaret	1.045
RTA Laboratuvarları	2.836
Sasa Polyester	93.250
Silverline Endüstri	11.298
Yataş	27.924
Total	**522.981**
Return (%)	**-5%**
XU100 Return (%)	**34%**
Diff.	**-39%**
Return (1+r)	0,95
Cumulative Return	5,23
Return (1+r)	1,34
Cumulative Return	2,64
Fon Toplam Değeri	522.981
Pay (Adet)	100.000
Son Fiyat (TL)	5,2298

2016	
INSTRUMENT SERIES CODE	**Actual Returns In TRY**
Adana Çimento (C)	84.818
Alkim Kimya	11.936
Anadolu Isuzu	9.747
Bantaş Ambalaj	17.119
Demısaş Döküm	12.000
Derimod	2.284
Erbosan	1.921
Good-Year	4.418
Hektaş	34.740
İhlas Ev Aletleri	62.982
İpek Doğal Enerji	151.006
Konfrut Gıda	2.072
Koza Madencilik	233.675
Orge Enerji Elektrik	10.514
Pergamon Dış Ticaret	2.120
RTA Laboratuvarları	1.401
Sasa Polyester	166.679
Silverline Endüstri	13.479
Yataş	33.914
Total	**856.827**
Return (%)	**64%**
XU100 Return (%)	**-5%**
Diff.	**69%**
Return (1+r)	1,64
Cumulative Return	8,57
Return (1+r)	0,95
Cumulative Return	2,51
Fon Toplam Değeri	856.827
Pay (Adet)	100.000
Son Fiyat (TL)	8,5683

2017	
INSTRUMENT SERIES CODE	**Actual Returns In TRY**
Alkim Kimya	27.804
Anadolu Cam	605.260
Hektaş	137.934
İhlas Ev Aletleri	264.779
İpek Doğal Enerji	522.647
İzmir Fırça	79.745
Kaplamin	63.589
Kerevitaş Gıda	16.407
Konfrut Gıda	6.037
RTA Laboratuvarları	6.390
Uşak Seramik	60.530
Total	**1.791.122**
Return (%)	**109%**
XU100 Return (%)	**48%**
Diff.	**61%**
Return (1+r)	2,09
Cumulative Return	17,91
Return (1+r)	1,48
Cumulative Return	3,71
Fiver Years Cum. Return	3,42
Fon Toplam Değeri	1.791.122
Pay (Adet)	100.000
Son Fiyat (TL)	17,9112

2018	
INSTRUMENT SERIES CODE	**Actual Returns In TRY**
PSDTC	4.185.634
Total	**4.185.634**
Return (%)	**134%**
XU100 Return (%)	**-14%**
Diff.	**148%**
Return (1+r)	2,34
Cumulative Return	41,86
Return (1+r)	0,86
Cumulative Return	3,19
Fiver Years Cum. Return	8,00
Fon Toplam Değeri	4.185.634
Pay (Adet)	100.000
Son Fiyat (TL)	41,8563

2019	
INSTRUMENT SERIES CODE	**Actual Returns In TRY**
Alkim Kimya	159.787
Bursa Çimento	544.287
Denizli Cam	34.905
Despec Bilgisayar	129.698
Erbosan	31.155
Gübre Fabrik.	3.705.656
İhlas Ev Aletleri	6.662.091
İpek Doğal Enerji	1.356.750
Konfrut Gıda	39.258
Pergamon Dış Ticaret	35.420
Sanifoam Sünger	191.843
Saray Matbaacılık	119.000
TGS Dış Ticaret	111.770
Türk Prysmian Kablo	984.301
Total	**14.105.923**
Return (%)	**237%**
XU100 Return (%)	**11%**
Diff.	**226%**
Return (1+r)	3,37
Cumulative Return	141,06
Return (1+r)	1,11
Cumulative Return	3,54
Fiver Years Cum. Return	26,97
Fon Toplam Değeri	14.105.923
Pay (Adet)	100.000
Son Fiyat (TL)	141,0592

26.05.2020 Fiyatları İle Hesaplanmıştır

2020	
INSTRUMENT SERIES CODE	**Actual Returns In TRY**
Alkim Kimya	1.650.747
Emek Elektrik	1.035.087
İpek Doğal Enerji	15.284.079
Mega Polietilen	787.049
Pergamon Dış Ticaret	269.819
Teknosa İç ve Dış Ticaret	6.069.679
Total	**25.096.459**
Return (%)	**78%**
XU100 Return (%)	**-10%**
Diff.	**88%**
Return (1+r)	1,78
Cumulative Return	250,96
Return (1+r)	0,90
Cumulative Return	3,19
Fiver Years Cum. Return	47,99
Fon Toplam Değeri	25.096.459
Pay (Adet)	100.000
Son Fiyat (TL)	250,9646