Do You Pay Too Much?

– The value of active management from the perspective of a Nordic investor

Magnus Andersson & Mikkel Hansen

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Abstract

As the economy has been growing and the financial well-being of the population as well, the demand for investment solutions from private individuals has also seen an increase over the past years. This trend has been especially evident in the Nordic countries. Along with the fact that a majority of these investors do not have the time or interest to manage and monitor their investments themselves, has led to a growth in the market for investment funds. Lately, there has been a focus in popular media on investment funds, where the spotlight has been turned to the choice between actively and passively managed funds. International research has shown diverse findings on the topic and the previous research focused on the Nordic markets are scarce. The foundation behind this paper is found in this discussion and the purpose of the paper is to investigate whether it is worth paying for active management of investment funds.

This purpose is operationalised by using the management fee of the fund as a proxy for whether it is actively or passively managed. The operationalisation allows for a large data set, which includes all funds listed in the Nordic countries. The data analysis seeks to find a relationship between management fee and the performance of the funds using a purely statistical methodology with focus on ordinary least squares regressions.

This paper finds a significant evidence for passively managed equity-focused funds to be the preferred choice over its actively managed counterparts. When investigating further, it seems that the evidence is strongest for funds focusing on global markets and a little less for emerging markets. For funds investing in the home market, the Nordic markets, the tendency is non-existent and the evidence points more towards preferring actively managed funds, however, it is highly insignificant.

The conclusions are further tested for its generalisability by carrying out similar analyses for other trade markets, longer time horizons and using other benchmarks. The effect these tests had on the results was found to be minor, hence the conclusions of this paper show a fairly high degree of generalisability.

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1. Introduction

1.1 Background

1.1.1 A Rising Interest in Mutual Fund Investments

During the past decades the world economy has grown at a high pace and more and more people across the globe have gotten to a financial level where they now have a demand for places to invest their money. Investing is no longer something exclusive that only a very and small fraction of the population is exposed to, but rather something that normal people are concerned about. You can hear discussions about how to invest your personal assets in lunch rooms at completely normal work places in many countries, and in some countries the pension system has been constructed in a way so that anyone with a job needs to take decisions about how to invest their public pension. As the demand for investments thus have risen, especially for investments targeted to the broader public with little to no knowledge and interest for the topic, the supply has also increased. There are more investment products available than ever before and this increase in supply makes it even more difficult for this new group of investors to make their decisions.

In most parts of the world the years that have passed since the turn of the millennium the economy has been characterized by extremely low interest rates. During the current decade the interest rates have even turned negative in some mature economies. For the closely interconnected Nordic economies this has been very evident where private investors have been offered mortgage loans with negative interest rate. The downside of this is that the offered rates on savings accounts are equally low, usually very close to zero. In order to get any return on savings at all investors turn to the financial markets, where different kinds of funds have become more and more popular.

Fund savings have been popular for a very long time in North America and therefore there are extensive research on the topic from American researchers examining investments targeted to investors in the domestic markets (Andersen, 2017). However, in Europe the culture of fund saving has not at all been present to the same extent. The Nordic countries have been an exception, where particularly Sweden extinguishes itself as the country with the most fund savings per capita worldwide (Helgesson, 2016). As banks and financial institutions commonly operate across the Nordics, this creates a large market where investors and institutions do business. During the previous decades there has been an increase in the fraction of private investors that invest in funds,

which is in line with the expectations of an economy with such low interest rates, as mentioned earlier (Rune, 2002).

1.1.2 Controversies Regarding Active Management

Funds are usually divided into two different categories depending on how they are managed. Passive funds are the most basic where money is allocated to assets based on some kind of weighted average, often called index, of a specified market. No further analysis is generally made and the purpose of the fund is just to give a return as close to the specified index as possible. In contrast to these, active funds do not follow any indices strictly and the fund managers perform analyses of the assets before investing in the securities held by the fund. The idea is by thorough analysis these funds will be able to perform better than the passive funds. Because of the more work-intense fund management, the actively managed fund generally charges higher fees from its investors (Berk & DeMarzo, 2014).

As more money is flowing into the funds people become more aware of the nature of this way of investing their savings money. Especially, discussions about fees and expenses to fund managers have ended up in much criticism towards fees that are perceived as too high. It is not a new discussion, as Michael Jensen already in 1968 wrote his famous article *"Problems in Selection of Security Portfolios"* arguing against actively managed funds and the expenses associated with them (Jensen, 1968). Since then the discussion on whether actively managed funds are able to consistently outperform the average return of the market has been more or less brisk.

Due to the large exposure to the mutual fund market has to private investors these discussions regularly come up also in popular press. This has put much light on the question whether the management fees are too high or if they can be justified. Articles stating that investors pay excessive fees to fund managers gets much attention as people have a tendency to find it somewhat provocative that their savings are diminished more than necessary (Aronsson, 2017). As a consequence, it has been observed that the cheaper, passive fund products have attracted more capital during the last years than before (Andersen, 2017). This movement is not isolated to the Nordic markets but is also present in the United States. The movement has increased in intensity as the consumers have become more aware of the effects of high fees. Interestingly, the opposite is seen in the mainland European markets, where active funds gain market share. The picture as described

in media is, however, not entirely one-sided and there are occasionally articles published that speaks in favour of actively managed funds (Dall, 2018).

1.1.3 Fund Investments as a Research Topic

The end investor does usually not care about whether the nature of the investment is active or passive, the rational investor is only interested in maximizing the return. As the fee can have a large impact on the final return to the investor, it can be argued that it is indeed more "interesting" for the investor to measure whether it pays off to pay a higher fee rather than measuring the degree if activeness in the fund.

This debate raises the question whether it is worth paying the extra money to an active manager if one cannot be at least to a certain probability expected to get more in return. No matter which side your sympathies belong to, the fact that actively managed funds exist and the fact that they are able to attract a majority of the capital invested in funds (Andersen, 2017), should mean that they are able to add value to the investor in some form. The question on in what sectors, markets or similar that active funds might be the most value adding is a much more controversial and less explored topic (Wermers, 2000).

As previously mentioned, there is to some extent existing research on the topic of the performance of active managers, however, it is mostly focused on American and UK markets (Korkeamaki & Smythe, 2004). Needless to say, there are differences between those large markets and the markets of the Nordic countries. It might not be possible to transfer conclusions directly to the Nordic financial environment without adjustments. In the research that has already been made on the value of active investing in the Nordic markets some issues are found. Firstly, much of the research was done a fair amount of years ago and in an ever-changing financial market they might not still be completely valid, as they will not cover the products that have been introduced over the last years (Christensen, 2005; Liljeblom & Löflund, 2000). Secondly, many of the papers use comparably small samples that do not cover the whole supply of securities available at the time of analysis (Christensen, 2003; Dahlquist, Engstrom, & Söderlind, 2000; Korkeamaki & Smythe, 2004).

1.2 Purpose

This paper will address the issue of whether the Nordic investor is better off investing in actively or passively managed mutual fund. The purpose of this research is to find whether it is worth paying an active fund manager in order to achieve a better return on investment funds offered to the Nordic market. The analysis will be conducted on general level as well as broken down into different segments and geographical focus areas in order to map out whether there are differences in the abilities of the active managers to add value.

1.2.1 Research Question

The research question sought to be answered in this paper is formulated as:

Does active management add value to the investor in the Nordic investment funds market?

To answer the research question, it is highly relevant to be able to answer some additional questions:

- *What are the differences across different asset classes?*
- *What are the differences between different geographical focus areas?*

The final conclusion will seek to answer these exact questions based on the research outlined in the paper.

1.3 Structure of Paper

First, the Literature Review is presented laying out the previous research on active and passive investing, both internationally and within the Nordics, as well as general studies on mutual fund performance. Next, the theoretical background is presented which includes definitions used throughout the paper and the quantitative models that are used to run the evaluate the funds, particularly the Capital Asset Pricing Model and Fama-French Three-Factor Model. Thereafter, the Methodology used in the analysis is laid out. The Methodology starts out with the Research Design & Philosophy, operationalisation, Conceptual Framework, Data Collection, followed by the Limitations on the analysis being done. Empirical Findings are then laid out, as well as a Summary of Results that were received from the analysis. This is followed by a Discussion and Critique of the

findings. Finally, a Conclusion is presented which summarises the entire paper along with a discussion of suggested topics for further research based on this paper.

2. Literature Review

2.1 International Research

Grinblatt & Titman (1989) used a, at least by that time, somewhat unusual methodology where they use quarterly holdings data to calculate the hypothetical returns without any fees, then this is compared to the reported returns of the funds. The realized and hypothetical returns are compared to map the impact of fees and transaction costs for the investor. Their sample is also adjusted for survivorship bias. There are several findings about fund expenses in general and also about returns in particular. The effect of survivorships bias seems to be relatively small, and the effect is largest for smaller funds. Transaction costs for smaller funds are generally higher than for larger funds. Gross returns show a tendency towards being higher for the smaller funds, however, the higher expense ratio of these makes the net returns being overall unaffected by fund size. To find if the funds can yield abnormal returns they are compared to benchmarks that in this particular case are adjusted for size bias, dividend yield bias and beta related bias. Examining the average fund, active management does not seem to be able to add any value compared to the adjust benchmarks. There are, however, some important exceptions. It is shown that aggressive growth funds, and growth funds are able to show abnormal gross returns that can be attributed to the skills of the fund managers. When gross returns are converted to net returns the difference is out shadowed by higher fees and transaction costs so that no gains are left for the investor to enjoy.

Hendricks, Patel, & Zeckhauser (1993) are examining whether there is a so-called momentum effect, where returns persist, in mutual funds. Their research starts with the discrepancy where academic research shows large amounts of evidence of mutual funds not being able to outperform the market while this seems to be viewed very differently by practitioners. The methodology used takes factors such as beta, return reversion and dividend yield into account, and furthermore the sample is constructed to avoid survivorship bias. The findings show that a strategy of every quarter picking the winning funds would create a return significantly higher than the average fund. There is even a tendency towards outperforming the benchmark index as the strategy shows marginally better performance. The persistence of poorly performing funds seems to be even stronger as the difference to the average fund is larger than for the well-performing funds. Interestingly, the effect of survivorship bias on return persistence seems to be absent within this research paper. The findings of performance persistence suggest that there might be a possibility to outperform the average mutual fund.

Grinblatt & Titman (1993) continues four years later with their research, where they just as previously put a large emphasis on finding an appropriate benchmark to compare the active fund returns to. In this article they use an approach similar to event studies, where returns are compared before and after they were part in the fund's portfolio. This way, the need for a benchmark is eliminated and any bias that might come from the benchmark will hence not be a problem. The findings show that the active managers are able to generate abnormal returns on average. Consistently with their article from 1989 they find that this effect is strongest in aggressive growth funds. Furthermore, they also found that although not all active managers were able to generate these returns, superior performance was predictable. If a manager had shown superior performance in the first half of the sample period, their probability to underperform their competitors in the next half were close to zero. It is important to note that this research is valid only for gross returns, when fees and transaction costs are taken into account the abnormal returns are almost neutralized. The application of this conclusion would be that by replicating the holdings of one of these over performing funds, an individual investor could also earn its returns, without having to pay the management fee.

Wermers (1997) points out that there seems to be momentum effect in stocks that can be used by active managers. This momentum effect does not yield abnormal return for a long time but appears to be working for one year. Thar means that stocks that performed well in the previous year are more likely to perform better than the average fund also the year after. Wermers also show that this strategy seems to be used to a large extent by fund managers, which in turn implies that the same effect should be observed for funds. The paper can confirm that this momentum effect is also present for active mutual funds, and thus they can also earn an abnormal return gross of fees and transaction costs. Similarly, the investor should avoid the strategy of picking last year's winning funds when the past year's well performing stocks are expected to underperform in the coming year. Furthermore, this paper confirms that survivorship bias is of minor importance. Surviving funds show a return that is only 23 basis points above the average return of all funds, including both survivors and non-survivors.

Cremers & Petajisto (2009) have a different research approach compared to the previous articles. They use a method where they calculate the fraction of which the funds' portfolio differs from that

of the comparable index, that fraction they call the "Active Share". The idea behind it is that it is only possible to create value above index as long as you hold securities that are different from the index. By adding this dimension to the more common tracking error method they are able to examine the funds more closely, revealing so called "closet index funds" that state they are active while only investing in the index. The conclusions from their research show that although the average active fund outperforms the market, the larger the fraction of the portfolio that is different from the market the higher the returns are to the investor. The "Active Share" is shown to be a predictor of returns.

Jensen (1968) in many aspects started the discussion on whether fund managers are able to consistently outperform their respective indices. The problem is not that no active funds outperform the index, in fact a large amount of them do, but it is more a problem of the average active manager being unable to beat the index. For the investor this becomes a problem as it becomes very hard to know which fund to pick. Furthermore, Jensen also discuss the fact that even though you might be looking at individual funds that actually do beat the market, instead of the average, this might simply be due to luck. In order to eliminate luck as the factor behind the performance, difference between the active fund returns and the average return on the market should be statistically significant. Jensen does not find any evidence of statistical significance for neither the average nor individual active fund manager. Jensen's results become even more interesting when he finds that there is no significance of outperformance even gross of fund management fee. It could of course be questioned how valid these results are today since Jensen evaluated the performance starting at 1945 and onwards. However, the main reason why his research is still relevant is because he started a discussion that is still highly active within the financial sector.

Carhart (1997) takes its starting point in the eyes of the investor, who wants a fund that persistently outperforms the market, counted in net returns. The articles conclude that there are three main factors that should be considered by investor to do this. Firstly, poorly performing funds consistently continue to perform badly and thus should be avoided. Interestingly this persistence of poor performance is the only persistence found in the article. Secondly, there is a one-year momentum effect previously found that is confirmed by this research. Hence, the investor should each year buy last year's winning funds. The effect only works for one year, so to buy and hold a fund will not generate any return better than the market. Finally, it is concluded that fees and transaction costs

have a large impact in the net returns to the investor. The abnormal return that might be generated by the active management is cancelled out by the higher fees. To conclude, Carhart finds no evidence of managers being able to add value to the investors.

Ferreira, Keswani, Miguel & Ramos (2013) use new data to evaluate this, by now, well-known problem and find a conclusion similar to that of Jensen (1968). The average actively managed mutual fund does not outperform its respective market index. More surprisingly they find that this differs across markets. In the more developed markets, with well-functioning financial institutions and legal systems the active funds perform better. Importantly, this article also uses much more modern data than Jensen, as it uses returns from the years 1997 to 2007. The conclusion of Ferreira et al implies that although the general, average active fund is not performing better than a passive fund, there might be specific areas where active management might be better.

Haslem, Baker & Smith (2008) originate the research from the hypothesis that there is a lack of competition in the fund market and they list several reasons for this. Economies of scale are present, as the cost of managing the fund does not increase at all as the amount of capital managed increases. They also state that there is a product differentiation which allow fund managers to charge higher fees that for a pure, generic product. Furthermore, expensive practices of trade increase the cost for investors. As customers of funds do not require as low prices as they technically could, there are huge opportunities for fund managers to gain high margins on their product, which would hit the net returns of the investor. The empirical findings of Haslem et al also confirms their hypothesis as they find that fees and expense ratios are significantly too high for many funds. They examined the performance of the funds by methods such as Jensen's alpha, Sharpe ratio, Morningstar ratings and five-year total returns. Interestingly, these different performance measures show mixed results. The authors suggest that this might imply that although funds in general are too expensive, there might be areas where management fees are actually value adding.

Cuthbertson, Nitzsche & O'Sullivan (2010) examine a sample of American and British funds. The paper shows that the greater majority, 75 %, of active funds do not outperform their benchmark but rather shows average performance, while 20 % underperform the respective index. A fraction as low as 5 % of the total funds analysed actually outperform their passive counterpart. Fees and transaction costs make the returns from the active funds minimal. The authors do acknowledge that

there is a past winners' effect, indicating that buying the best performing funds from the last period could yield a small return over the benchmark. The results from this study suggest that the British and American fund markets have a high degree of efficiency as they do not allow active investors to gain any abnormal returns.

Fama & French (2010) go through a sample of 3156 exclusively active funds from 1984 to 2006 and find that the average active fund underperforms the market by approximately as much as they take out in fees. There are, however, some funds that manage to do abnormally good, but this is evened out by the fact that approximately the same amount of funds perform abnormally bad. Fama & French continue to examine whether the well-performing fund managers do so just because of luck or because of skill. By using bootstrap simulations, some of the results suggest that the best performing managers actually may do so out of skill, however, it is not a clear significance across the analysis. Taking out the effect of fees and looking at gross returns there seems to be evidence of fund management skills. To conclude, fund managers seem to have some abilities to pick securities, but they charge too high fees to the investors for any abnormal returns to be left for the end investor.

Jones & Wermers (2011) start their research review from the viewpoint that the average active fund does not outperform the market, however, they state that a significant minority of the active managers actually can add value to their investors. As opposite to Ferreira et al., (2013) they suggest that fund managers on less well-functioning markets are more likely to achieve over market performance. They do, however, acknowledge that active managers do have a place in the markets as they would keep them more efficient than with just passive investing. The literature review suggests that there are four main factors to consider in order to find the over performing fund managers. Firstly, past performance would to a certain extent be a predictor of future performance. Secondly, macro-economic factors and forecasts should be considered. Thirdly, it is suggested that a number of specific characteristics of the fund manager would predict the chances of over-market returns. Finally, the type of securities and investment strategies are impacting the performance of the fund. By putting specific focus on these areas an investor would be able to find the active funds that actually do outperform passive funds net of fees.

2.2 Nordic Research

Dahlquist et al., (2000) evaluate the Swedish fund market in general, but also breaks down their analysis to include an analysis on how different characteristics of the funds affect their performance. Important to note is that only fund investing in Sweden is included, so the data will not be able to provide any information about investments in any other markets. The characteristics are for example size, asset types, turnover, different fees and active vs passive management. The high resolution of the data from the Swedish fund markets allows for a thorough, cross-sectional analysis. The sample in total consists of in total 210 funds. A methodology mainly using linear regressions to measure alpha is applied and regression coefficients are allowed to vary over time. Interestingly the analysis shows that there is a presence of survivorship bias in the data, but this is however mitigated by including non-surviving funds in the major analysis. The main results from the paper show that there are clear differences in the performance across different types of funds, where equity-focused funds generally perform better than bond- and money market-focused funds when investigating abnormal returns over the relevant index. Fund performance is negatively related to fee, but nevertheless active funds show some tendencies to a better result than passive, in this sample.

Christensen (2003) takes his starting point in the fact the performance of Danish mutual funds is a fairly unresearched topic. The research is based on a sample of 44 mutual funds that were in operation between 1994 and 2003 and is free of survivorship bias. Unlike the sample of Dahlquist et al. (2000), the funds included in this research invest not only domestically, but in most financial markets over the world, as well as in different asset classes. The data is analysed with several different models as well as analysed the effects of management fees. On a general level the results to not show any significant relationships, a conclusion that also holds when the data is broken down into more specific categories. The conclusion is that Danish fund managers have not shown neither selection ability nor timing ability. There is no significant relationship between management fee and fund performance net of the fee found in the sample.

Liljeblom & Löflund (2000) has a main focus on methodological issues related to benchmarking of mutual funds in smaller financial markets, however they also analyse the performance of the funds included in the sample and the relationship to the management fee. The sample consists of 41 mutual funds in Finland that are studied over a time period from 1991 to 1995. From the analysis it is concluded that the choice of benchmark has little importance for the results within the specified

sample, whoever the authors note that the time period has some special characteristics that might influence the results of the study. Furthermore, there is a significant negative relationship to be found between the management fee and the performance of the fund.

2.3 Summary of Literature Review

The general pattern from the literature review is that there is a fairly large ambiguity of active versus passive investing and how the fee affects the performance of a fund. Where any tendencies were found it leaned towards the fee having none to negative effect on the net returns, however, some researchers found signs of skilled managers which was measurable through abnormal gross return. Many researchers found that the effect of survivorship bias seemed small but still recommended to keep any sample free from this bias. There were also multiple signs of returns persistence, the so-called momentum effect. Finally, the research on Nordic market is scarce and where it exists it is either old or only using very small samples. The main findings are summarised in the table below.

Authors	**Field of study**	**Main findings**
Grinblatt & Titman (1989)	Comparing gross and net returns of a sample adjusted for survivorship bias.	Managers can outperform the market, but not enough to cover the higher fees. The effect of survivorship bias is very small. Aggressive growth funds show the best probability of excess returns.
Grinblatt & Titman (1993)	Introducing a benchmark independent model any bias from the benchmark itself can be excluded.	Confirms previous findings that managers of aggressive growth funds are able to generate significant excess gross returns. However, this effect is still cancelled by high fees.
Wermers (1997)	Using a methodology to test and adjust for survivorship bias the paper examines persistence of fund performance.	There is a one-year momentum effect that active managers can use. Abnormal returns gross of fees are observed and survivorship bias seems to have only minor effect.
Jensen (1968)	One of the first studies on active fund performance, with a sample of fund returns from 1945 to 1964.	Jensen find no evidence for active funds outperforming the market, even gross of fees. No funds in the sample showed significant outperformance of the market portfolio.
Carhart (1997)	Examination of returns persistence in a survivorship bias free and unusually large sample.	The results do not show any evidence of a skilled manager being able to outperform the market. The only persistence found is that badly performing funds continue to perform badly.

Ferreira et al (2013)	Investigating differences in fund performance depending on geographical area.	Active managers do not seem to be able to outperform the market. Funds operating in countries with well-functioning markets perform better.
Haslem et al (2008)	The hypothesis that the comparative performance of a fund is negatively correlated to the fees.	Unsatisfactory competition makes fund fees high and therefore diminish investor returns. There are, however, some indications that higher fees predict higher performance.
Cremers & Petajisto (2009)	By introducing a new concept to rank how active the fund is and then compare returns.	It is found that the more active funds outperform the less active funds. The relationship is valid also while taking fees into consideration.
Cuthbertson et al (2010)	Reviews empirical findings on fund performance.	There is a momentum effect – winners seem to persist. Fees make the higher returns from better performing funds marginal.
Fama & French (2010)	Analyses fund returns to see whether higher fees yield better returns. Furthermore, it investigates whether well-performing managers do so out of skill or luck.	The average fund outperforms the market by approximately the same percentage as the fee. It seems like the persistently overperforming managers do so out of skill.
Jones & Wermers (2011)	Investigates whether active management add value and if It is possible to identify superior funds.	The average fund manager does not outperform the market, however, a significant minority is able to do so.
Hendricks et al (1993)	Examining if fund returns persist and whether the results are affected by survivorship bias.	There is a persistence effect that is the most significant for poor-performers. Survivorship bias does not seem to affect conclusions.
Dahlquist et al (2000)	Studies 210 domestically investing Swedish funds, differentiation on characteristics. There is also an analysis of the relationship between fee and return.	There are fairly large differences in the performance depending on the characteristics of the fund. Negative relationship between fee and performance.
Christensen (2003)	Analyses the performance of 44 Danish funds.	No evidence for managers being able to neither select nor time the market in a way that leads to outperformance. Very few significant results. No significant relationship between fee and performance.
Liljeblom & Löflund (2000)	Investigation of benchmark effects of the Finnish fund market. Also analyses the fund's performance and fee impact.	The choice of benchmark has little importance for the conclusion. There is a negative relationship between fee and performance.

3. Theoretical Background

3.1 Definitions

3.1.1 Basic Fund Knowledge

An investment fund is a pool of money where several investors go together to achieve certain benefits compared to investing individually. Such benefits are for example: economies of scale in transaction costs and being able to employ a fund investment manager. The governing thought is that these factors will give the investor a better return with a lower risk than if the investment was made individually. Funds are divided into many different categories depending on what assets it invests in, on what markets they invest and many more which will be described below.

3.1.2 Trading of Funds

There are several different ways of categorising investment funds, one of them is to divide them by the way they are traded. The main categories are then mutual funds and Exchange Traded Funds (ETF's), where the mutual fund is by far the most common in the Nordics (Berner, 2015). The mutual fund is priced once a day when the Net Asset Value (NAV) of the fund is calculated and investors can then buy shares in the fund at the price of the NAV divided by total number of shares. The ETF is traded on an exchange just like a stock and is thus priced continuously while the exchange is open, and it is not possible to trade while the exchange is closed. ETF's are most commonly, but not exclusively, passive funds, with substantially lower fees. The low fees plus the continuous pricing mean that it has two main advantages over a mutual fund, firstly it can be used for short term speculation, day trading, on the underlying indices that it is replicating, secondly it can use the benefits of low fees by buying and holding the ETF over a long time (Henriksen, 2007). It is generally not considered as beneficial to use ETF's for monthly savings and similar as the disadvantage of the funds being traded on an exchange is the costs for brokerage, bid-ask spreads and similar. Due to these properties ETF's have not gained the same popularity in Europe as they have in the US. Furthermore, they cannot in the same way benefit from economies of scale as the European markets a small and heterogeneous compared to the unified American market. Nordic markets are even smaller than the major European markets and thus ETF's have an even lower significance (Lindmark, 2016).

For private savings investment the mutual fund is the most common of the two as there is normally no punishment for regular transactions, however, the fees are usually higher than for ETF's. As they are also more commonly actively managed this adds to the expected cost of the mutual fund. Regular transactions such as monthly savings makes the transaction costs for ETF's grow proportionally more than for mutual funds (Lindmark, 2016).

Finally, there are also hedge funds, but they are excluded from this paper as they follow completely different mechanisms than the general fund examined in this paper. Furthermore, it is generally hard to find reliable information about performance and fees of hedge funds, since they are not obliged to report this and therefore primarily report when it benefits them. There are more categories of funds than the ones outlined here, but they are only of minor importance in the Nordic markets (Berner, 2015; Lindmark, 2016).

3.1.3 Management of Funds

Somewhat simplified, management of funds can be divided into two categories: actively and passively managed funds. The later buy and sell assets according to a defined condition and no further analysis is made. The most common example is the index fund that simply strives to replicate an index and thus will generate close to exact the same return as that index (Berk & DeMarzo, 2014). Lately, it has become more common with so called "smart passive funds" which can take more pre-defined conditions into consideration than the traditional passive funds (Andersen, 2017).

On the contrary, actively invested funds use different extents of active analyses carried out by professional investors in order to make decisions on what assets to invest in. This drives costs of the funds, as explained in the section below, but the idea is that these informed investment decisions will generate a higher return. Of course, the difference between these categories is not discrete, it is more similar to a continuum with varying degrees of activeness within the funds (Sjöholm & Schauman, 2017). There is also a problem with passive funds stating that they are active, and charging fees for active management, but on closer inspection they are just passive funds. The phenomenon is called "closet index funds" and is a topic researched by among others (Cremers & Petajisto, 2009).

3.1.4 Management Fees

There are several different fees associated with fund investments. Depending on the profile of the fund there could be management fees, performance fees, transaction fees, tax and several more. In order to get a comparable fee level there is a consolidated fee measure called Total Expense Ratio (TER). The Total Expense Ratio includes all fees, except the transaction fees. Transaction fees differ depending on the investors choice of bank or other institution handling the transaction and therefore is not exactly a part of the costs directly associated with the fund (Morningstar, n.d.). The Total Expense Ratio is quoted as a percentage of the invested capital and is usually paid by the fund reducing the invested capital by the TER on a daily basis.

3.1.5 The Nordic fund markets

Compared to the rest of the world, the Nordic fund markets are very similar to each other, although there are some minor differences worth mentioning. Sweden is the largest fund market in the Nordics and that is also the country where funds have been traded since the fifties, which is the longest periods of time. One of the reasons for the size of the Swedish fund market is the fact that the pension system is constructed in a way that makes all citizens invest their pension savings in the fund market (Pettersson, F., Helgesson, H. & Hård af Segerstad, 2009).

Although being a relatively new type of investment, only introduced in 1982, Denmark has seen a rising interest in fund savings over the past years and particularly the interest of passive funds has been present (Andersen, 2017). The investor environment is favourable with among the lowest fees in the world charged for Danish funds (Christensen, 2005).

Norway is the home of the single largest fund in the world – the Norwegian pension fund, commonly referred to just as the oil fund, even though this is not a fund that investors can invest in. As with the case of Denmark, the investment fund market for private investors has emerged from the early 1980's. There are no large anomalies to take into consideration for the Norwegian market (Chambers, Dimson, & Ilmanen, 2012).

Finland is the newest of the Nordic fund markets (excluding Iceland) as funds have only been available to private investors since the late 1980's. The fund providers are most commonly retail banks which due to bundled solutions for private investors are said to enable higher fees that in for

example Denmark. Finnish funds are to a large extent actively managed although the trend of moving to passive management can be seen there as well (Korkeamaki & Smythe, 2004).

Due to the by far lowest population Iceland is an outlier as of the total amount of invested capital, Denmark, Norway and Finland have roughly equal amounts of assets invested in funds, while Sweden is close to twice as high number. This difference likely to be explained by the size of the population and also the properties of the pension system, as mentioned earlier (Serhan et al., 2017).

3.1.6 Performance Evaluation of Investment Funds

Performance evaluation of mutual funds does not take its starting point at the risk-free rate, although it would be tempting to compare whether the fund would yield a better interest rate than keeping the invested money in a bank account. Instead, it must be compared to a return that takes the general return of an asset with a similar risk level into account. The more relevant benchmark that is used the better evaluation can be made of the specific fund's performance. Most commonly, an index or an index fund based is used as the benchmark (Berk & DeMarzo, 2014). Research has been made to find out how sensitive the fund evaluation is to the choice of benchmark, where Grinblatt & Titman (1994) found a high level of sensitivity while Liljeblom & Löflund (2000) found the opposite – low sensitivity to the choice of benchmark. The conclusion being that there are different views on how to best evaluate fund performance.

3.1.7 Asset Classes

In the prospectus of the fund, there is a description of which asset classes the fund invests in. For some funds this is a very strictly formulated requirement while for others it is more loosely formulated. The fund manager is obliged to follow these requirements and not go outside of his scope. Requirements can be geographical, industrial, determine what fractions must be in certain assets classes etc. It has become more and more popular to introduce ethical, social and governance requirements so that the fund avoids investing in controversial businesses (Serhan et al., 2017). Four primary asset classes are used to classify the funds in this paper: equities, bonds, mixed assets and money markets.

Equities are stocks and equivalents that represent ownership in a firm, and most commonly they are publicly traded when owned by a fund. Generally, Equities have a high expected return and

therefore by many are considered the best investment over a long time horizon, but equities also come with a higher risk which makes them substantially more volatile in the shorter run.

Bonds and other fixed income securities are interest rate-based assets whose value are mostly influenced by fluctuations in the interest rate levels in the markets. The expected return of bonds is generally much lower than that for equities but in return also comes with a much lower risk (Berk & DeMarzo, 2014).

Sometimes the asset class money markets are included in the bond category but in this paper, they will be presented separately as they represent a category large enough to analyse on its own. Assets categorised as money markets commonly includes short term fixed income securities, such as deposit certificates, treasury bills and similar. The risk and return profiles are comparable to other fixed income securities (Berk & DeMarzo, 2014).

The funds that do not fit into neither of these categories or contains a mixed selection of assets have been categorised as mixed assets-focused funds. Thus, this is the most diverse group within this research. Except from the securities already mentioned it can include assets such as real estate, commodities, foreign exchange and others, but more often than not the term mixed assets refer to a mixture between equities and bonds.

3.1.8 Tax Issues

The effect of taxation on funds and fund performance have been studied previously by several researchers. Bergstresser & Poterba (2002) find that the taxation structure do affect capital flows of mutual funds, so that the larger portion of the taxation that is pushed onto the investor, rather than paid inside the fund, the less inflow of capital tat fund sees. Barclay, Pearson & Weisbach (1998) investigates the internal tax management of mutual fund managers and how they, despite intuition suggesting the opposite, regularly realise gains and pay tax rather than deferring tax payments as far into the future as possible. It seems clear that is a factor that do affect the mechanics and performance of mutual funds, while the tax effect is not particularly in scope of this paper a short description of basic assumptions of taxation effects is found necessary.

The net return reported by funds are commonly reported after the fund has paid its internal tax on for example the capital gains on the assets held by the fund. However, it does not include any deductions for the taxation that affects the individual investor (Cuthbertson et al., 2010). Therefore, it is only the individual tax of the investor that is left to affect the final return of an investment. This is an important factor for the actual return of the final investor and cannot be said to be a factor without importance. However, taxes for the individual investors differ largely between countries and can furthermore differ between individuals in the same country, for example depending on other income, composition of total assets held by the individual and more. Thus, will the individual tax paid directly by the investor be ignored. This is a methodology in line with other previous research that do not have the taxation as such as the main topic of research (Cuthbertson et al., 2010; Hendricks et al., 1993; Jones & Wermers, 2011).

3.1.9 Emerging Markets

Emerging markets is a term that have been used for a long time to describe investment markets outside of the more developed financial markets of the western world. The more economically advanced markets are called developed markets. In the 2000s, the term emerging markets has received much criticism for not reflecting the actual state of the financial markets very well (The Economist, 2008).

A third category that is sometimes used is the so-called frontier markets which usually have a slower economic development than the emerging markets. The core of emerging markets commonly includes the countries behind the acronym BRICS: Brazil, Russia, India, China and South Africa. MSCI uses this three markets categorisation and have developed a system to rank different geographical markets in order to fit them into a certain category. It is important to note here that the categorisation is not static and countries frequently move between the categories (MSCI, n.d.).

In this paper, a broader definition than what MSCI commonly use will be applied. The rationale for that decision is that the purpose of this research is not to go into depth with certain foreign markets, but rather to distinguish between those markets that are well-established with a developed financial and legal system and those markets that are characterised by lower degrees of the factors above. The countries defined as developed conform with those of MSCI (MSCI, n.d.).

3.2 Methodological Theory

3.2.1 Survivorship Bias

A common problem in evaluation of historical performance of investment securities is that only surviving investments are included. A badly performing firm will go bankrupt and thus disappear from the market while firms performing well will remain. The same applies to funds, as the worst performing have a tendency to be discontinued. In that way only including investments that have been on the market for a long time will give the results that that returns seem disproportionally high (Rohleder, Scholz, & Wilkens, 2010). This problem is commonly referred to as survivorship bias, as including only the surviving funds creates a bias towards well-performing funds in the analysis.

As referred to in the literature review, several researchers have investigated the issue with survivorship bias in funds. This effect seems to have been of minor importance to the results, but yet present (Carhart, 1997; Grinblatt & Titman, 1989; Wermers, 1997). Thus, it strengthens the conclusion from any research to minimise this bias. This paper attempts to reduce the survivorship bias by not only including currently active funds but also those that were discontinued during the period of study. The data being analysed takes its starting point five years ago and includes the funds which survived the whole period as well as the funds which were discontinued during the period. That implies that the number of data points at each given point in time may differ, however, this is not issue which needs to be controlled for with the methodology chosen. As there is data available also for non-survivors the condition for survivorship bias free sample as suggested by Rohleder et al. (2010) is met.

3.2.2 Ordinary Least Squares Regressions

Least squares regressions or least squares estimation is a statistical method used widely in academic literature. The outline in this section is based on Newbold, Carlson, & Thorne (2013). The method is used to estimate covariances between different numeric variables on which conclusions can be based. An example of such a model with only one explanatory variable, a simple linear regression, can be written in formulas, where the least squares regression line is equal to:

$$\hat{y} = b_0 + b_1 * x$$

Where $\hat{y}$ is the estimated y-values also called the dependent or endogenous variable, x is the explanatory variable also called the independent or exogenous variable. The other two parameters

in the equation are estimated in the model, where b_1 is defined as the slope of the line estimated, like a normal straight line, and is the change in y for every unit change in x:

$$b_1 = \frac{Cov(x, y)}{s_x^2}$$

And that means the y-intercept, b_0, is equal to:

$$b_0 = \bar{y} - b_1 * \bar{x}$$

Where the y and x values used are means of the sample data used.

The above model is the best fitting model in theory, but using real data is naturally not a line that fits the data perfectly, hence there will be some errors in the estimation. This is caught in the model with the Greek letter epsilon. Also, the following model uses the Greek letter beta instead of b's:

$$y_i = \beta_0 + \beta_1 * x_i + \epsilon_i$$

The random error term, ϵ_i, represents the variation in y that is not already estimated by the linear relationship.

The model introduced so far is a so called simple regression, meaning it uses only one independent variable. This simplifies a lot of equations and gives the basic understanding of what is happening. Extension to a multiple regression means that you are adding at least one additional independent variable, call it x_2, but in theory as many independent variables as wanted can be added, say up to *n*, so that the last variable is called x_n. The multiple regression will look as the following:

$$y_i = \beta_0 + \beta_1 * x_{1,i} + \beta_2 * x_{2,i} + \ \dots + \beta_n * x_{n,i} + \epsilon_i$$

Important to note is that the beta values are now almost impossible to calculate by hand, instead the well-known least squares procedure is used, meaning that the model is estimated so that it minimizes sum of squared errors (SSE), where SSE can be calculated as the following:

$$SSE = \sum_{i=1}^{n} \left(y_i - \beta_0 - \beta_1 * x_{1,i} - \beta_2 * x_{2,i} - \cdots - \beta_n * x_{n,i}\right)^2$$

This equation effectively means that you get the error between the known y-value, y_i, and the predicted y-value, $\hat{y}$, which in the equation are measured by the beta values and the actual x-values.

Using these terminologies another important measure can also be highlighted. This is the R-squared value, R^2. The R-squared value is basically a measure of how well the model fits. It takes a value between 0 and 1 and can be interpreted in percentage as which percentage of the variation in *y* the model explains. The R-squared value is calculated from the Sum of Squared Total (SST) and Sum of Squared Regression (SSR). The SST is equal to the sum of SSE and SSR. They can be calculated from the regression output as:

$$SST = \sum_{i=1}^{n}(y_i - \bar{y})^2 = \sum_{i=1}^{n}(\hat{y_i} - \bar{y})^2 + \sum_{i=1}^{n}(y_i - \hat{y_i})^2$$

$$SSE = \sum_{i=1}^{n}(y_i - \hat{y_i})^2 = \sum_{i=1}^{n}\epsilon_i^2$$

$$SSR = \sum_{i=1}^{n}(\hat{y_i} - \bar{y})^2$$

SST is often referred to as the total variability in the sample y data, SSR is referred to as explained variability and SSE is referred to as the unexplained variability. This also explains why SST is equal to the sum of the other two measures. Using these measures, the R-squared value can be calculated as:

$$R^2 = \frac{SSR}{SST} = 1 - \frac{SSE}{SST}$$

The R-squared is often ignored and instead the adjusted R-squared value is used. This value penalizes the R-squared for having too many independent variables, as increasing the number of independent variables will increase the R-squared even though they are not always relevant. In theory you can add infinitely many independent variables. The adjusted R-squared is calculated as:

$$\bar{R}^2 = 1 - \frac{SSE/(n-K-1)}{SST/(n-1)}$$

Where *n* is the number of observations and *K* is the number of independent variables. Throughout this paper, the adjusted R-squared value will be used, even though it will just be referred to as R-

squared. In reality, the difference is very small since the number of independent variables is generally low, hence the penalty is minor.

Using linear regressions is an intuitive method but relies heavily on five important assumptions. Some of them are more important to test if there is a reason to doubt them. The assumptions are the following (Newbold et al., 2013):

1. The $x_{j,i}$ terms are fixed numbers, or they are realizations of random variables, X_j, that are independent of the error terms, ϵ_i. In the latter case, inference is carried out conditionally on the observed values of the $x_{j,i}$'s.
2. The expected value of the random variable Y is a linear function of the independent X_j variables.
3. The error terms are normally distributed random variables with a mean of 0 and the same variance, σ^2. The latter is called homoscedasticity, or uniform variance.

$$E[\epsilon_i] = 0 \quad \text{and} \quad E[\epsilon_i^2] = \sigma^2 \quad \text{for } (i = 1, \dots, n)$$

4. The random error terms, ϵ_i, are not correlated with one another, so that

$$E[\epsilon_i \epsilon_l] = 0 \quad \text{for all } i \neq l$$

5. It is not possible to find a set of nonzero numbers, $c_1, \dots, c_K$, such that

$$c_1 x_{1i} + c_2 x_{2i} + \cdots + c_K x_{Ki} = 0$$

Where the last assumption is only relevant for multiple regressions, since it basically means that there is no direct relationship between X_j variables. The other four are also assumptions in simple regression models (Newbold et al., 2013).

Some of the assumptions will be tested throughout the analysis to ensure there are no problems with accepting the assumptions. Failing to accept the assumptions means the coefficient estimates and the standard deviation of these are estimated in a wrong way, since least squares estimation is no longer the best estimation method. More on this in section 4.4.2.3.

3.3 Theoretical Frameworks

There are two theoretical frameworks which will be used extensively in this paper, the Capital Asset Pricing Model and the Fama-French Three-Factor Model. These two will be explained in the following sections.

3.3.1 Capital Asset Pricing Model Framework

Throughout the paper, the theoretical framework of the Capital Asset Pricing Model (CAPM) will be mentioned extensively. The model is the starting point for the analysis done, hence this section will seek to explain the idea behind CAPM, the situations where CAPM can be used and finally the shortcomings of the CAPM.

CAPM was developed individually by Lintner (1965), Mossin (1966), Sharpe (1964), Treynor (1961) and build on the mean-variance theory first developed by Markowitz in 1959 (Markowitz, 1959). The CAPM was the first model which was constructed around assumptions and principles about the nature of tastes of consumers and investment opportunities and with a clear relationship about expected return and risk that could be tested (Fama & French, 2004).

The theory about the CAPM are relying on certain assumptions. The assumptions are centred around the investor and are stated as the following (Berk & DeMarzo, 2014):

1. Investors can buy and sell securities at market prices, i.e. no transaction costs or tax exists, and can lend or borrow at the risk-free rate.
2. Investors hold only the efficient portfolio, i.e. they maximise expected return for any given volatility.
3. Investors have homogeneous expectations on expected returns, volatilities and correlations.

When these three assumptions hold, the CAPM states that all investors will invest in a combination of the risk-free asset and the market portfolio. The market portfolio is as stated by Markowitz, the portfolio on the efficient frontier, where a line from the risk-free asset is a tangent to the efficient frontier. This portfolio has the highest Sharpe Ratio of the possible portfolios, meaning it has the highest expected return to standard deviation ratio. The line from the risk-free asset, which is a tangent to the efficient frontier is defined as the Capital Market Line (CML) (Markowitz, 1952,

1959). From these assumptions, the most acknowledgeable thing about the CAPM, the equation, can be derived:

$$E[r_i] = r_i = r_f + \beta_i * (E[R_{mkt}] - r_f)$$

In the equation $E[r_i]$ is the expected return on asset *i*, r_f is equal to the risk-free rate, β_i is the beta of asset *i*, defined as a measure of asset *i*'s sensitivity to market risk and $E[R_{mkt}]$ is the expected return on the market portfolio as explained above. The last part of the equation above, $E[R_{mkt}] - r_f$, is often referred to as the excess return on the market portfolio, where excess return is defined as in excess of the risk-free rate. The market excess return is also referred to as the market risk premium.

The CAPM is very well known for the equation above and the fact that it is the individual assets' sensitivity to the market portfolio, measured by the individual assets' beta, which should determine the expected return. Implied by that connection, the relationship between beta and expected return is linear and has a slope equal to the expectations of the risk premium on the market portfolio (Guermat, 2014). This linear relationship is naturally not what is experienced in the real world, and therefore it is an obvious limitation to applying the CAPM in the real world and the assumptions stated above are simplified. Additionally, the CAPM has been extensively tested and has a bad empirical track record (Fama & French, 2004).

However, the CAPM is still widely used in the industry and taught at universities. This is mainly because it is the starting point for many extensions to the model, one of which the focus will turn to shortly. Furthermore, it is easy to understand and is an intuitive starting point for many types of financial analysis.

The CAPM will be used throughout the analysis in this paper for assessing statistically whether any significant relationship between fund returns and fund fees exists in the Nordic markets. More specific in-detail explanation on how the CAPM will be used in this paper can be found in section 4.4.2.1.

3.3.2 Fama-French Three-Factor Model Framework

Since the origin of the CAPM, the model is widely applied throughout the finance industry globally. For many years CAPM was the standard model when thinking about expected returns, and some would argue the CAPM is still the standard model most widely adopted and used. However, in 1992 Eugene Fama and Kenneth French released an article with the name "*The Cross-Section of Expected Stock Returns*". In this article, Fama and French argued why the empirical evidence of the CAPM is at best questionable and by that argumentation instead suggested use of the Fama-French Three-Factor Model that they had developed (Fama & French, 1992).

Fama and French developed this model by testing other factors which has a reliable explanatory power over returns and were not accounted for by the CAPM. The additional factors are Small-Minus-Big (SMB) and High-Minus-Low (HML), which they extended the CAPM model with to explain a higher fraction of the deviation in the returns (Fama & French, 1992).

The research resulted in the following equation:

$$r_i - r_f = \alpha_i + \beta_{i,m} * (r_m - r_f) + \beta_{i,SMB} * SMB + \beta_{i,HML} * HML + e_i$$

Where $\beta_{i,m}$, $\beta_{i,SMB}$ and $\beta_{i,HML}$ are the sensitivities of the return on asset i with respect to each of the factors, r_m is the return on the market portfolio, r_f is the risk-free rate and e_i is the residual term which has zero covariance with the return on the market portfolio and the SMB and HML factors (Fama & French, 1992).

The factor Small-Minus-Big is defined as the return of a portfolio of small equity stocks minus a return of a portfolio of large equity stocks. It is often referred to as the small-firm effect and what Fama and French find is that the small-firm effect is a source of excess returns, meaning that abnormal returns can be explained – at least partly – by the small-firm effect. The other factor, High-Minus-Low, is defined as the return on a portfolio with high book-to-market ratios (value stocks) minus return on a portfolio with low book-to-market ratios (growth stocks). This is often referred to as the value effect and is like Small-Minus-Big found to be a source of excess returns. The reasoning behind this is that Fama and French find that small equity stocks and high market-to-book ratio stocks outperform their respective opposites (Fama & French, 1992).

One of the main arguments that Fama and French make, which strengthens their additional factors, is that the model provides a premium on financial distress. Generally, smaller firms and value firms are hit harder in times of recessions, hence they should have a premium on expected returns to justify taking on that risk (Fama & French, 1996). This is the exact same reasoning as underlying the CAPM, where the expected return is higher when investors take on more covariance with the market – measured by a higher beta.

As with the CAPM, the Fama-French Three-Factor Model will be used throughout the analysis, however, only when equity focused funds are analysed. The reason being that the Fama-French Model is more tailored to equity markets than the CAPM. More on the specific methodology used are available in section 4.4.2.2.

4. Methodology

4.1 Research Design & Philosophy

Research philosophy is a term that describes the author's view and ideas of knowledge creation. By openly describing what philosophy inspires and influences the research, the author gives the reader the possibility to understand the thoughts and underpinning assumptions behind the paper. This increases the credibility of the research as the reader then can value these assumptions more objectively and make a judgement of their own about the strengths of the conclusions (Saunders, Lewis, & Thornhill, 2016).

Scientific research is a process affected and influenced by theories and methodologies on different levels of abstraction. Sometimes the interdependencies are described as an onion, a process with several layers, where the most central and tangible methodologies are located in the middle and the more abstract philosophies at the outer parts. (Saunders et al., 2016)

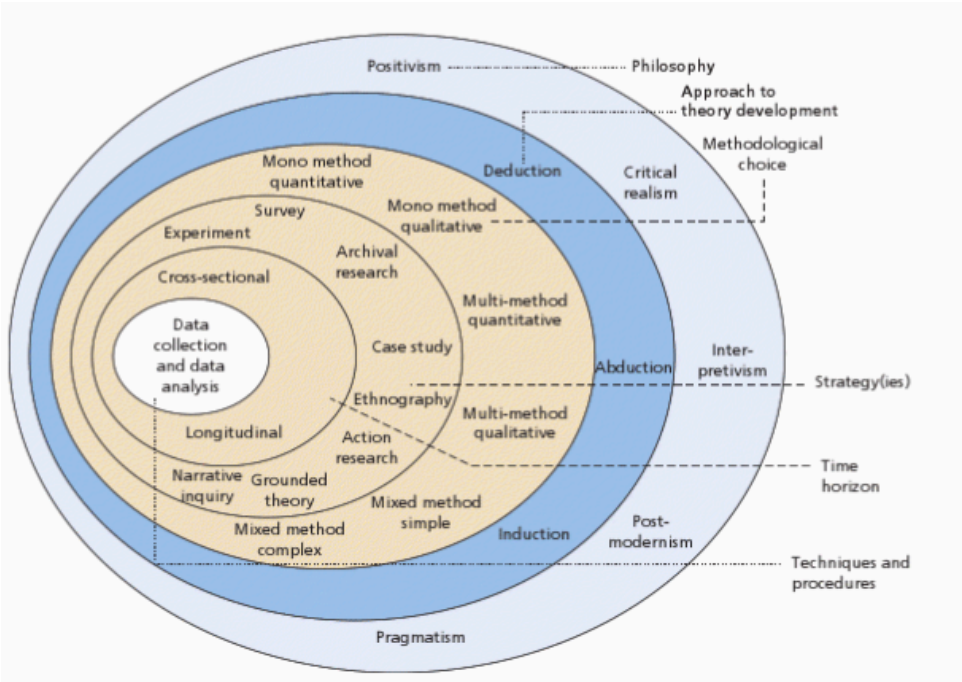


Figure 4.1: Illustration from Saunders et al. (2016)

The general research philosophical approach behind this research project is positivism. Positivism is a philosophy often associated with natural sciences as it takes its starting point in observable phenomena. These phenomena are then tested with methodology derived from previous research,

to find whether the methods successfully manage to explain the observed phenomenon (Bryman & Bell, 2015). Methodology used within a positivistic view is almost exclusively pure mathematical and building on logical reasoning, while the more subjective, intuitive and value-based methodologies more commonly are rejected (Bryman & Bell, 2015). When a satisfying result is found the conclusions are used to explain similar observations. The positivistic view is not particularly interested in human perceptions, social behaviour and similar less binary factors. These are more commonly valued within a contrasting view – the constructivist philosophy (Saunders et al., 2016). The main criticism towards the positivist view is that it does not take humanistic values and the perception of individuals into account (Bryman & Bell, 2015). In this paper, this disadvantage is not considered a major issue as the nature of the research carried out is concrete and objective. Thus, there is little room for interpretation and individual preferences affecting the conclusions drawn by the analysis.

This paper uses a deductive approach to theory development. Thus, existing theories and methodology is applied to a sample in order to test and verify whether they are valid for the particular sample or not. A hypothesis is central as it defines very specifically what is going to be tested by the research. The objective is to be able to make a conclusion that is generalisable from the specific data set to a wider application in reality (Saunders et al., 2016). The deductive approach usually comes closely connected to the positivistic view that is mentioned earlier. One prerequisite to using the deductive approach is that there actually exists previous theories and research within the chosen topic of analysis (Bryman & Bell, 2015). This prerequisite is without doubt met by the research topic of this paper, as there is much material that covers mutual fund performance within the business research arena.

In line with a positivistic research philosophy and deductive approach to research design, this paper will use a nearly solely quantitative methodological approach. The objective is to compare how a certain data sample compares to what contemporary theories and previous research.
Only observable and quantitative data is taken into account in this paper, and thus further analysis through for example surveying or interviewing will not be applicable. Furthermore, the data used for the analysis will be historical and thus backwards-looking, which is a common practice within financial research (Bryman & Bell, 2015).

4.1.1 Validity & Reliability

A favourable approach to research must ensure to be using a model of analysis that ensures both validity and reliability. If a research model is valid that means that a research model actually measures what it is said to measure. There are several different ways of ensuring validity, for example making sure to analyse the quality of the sources of data, as well as analysis of the quality of the specific data (Saunders et al., 2016).

Reliability means that an analysis shows an accurate result that is possible to repeat at other occasions and by other researchers without any major alterations in the achieved results. The issue with reliability is usually considered to be larger in purely qualitative analyses than in a purely quantitative analysis. Nevertheless, there are examples of how to ensure reliability in a research model: making sure to have a structured and well-documented analytical approach, applying models and techniques in a correct way and, when using historical data, using a sample that covers a period of time that is long enough so that the effect of anomalies is minimised (Saunders et al., 2016). Choices and decisions to ensure validity and reliability in this paper will be presented continuously throughout the relevant sections.

4.1.2 Operationalisation

The main motivation behind this paper is centred around whether investors should invest in funds which are managed passively or actively. This discussion has been heavily investigated and there are many prominent persons speaking in favour of either options, as mentioned in the literature review. These discussions are based on as well actual performance as more psychological arguments. This paper seeks only to cover the actual performance of funds, hence does not include any perspectives on psychological and ethical arguments. In order to answer the research question, a definition of how to differentiate between actively and passively managed funds will be needed. However, there is no binary distinction, and it is difficult to derive the level of activeness directly from databases without further analysis.

To overcome this issue, the focus will instead be put on whether it is possible to find a relationship between the management fees the funds charge and how they perform. The fee itself does not reveal the exact answer to whether the fund is actively or passively managed, but indirectly the fee can be viewed as a proxy for how actively and passively managed a fund is. The logic is that, ceteris

paribus, the fee must be higher in an actively managed fund than in a passively managed fund to cover for the larger amount of work required for the active management. The active manager has to assess which stocks, bonds, markets etc. to buy or overweight and similarly the manager has to assess which to not buy or underweight. The passively managed fund simply follows the investment strategy outlined, without any further analysis, allowing it to charge a lower management fee from its investors.

The implication of this operationalisation is that the analysis conducted will focus on whether there is a relationship between management fees of the funds and how they perform. In the end of the analysis, the results obtained will be related back to the implications for the discussion of active versus passive investing and the operationalisation done will be discussed in detail.

4.1.3 Conceptual Framework

To illustrate the methodology used throughout this paper, a conceptual framework has been developed. The illustration is meant to give an overview of the overall approach of the paper before going into detail with every point.

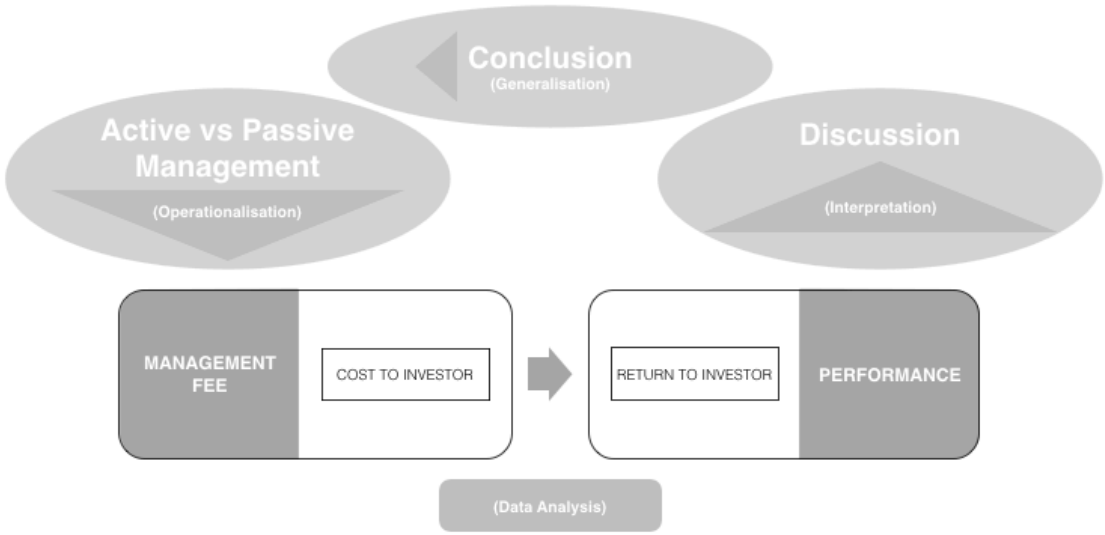


Figure 4.2: Conceptual framework

The illustration starts with the idea of active versus passive investing, operationalising the concept into the fees charged to the investor. The data analysis, which is the core of the research carried out in the paper, investigates how the management fee relates to the return to the investor. The results feed into the discussion, which consolidates the results and interprets these while relating to previous knowledge and discusses limitations surrounding the analysis. Finally, the conclusion takes these patterns and generalise them back to the discussion on active vs passive investing and what practical implications this research has.

4.2 Choice of methodology

The analysis conducted in the paper is focused around answering the research question outlined previously. The objective is to gather as much information as possible to be able to answer the question. The methodological approach is purely quantitative and statistical, hence the focus will be on drawing numerical, statistically significant conclusions.

The main quantitative methodology used throughout this paper is regressions, or more specifically ordinary least squares regressions (OLS). This methodology is used as it can provide a statistical assessment of whether there is a relationship between the management fee of the funds and their respective performance. The main principles of OLS regressions has been presented above, along with the underlying assumptions, which are important to note. One of these assumptions are more exposed in the analysis done, hence will be tested thoroughly. More on this in section 4.4.2.3.

The approach seeks to start at a top-level analysis and subsequently dig deep into various areas. There are in general two specific areas that will be zoomed in on: the different asset classes the funds invest in and the geographical focus area of the funds. The approach will continually outline the current focus. Furthermore, a combination of the two focus areas are also frequently used in order to analyse specific areas in depth.

The initial regression analysis will focus solely on all types of asset classes and all geographical focus areas. Thereafter, the goal is to show whether there are any differences across the different asset classes for the results obtained. The following breakdown will shift the focus to analysing different geographical focus areas, to see whether there are any differences in the performance of active or passive management. Inside each geographical focus area, there will also be an investigation across

the asset class dimension. The underlying purpose of this breakdown is to map out whether there are specific combinations of asset classes and geographical areas where active investing performs better than others.

4.2.1 Choice of Asset Classes & Geographical Focus Areas

The main focus in the analysis will, in terms of asset classes, be on the funds investing in equities, called equity-focused funds in the following. There are several reasons for this. First of all, the focus on equity-focused funds allows the use of concepts familiar to most people in the financial industry such as the Capital Asset Pricing Model (CAPM) and the Fama-French Three-Factor Model. Secondly, the ongoing discussion on fund investments in the academia and popular press, which is the underlying motivation for this research topic, is mainly centred around equity funds. Finally, the majority (around half) of the funds in the data sample are equity-focused funds. Although the main focus is on the equity focused funds, this does not mean the other funds will be ignored. They will be analysed in depth for the overall geographical focus area, but once the focus is being put on a specific geographical focus area, the main area of analysis is either all available funds or the equity-focused funds.

In terms of geographical focus areas, there are almost endless possibilities. Since the data used is so rich in the amount of funds, there are a lot of different perspectives which can be taken on the focus areas of the funds. The main reason why it is chosen to zoom in on different geographical focus areas is, that there could exist big differences across these areas. The reasoning behind that hypothesis is that Nordic funds could have an information advantage in Nordic markets compared to e.g. Nordic funds investing in emerging markets. This advantage could potentially exist even though most information is available online now and most of the companies are highly global in their activities. If it exists it might show up in returns for active investing being more positively correlated with the management fee of the fund in Nordic markets compared to e.g. emerging markets.

In trying to analyse this, the focus will be put on three smaller geographical focus areas which means it will be possible to compare these with the results for other geographical focus areas and for the overall analysis. The three smaller geographical focus areas that will be analysed in depth are emerging markets, Nordic markets and global markets.

The reasoning behind choosing the Nordic markets are more or less given, as the hypothesis about a possible information advantage can then be tested. For emerging markets, the reasoning is that this is possibly the market where Nordic fund managers will have the least chance of having an advantage in information and hence passive investing is likely to outperform active investing here. In other words, emerging markets are a counterpart to funds investing in Nordic markets. Finally, there is a lot of focus on investor returns in emerging markets and therefore also a lot of funds focusing on this, which increases the validity of the analysis. The last market which is chosen is the global markets. The main argument behind this is that it makes a lot of sense for an investor to try and achieve the global market return, aligned with the theory behind the Capital Asset Pricing Model. At the same time, the global markets are also a market that a lot of funds focus on, which will be increasing the strength of the conclusions drawn based on the analysis

4.2.2 Choice of Theoretical Frameworks

As previously mentioned, one of the main advantages of analysing equity focused funds is, that it allows for the use of well-known financial models for explaining returns of equities. The fact that the models can explain equity returns means that they can also be used for explaining returns of equity focused funds, as they are basically a weighted average of the holdings in the fund. Therefore, the analysis conducted will heavily draw on the Capital Asset Pricing Model (CAPM) framework, as this will be able to explain the part of the variance related to market movements. The CAPM framework as explained above relies on benchmarks – or market returns – to explain the variance in the equities.

Apart from the CAPM framework, a well-known extension to the CAPM will also be applied to further enhance the variance explained before trying to explain parts of the remaining variance using the fee. The extension used will be the Fama-French Three-Factor framework. As explained above, the Fama-French Three-Factor model relies on the CAPM methodology along with two additional factors, Small-Minus-Big (SMB) and High-Minus-Low (HML). The two additional factors are also called the Small Firm-effect and the Value-effect. Even if the Fama-French Three-Factor Model does not add anything in terms of changing the coefficient estimates, it nevertheless enhances the reliability of the results found in regressions using the CAPM framework and therefore still adds value to the conclusion. Another reason for extending the CAPM framework to using the

Fama-French Three-Factor Model as well is that the empirical evidence of the CAPM is at best questionable (Berk & DeMarzo, 2014). Extending it with the Fama-French Model means that the analysis is using a theoretical framework which still relies on the basic, intuitive ideas captured by the CAPM, but now enhanced with a theoretical framework which has proven better in terms of empirical evidence (Berk & DeMarzo, 2014). However, although the Fama-French Three-Factor Model might be the better choice, the starting point will be the CAPM when running the regressions. Reason for this is that it has such widespread use, especially in the industry, and its intuitiveness enables a better understanding of the Fama-French Model.

The two theoretical frameworks applied in the analysis, CAPM and Fama-French Three-Factor Model, are both constructed with the purpose of explaining variance in equity returns. This paper will extend the CAPM framework in the sense that it will also be used for the other asset classes analysed. Specifically, the methodology of explaining the variance with the market excess return will also be applied on the funds investing in bonds, money markets and mixed assets. One implication of this is that the model likely will be a less good fit to the data and hence result in a lower R-squared value than the model will for equity focused funds. On the other hand, the use of the CAPM framework in other situations than the usual will prove an interesting test of the use of the model. However, it is not the purpose or scope of the analysis to evaluate the use of CAPM in another setting.

In addition to the note on extending the CAPM framework to use in other settings, it should be noted that the Fama-French Three-Factor Model will not be used in the setting with Bond-, Money Market- and Mixed Assets focused funds, but only in the setting where equity focused funds are the focus of the analysis. The reasoning being that the Fama-French Model is very specific in that the factors are based on equity factors, which may not be relevant for other asset classes. An illustration of this is clear as the Small-Minus-Big factor is also called the Small Firm-effect, illustrating that it is related to firms, which is equivalent to equities. Because of that, only the CAPM framework will be used in settings with other funds included than equity focused funds.

The purpose of using the methodology as explained above is to add an additional factor to the models. The extra factor is the fee of the fund at a given point in time, which is important to note because the fees vary over time. The fee variable – as it will be called – will be added to see whether

it adds any explanatory power to the regressions run. Adding explanatory power can take two forms, either by increasing the R-squared value of the regression compared to the regression without the fee, or by resulting in a coefficient estimate which is significantly different from zero.

4.3 Data Gathering

The paper relies solely on secondary data, as all data necessary to perform the analysis is available already. The data used for the analysis are available from two data libraries and this section seeks to explain how the data can be accessed and explain the choices taken which might or might not impact the results of the analysis. Some of the choices taken will be further discussed in the limitations paragraph available in the end of this chapter.

4.3.1 Return Data for Funds

The return data for funds used throughout the paper is available in the Thomson Reuters database, Datastream. This database contains time series data for 162 markets, where a lot of the data is available all the way back to when the asset started trading. More specifically, the Microsoft Excel Datastream plug-in has been used for retrieving the data. Datastream has data for equities, bonds, money markets etc., and relevant to this paper, also data on funds, their performance and their characteristics such as the trading market for the fund, the geographical focus area, the asset class the fund invests in and finally the management fee of the fund. The management fee is referred to as the *Total Expense Ratio*, TER, in Datastream but throughout this paper the primary term used is management fee. Furthermore, Datastream uses the term *Unit Trusts* for investment funds, which is a wider definition (Thomson Reuters Datastream, n.d.).

The focus has been on funds traded in the Nordic markets, as this is the primary markets for private investors in the Nordics. Hence, data for all unit trusts traded on the Nordic markets - i.e. Denmark, Sweden, Norway, Finland and Iceland – is extracted. Furthermore, there are many funds which are denoted in the Nordic currencies but registered in other markets. The two main other markets are Luxembourg and Ireland where there is a substantial amount of funds denoted in Nordic currencies. The reason why some of the funds are traded on these markets are mainly tax reasons. This means the full data extract includes funds traded in many countries, but with a focus on that these funds are aimed towards Nordic private investors.

From this full data extract, there are some filters which has had to be applied, in order for it to be relevant for the analysis. These filters will be discussed one by one in the following sections, to explain the implications and possible problems occurring by using these filters.

4.3.1.1 Choice of Time Horizon

First of all, there is an important decision to be made in choosing the time horizon of the analysis or length of the time series data. This decision is a trade-off between the long horizon, which would mean that a lot of funds would have incomplete data, since they have not existed over the whole timespan, and on the other hand the short horizon, which would mean the analysis would be less reliable. A longer time horizon also means that there are more data points to manage. A long time horizon in this case is 10 years, whereas a short horizon is below one year, hence the trade-off implies that a time horizon in between those would be the most appropriate.

Thus, weighing pros and cons, a time-horizon of five years a chosen to have as many funds with as complete data as possible, while still having a horizon long enough to be able to achieve reliable results.

By changing from a long time horizon to a medium, there will be an exclusion of data points which poses a risk that the results would be less reliable, as there could have been unusual events included in the time span that would then affect the results. Furthermore, a medium time horizon might not include a complete economic cycle which could also potentially affect the reliability of the results. On the other hand, these risks might not have any effects at all on the achieved results. This point will be further discussed in the section regarding limitations and decisions, section 4.5.2.

4.3.1.2 Choice of Data Frequency

What is meant by the choice of data frequency is that it is possible to use different "steps" of data, I.e. yearly data, quarterly data and all the way down to intraday data. This choice should have little to no effect on the estimates obtained, but it has a large effect on the amount of data points. Therefore, the trade-off is clearly in favour of using longer steps in the data, to avoid extreme amounts of data points. Hence, the analysis will go with monthly data. This should be short enough data steps to be able to trust the estimates and at the same time it will not create an extreme amount of data points. Another benefit of this is that this is a very standard data frequency to use, which

means that it is easy to retrieve the data needed and it is easily comparable with previous literature. More on that will be explained in the following sections.

4.3.1.3 Managing Survivorship Bias

Firstly, to avoid confusion, active funds refer to funds which are still existing, and not to the investment strategy of the funds. Secondly, non-active funds will be referred to as 'dead' in the following since this is the terminology used by the Thomson Reuters Datastream database, where the data is retrieved from.

It could be considered the natural choice to only include active funds and leave out the dead funds as it would make the number of data points equal to each fund in the sample. However, the analysis which will be conducted in this paper is constructed in a way such that it can handle if the funds only have existed in parts of the time period. The reason why it can be handled by the analysis is, that the analysis only uses the time period for linking fund return with market returns and hence the time periods where the dead funds lack data can be excluded. The implication of this is that there will be more observations in the first part of the period, since the total amount of funds included existed there, while in the latter part of the period some funds have been discontinued, implying less data points. This implication is not a problem from a statistical point of view, which will be explained further in the following paragraphs.

Including dead funds circumvents potential problems of survivorship bias, which would significantly decrease the reliability of the analysis, even though previous research found the impact to be minimal (Carhart, 1997; Grinblatt & Titman, 1989; Wermers, 1997). Circumventing this bias is an important point about the analysis, since the problem of survivorship bias means that returns on average are overestimated due to the worst performing funds being shut down, and hence potentially being left out of the analysis.

4.3.1.4 Asset Classes of Funds

When getting data from Datastream, the database has information regarding the funds as well, which will be utilised throughout this paper. One of the characteristics which is mapped in Datastream is which asset class the fund invests in. The general idea people have about mutual funds etc. are probably that they invest in stocks or bonds, but Datastream also has data on funds

investing in other classes of assets, and in a mixture of stocks and bonds. The reason why it is important to note which asset class the fund invests in, will be explained later in this section, but it is chosen to exclude funds which invests in Alternatives, Real Estate and in Commodities. The impact on the number of funds are very small, as in total around 4% of the total funds are excluded.

The reason behind excluding funds investing in these asset classes is that mainly that they make up such a small fraction of total funds and that they are not as popular as the other asset classes. Funds like these are rarely owned by private investors, and therefore are much less relevant for the analysis conducted here. Weighing that up against that only around 4% of the funds are investing in these asset classes, the choice of excluding these funds seems reasonable and furthermore will not hurt the reliability of the conclusions regarding the other asset classes.

4.3.2 Benchmarks

As explained earlier, there are two theoretical frameworks used in the analysis, the Capital Asset Pricing Model and the Fama-French Three-Factor Model. To be able to run the regressions wanted with these theoretical frameworks, some other data than just the returns of the funds are needed. As explained earlier, both theoretical frameworks use the market excess return, to try and explain the variance in the returns. That means the market excess return needs to be downloaded as well. Furthermore, the Fama-French Three-Factor Model also uses two additional factors, Small-Minus-Big and High-Minus-Low, which obviously also needs to be downloaded to be able to run the regressions.

The market return for the fund is dependable on which type of assets the fund invests in, which means that a different market return will need to be downloaded for the four types of assets that the analysis is dealing with. The market return used for each of the different asset types will be explained in the following.

4.3.2.1 Market Return Benchmark

For equity focused funds, the choice of market return is not a hard one. Many textbooks use the S&P500 index as the market return, but this an American index meaning it will not explain any regional variation besides US variation. Because of that, this paper will instead use the MSCI world index as market return for the equity focused funds. This practically means that the returns of a

tracker of this index has been downloaded for the same time period as mentioned above for the funds. The tracker used is the "Vanguard All-World ETF" (n.d.). The return data for this ETF has been downloaded from the Thomson Reuters database, Datastream, like the return data for the funds. The choice of using the world index instead of the S&P500 index seems natural since the funds are not only investing in American equities so even though it might not make a big difference, since they are highly correlated, then it is a more reasonable choice of market index.

For bond focused funds it is a bit harder to choose a market return, since there is not as much focus on what the market return of bonds is. That said, Vanguard also has an ETF tracking the total bond market, called "Vanguard Total Bond Market ETF" (n.d.). The name of the ETF reveals that it tracks the total bond market which is exactly what is needed in the analysis, but it is focused on the US market, which might skew the analysis a little bit. However, it is not seen as a big problem using this ETF as a proxy for the market return of bonds. The effects of this will nevertheless be discussed after the results have been presented.

For money market focused funds there is a ETF similar to the one used as proxy for market return for bonds, however, it is another firm issuing the tracker, iShares. As Vanguard and iShares are the two biggest players in the US market, this is not seen as a problem. The iShares ETF used is called "iShares Short Treasury Bond ETF" (n.d.). This ETF is mainly tracking the American market but is also seen as a good proxy for the money market, looked at as the short-rate market.

For the funds investing in the last asset class, the mixed assets-focused funds, the market return is much harder to interpret. As explained earlier, mixed assets are a combination of the other asset classes analysed, with a main focus on equities and bond, which means the market return is also a combination of these. In the analysis conducted in this paper the market return used will be a 60/40 combination of equity market return and bond market return respectively. This means there is no need to download further data to use on this. The market return is simply 60% times the market return for equities, the "Vanguard All-World ETF", plus 40% times the return of "Vanguard Total Bond Market ETF". This choice can of course be questioned and therefore there will be an evaluation of the methodology used in the latter part of the paper.

What has been explained in this paragraph is only the market returns, and as explained the theoretical frameworks rely on market excess returns. The distinction is simply whether the market returns are in excess of the risk-free rate or not. To use market excess returns instead, there is obviously a need to determine what the risk-free rate is. The risk-free rate used in the analysis here is the risk-free rate available in Kenneth French's Data Library (French, n.d.). The co-creator of the Fama-French Three-Factor Model used in this paper, Kenneth French, has a lot of data available here, which will be explained in the coming paragraph, and among these the monthly risk-free rate. It is US-based, but it is not important for the analysis whether it is based on the whole world or just US. The risk-free rate will be subtracted from all market returns so that market excess returns are used instead.

4.3.2.2 Factor Data

As mentioned earlier, the extension of the CAPM used in this analysis requires other data points than returns of the funds and the market excess return. Fama-French's Three-Factor Model uses the factors SMB and HML. The data library that Kenneth French has available on his website (French, n.d.) is continually updated with data on these factors, which he has made available to all for free. Therefore, this data is easily downloaded from here on a monthly basis so it fits the return data of the funds previously explained. These factors will only be used for equity focused funds, as the Fama-French Three-Factor Model only is used for these.

4.3.3 Final Data

The choices taken, which has been described and analysed above, leads to having excluded some funds, but means that data is still available for in total 3,437 funds. These funds all existed 5 years ago and are investing in 4 different asset classes, Equities, Mixed Assets, Bonds and Money markets. They are generally intended for Nordic based private investors, but are not only traded on the Nordic markets, but as mentioned also in Luxemburg, Ireland and a few others. The distribution is shown in the table 4.1 below.

	Asset Class				
	Equity	Bond	Mixed Assets	Money Market	**Total**
Finland	551	220	172	64	**1,007**
Sweden	441	100	196	28	**765**
Denmark	289	213	77	2	**581**
Luxemburg	210	234	95	14	**553**
Norway	229	95	52	47	**423**
Ireland	20	36	7	-	**63**
Iceland	14	20	4	4	**42**
Other	1	1	1	-	**3**
Total	**1,755**	**919**	**604**	**159**	**3,437**

Table 4.1: Distribution of number of funds across asset classes and trade markets.

The table shows that Finland is the largest trade market for Nordic funds which at first sight is a little surprising. One possible reason for this is that Finland uses Euro which can be an advantage, since the issuer then avoids currency exposure to the Euro. Number two and three are Sweden and Denmark, which is not surprising, but maybe a bit more surprisingly Luxemburg is bigger than Norway. As mentioned earlier this is mainly due to taxation, meaning that foreign investors avoid double taxation.

Another way to illustrate the table above is in terms of the geographical focus area that the funds have, i.e. where the assets the fund invests in are traded. This overview is seen in table 4.2 below.

	Asset Class				
	Equity	Bond	Mixed Assets	Money Market	**Total**
Emerging Markets	364	109	6	4	**483**
Nordic Markets	479	339	65	91	**974**
Global Markets	527	238	500	7	**1,272**
Other Markets	385	233	33	57	**708**
Total	**1,755**	**919**	**604**	**159**	**3,437**

Table 4.2: Distribution of number of funds across asset classes and geographical focus areas.

It can be seen from this table that the emerging markets are the smallest of the three geographical focus areas being highlighted. This is not a surprise since it is Nordic funds and they therefore probably have a better knowledge about the Nordic markets. Also, the global markets are the largest

fraction, which is maybe a bit surprising but nevertheless most funds have a global focus in their investment approach.

4.4 Research Approach

This section will seek to explain in detail how the different regressions are actually conducted, and the choices taken in relation to that. The section will go into detail with the regression equations and the hypothesis tests, which enables making conclusions regarding relationships between management fee and return. In the section the notation for the fee coefficient will be the Greek letter psi, ψ. The reason for using ψ is to ease the notation for the reader.

4.4.1 The Hypothesis Tested

The hypothesis which will be tested in the regressions are stated as whether there is any significant relationship between the fee and the return of the fund. Said in another way, the test will conclude whether the return of the fund is impacted by the fee of the fund. More formally stated, the hypothesis looks like this:

$$H_0: Fee\ coefficient\ estimate, \psi = 0$$
$$H_a: Fee\ coefficient\ estimate, \psi \neq 0$$

The interpretation of this is that if the null hypothesis can be rejected, instead the alternative hypothesis will be accepted. This means that if the null hypothesis is rejected, the Fee coefficient estimate is not equal to 0. Said in another way, this means that it is a double-sided test, since the test is not trying to conclude whether it is above or below a specific level but instead trying to conclude whether it is equal to a specific value or not.

The hypothesis test is automatically done when the regression is run, meaning the output of the regression actually allows a direct conclusion on whether the null hypothesis can be rejected or not. The conclusion can both be drawn in different ways and on different significance levels, depending on whether the p-value, the t-statistic or the 95% confidence interval is used. The typical significance level used is 95% confidence level but where it makes sense, other significance levels will be mentioned as well.

The p-value can be used to reject the null hypothesis in the easiest way. If the p-value is above 0.05 or 5%, then the hypothesis that the coefficient estimate is equal to zero cannot be rejected at 95% confidence level. Extending this methodology to other significance levels are easy. If the test is to be done at 99% confidence level instead, the p-value has to be below 0.01 to be able to reject the null hypothesis.

The same conclusion can be reached by evaluating the absolute value of the t-statistic up against critical values for the students t-distribution. The critical value for t-distribution at 95% confidence level, when having a high number of degrees of freedom, is 1.96. For a 99% confidence level the critical value is 2.576. If the null hypothesis should be rejected, the absolute value of the t-statistic should exceed the critical value, meaning that if the t-statistic is above the critical values just mentioned, the null hypothesis stated above can be rejected.

Finally, the test at 95% confidence level can also be done using the 95%-confidence interval. If 0 is a part of the 95% confidence level the null hypothesis cannot be rejected at 95% confidence level. This effectively means that if the 95% confidence interval has a lower limit which is negative and an upper limit which is positive, then the null hypothesis cannot be rejected. This test can also be done at other confidence level, but that would require other confidence intervals to be set up.
The three different methods do always give the same answer, so they can all be used to reach the same conclusion.

If the null hypothesis is rejected, then it means that a significant relationship exists between the fee of the fund and the return of the fund and hence the alternative hypothesis is accepted.
Alternatively, if the null hypothesis cannot be rejected, no significant relationship exists between fee and return.

4.4.2 Regression Methodology

As mentioned earlier, the hypothesis mentioned above will be tested with the output from regressions. The regressions which will be run takes different forms, but in general there are very few differences in the methodological approach and instead the difference is found in which data are used. The regression methodology depends on which theoretical framework will be used in the specific setting. As mentioned, there is two different theoretical frameworks which will be used,

starting with the CAPM and moving on to the Fama-French Three-Factor Model. Using the theoretical frameworks to analyse funds follows the methodology of Fama & Macbeth (1973) and Jensen, Scholes & Black (1972) who both creates portfolios from individual assets. The same can be said is done when using funds, which essentially is a portfolio of individual assets. The regression methodology and the specific equation will be described for both frameworks in the following.

4.4.2.1 CAPM Methodology

As previously explained in depth, the CAPM framework relies on the market excess return as basis for explaining variance in returns. This explanatory power of the market excess return is exactly what is trying to be utilised in the analysis here, as that in theory means that the variance left in the error terms, once the variance related to the market excess return is considered, should be unexplainable. The variance left in the error terms, if it is unexplainable, is also called white noise. Even though the empirical evidence behind CAPM are at best sceptical this is, nevertheless, the assumption. Instead of treating the remaining variance as unexplainable, the fee factor will be added to the regression, to see whether it can explain some of the remaining variance in the error terms. This is the general idea behind the regression and results in the more formal equation below:

$$Z_{it} = \alpha_i + \beta_i * MKTRP_t + \psi_i * Fee_{it} + e_{it}$$

Where Z_{it} is the expected return of fund *i* in month *t*, α_i is the risk-free rate, β_i is the risk factor between the asset *i* and the market, $MKTRP_t$ is the market risk premium at time *t*, ψ_i is the estimated impact of the fee on the return of asset *i*, Fee_{it} is the fee of fund *i* at time *t* and finally the e_{it} is the residual term of fund *i* at time *t*.

The CAPM framework will be used to analyse the relationship between fees and returns for both the overall data, for specific geographical focus areas, for specific asset classes and for combinations of these.

The approach can be looked at as "Zooming in", where the start of the analysis will focus on all asset classes in all geographical focus areas. After that, the focus will turn to differences in results across asset classes. Hereafter there is specific geographical focus areas that will be analysed, where the main focus will be on the total geographical focus area and on only equity focused funds in that

geographical focus area. The "Zooming in"-approach that will be used will be explained as it develops.

In the CAPM regressions which will be run, the main focus is to investigate whether the fee variable has a significant impact on the return. If the null hypothesis stated above can be rejected, it means that there exists a significant relationship between the fee and the return, which is the objective of the analysis to analyse whether is present or not.

4.4.2.2 Fama-French Three-Factor Model Methodology

As explained in section 3.3.2 the Fama-French Three-Factor Model is developed to incorporate two additional factors which has an explanatory power over equity returns. The model is essentially an extension to the CAPM, but Fama and French found that the extra factors improved the empirical evidence of the model. The goal of using the Fama-French Model in extension of the CAPM is that is can further increase the reliability of the results. The reason for this is that if the coefficient estimate of the fee factor is significant in the CAPM setting, it could be due to that factor explaining some omitted variable bias which is unrelated to the fee factor. If some of that omitted variable bias is then caught in the additional factors added, and the coefficient estimate of the fee factor is still significant, that enhances the reliability of the estimate a lot.

Using the Fama-French Three-Factor Model means setting the regressions up in the following equation:

$$Z_{it} = \alpha_i + \beta_i * \ MKTRP_t + s_i * SMB_t + h_i * HML_t + \psi_i * Fee_{it} + e_{it}$$

Where many of the symbols are as explained above in the CAPM methodology section, the s_i is asset i's sensitivity to the SMB factor, SMB_t is the Small-Minus-Big factor at time t, the h_i is asset i's sensitivity to the HML factor and HML_t is the High-Minus-Low factor at time t.

Extending the CAPM framework to the Fama-French Three-Factor Model is only done in situations with equity focused funds. This is both on the overall geographical focus area and when a specific geographical focus area is being analysed. The specific situations where the Fama-French Model will be used, the same data will also be analysed using the CAPM framework. This allows for direct comparison between the two models.

4.4.2.3 Assumption Testing

The assumptions underlying the ordinary least squares estimation method are outlined in section 3.2.2. Especially one of them are seen as an assumption which has a high likelihood of being breached in one or more of the regressions. This assumption is number 3 in the outline of them (Newbold et al., 2013):

The error terms are normally distributed random variables with a mean of 0 and the same variance, σ^2. The latter is called homoscedasticity, or uniform variance.

$$E[\epsilon_i] = 0 \quad \text{and} \quad E[\epsilon_i^2] = \sigma^2 \quad \text{for } (i = 1, \dots, n)$$

The assumption states two things, error terms have mean zero and their variance are independent of which observation we are looking at. Mostly, it is the latter part of the assumption that is concerning in the regressions performed here.

The reason why this assumption is the main concern is that it is very normal to experience heteroscedasticity, i.e. not homoscedasticity, in regressions with data on equities. Reasoning behind this is that the returns of the stocks do not have the same variance and therefore it can be hard for a linear model to get independent variance for the error terms along funds with different variance. Furthermore, the regressions done in this paper handles a lot of different types of funds, e.g. bond-focused funds, money market-focused funds, funds focusing on small geographical regions etc. Because of this, the assumption that error terms are independent of which type of fund it is related to seems hard to accept when thinking of it.

Because of the reasoning above, this assumption will be tested in all regressions throughout the paper. The assumption is easily tested by looking at residual plots, where the residuals are plotted against the predicted y-values and/or against x-values for the different independent variables. What you should keep in mind when examining these plots is that the residuals do not change in variance along the x-axis. Of course, the conclusion is not exact by looking at a plot, but it is more than enough to either accept or decline the assumption in the regressions performed throughout this paper.

4.5 Limitations

The analysis conducted in this paper relies on a few central limitations and some impactful decisions. Some have been mentioned briefly before, but this chapter seeks to highlight and gather these and to further assess the impact they have on the conclusions drawn. Most of the decisions discussed in relation to data gathering will not be discussed further in this chapter as they have been discussed in depth in section 4.3.1. Only the decision regarding time horizon will further be discussed in the following.

4.5.1 Nordic Fund Markets

The first limitation is actually related to data gathering but was not discussed in detail in the chapter focusing on data gathering. The limitation is centred around the choice of only using funds from Nordic markets. There are several reasons why this choice has been taken. First of all, the perspective of this paper is that of a Nordic investor and a Nordic investor will most likely seek to invest in the Nordic markets, both because of convenience (market opening hours) and because it is typically cheaper in terms of trading fees. Second of all, there was a need to limit the amount of funds included since there is simply too much data to handle if a wider market was chosen. Monthly data for 3437 funds in five years is: 3,437 funds * 12 months a year * 5 years = 206,220 data points. This number explodes if the number of funds is increased a lot, if the data frequency is changed to daily data and if the time horizon is increased. Lastly, it is natural to focus on the Nordic markets for a Swede and a Dane, since this is the home market for us.

Even though the Nordic markets provide a lot of data, the same data will be analysed for the Swiss market in the discussion paragraph later in the paper. The reason for choosing Switzerland is that the data is very good in the Datastream database, i.e. Datastream has data about the fees and the performance of almost all funds in Switzerland in the time horizon wanted. Furthermore, Switzerland is comparable to many of the Nordic countries in many ways. That said, it is not of major importance which market is further analysed for comparison, as long as the countries are somewhat comparable and the data is reliable. Switzerland is one example of that. The comparative analysis of Switzerland is available in section 6.3.3.

4.5.2 Time Horizon

Another choice taken in the analysis is that of having a time horizon of five years. This should be seen as an alternative to having either 10 years or just one year of data. The reasoning behind not

choosing 10 years are twofold. Firstly, 10 years of data generates a lot of extra data points. As mentioned in the calculation above, the choice of five years already means that there is over 200,000 data points, and this should of course be doubled with 10 years of data, meaning over 400,000 data points. This amount of data is a lot to process. Secondly, and most important, using 10 years of data means that there are a lot of funds which have incomplete data, meaning they have only existed for parts of the time horizon. This means that there are times where there is a lot more data points, which could easily change the conclusions drawn in the analysis. This should of course be avoided. The reasoning for not having only one year of data is easy to grasp. This would create way too much uncertainty around if it is the right year which has been chosen.
Because of the reasoning above, a time horizon of five years has been chosen to balance out the positives and negatives of a long and short time horizon. That said, it is indeed very interesting to see whether there is any change in the conclusions drawn when using a longer time horizon. Because of that, the discussion section, section 6.3.1 will both discuss the impact in detail and report results using a longer time horizon, which can then be compared with the original results to assess the impact.

4.5.3 Benchmarks

The analysis conducted relies heavily on market returns, which might as well be called benchmarks. These benchmarks are chosen to fit the type of funds they are used for, but for several of the asset types the benchmarks are not at all perfect proxies for market returns. There are two limitations related to the benchmarks used, which will be handled separately in the following.

Firstly, the benchmark used for bond-focused funds, money market-focused funds and for mixed assets-focused funds is not a perfect proxy for the respective market returns. For the bond-focused funds the benchmark used is the "Vanguard Total Bond Market ETF". The name seems to indicate that it is the perfect benchmark but actually, the ETF only covers the total bond market in the United States. This is of course not ideal. The same problem appears for the money market-focused funds, where the ETF used also covers only United States. For the mixed assets-focused funds the problem is more that mixed assets are a fairly broad definition, as there is no clear indication of which assets they focus on. For these funds, a benchmark is constructed as 60% of the benchmark for equity-focused funds and 40% of the benchmark for bond-focused funds. This is by no means ideal, as the distribution can be far from correct. Nevertheless, this has been used in lack of a better

benchmark. The impact of this can be substantial but it is a problem which is very hard to overcome, as there seems to be no better benchmark to use for the three types of asset classes. Because of that the conclusions drawn regarding these types of funds have a significantly decrease in their validity. Another impact of this is that the analysis will focus mainly on the equity-focused funds, as the validity of the conclusions drawn here are significantly higher.

Secondly, the benchmark used for equity-focused funds throughout the analysis are a global benchmark, meaning that it is an ETF tracking the global equity market. This is on line with the theory behind CAPM since CAPM would argue that all rational investors would invest in this portfolio, but there are also arguments for using another approach. Another approach could be to use a benchmark for whatever geographical focus area the funds have. This could especially make sense in the regressions where only funds focusing on a specific geographical focus area are included. That said, the analysis will still use the global indices as this is the approach most consistent with the theory behind the CAPM and the Fama-French Three-Factor Model frameworks.

The impact of this limitation can quite easily be investigated with the way the model is set up. The only change compared to the original setup is that the market return benchmark is changed in the regressions focusing on a specific region, whether it is emerging markets, Nordic markets or global markets. The impact of the limitation will be further discussed in section 6.3.2 covering the how the results change when using local benchmarks.

4.5.4 Level of Activeness

The operationalisation used throughout this paper of using the fee as a proxy for the distinction between actively and passively managed funds has some flaws built into it. This operationalisation is by no means linear, implying that a high fee not necessarily means a high level of activity. This connection between fee and the level of activeness in the fund is not in scope for this paper but could instead be an area of further research to be done. As Financial Times reports '*Some tracker funds cost 10 times more than rivals*' (Financial Times, 2017), where the title says it all. A tracker fund is another word for a passive fund and therefore it is a clear indication of that the link between fee and level of activeness of a fund.

4.5.5 Tax

As it previously has been mentioned, taxation of fund returns for private investors are different across countries, even in the Nordics. Furthermore, for some countries it is even different how domestic and foreign investment funds are taxed. Taxation is of course of major importance when private investors choose to invest in an investment fund, but it is not a problem which will be handled in this paper. Reason for that is that it should have minimal impact on the choice of funds and especially minimal impact on whether an investor should choose an actively or a passively managed fund.

4.6 Critique of Methodology

The methodology of this paper has been presented and a lot of choices and limitations have been taken. There are some clear flaws built into the methodology used and some of these will be addressed here.

An important critique which can be relevant to address is the fact that only CAPM and Fama-French Three-Factor Model will be used. This means that only models which are built for explaining variation in in equities will be used. This creates some reliability problems for the conclusions regarding funds invested in other asset classes, or turned the other way around, the reliability regarding these funds could be increased by using more suited return models to explain the variance for these funds.

Another important critique of the methodology used in this paper is that relies very heavily on Ordinary-Least-Squares estimators in regressions. There could be a strengthening of the conclusions by basing the estimators on other estimation methods or on more than one estimation method. The reason why only OLS is the only estimation method used should be found in the that this is the most intuitive estimation method to understand. Fitting a straight line to minimize the squared deviation is easy to understand and easy to apply. However, this also means that the paper only investigates relationships as being linear, while in reality this is highly unrealistic. The reasoning behind doing this also is that it is easy to understand, interpret and there is very little value to be gained from using more sophisticated non-linear models.

5. Empirical Findings

5.1 Initial Analysis

Like with stocks, there is of course a high standard deviation of how well funds perform, both related to which fund it is, but as much related to which year that fund is held in. If an investor knew which fund would perform the best, there would be no need for an analysis like the one conducted in this paper. This is most likely not the case. There are several ways of assessing this; one is to look at a simple trading strategy, where you go long the top performers to see if that beats the index the next year. This analysis will be conducted in the following. First of all, a first look at the returns of the funds will be presented.

As mentioned earlier, there are in total 3,437 funds which are being analysed. Some of them doesn't have data for the full period, hence are only partly included in the following. Table 5.1 below shows some statistics of the returns for the funds per year. The funds are only included to the extent that if they have existed for the full year, their return has been included, otherwise the fund is excluded.

All Asset Types	2013	2014	2015	2016	2017
Mean	0.07	0.09	0.06	0.07	0.07
Standard deviation	0.11	0.11	0.11	0.09	0.08
Median	0.06	0.09	0.04	0.06	0.05
25% quartile	0.01	0.04	0.00	0.02	0.02
75% quartile	0.14	0.15	0.11	0.11	0.11
Skewness	-0.19	-1.53	-0.04	-0.24	-0.42

Table 5.1: Return statistics of funds per year.

From the table above, a lot of interesting things can be seen. First of all, the mean seems to be fairly stable arounds 7%, going as high as 9% in 2014 and as low as 6% in 2015. The mean is very interesting here, as this is the return you would get if you were to allocate your savings equally among the 3,437 funds. This figure is also very much in line with the market return of the stock market, which is to be expected since most of the funds are oriented towards equities (1,755 out of 3,437).

What can also be seen from the table is the standard deviation of the mean estimate, the development of it signals a tendency to the standard deviation becoming smaller. This implies that fund returns get more similar, hence there are less extreme returns. From the level of the standard

deviation the most interesting thing to note is, that it is pretty low, compared to equities at least. This can be caused by many things, but just the fact that the funds are probably diversified means that the standard deviation of them becomes smaller, hence the standard deviation of the funds will also decline. Other than that, there are also funds investing in generally less risky assets, bonds & money markets, which leads us to expect a lower standard deviation.

The third statistic included is the median. The reason why this is included is, that it is actually more relevant than the mean. Reason for that is, that the median shows which return you have 50% chance of exceeding and 50% chance of having a return beneath the median. This implies that if you choose a random fund out of the sample, you will have equal probability of ending up above or below the median. The fact that the median is below the mean implies that the distribution is skewed. This is also seen from the skewness reported, which in most years are fairly close to 0. Skewness between −0.5 and 0.5 are generally considered to be fairly symmetric, i.e. the opposite of skewed (SPC, 2016). 2014 stands out it terms of skewness, where the distribution is heavily negatively skewed – this will be discussed further below.

Lastly, the table shows the 25% and 75% quartile. What is most interesting about these are that the 25% quartile is positive for all years, implying that above 75% of funds generate a positive return each year. Meanwhile the 75% quartile shows that over 25% of the funds actually generates returns much higher than the mean. Both quartiles are non-stable over years, which is to be expected.

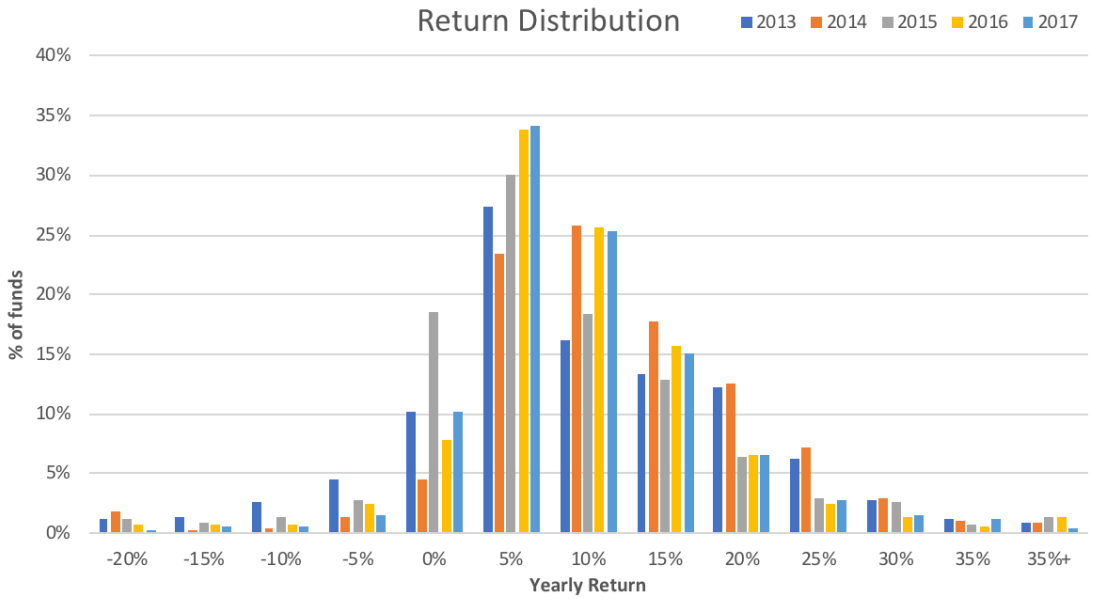


Figure 5.1: Return Distribution of funds per year

The figure above shows the distribution of returns per year. It shows that there is not too much of a difference between years, except for 2015, which looks more like a normal distribution from this. 2015 is also the year with the lowest mean return (6%) and the lowest median (4%) as reported above.

From the first look the distribution seems to be positively skewed, which means that the right 'tail' is longer and fatter than the left one. As the skewness was reported above to be negative, we can conclude that the reason why it looks different here, must be due to the choice of *bins*, i.e. the groupings of the returns. As mentioned earlier, the skewness is vastly different in 2014. There can be many reasons for this, but the graph below, 5.2, takes a closer look at the distribution of returns in 2014.

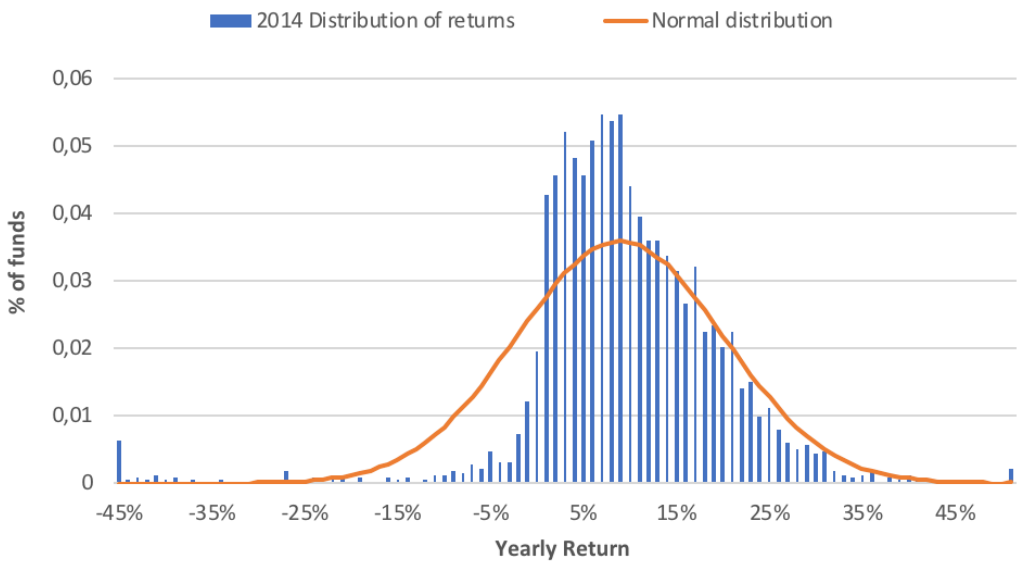


Figure 5.2: 2014 Return Distribution compared with normal distribution

To show what skewness means to the look of the distribution, the normal distribution has been included in the graph as well. First of all, it is worth noticing that there are spikes in both the last and first bin. This means that there are a lot of extreme returns, where especially the fact that above 0.5% of returns are below −45%. Second of all, the distribution has a pretty high kurtosis, seem by the fact that the distribution declines fast when moving away from the mean value, implying that the returns are very much centred around the mean, except for the extreme returns mentioned above. Lastly, the negative skewness is actually very hard to visually observe, but the reason why this year is so skewed in its distribution is that that the tail to the positive side, right, does not drop as fast as it does to the negative side.

5.1.1 Equity-Focused Funds

As interesting as the overall statistics reported are, it is still a picture with a lot of noise, since there is a large difference between what is expected for the equity-focused funds and for the money market-focused funds. To circumvent this, this chapter will take a look at the statistics for the main asset class analysed throughout this paper, equities. For bonds, mixed assets and money markets, the same statistics can be seen in appendix 1.

Equities	2013	2014	2015	2016	2017
Mean	0.11	0.12	0.09	0.09	0.10
Standard deviation	0.13	0.14	0.13	0.12	0.10
Median	0.13	0.14	0.10	0.10	0.10
25% quartile	0.04	0.07	0.04	0.04	0.05
75% quartile	0.19	0.19	0.15	0.15	0.15
Skewness	-0.25	-2.05	-0.91	-0.67	-1.28

Table 5.2: Return statistics for equity-focused funds only per year.

The statistics for equity-focused funds generally show what should be expected. Compared to the overall statistics equity-funds have strictly higher mean, standard deviation, median and quartiles. Since equity markets are generally riskier and hence have higher expected return than bond and money markets, this is in line with expectations. Furthermore, equity-focused funds have a higher negative skewness in the distribution than the overall distribution.

These statistics are based on all equity-focused funds, i.e. does not look into whether there are differences across geographical focus areas. The two main geographical focus areas analysed throughout this paper is emerging markets and the Nordic markets. Therefore, it makes sense to dig a bit deeper into these markets for equity-focused funds.

5.1.1.1 Emerging Markets

For the equity-focused funds focusing on there are 364 funds from the beginning of the period. This decline throughout the years as explained earlier, and there are "only" 309 funds left in 2017, meaning above 15% of the funds are discontinued in that period. Besides that, table 5.3 below shows the same statistics as reported earlier.

Emerging Markets	2013	2014	2015	2016	2017
Mean	-0.05	0.06	0.01	0.12	0.15
Standard deviation	0.12	0.23	0.14	0.15	0.12
Median	-0.04	0.10	0.01	0.11	0.15
25% quartile	-0.12	0.02	-0.05	0.05	0.07
75% quartile	0.02	0.18	0.09	0.18	0.23
Skewness	-0.25	-1.28	-0.09	0.38	-0.57
Number of funds	364	363	352	330	309

Table 5.3: Return statistics for emerging markets-focused equity funds only per year.

Noteworthy from these statistics are the very varying mean returns. This is maybe not very surprising, as emerging markets are generally expected to be more volatile. The negative mean return in 2013 are also in line with the return of the MSCI emerging markets index, which reported a negative return of 2.60% in 2013 (MSCI, 2018). As emerging markets in general performed relatively bad in 2013, it is of course also expected that funds focusing on emerging markets are performing badly. Other than this fact, the statistic which is the most interesting is the standard deviation which is surprisingly not far from the standard deviation of the overall equity-focused funds, with 2014 as a clear exception to that.

The standard deviation of fund returns might be somewhat harder to interpret than standard deviation of stock returns, as this is based on funds which are already supposedly diversified. One interpretation of the fact that emerging markets-focused equity funds don't have that much higher standard deviation than the overall market is, that these funds may focus more on "just" realizing the market return of emerging markets, since this is harder to obtain. This means they own many of the same stocks and hence have a high correlation, lowering the standard deviation of their returns.

5.1.1.2 Nordic Markets

For the Nordic markets-focused equity funds there are 479 funds in 2013, which is only ~33% more than funds focusing on emerging markets. This is maybe a bit surprising but can be due to the somewhat broad definition of emerging markets applied by this paper. There is ~18% of these funds which are discontinued in the period, which is on line with the tendency seen in the emerging markets-focused equity funds. Besides that, table 5.4 below shows the same statistics as reported earlier.

Nordic Markets	2013	2014	2015	2016	2017
Mean	0.17	0.13	0.15	0.10	0.11
Standard deviation	0.08	0.07	0.11	0.11	0.06
Median	0.17	0.14	0.14	0.11	0.11
25% quartile	0.13	0.08	0.07	0.05	0.08
75% quartile	0.21	0.18	0.23	0.15	0.14
Skewness	2.31	-0.19	0.71	-3.37	-0.71
Number of funds	479	477	448	422	399

Table 5.4: Return statistics for Nordic markets-focused equity funds only per year.

The first thing to note about the statistics are the very high mean and generally very low standard deviation. This is a good combination as it means that investors have a good chance of owning a fund which generates a high return. As explained earlier, a high standard deviation could mean a high correlation between funds, which may be due to (i) the funds owning many of the same stocks, or (ii) the stocks generally being highly correlated with the market, i.e. they have a high beta. The fact that the funds focused on Nordic markets have a lower standard deviation hence indicates that the factors mentioned are less present in these funds, compared to the ones focused on the emerging markets as shown above. Generally, the statistics shows that funds focused on the Nordic markets have performed well.

5.1.1.4 Global Markets

The last geographical focus area is the global markets, where there are 527 equity-focused funds in the beginning of the period of analysis. Around ~22% of these are discontinued during the period, which a little higher but still somewhat on line with what was found for emerging markets and Nordic markets above. Besides these numbers, the other statistics are reported below in table 5.5 showing the statistics in the same format as above.

Global Markets	2013	2014	2015	2016	2017
Mean	0.15	0.17	0.09	0.08	0.07
Standard deviation	0.11	0.09	0.10	0.08	0.09
Median	0.14	0.17	0.10	0.09	0.08
25% quartile	0.09	0.12	0.06	0.05	0.02
75% quartile	0.20	0.22	0.14	0.13	0.12
Skewness	1.53	-1.05	-4.90	-0.63	-0.86
Number of funds	527	485	447	428	410

Table 5.5: Return statistics for global markets-focused equity funds only per year.

These statistics are very much on line with the ones for the Nordic markets, although the mean and median are a little lower, except for 2014. Furthermore, the skewness in 2015 is highly negative, indicating a non-symmetric distribution where the median is higher than the mean, which is exactly what is observed here. Other than that, the statistics are very much on line with what was found for the Nordic focused equity-focused funds.

5.1.2 Test of Momentum Effect

As mentioned earlier, Carhart (1997) and Cuthbertson et al. (2010) both find that a one-year momentum effect is prevalent in their sample of funds. Furthermore, underlying the motivation for this paper is the assumption that it is extremely hard, if at all possible, to choose the "winners", i.e. the funds which performs the best in the coming period. This assumption will be tested in a very simple way in this paragraph using the data which is being used throughout the analysis.

This will be tested by ranking the funds by performance each year, buying the top performers and hence get their return in an equally weighted portfolio. The analysis will also be extended to shorting the worst performers to see if that makes a difference. By doing so, you can almost eliminate all market risk, assuming that the funds you go short has the same market risk (beta) as the funds you go long. However, this will not be tested, as it is out of scope for this paper.
The trading strategy's returns can be seen in table 5.6 below.

		All asset types		Equities only		All asset types	Equities only
		Only long	Long & Short	Only long	Long & Short	Excess return, only long	Excess return, only long
Quartile invested in (both long & short)	1%	0.0615	-0.0242	0.0493	-0.0576	-0.0085	-0.0519
	2%	0.0692	0.0131	0.0588	-0.0301	-0.0008	-0.0424
	3%	0.0790	0.0486	0.0689	-0.0040	0.0090	-0.0323
	4%	0.0888	0.0596	0.0714	0.0202	0.0188	-0.0298
	5%	0.0984	0.0652	0.0779	0.0427	0.0284	-0.0233
	6%	0.1008	0.0636	0.0821	0.0402	0.0308	-0.0191
	7%	0.1021	0.0663	0.0876	0.0409	0.0321	-0.0136
	8%	0.1018	0.0663	0.0932	0.0421	0.0318	-0.0080
	9%	0.1037	0.0657	0.0986	0.0504	0.0337	-0.0026
	10%	0.1054	0.0667	0.1009	0.0531	0.0354	-0.0003
	11%	0.1052	0.0666	0.1009	0.0508	0.0352	-0.0003
	12%	0.1054	0.0675	0.1019	0.0515	0.0354	0.0008
	13%	0.1064	0.0686	0.1031	0.0496	0.0364	0.0019
	14%	0.1054	0.0671	0.1017	0.0470	0.0354	0.0005
	15%	0.1063	0.0687	0.1025	0.0458	0.0363	0.0013

Table 5.6: Momentum trading strategy test

Generally, it can be seen that the strategy only generates some form of excess return if all asset classes are included and a fairly big percentage of top performers are included. This creates another problem as the analysis doesn't take transaction costs into consideration, and if a large number of funds have to be traded, this could potentially lower the excess return to a less significant size.

5.2 Main Regression Analysis

This section will present the output of the regressions performed. The regressions have all been performed as explained previously and this paragraph will therefore focus on what the results show and also how reliable the estimates are. There are some underlying assumptions in the OLS regressions which are most likely to interfere with the estimates provided, and hence the focus will be on testing whether these assumptions hold in this data or not.

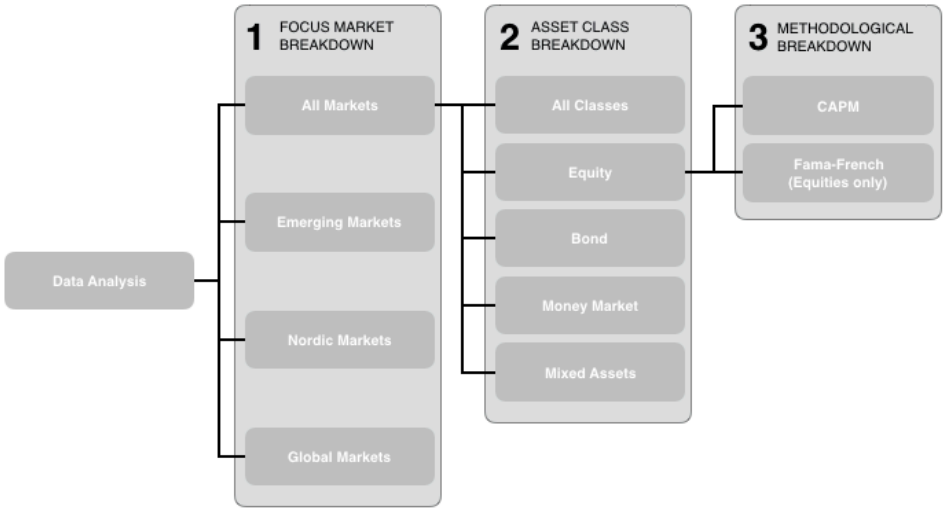


Figure 5.3: Structure of main regression analysis

The main analysis is broken down and presented according to three different factors. Firstly, the funds are analysed according to their respective focus markets. The initial analysis is always carried out on all funds, irrespective on market, subsequently they are divided into their respective markets. Important to note that it is not the markets on which the funds are listed, but the markets in which they invest. Secondly, the funds are analysed according to what assets classes they invest in, where they also are initially analysed all together and thereafter broken down to the respective classes. Thirdly, the analysis is broken down on methodological approach. All analyses are made with CAPM, but the equities analysis is also made with the Fama-French three factor model.

5.2.1 All Markets Analysis

The first regression performed is the simplest one, where only the return is regressed on the fee and an intercept only. The regression returns the estimates shown in table 5.7 below.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0051	0.0002	32.13	0.00	0.0047	0.0054
Fee	0.0672	0.0107	6.28	0.00	0.0462	0.0881

Table 5.7: Simple regression with only returns and fee

What is seen from the output is that both the intercept and the fee is highly significant, even at a 99% significance level. This can be seen from the p-value being lower than 1%, meaning the hypothesis that the coefficient estimate is equal to zero can be rejected with above 99% confidence. The same conclusion can be reached by looking at the t-statistic, which absolute value has to exceed 2.326 to reject the null hypothesis at 99% confidence level, and by looking at whether 0 is included in the 95% confidence interval, which would allow the rejection of the null hypothesis at a 95% confidence level.

The fee coefficient estimate of 0.0672 first of all is positive, indicating a positive relationship between the return of the fund and how high their fee is. Secondly, the number means that increasing the fee of the fund by 1% implies a higher monthly return by
1% * 0.0672 = 0.000672 = 0.0672%

This is a very little difference, but it is monthly return that is impacted by that. Since the return is a log-return, it can simply be multiplied with 12 to make is yearly, I.e. the impact of increasing the fee by 1% on yearly log-return is 0.8062%.

Capital Asset Pricing Model Regression

The estimates in the regression above is obviously not too reliable, mainly because the error terms in the regression are not what would be called 'white noise' and hence the regression has some form of Omitted Variable Bias. The returns are not fully explained by the fee, hence the regression in this section will include a variable with the market return to get rid of some of the Omitted Variable Bias. This regression estimates, still including all asset classes and all markets, are presented below.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0025	0.0001	19.00	0.00	0.0022	0.0028
Market Return	0.6790	0.0026	262.05	0.00	0.6739	0.6841
Fee	-0.1035	0.0090	-11.53	0.00	-0.1211	-0.0859

Table 5.8: CAPM regression, all asset classes, all markets

What is seen from the estimates is again that they are all highly significant. The regression reports a R-squared value of 0.2991, implying that almost 30% of the variation in the returns variable is being explained by the variables included in the regression.

Interestingly, the t-statistic for the fee increases to 11.53 (absolute number) from 6.28 above, which means that it is now even more significant than what it appeared at first. Secondly, it has changed sign, implying that the fee now has a negative relationship with the return of the fund. Furthermore, it is worth noting that the market return is highly significant with a t-statistic of 262.05, and has a coefficient estimate of 0.6790. This coefficient estimate can be interpreted as a very significant positive relationship between how the overall market performs and how the funds perform. Lastly, the intercept is still also significantly different from zero.

One of the underlying assumptions in OLS regressions that might be breached is that the residuals have the same variance across predicted y-values and across values of the x-variables, more formally known as the assumption of homoscedasticity. The easiest way to test this is to look at plots of residuals against predicted y-values and against values of the x-variables. For this regression, the plots are shown in appendix 2. What to look for when looking for homoscedasticity is that the residuals are not increasing or decreasing in variance with the values on the x-axis.
The plots in the appendix 2 shows no to little signs of this change in variance for this regression. The plot with the fee variable on the x-axis shows small signs of a decreasing variance with higher fee values, but the pattern is not strong enough to reject the assumption of homoscedasticity. The other two plots seem to have exactly the same variance across the values on the x-axis. Therefore, the assumption of homoscedasticity holds in this regression, hence the coefficient estimates above can be trusted.

5.2.1.1 Equity-Focused Funds

Capital Asset Pricing Model Regression

The above regression gave some very interesting results, but the methodology used to explain bond returns, money market returns and mixed assets returns are not created for that purpose. Because the focus mainly is on equity focused funds, this section will handle the same regression as above, where only equity focused funds are included. This obviously lowers the amount of observations, but since the amount of funds are so high to begin with, this does not lower the reliability of the estimates in the regression. The output of this regression is reported below in table 5.9.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0043	0.0003	15.16	0.00	0.0038	0.0049
Market Return	0.6976	0.0037	187.23	0.00	0.6903	0.7049
Fee	-0.1914	0.0163	-11.72	0.00	-0.2235	-0.1594

Table 5.9: CAPM regression, equity focused funds, all markets

Similarly, to the previous regression, this regression shows highly significant coefficient estimates. Worth noting compared to the previous regression is that the intercept is higher and that the coefficient estimate for the fee is almost twice the previous estimate. The regression reports a R-squared value of 0.3086, which is a bit higher than before, indicating that this methodology fits the equity focused funds a little better than the others, on average. Above 30% of the variation in the returns variable is explained, which as for the previous regression seems pretty high. The test for homoscedasticity will also be performed here and will again be tested using the residual plots, which are shown in appendix 3.

The residual plots look very similar to the previous regression. Both of the first two plots with predicted y-values and the market return on the x-axis, shows no signs of heteroscedasticity. The residual plot with the fee variable on the x-axis shows minor tendencies of decreasing variance in increasing fee, but it is not a strong enough pattern to breach the assumption of homoscedasticity, meaning the assumption of homoscedasticity will be assumed to hold, hence the coefficient estimates can be trusted.

Fama-French Three-Factor Model Regression

To further enhance the reliability of the estimate for the fee variable, the CAPM regression will be extended to include some of the other factors which has proven to explain variation in equity markets, and thereby probably also variance in the market for equity focused funds. The factors included has been explained previously and are named Small-Minus-Big (SMB) and High-Minus-Low (HML). The output of this regression is shown in the table below.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0042	0.0003	15.07	0.00	0.0037	0.0048
Market Return	0.6996	0.0037	189.52	0.00	0.6923	0.7068
SMB	0.1702	0.0055	31.20	0.00	0.1595	0.1809
HML	-0.1793	0.0058	-31.00	0.00	-0.1906	-0.1680
Fee	-0.1919	0.0162	-11.86	0.00	-0.2236	-0.1602

Table 5.10: Fama French 3-factor regression, equity focused funds, all markets

The regression output including these two factors, which are highly significant both of them with absolute t-statistics above 30. Even though these are added, the difference in the coefficient estimates of the other variable are only minor, indicating that there is almost none, if any, overlap in what they are explaining. This increases the validity of the fee coefficient estimate. The fact that significant variables are added without decreasing significance of the other values leads to think that the R-squared should be increased. This is also the case, as this regression has an R-squared of 0.3216, approximately 1.5% higher than the previous regression.

As before, there is also the risk of heteroscedasticity in this regression. Although the conclusion from the previous regression are likely to be the same in this regression, the test will still be performed to ensure heteroscedasticity is not a problem in this regression. The residual plots are shown in appendix 4.

The residual plot with the fitted y-values on the x-axis shows no signs of a change in variance across values of y. Actually, it shows a very stable variance with few outliers. This pattern is almost exactly the same for the next three graphs as well with market returns, Small-minus-big and High-minus-low. These shows no signs of heteroscedasticity either. For the plot with the fee variable on the x-axis there is a small change in variance it could seem like. It seems that it is first increasing a bit,

thereafter it is decreasing a bit in high values for the fee. This means that for funds with a very low fee and funds with a very high fee the model seems to fit a little bit better, than what it does for funds with a medium fee. That said, the pattern is not clear enough to reject the assumption of homoscedasticity, hence the coefficient estimates reported above can be trusted.

5.2.1.2 Bond-Focused Funds

Capital Asset Pricing Model Regression

So far, all the regressions have handled equity focused funds or simply all funds. The next couple of sections will focus on the other asset classes; bonds, money markets and mixed assets. The methodology used is, as explained earlier, the same as for equities although this methodology is normally used only for equities, this could be useful for other asset classes as well.
First, the focus is on bonds explained by the fee and the market return. The output from this regression is shown below.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0019	0.0001	17.06	0.00	0.0017	0.0021
Market Return	0.3719	0.0061	60.63	0.00	0.3598	0.3839
Fee	-0.0342	0.0117	-2.92	0.00	-0.0572	-0.0113

Table 5.11: CAPM-like regression, bond focused funds, all markets

The table shows that all coefficient estimates are statistically different from zero at a 99% confidence level, indicated by p-values being lower than 0.01 and the absolute value of the t-statistics all exceed 2.326. The Fee variable coefficient estimate is also negative here indicating that higher fees are associated with lower returns, while the market return variable is positive indicating that bond focused funds' returns are positively correlated with the market return proxy used for bonds. These findings are very similar to the ones found for equity focused funds, but there seems to be a smaller impact of the fee in bond focused funds compared to equity focused funds. However, there is a big difference in how well the model explains the data, measured by the R-squared, which is 0.0726 for this regression. This means that the model explains just 7% of variation in the returns of the bond focused funds, while the previous regression explained above 32% of variation for equity focused funds.

Similarly, to the previous regressions, the residual plots will be presented to test for homoscedasticity in the error terms. The residual plots can all be seen in appendix 5 and the residual plot with predicted y-values on the x-axis is also shown below in figure 5.4.

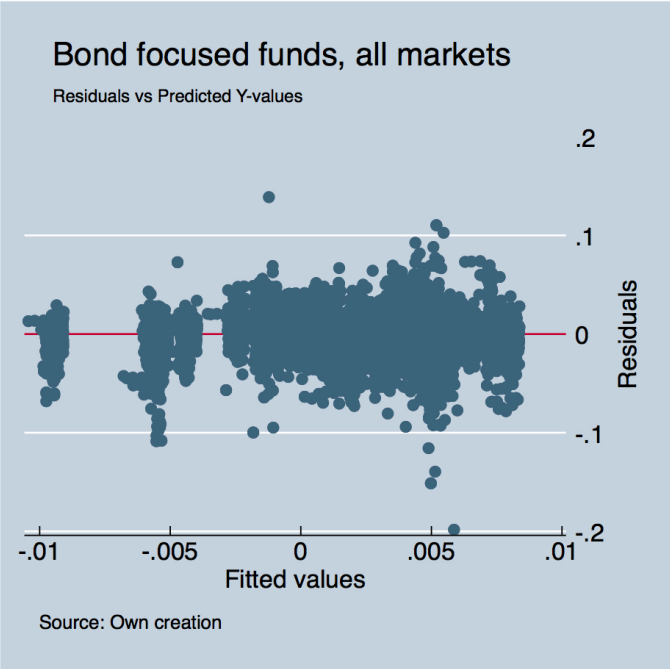


Figure 5.4: Residual vs predicted Y-values plot for CAPM regression, bond focused funds, all markets

In the graph above there is a small tendency to increasing variance with increasing y-values. The pattern is not very clear and if the outliers are ignored it does not seem to be a significant pattern. Nevertheless, it means that the coefficient estimates are a bit more uncertain and therefore should be used with care. The two other plots, which can be seen in appendix 5 shows no signs of heteroscedasticity in any way. With contradictory results, where the argument for heteroscedasticity is very weak, the assumption of homoscedasticity seems to be reasonable, therefore the coefficient estimates can be used, but should be used with care.

5.2.1.3 Money Market-Focused Funds

Capital Asset Pricing Model Regression

As for the previous section, this section will focus on another asset class area. This section will analyse money market focused funds. There is less of the money market focused funds as less people invest in these, but still there is 159 funds traded on the Nordic markets. Analysing these funds using the methodology as explained presents the results shown in the table below.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0005	0.0001	4.87	0.00	0.0003	0.0007
Market Return	0.1176	0.2154	0.55	0.59	-0.3045	0.5398
Fee	0.0583	0.0305	1.91	0.06	-0.0014	0.1181

Table 5.12: CAPM-like regression, money market focused funds, all markets

The output shows a statistically significant intercept, while the market return is far from significant. It can be seen that for the market return, the standard error is very big, compared to the coefficient estimate, which means that the t-statistic is very low and that the 95% confidence interval is very wide and includes 0 in this case. The Fee variable is only significant at a 90% confidence level, implying that it shouldn't be trusted too much. The coefficient estimate is almost significant at a 95% confidence level, which can be seen from the p-value, but since it is only close to significant, 0 is also included in the 95% confidence interval. If a 93% confidence interval were to be used instead 0 wouldn't be included, as the p-value is below 0.07. This is just to illustrate the link between the statistics reported above. For the Fee variable it is worth noting, that the sign has switched compared to the previous regressions, implying a positive relationship between fee and return.

Similarly, to the bond regression above, this model also fits the return data less than what it did for equity focused funds. This regression explains even less variation compared to the one for bond focused funds above, as the R-squared value is only 0.0005, implying it only explains around 0.05% of variation in returns of money market focused funds.

The test for breaches of the assumption of homoscedasticity will be performed for this regression as well. All the residual plots are shown in appendix 6, but the plot with predicted y-values on the x-axis are shown in figure 5.5 below as well.

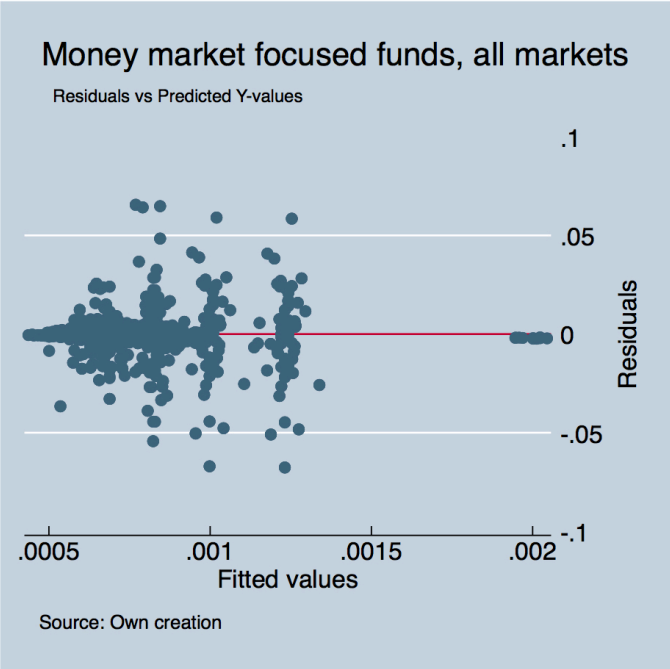


Figure 5.5: residual vs predicted Y-values plot for CAPM regression, money market focused funds, all markets

The residual plot above shows a clear tendency for increasing variance in the error terms with increasing predicted y-values, more formally known as heteroscedasticity. This effectively means that Ordinary Least Square is not the right estimation methodology to use for this dataset. Apart from harming the reliability of this regression, another implication of this is that it might harm the overall regressions, but since money market focused funds are such a small fraction of total funds and the fact that no signs of heteroscedasticity were found in that regression, speaks in favour of this conclusion not harming the reliability of the results obtained earlier. However, it does mean that the conclusions drawn from this regression shouldn't be trusted when using Ordinary Least Square. Heteroscedasticity does not change the coefficient estimates but it potentially means that the variance therefore also the standard error is biased. This means that the hypothesis tests performed cannot be trusted, since the standard error is used to calculate the t-statistics. Because the main focus of this paper is the equity focused funds, there will be no further action done to obtain better estimates for the money market focused funds.

The other two residual plots shown in appendix 6 do also indicate changing variance of residuals given x. The plot with the market return on the x-axis has relatively high variance in the residuals around the value 0 for the market return, while the errors seems to decline with higher and lower returns. The plot with the fee variable on the x-axis is maybe the plot which shows the

heteroscedasticity clearest, as the variance is almost 0 when the fee is around 0 but increases drastically with increasing fee. Therefore, the plots support the conclusion of heteroscedasticity in this regression.

5.2.1.4 Mixed Assets-Focused Funds

Capital Asset Pricing Model Regression

This section will be presenting results on the mixed assets focused funds, which has been analysed using the same methodology as explained earlier. From the beginning of the period of analysis there is 604 funds focused on investing in mixed assets. The regression run provides the following estimates.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0021	0.0003	7.05	0.00	0.0015	0.0027
Market Return	0.5996	0.0057	105.17	0.00	0.5884	0.6108
Fee	-0.0781	0.0186	-4.19	0.00	-0.1145	-0.0416

Table 5.13: CAPM-like regression, mixed asset focused funds, all markets

The results show the coefficient estimates are all significant at a 99% confidence level, as the p-value is below 0.01. The Fee variable is the least significant variable but is still significantly different from zero. It is worth noting that it is negative, which is not really a surprise, since mixed assets are a combination of equities and bonds, where negative coefficient estimates are found for both asset classes.

The fact that the results for mixed assets focused funds seems to be some combination of the results for equity focused- and bond focused funds, is further enhanced by the R-squared value of this regression, which is as high as 0.2864. This is almost as high as for equity focused funds and higher than for bond focused funds. This is a clear indication that the model fits the return data for mixed assets focused funds well.

As has been done in the previous regressions, this regression will also be tested for heteroscedasticity in the residuals. The residual plots can all be seen in appendix 7, and the residual plot with the fee variable on the x-axis is also shown below in figure 5.6.

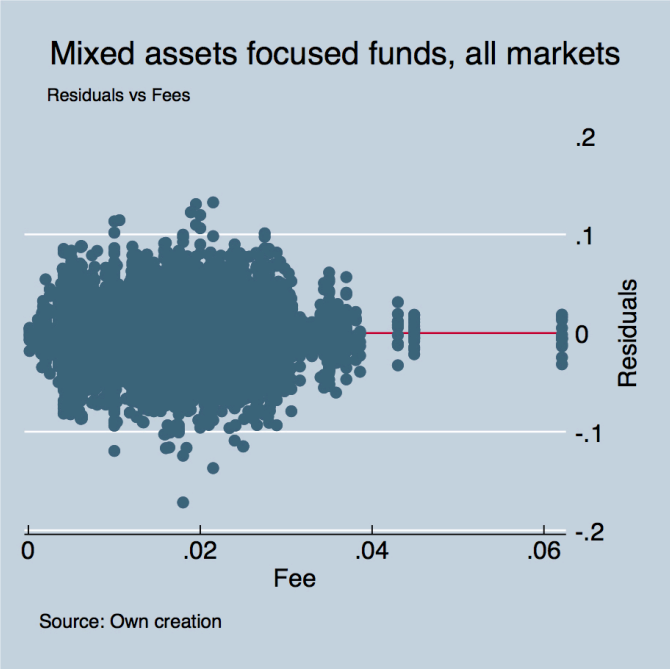


Figure 5.6: residual vs fees plot for CAPM-like regression, mixed asset focused funds, all markets

The residual plot above has a small pattern leaning toward a decreasing variance in the fee variable. The pattern is not very clear, and it is very few observations that creates this pattern as the major part of residual observations have no indication of heteroscedasticity. The two other residual plots shown in appendix 7 shows no signs of heteroscedasticity, and hence the assumption of homoscedasticity is assumed to hold in this regression, ensuring that the conclusions drawn above can be trusted.

5.2.2 Emerging Markets

Capital Asset Pricing Model Regression

To further extend the analysis, and since the data is so rich in terms of number of funds and characteristics, there is a possibility of analysing only funds which focus on specific geographical areas, called geographical focus area in the following.

The first geographical area which is found interesting to analyse is emerging markets. As explained earlier, the reason why emerging markets is interesting is that it is a geographical region very different from the Nordics, Europe in general and North America which are generally regarded as the more mature investing markets. Emerging markets are often very dependent on e.g. a

commodity or a currency. An example is Venezuela, which are very oil dependent. Because of that, emerging markets could be more volatile, potentially deliver higher expected returns and could have a very low correlation with the mature markets.

The first regression run only on funds which geographical focus area is emerging markets is for all asset classes, I.e. the regression includes all funds which focuses on emerging markets and are included in the data used. There is a total of 483 funds included in this regression. The same methodology as explained earlier is used and the results in table 5.14 below are the estimates from the regression.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	-0.0003	0.0007	-0.41	0.68	-0.0016	0.0010
Market Return	0.8486	0.0104	81.63	0.00	0.8282	0.8690
Fee	-0.1003	0.0338	-2.97	0.00	-0.1665	-0.0341

Table 5.14: CAPM regression, all asset classes, emerging markets

From the table above, it can be seen that the intercept is insignificantly different from 0 even at 90% confidence level as the p-value is above 0.1, while the market return variable is statistically significant different from zero at 99% confidence level. Also, worth noting is that the coefficient estimate for the market return is substantially higher than what was obtained for a similar regression for all geographical focus areas, see section 5.2.1. This means that funds focusing on emerging markets are more correlated with the overall market return. This is maybe a bit surprising. The Fee variable is significantly different from zero at 99% confidence level and is negative, implying a negative relationship between fees and returns.

The regression has a R-squared value of 0.2825, which is very similar to the R-squared value of the similar regression for all geographical focus areas. This means that this model as much of the variation in the dependent variable, returns of funds focusing on emerging markets.

As with the regressions for all geographical focus areas there could be a chance of experiencing heteroscedasticity in the error terms. Therefore, the same graphical tests are applied here, using the

residual plots in appendix 8. The residual plot with market return on the x-axis are also shown below.

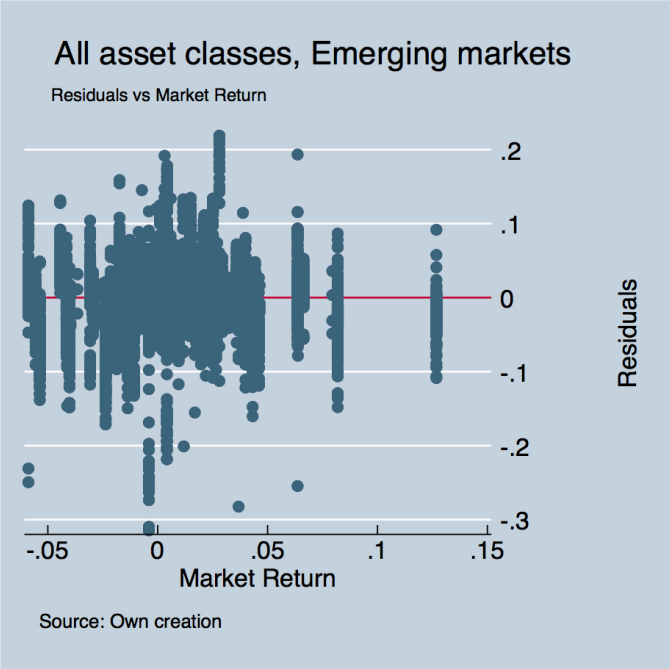


Figure 5.7: residual vs market return plot for CAPM-like regression, all asset classes, emerging markets

The graph shows no particular pattern which indicates heteroscedasticity, but it does show a little bit of change in variance across x's. The pattern is not very clear, but the variance could seem to be a bit higher in the interval market return = [0;0.05], whereas it looks lower in both lower and higher values for x. This pattern is also somewhat existent in the other residual plots shown in appendix 8, although the one above has the clearest pattern. There is not a clear indication that heteroscedasticity is a problem, hence there is no reason to not assume homoscedasticity and trust the coefficient estimates and conclusions highlighted above.

5.2.2.1 Equity-Focused Funds

Capital Asset Pricing Model Regression

Like for the regressions which had no filter on geographical focus areas, a regression will also be conducted focusing only on equity focused funds, which are focusing on emerging markets. Of the 483 funds in total which has emerging markets as their geographical focus area, a total of 364 of these are equity focused and are therefore included in this regression. The regression yields the results presented in table 5.15 below.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	-0.0029	0.0011	-2.74	0.01	-0.0050	-0.0008
Market Return	0.8522	0.0126	67.48	0.00	0.8274	0.8769
Fee	-0.0182	0.0465	-0.39	0.70	-0.1094	0.0729

Table 5.15: CAPM regression, equity focused funds, emerging markets

From the table it can be seen that the intercept is significant at 99% confidence level. Even though this cannot be seen from the p-value itself, it can instead be seen by the absolute value of the t-statistic exceeding 2.326. The market return is still highly significant even at 99% confidence level, while the latter variable, the fee, is statistically insignificantly different from zero with a p-value as high as 0.70. This is an interesting result as the previous regression with all asset classes showed the fee variable being significant even at 99% confidence level. The interpretation of an insignificant coefficient estimate is that it isn't possible to conclude anything about a relationship between the fee and return.

The regression has a R-squared value of 0.2947, which is on line with what was found for the similar regression with no filter on the geographical focus area on the equity focused funds.
As has previously been done for the regressions, the test for heteroscedasticity will also be performed here using residual plots. The residual plots are shown in appendix 9. Also, the residual plot with the fee variable on the x-axis are shown below in figure 5.8.

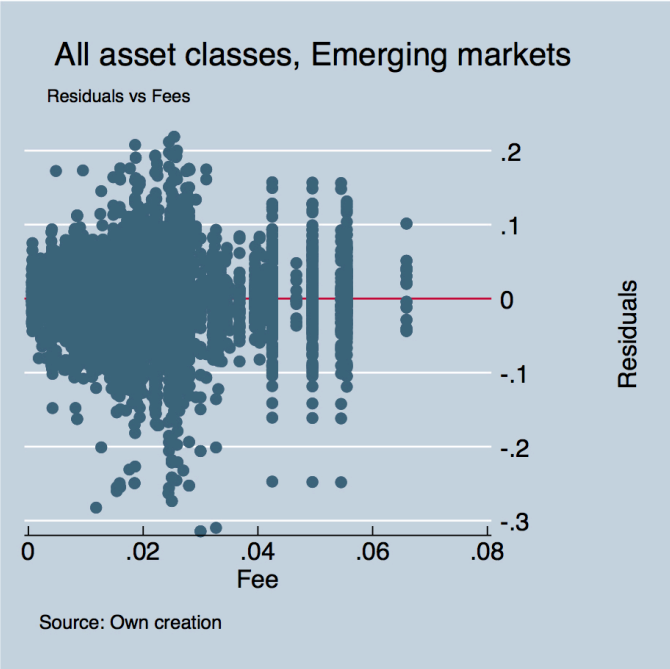


Figure 5.8: residual vs fees plot for CAPM regression, equity focused funds, emerging markets

The graph above does not show significant indication of heteroscedasticity, but it shows that there could be a small difference in variance of residuals across fees. This can both be due to how large the most extreme residuals are for a given level of x, but it could also be due to there being a higher intensity in small residuals for some level of x. The latter part could be the case above as it seems the for some levels of fee, there is a very high intensity of residuals around 0, which is obviously great, but that could also lower the variance. A similar pattern is seen in the two other residual plots shown in appendix 9. However, the conclusion is that there is no clear indication of heteroscedasticity and hence the assumption of homoscedasticity is not breached in this regression.

Fama-French Three-Factor Model Regression

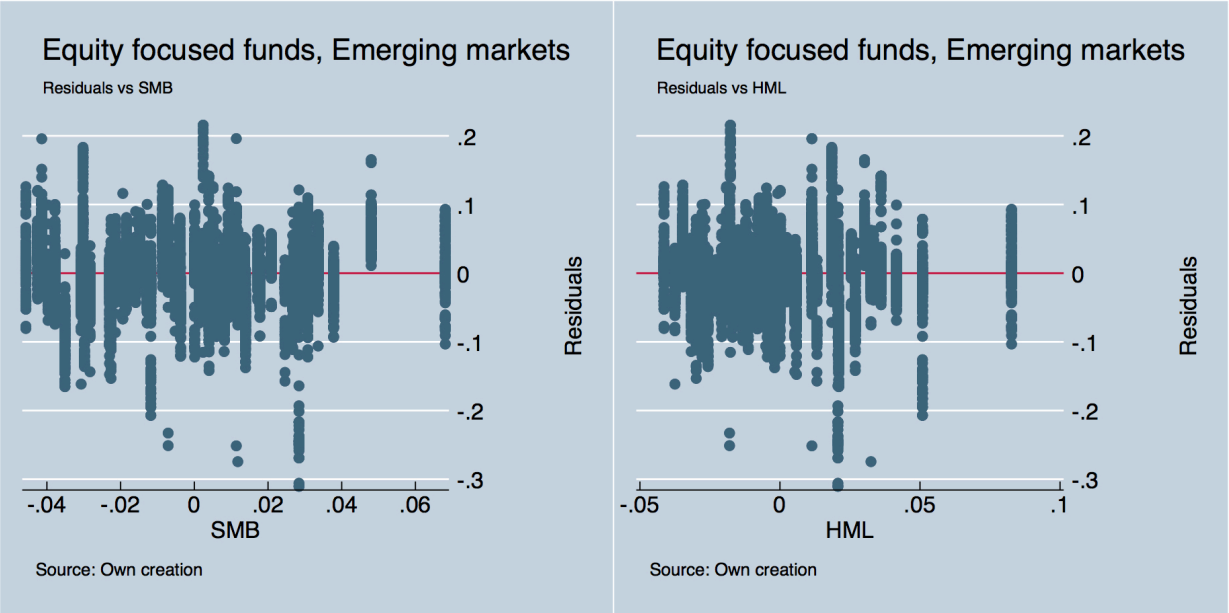
Since the overall regression surprisingly showed an insignificant coefficient estimate for the fee variable, the analysis will be extended in terms of theoretical framework used, in the sense that the additional factors in Fama-French's Three-Factor model will be included. The reason is that this improves the reliability of the estimates and the added variables can potentially explain some variance not previously explained, which might change the coefficient estimates or the standard errors. The regression performed present the results shown in table 5.16 below.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	-0.0030	0.0011	-2.86	0.00	-0.0051	-0.0009
Market Return	0.8548	0.0126	68.02	0.00	0.8302	0.8794
SMB	0.0184	0.0186	0.99	0.32	-0.0180	0.0548
HML	-0.2050	0.0197	-10.41	0.00	-0.2435	-0.1664
Fee	-0.0199	0.0463	-0.43	0.67	-0.1105	0.0708

Table 5.16: FF3-factor regression, equity focused funds, emerging markets

The first thing to note is, that only the HML variable is significantly different from zero, while the SMB factor is insignificant, implying that there seems to be no "small firm effect" in the returns of equity focused funds. The table also shows that including the additional variables does not change a lot for the other variables. The intercept is still significant, and the coefficient estimate is almost the same. The same goes for the market return and also for the fee variable, which both have not changed much when including the additional variables in the regression. The R-squared value has increased to 0.3019, probably mostly due to the HML factor which has some significant explanatory power.

The residual plots used for testing for heteroscedasticity are shown in appendix 10 and the two residual plots with the extra Fama-French factors on the x-axis, SMB and HML respectively, are shown below in figures 5.9 & 5.10.



Left figure 5.9: residual vs SMB plot for Fama French 3-factor regression, equity focused funds, emerging markets

Right figure 5.10: residual vs HML plot for Fama French 3-factor regression, equity focused funds, emerging markets

The graphs above show the residual distribution over different values for the two Fama-French factors, Small-Minus-Big and High-Minus-Low. In general, there seems to be no pattern leading to suspect heteroscedasticity, except for a few outliers in the HML plot to the right. The residual plot with predicted y-values on the x-axis, shown in appendix 10, has a weak pattern indicating a smaller variance for higher predicted y-values. The pattern does however not seem to be significant enough to reject the assumption of homoscedasticity. The two last plots do not have any clear pattern and hence the assumption of homoscedasticity are assumed to hold in this regression and the conclusions drawn above can be trusted.

5.2.3 Nordic Markets

Capital Asset Pricing Model Regression

With the last couple of sections focusing on emerging markets, it seems reasonable to find another geographical focus area to focus on for a comparison to make sense. Furthermore, it is interesting to analyse the Nordic markets since this is the home market for the funds of analysis. This could potentially have an effect. Because of that, the next couple of sections will put in a filter and only focus on funds which has the Nordic markets as their geographical focus area.

Of the total 3,437 funds, a total of 974 has the Nordic markets as their geographical focus area, which means that it is these 974 funds that will be analysed in the following sections. The first regression includes all asset classes, and after that the focus will again be concentrated on equity focused funds. The regression with all asset classes gives the following output.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0007	0.0002	3.13	0.00	0.0003	0.0011
Market Return	0.6332	0.0045	139.71	0.00	0.6243	0.6421
Fee	0.2157	0.0191	11.28	0.00	0.1782	0.2532

Table 5.17: CAPM regression, all asset classes, Nordic markets

All three coefficient estimates are statistically significantly different from zero at 99% confidence level, although the Intercept is close to the border. Interestingly, the fee variable is positive and significant, which indicates a positive relationship between fee and return, meaning that the higher the fee the higher the return. Not only is the fee variable positive, it is also a quite high number. As explained earlier, the impact of an increase in the fee by 1 percentage point on the yearly return can be calculated as the fee multiplied by 12. This means the model above predicts the impact on the yearly log return to be an increase of 2.5884 percentage points, when the fee increases by 1 percentage point.

The model explains the data relatively well, as the regression reports a R-squared value of 0.3106, indicating that over 31% of the variation is explained by these two variables and an intercept.
As with the previous regressions, a look at the residual plots are necessary to check for potential problems with heteroscedasticity. The residual plots are all shown in appendix 11. The plot with predicted y-values on the x-axis are shown in figure 5.11 below as well.

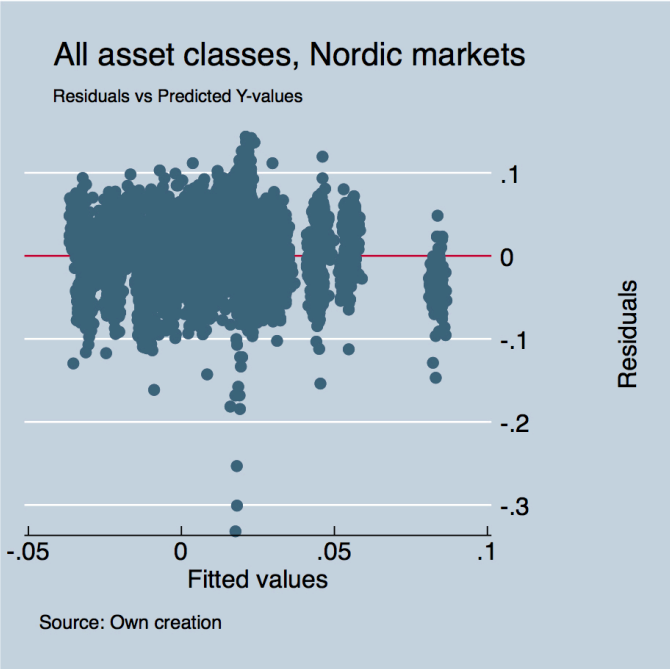


Figure 5.11: residual vs predicted Y-values plot for CAPM regression, all asset classes, Nordic markets

The plots all shows a quite constant variance of the residuals across the x-axis. There are in all plots a few outliers with relatively large negative residuals, but these few prediction residuals are not enough to have a breach of the homoscedasticity assumed in the Ordinary Least Square regression. The fairly stable variance is a good sign, as the three observations with large negative residuals are regarded as outliers, implying that they do not lower the reliability of the coefficient estimates too much, and they are certainly not a sign of problems with heteroscedasticity.

5.2.3.1 Equity-Focused Funds

Capital Asset Pricing Model Regression

As with the emerging markets regressions above, the regressions for the Nordic markets will also put focus on the equity focused funds in this section. Of the 974 funds with geographical focus area in the Nordic markets, a little under half of the are equity focused funds. More precisely there are 479 funds in the data analysed in this section. Regressing this data with methodology as explained yields the following results.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0037	0.0006	5.93	0.00	0.0025	0.0049
Market Return	0.6511	0.0066	97.96	0.00	0.6381	0.6641
Fee	0.0513	0.0429	1.20	0.23	-0.0327	0.1353

Table 5.18: CAPM regression, equity focused funds, Nordic markets

Where the previous regression including all asset classes showed all three coefficient estimates were significant, this regression has an insignificant coefficient estimate for the fee variable. This means that the regression does not find any significant impact of fees on returns for equity focused funds in the Nordic markets. The other two variables have significant coefficient estimates like in the previous regressions. An interesting thing to note is that the intercept is much higher in this model, which is of course due to the equity focused funds having a higher return on average than all the funds on average. This is supported by the tables shown in appendix 1, where equity focused funds clearly have the highest mean return.

The regression reports a R-squared value of 0.3108, meaning it is almost exactly the same as for the regression including all asset classes. Surprisingly the model is not a better fit for equity focused funds than what it is for all the different asset classes, even though the methodology is constructed to explain equity returns.

As with the other regressions, a test for problems with heteroscedasticity will be performed by looking at the residual plots. The residual plots are all shown in appendix 12. The plot with predicted y-values on the x-axis are shown in figure 5.12 below as well.

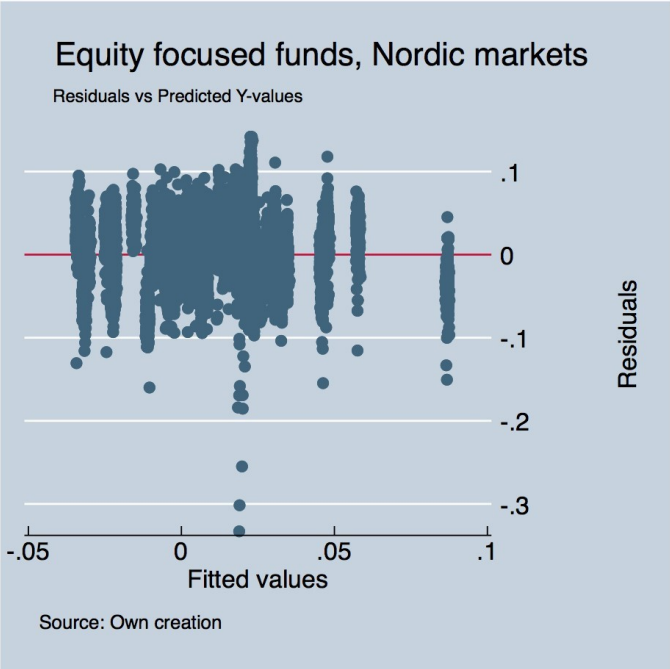


Figure 5.12: residual vs predicted Y-values plot for CAPM regression, equity focused funds, Nordic markets

The graphs both in appendix 12 and the one above looks very similar to the ones presented with the previous regression, except there are less observations. This is of course not a coincidence, and since some of the coefficient estimates are very similar and many of the funds are included in both, this also should not come as a surprise. The plot above shows the same three outliers. This picture is almost the same for the other two plots in the appendix. As with the previous regression this shows a very stable variance in the residuals, which is a clear sign of homoscedasticity and hence there is no reason to question the reliability of that assumption.

Fama-French Three-Factor Model Regression

As has been done earlier, the model used above will be extended to include the extra two factors in Fama-French's Three-Factor Model, Small-Minus-Big and High-Minus-Low. This will add further validity to the conclusions drawn, either by possibly changing the results or by simply confirming the estimates from the previous regressions. The Fama-French Three-Factor Model, including the fee variable, produces the following results shown in table 5.19 below.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0036	0.0006	5.83	0.00	0.0024	0.0048
Market Return	0.6538	0.0066	99.80	0.00	0.6409	0.6666
SMB	0.1722	0.0097	17.79	0.00	0.1532	0.1912
HML	-0.2286	0.0103	-22.28	0.00	-0.2488	-0.2085
Fee	0.0518	0.0422	1.23	0.22	-0.0309	0.1346

Table 5.19: Fama French 3-factor regression, equity focused funds, Nordic markets

The results are not surprising. The coefficient estimates for the intercept and the market return have not changed much and they are still significant at 99% confidence level, as the p-value is below 0.01. Both of the new factors are highly significant at 99% confidence level as well, but they do not change the conclusion about the fee variable, as there seems to be no significant relationship between fees and returns for equity focused funds with the Nordic markets as their geographical focus area. What can be said, is that even though no significant relationship exists, there is no reason for concluding that higher fees should lead to lower returns.

The regression returns a R-squared value of 0.3310, which means it has increased around two percentage points by adding the two additional factors. This is not surprising as they are highly significant and does not change the conclusions already drawn about the variables included in the previous regressions. This means the new variables are able to explain some of the variance not already explained in the previous regression.

The test for heteroscedasticity is performed using the residual plots shown in appendix 13. The residual plot with predicted y-values on the x-axis are also printed in figure 5.13 below to highlight differences or lack of differences compared to the previous regression.

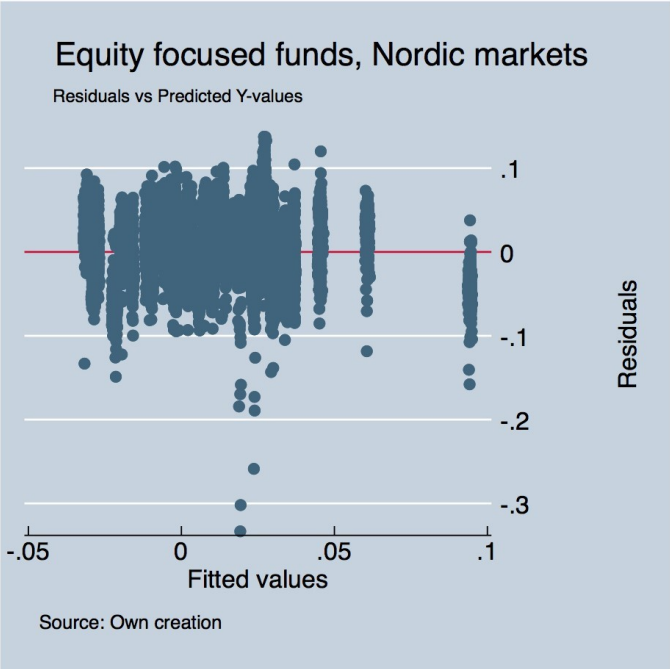


Figure 5.13: residual vs predicted Y-values plot for Fama-French regression, equity focused funds, Nordic markets

The plot above and the additional plots in the appendix shows no to little signs of heteroscedasticity. The only plot which shows some tendencies of heteroscedasticity are the residual plot with the fee variable on the x-axis. The tendency is not strong and hence the assumption about homoscedasticity in the error terms are assumed to hold in this regression.
Interestingly, and maybe a bit surprising, the error plot above looks almost exactly the same as the one in the previous regression, in the sense that the two additional factors have failed to explain the variance in the outliers. This means that even though the R-squared has increased by two percentage points, the residuals looks almost exactly the same.

5.2.4 Global Markets

Capital Asset Pricing Model Regression

The last couple of paragraphs have been dealing with the Nordic markets as the geographical focus area, but now the attention will be directed towards funds focusing on the global markets. This effectively means that the funds are not limiting themselves in terms of where they invest, but instead they are able to invest in the stocks in all markets and they do so.

The methodology which has been used for emerging markets and the Nordic markets will also be applied here, which means that the focus will go from a regression including all asset classes,

thereafter the focus will turn to equity focused funds and in the end the Fama-French Three-Factor Framework will be applied to extend the model and hence hopefully increase the reliability of the coefficient estimates obtained.

As said, the first regression below will not be limited in terms of asset classes the funds invest in and therefore it includes all funds investing in the global markets, which in the dataset used are 1,272 funds or more than 37% of the total amount of funds included. This shows that even though it is funds directed towards Nordic investors, there are more funds focusing on global markets than on the Nordic markets. The regression gives the following output shown below in table 5.20.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0034	0.0002	15.49	0.00	0.0030	0.0039
Market Return	0.5253	0.0038	139.09	0.00	0.5179	0.5327
Fee	0.0008	0.0145	0.06	0.96	-0.0275	0.0291

Table 5.20: CAPM regression, all asset classes, global markets

The results shown are for the intercept and the market return somewhat on line with what has been reported earlier. The intercept is small but still significant even at 99% confidence level. The market return is an indication of the correlation of the fund returns with the market return, and are highly significant, also at a 99% confidence level. It indicates that the funds are positively correlated with the market, which is not at all surprising. The fee variable is in this case almost equal to zero. It is far from significantly different from zero as the p-value is almost one and therefore, there seems to be no significant relationship between the fee the funds charge and their return.

The regression returns a R-squared value of 0.2207 which is in the low end compared to the similar regression for Emerging and Nordic markets, which returned R-squared values of 0.2825 and 0.3106 respectively. This means the regression methodology fits the funds with a geographical focus area of the global markets a little bit worse than the same methodology fitted emerging and Nordic markets.

As has been done for the other markets, there is obviously also a risk of heteroscedasticity in this regression which can possibly disable the use of the conclusions just drawn. The test for this will be

performed using the residual plots, which are all shown in appendix 14. The residual plot with the fee variable on the x-axis are also printed in figure 5.14 below.

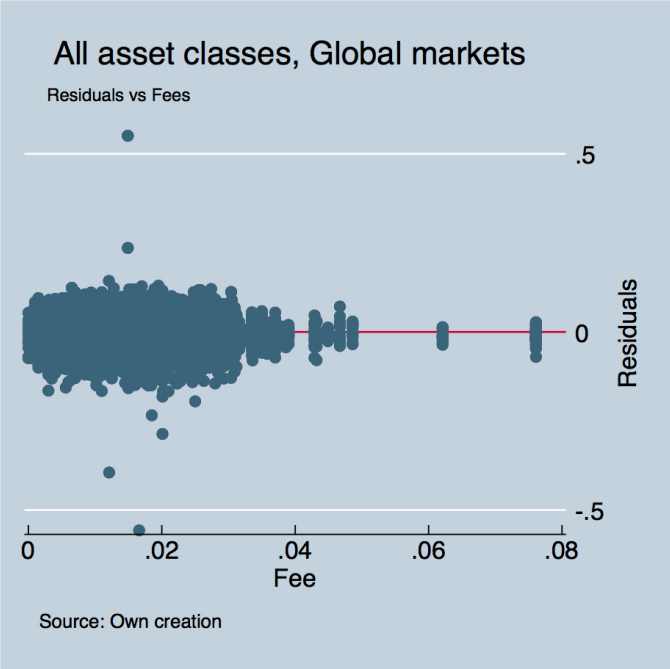


Figure 5.14: residual vs fees plot for CAPM regression, all asset classes, global markets

The graph above shows a fairly stable variance in the residuals. There are a few outliers around a fee of 0.02, but apart from those, the estimated model seems to fit the return data quite well. The additional plots shown in the appendix has no indication of heteroscedasticity, and therefore there is no reason to doubt the assumption of homoscedasticity in this regression. This effectively means the conclusions drawn above can be trusted.

5.2.4.1 Equity-Focused Funds

Capital Asset Pricing Model Regression

The regression above has been dealing with all asset classes, whereas this section will focus on the equity focused funds. Of the 1,272 funds with a geographical focus area of the global markets, above 41% are focusing on equities only. In total that amounts to 527 funds, which will be analysed in the following using the methodology explained earlier. This regression gives the results presented in table 5.21 below.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0053	0.0005	10.79	0.00	0.0043	0.0063
Market Return	0.5738	0.0059	97.00	0.00	0.5622	0.5854
Fee	-0.1294	0.0308	-4.20	0.00	-0.1898	-0.0690

Table 5.21: CAPM regression, equity focused funds, global markets

Compared with the regression above the intercept and market return coefficient estimates have both increased and are still both highly significant at a 99% confidence level. The fact that the estimates increase should not come as a surprise, as the data now only includes equity focused funds, which in general delivers higher returns. At the same time the CAPM framework is created for explaining equity returns, so the fact that the correlation with the market return is higher is also not surprising.

The coefficient estimate of the fee variable has changed a lot compared to the previous regression. It is now negative and significantly different from zero, even at 99% confidence level. This means the regression finds a significant negative relationship between fees and returns.

The regression reports a R-squared value of 0.2663, which has then increased around 4.5 percentage points compared to the regression including all asset classes. This means the methodology used is better at explaining the return of equity focused funds than the average of bond focused, money market focused and mixed asset focused funds. As mentioned earlier, this is no surprise as the CAPM framework has its roots in explaining equity returns. Although the R-squared value has increased it is still lower than the comparable regressions for emerging and Nordic markets, which reported R-squared values of respectively 0.2947 and 0.3108.

The residual plots used for testing for heteroscedasticity in the error terms can be seen in appendix 15. The looks of them are very similar to the regression above, although there are of course fewer observations. The outliers which is seen in the residual plots of the previous regression are also present here, meaning it was the equity focused funds which caused the outliers in the first place as well. This means that the plots look very similar, and hence the same conclusion about no existence of heteroscedasticity is also reached here, implying the conclusions drawn are valid.

Fama-French Three-Factor Model Regression

As has been done with the other geographical focus areas as well, the reliability of the estimates reported will be sought to be enhanced by extending the theoretical framework used from CAPM to Fama French Three-Factor model. This effectively means that two extra variables will be added, Small-Minus-Big and High-Minus-Low to the already used variables in the regression above. This will allow the results to be cleaned in the sense that variance related to the "Small-firm effect" and the "Value premium" are explained by the additional factors. This further enhances the reliability of the coefficient estimate, since it is now for sure explaining these two factors.

The Fama French Three-Factor regression for the global markets using only equity focused funds reports the following results seen in table 5.22.

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0053	0.0005	10.96	0.00	0.0044	0.0063
Market Return	0.5741	0.0058	98.54	0.00	0.5627	0.5855
SMB	0.2405	0.0086	27.94	0.00	0.2236	0.2573
HML	-0.1209	0.0092	-13.15	0.00	-0.1389	-0.1028
Fee	-0.1290	0.0303	-4.25	0.00	-0.1885	-0.0695

Table 5.22: Fama French 3-factor regression, equity focused funds, global markets

The results seen in the table above have not changed a lot compared to the regression using the CAPM framework. All of the three coefficient estimates are very similar to the ones reported earlier and are still statistically significant at a 99% confidence level. The additional factors added, SMB and HML, are both highly significant at a 99% confidence level as well. The interpretation of these results is that it enhances the reliability of the estimate of the fee variable. One worry before this regression could be that the fee estimate included some of the variance which could be explained by the "Small-firm effect" and the "Value premium". The fact that the estimate is almost the same, leads to the conclusion that the coefficient estimate for the fee variable did not include any variance which can be explained by SMB and HML.

The R-squared value of the regression has increased by a little over two percentage points to 0.2888 but is still lower than the comparable regressions for the emerging and Nordic markets, which reported R-squared value of 0.3019 and 0.3310 respectively.

The residual plots used for the graphical test for heteroscedasticity are found in appendix 16. They are again very similar to the previous two regressions and are showing the same outliers. This means that the two additional factors have not been able to explain the variance in the outliers. That said, there is no reason seen in the plots to doubt the assumption of homoscedasticity and hence the conclusions drawn are more reliable.

5.2.5 Summary of Main Regression Analysis

The previous chapter has mentioned a lot of numbers and it is maybe a bit hard to get an overview. To try and create this overview and to further enable comparisons between regressions, an overview table for the conclusions has been made. The overview table can be seen in table 5.23 below.

Regression number	Asset classes included	Geographical focus area	Theoretical framework	Coefficient estimate			Significance at 95% confidence level?			
				Intercept	Market Return	Fee	Intercept	Market Return	Fee	R-squared
1	All	All	None	0.0051	0.0000	0.0672	Yes	N/A	Yes	0.0002
2	All	All	CAPM	0.0025	0.6790	-0.1035	Yes	Yes	Yes	0.2991
3	Equity-focused funds	All	CAPM	0.0043	0.6976	-0.1914	Yes	Yes	Yes	0.3086
4	Equity-focused funds	All	Fama-French Three-Factor	0.0042	0.6996	-0.1919	Yes	Yes	Yes	0.3216
5	Bond-focused funds	All	CAPM	0.0019	0.3719	-0.0342	Yes	Yes	Yes	0.0727
6	Money market-focused funds	All	CAPM	0.0005	0.1176	0.0583	Yes	No	No	0.0005
7	Mixed assets-focused funds	All	CAPM	0.0021	0.5996	-0.0781	Yes	Yes	Yes	0.2864
8	All	Emerging Markets	CAPM	-0.0003	0.8486	-0.1003	No	Yes	Yes	0.2825
9	Equity-focused funds	Emerging Markets	CAPM	-0.0029	0.8522	-0.0182	Yes	Yes	No	0.2947
10	Equity-focused funds	Emerging Markets	Fama-French Three-Factor	-0.0030	0.8548	-0.0199	Yes	Yes	No	0.3019
11	All	Nordic Markets	CAPM	0.0007	0.6332	0.2157	Yes	Yes	Yes	0.3106
12	Equity-focused funds	Nordic Markets	CAPM	0.0037	0.6511	0.0513	Yes	Yes	No	0.3108
13	Equity-focused funds	Nordic Markets	Fama-French Three-Factor	0.0036	0.6538	0.0518	Yes	Yes	No	0.3310
14	All	Global Markets	CAPM	0.0034	0.5253	0.0008	Yes	Yes	No	0.2207
15	Equity-focused funds	Global Markets	CAPM	0.0053	0.5738	-0.1294	Yes	Yes	Yes	0.2663
16	Equity-focused funds	Global Markets	Fama-French Three-Factor	0.0053	0.5741	-0.1290	Yes	Yes	Yes	0.2888

Table 5.23: Overview table of regression figures

In the table above the regressions have been organized in the same order as they have been presented in the previous chapter. Furthermore, they have been given a number in the first column so that it is easier to refer to them. In the following the numbering will be used to allow for easier references to each regressions' output.

It should also be noted that not all regressions are equally easy to compare. The ones which are easiest to compare are the ones where only one parameter has changed, i.e. regression 4, regression 10, regression 13 and regression 16, where the only change is the geographical focus area of the funds included. Regression 4 includes all equity-focused funds, regression 10 includes only the ones focusing on emerging markets etc.

First of all, it is worth noting that the R-squared values are generally in the interval [0.22;0.33], which is quite high, with the exception of the very first regression, regression 5 and regression 6. Regression 5 and 6 are with the bond-focused funds and money market-focused funds respectively. With this low R-squared values the conclusions which appears are less reliable, implying they should not be trusted as much although the discussion about the results are still valid.

Secondly, if regression 3 and 4 are compared, it can be seen that the coefficient estimates of the fee variable changes very little, as it is still significantly different from zero on the negative side. At the same time the R-squared value increases by approximately 0.015 or 1.5%, indicating that adding the additional factors in the Fama-French framework is able to explain a fairly high percentage of the variation in the return of the equity-focused funds. This indication is not as clear in the emerging markets (regression 9 and 10) but is even more clear for both Nordic markets (regression 12 and 13) and global markets (regression 15 and 16). This could be due to the Nordic markets and global markets on average being more developed trading markets than the emerging markets.

Lastly, comparing the Fama-French Three-Factor Model regressions, regression 4, 10, 13 and 16, the most important thing is how the coefficient estimate for the fee variable looks. For regression 4 with all equity-focused funds included, the fee variable is significantly negative and the coefficient estimate is −0.19. For the equity-focused funds focusing on global markets, regression 16, the fee variable is also significantly negative, although the coefficient estimate is less negative. For both of these regressions it indicates a negative relationship between fee and return, implying the higher the fee the lower the return and vice versa. The two other regressions with equity-focused funds focusing on Nordic markets (regression 13) and emerging markets (regression 10), the coefficient estimates of the fee variable are insignificantly different from zero, and for the Nordic markets it is even positive, although the fact that it is insignificantly different from zero it is still worth noticing

that it is positive. This indicates that for funds focusing on these two markets, there seems to be no to little relationship between the fee the fund charges and the return of the fund, although the fact that the coefficient estimate is positive for equity-focused funds investing in Nordic markets, gives a slight indication that there is a tendency to a positive relationship between fee and return.

6. Discussion

The following sections will seek to discuss the implications of the results just highlighted. The first part will handle the relation of results to each other, and where the interesting differences and similarities appear. The following section relates the results obtained to the previous research presented in the literature review, in order to highlight where these results might differ and if there are any methodological reasons for this. Finally, a section on the impact of the limitations of the research in this paper, which will try and relax the limitations to assess what impact they have on the results just presented.

6.1 General Discussion

This section will relate the results obtained to each other and highlight similarities and differences. To ease the reading each point will be introduced using parts of table 5.23 in the summary section (section 5.2.5) to only show the results discussed in the following.

First of all, regression 4, 10, 13 and 16 will be compared as they all use the same theoretical framework, they only focus on equity-focused funds and are therefore only different in which geographical focus areas they have. Results from these regressions are presented below in table 6.1.

Regression number	Asset classes included	Geographical focus area	Theoretical framework	Coefficient estimate			Significance at 95% confidence level?			
				Intercept	Market Return	Fee	Intercept	Market Return	Fee	R-squared
4	Equity-focused funds	All	Fama-French Three-Factor	0.0042	0.6996	-0.1919	Yes	Yes	Yes	0.3216
10	Equity-focused funds	Emerging Markets	Fama-French Three-Factor	-0.0030	0.8548	-0.0199	Yes	Yes	No	0.3019
13	Equity-focused funds	Nordic Markets	Fama-French Three-Factor	0.0036	0.6538	0.0518	Yes	Yes	No	0.3310
16	Equity-focused funds	Global Markets	Fama-French Three-Factor	0.0053	0.5741	-0.1290	Yes	Yes	Yes	0.2888

Table 6.1: Overview table of regression figures for regression 4, 10, 13 and 16

The table above shows the regression including all equity-focused funds, regression 4, followed by regressions focusing on emerging markets, Nordic markets and global markets, regression 10, 13 and 16 respectively. Major differences are that the fee coefficient estimate is insignificantly different from zero for emerging markets and Nordic markets, whereas it is significantly negative for the overall regression and for global markets. For the Nordic markets the coefficient estimate is even slightly positive. What can be observed from that evidence suggests that actively managed equity-focused funds are performing better in Nordic markets than their passively managed equivalents,

although the difference is non-significant, implying that the coefficient estimate might as well be equal to zero. One reason why it could be that actively managed funds are performing relatively good focusing on Nordic markets could be that this is the home market for the funds. Even though most information by now are digital and therefore as accessible no matter where the fund manager is located, there could still be significant advantages by being close to the headquarters of the companies you invest in. The results obtained here could seem to point in that direction as well, even though the evidence is insignificant.

Furthermore, for global markets there is a clear indication that investors should prefer the passively managed funds, as the funds with the lower fees perform better than funds with higher fees. This could be due to the same point as mentioned above for Nordic markets but with the argument turned upside down. If a fund has a global perspective, there are so much information to process, and the fund will have a hard time being very close to all the firms they are invested in, which could explain why actively managed funds perform significantly worse than passively managed equity-focused funds.

In the following, the focus will be put on how the results for different asset classes are related to each other. For comparing that, the table below shows outputs for regression 2, 3, 5, 6 and 7 where the only difference is which asset classes are included in the analysis.

Regression number	Asset classes included	Geographical focus area	Theoretical framework	Coefficient estimate			Significance at 95% confidence level?			
				Intercept	Market Return	Fee	Intercept	Market Return	Fee	R-squared
2	All	All	CAPM	0.0025	0.6790	-0.1035	Yes	Yes	Yes	0.2991
3	Equity-focused funds	All	CAPM	0.0043	0.6976	-0.1914	Yes	Yes	Yes	0.3086
5	Bond-focused funds	All	CAPM	0.0019	0.3719	-0.0342	Yes	Yes	Yes	0.0727
6	Money market-focused funds	All	CAPM	0.0005	0.1176	0.0583	Yes	No	No	0.0005
7	Mixed assets-focused funds	All	CAPM	0.0021	0.5996	-0.0781	Yes	Yes	Yes	0.2864

Table 6.2: Overview table of regression figures for regression 2, 3, 5, 6 and 7

The first regression above includes all the funds in the dataset, where the four subsequent regressions each include a fraction which are determined by determined by the asset classes the funds focus on. This is the only difference between the regressions to allow easy comparison.

Surprisingly, all regressions except regression 6 find a significantly negative relationship between management fee and return of the funds. This means that it does not matter whether the fund focuses on equities, bonds or mixed assets, as passively managed funds are preferred to actively managed funds, suggested by the evidence that the higher the fee the lower the return. For Money market-focused funds the fee coefficient estimate is positive, implying actively managed funds are preferred over passively managed funds but the coefficient estimate is insignificantly different from zero, hence the conclusion is statistically unreliable, as the statistics say the coefficient estimate as well might be zero at a 95% confidence level.

That said, these conclusions should be used with care. As mentioned earlier, the methodology and theoretical frameworks used in this paper are developed with the purpose of explaining equity returns, and therefore should be used mainly for explaining returns of equity-focused funds. However, the results are still interesting as the statistical significance found and reported above are the main result to base the conclusions on. The fact that the model estimated fits better for equity-focused returns can be seen in the fact that the R-squared value are highest in regression 3, followed by regression 2 which also includes these funds. Finally, regression 7 has the third highest R-squared which partly can be explained by the fact that Mixed assets-focused funds likely includes a large fraction of equities.

6.1.1 Interpretation of Operationalisation

As previously described this paper uses the operationalisation of fees for actively and passively managed funds. This section seeks to relate the conclusions just drawn back to the discussion between active and passive investing.

Overall it can be said about the operationalisation that if the fee coefficient estimate is found to be significantly negative there is evidence suggesting that passive investing is better than active investing, as the evidence says that the higher the fee the lower the return. On the other hand, if the relationship between the fee and the return is significantly positive, it is evidence implying that active investing is performing better than passive investing. As mentioned this link is not completely linear but this is the operationalisation used and the evidence can be used to draw some conclusions about active and passive investing philosophies.

The conclusions drawn above means that overall evidence is found that passive investing should be preferred for investors when looking at equity-focused funds. This is seen in that the fee coefficient is significantly negative in regression 3 and 4 and thereby there is a negative relationship between management fee and the return. This, in addition to that active managed funds have a higher fee, all else equal, leads to the conclusion that passive investing should be preferred.

The regressions analysing equity-focused funds focusing on the emerging markets and the Nordic markets, the fee coefficient is insignificantly different from zero. That means there is no evidence suggesting that either passive or active investing should be preferred. That said, there seems to be some reason to believe that active investing performs better in the Nordic markets, also referred to as the home market, as the coefficient estimate is positive in regression 12 and 13. Even though there seems to be a tendency towards that, the coefficient estimate is not significant and therefore it is not a conclusion that can be trusted.

Turning to the analysis covering equity-focused funds focusing on global markets there is evidence suggesting that passive investing is preferred here. This is seen in the fact that the fee coefficient estimate is significantly negative in regression 15 and 16, implying a negative relationship between management fee and return creating this evidence.

Lastly, the regressions covering the other asset classes also provide some interesting insights. Regression 5 suggests that passive investing is preferred in bond-focused funds, as the fee coefficient estimate is significantly negative in this regression. For Money market-focused funds there seems to be no obvious preference between active and passive investing, as regression 6 shows a fee coefficient estimate which is insignificantly different from zero. Regression 7 suggests that for Mixed assets-focused funds, passive investing should be preferred with the same argument as for bond-focused funds.

6.2 Results Related to Previous Research

The general result of this paper shows little evidence towards the active manager being able to consistently and significantly outperforming the global stock market, measured in net return. This result is in line with some previous research, such as Carhart (1997), Ferreira et al. (2013) and

Jensen (1968). Although the highest level of analysis shows a significant negative relationship between fee and net return, all the broken-down results do not share the same conclusions.

It seems like the conclusion shows similar patterns that have been by recorded by previous researchers studying the larger markets around the world. The Nordic markets have, thus far, been left fairly unresearched, most likely due to their small size. The results in this paper also confirms that the Nordic markets also show the same characteristics as well-functioning markets, in terms of showing a slight tendency towards active managers adding more value than on the less functioning markets (Ferreira et al., 2013).

The sample has been kept survivorship bias free as described in the methodology section, as recommended by Grinblatt & Titman (1989, Hendricks et al. (1993) and Wermers (1997). Although their findings show that survivorship bias generally has a small effect on the investigated net returns, the effect is not possible to ignore and by adjusting the sample for these biases the results of this paper are comparable to those of the researchers mentioned above.

The difference found, that Nordic equity funds show a non-significant positive relationship between the fee and return implies similarities to the results of Ferreira et al. (2013). The Nordics can be classified as well-functioning and stable markets which is in line with the findings where the more stable markets were among the best for investments in active funds. It is, however, important to point out that this is not a significant result, but rather a tendency towards a similar result to Ferreira et al. (2013). Haslem et al. (2008) finds that fees that are disproportionally high compared to their returns might be explained by unsatisfactory levels of competition in the specific fund market. Taking that finding into account the results of this paper might show tendencies towards satisfying levels of competition in the Nordic fund markets. Interestingly, the total amount of funds offered with a focus on emerging markets exceed the amount of funds focusing on the Nordic markets. As mentioned earlier, this paper applies a fairly broad definition of the term emerging markets and therefore the intensity of competition could be lower despite the higher number of funds. The explanation could be that out of all the emerging markets funds, they might have large variations in their focus and thus not be direct competitors. The implication is that there might be unsatisfactory competition within the emerging markets segment causing a similar effect to the one

described by Haslem et al. (2008). The most apparent way to adjust for that issue as an investor is to simply make sure to invest at an as low fee as possible.

This paper shows some evidence of a so-called momentum effect, where a trading strategy of buying the past winners would yield a positive abnormal return. This effect is usually considered to be caused by persistence in returns, which is showed in previous research by among others: Cuthbertson et al. (2010), Hendricks et al. (1993) and Wermers (1997). The most common length of the persistence is one year, however, the length of this effect has not been studied further by this paper. Nevertheless, it is worth mentioning that performance persistence has been found also in this Nordic focused sample.

Cremers & Petajisto (2009) find that the level of activeness can be a predictor of returns, it seems like the more active the fund manager is, the more abnormal return can be generated. It is important to note that in comparison to this paper, there is no mechanism in place to measure the level of activeness within the examined funds. As discussed in the methodology section, the fee is just a proxy for active- and passiveness, but it cannot be used to compare level of activeness between funds. Therefore, these conclusions are not completely possible to apply to this paper.

The main conclusion drawn in this research is that there is no or little evidence of a skilled manager being able to add value to an investor choosing from the selection of funds in the Nordic market. This conclusion opposes these of previous authors such as Cuthbertson et al. (2010), Fama & French (2010), Haslem et al. (2008) and Wermers, (1997). Worth noting is that these authors used a somewhat different methodology where many compared gross returns and then added the fee at a later stage in their analysis. Interestingly, Fama & French find that there seems to be evidence for some managers actually being able to outperform the market because of skill. Due to the methodological decisions of this paper, no such analysis has been made.

6.3 Testing of Limitations

As discussed in the limitations and decisions section there are some limitations which are possible to relax in order to analyse the impact of having these limitations. The three limitations which will be analysed here is the limitation regarding only using Nordic funds, the limitation regarding the five-

year time horizon and the limitation regarding benchmarks. The following sections will analyse each of them in depth to assess if there is any impact of the limitations or not.

Each discussion is separate, meaning that they are not combined so that both time horizon is extended and other benchmarks are used in the same regressions. Instead the focus is on relaxing one limitation at a time. This is done to ease the comparison with the starting point and because the starting point is chosen as it is seen as the most reliable methodology, hence many changes to that will be of more confusion than adding value.

6.3.1 Time Horizon

As mentioned, this limitation is related to choosing a five-year time horizon. The choice of that is a trade-off between different factors talking in favour of a longer and/or shorter time horizon. The choice of five years is taken to try and balance out the disadvantages of either increasing or decreasing this horizon.

There are too big disadvantages of having a shorter time horizon, e.g. one year, but a longer time horizon of 10 years is worth investigating the impact of and that is exactly what this chapter will do. The analysis of this includes the same funds as the previous analysis, but it includes data all the way back to start of 2008 and still up until end of 2017, i.e. 10 years of data. This means that the funds which only existed in the period from 10 years ago and had closed down before beginning of 2013 are not included in the analysis. This is obviously reducing the validity a little bit, mostly because the number of observations are higher in some time periods than other, especially it means that the very first part of the time horizon, i.e. 2008 and 2009 have significantly less observations than e.g. 2013 has.

With the limitations mentioned, the analysis nevertheless will highlight whether changing the time horizon will change the conclusions drawn. Table 6.3 below presents the results in the same style as table 5.23 in section 5.2.5 where the summary of the empirical findings is found. This is done to simplify observing any potential differences. Furthermore, the same tables that is used along the analysis done in the previous sections is made with a time horizon of 10 years. These are all found in appendix 17 where more details regarding each regression can be found.

Regression number	Asset classes included	Geographical focus area	Theoretical framework	Coefficient estimate			Significance at 95% confidence level?			
				Intercept	Market Return	Fee	Intercept	Market Return	Fee	R-squared
1	All	All	None	0.0046	0.0000	0.0544	Yes	N/A	Yes	0.0002
2	All	All	CAPM	0.0024	0.6587	-0.0603	Yes	Yes	Yes	0.2266
3	Equity-focused funds	All	CAPM	0.0048	0.6772	-0.1734	Yes	Yes	Yes	0.2355
4	Equity-focused funds	All	Fama-French Three-Factor	0.0048	0.6769	-0.1733	Yes	Yes	Yes	0.2359
5	Bond-focused funds	All	CAPM	0.0016	0.3693	0.0260	Yes	Yes	Yes	0.0620
6	Money market-focused funds	All	CAPM	0.0001	0.0042	0.0417	No	No	Yes	0.0010
7	Mixed assets-focused funds	All	CAPM	0.0023	0.5763	-0.0667	Yes	Yes	Yes	0.2085
8	All	Emerging Markets	CAPM	0.0019	0.8031	-0.1790	Yes	Yes	Yes	0.2144
9	Equity-focused funds	Emerging Markets	CAPM	0.0008	0.8042	-0.1476	No	Yes	Yes	0.2201
10	Equity-focused funds	Emerging Markets	Fama-French Three-Factor	0.0007	0.8278	-0.1463	No	Yes	Yes	0.2267
11	All	Nordic Markets	CAPM	0.0009	0.6534	0.1467	Yes	Yes	Yes	0.2312
12	Equity-focused funds	Nordic Markets	CAPM	0.0044	0.6744	-0.0155	Yes	Yes	No	0.2342
13	Equity-focused funds	Nordic Markets	Fama-French Three-Factor	0.0044	0.6733	-0.0160	Yes	Yes	No	0.2353
14	All	Global Markets	CAPM	0.0029	0.5893	-0.0701	Yes	Yes	Yes	0.2378
15	Equity-focused funds	Global Markets	CAPM	0.0051	0.5940	-0.1520	Yes	Yes	Yes	0.2547
16	Equity-focused funds	Global Markets	Fama-French Three-Factor	0.0052	0.5834	-0.1524	Yes	Yes	Yes	0.2572

Table 6.3: Overview table of regression figures with time horizon of 10 years

First of all, an observation is that the R-squared values are in general much lower when using 10 years as time horizon. Most of the regressions done with five years of data resulted in R-squared values in the interval [0.22;0.33], where the R-squared values shown above are generally a little bit lower and most of them in the low end of that interval. A concrete example is regression 13 which has a R-squared value of 0.3310 with five years of data, while it is only 0.2352 in the table above. This means that the methodology of using the theoretical frameworks CAPM and Fama-French Three-Factor Model combined with the fee-variable is generally better in the latter part of the interval, as approximately 10% additional variation is explained.

In addition to that it can be seen the Fama-French model with two additional factors almost does not change the R-squared, even though the two factors, High-Minus-Low and Small-Minus-Big, are significantly different from zero in all regressions where they are included. This can be seen from the tables reported in appendix 17. This could potentially mean that these factors instead take away some of the explanatory power from the fee-variable, however this does not seem to be the case,

since the conclusion regarding significance of the fee variable and the coefficient estimate for the fee are unchanged in the table above, when going from CAPM regressions to Fama-French regressions.

The most important observation from the differences between the tables is, that regression 9 and 10 regarding emerging markets now reports the fee variable as significantly negative, implying a negative relationship between fee and return. This is different from the result obtained when using the shorter time horizon, although the coefficient estimate was negative there as well but insignificantly different from zero. The fact that the conclusion has changed is the most important impact of extending the time horizon to 10 years and indicates that the negative relationship between fee and returns in funds focusing on emerging markets are more significant in the beginning five years of the 10-year horizon.

Relating this change in significance back to the discussion of active versus passive investing, there are some change in the conclusions. The now significantly negative coefficient estimates for equity-focused funds focusing on emerging markets, implies that when investors have to choose between investing in passive or active equity-focused funds with a focus on emerging markets, passively managed funds should now be the preferred choice of the investor. This conclusion is drawn based on the statistically significant negative relationship between management fee and the performance of the fund.

There are also other conclusions that have changed when extending the time horizon but since the focus is mainly on equity-focused funds the one mentioned above is seen as the most important one. The other changes in relation to significance of the fee-variable is that the coefficient estimate is now significantly positive in the regression focusing on money market-focused funds, i.e. regression 6 in the table above, and that regression 14 including all asset classes with focus on global markets, now has the fee-variable significantly negative at a 95% confidence level. These conclusions, although interesting, has less impact on the focus area of this paper.

6.3.2 Benchmarks

As mentioned earlier it is highly relevant to investigate whether the conclusions drawn changes when using local indices as benchmarks instead of the global benchmarks used for far. There are both arguments for and against using these, while the main argument for using global indices as

benchmarks is that it aligns with the theory behind the CAPM and the Fama-French Three-Factor model, as these suggests all investors should invest in the market portfolio, which is typically regarded as e.g. the MSCI world index. Throughout this paper, it is also known as global benchmarks, although it is generally referred to simply as benchmarks.

This investigation will only look at the regressions which is are geographically focused on other regions than global markets and only includes equity-focused funds. The reason for this is simple, as changing to local benchmarks, which are dependent on the geographical focus of the regression only makes sense when the geographic focus is different of that already used. This means that the regression focusing on global markets already uses the "local" benchmark, as that is the global benchmark. The reason why it is only the equity-focused regressions which will be investigated here is that it is these funds which are the main focus area, and that equity-funds have more locally focused benchmarks in general compared to the other asset classes.

Because of this, it is regressions 9, 10, 12 & 13 that has been reconsidered here. The table 6.4 below shows these regressions in the same format as the original overview table. In appendix 18 the full output of each regression can be found, which provides further details regarding each regression. The main discussion is centred around the table shown below.

Regression number	Asset classes included	Geographical focus area	Theoretical framework	Coefficient estimate			Significance at 95% confidence level?			
				Intercept	Market Return	Fee	Intercept	Market Return	Fee	R-squared
9	Equity-focused funds	Emerging Markets	CAPM	0.0065	0.4841	-0.1502	Yes	Yes	Yes	0.1543
10	Equity-focused funds	Emerging Markets	Fama-French Three-Factor	0.0065	0.4811	-0.1496	Yes	Yes	Yes	0.1551
12	Equity-focused funds	Nordic Markets	CAPM	0.0087	0.2405	0.0092	Yes	Yes	No	0.0478
13	Equity-focused funds	Nordic Markets	Fama-French Three-Factor	0.0088	0.2257	0.0091	Yes	Yes	No	0.0542

Table 6.4: Overview table of regression figures with local indices

What can be seen in the table above should be compared to table 5.23 in section 5.2.5 showing the results of the original analysis.

For regression 9 and 10 the local index is an ETF tracking the stock price development in emerging markets. The ETF chosen is issued by iShares by BlackRock, which is one of the major issuers in

the ETF market. The ETF is called "iShares MSCI Emerging Markets ETF" (n.d.). The return data has been downloaded just like what was originally done with the world market ETF.

For regression 12 and 13 the local index is an ETF tracking the Nordic stock price development. The Nordic markets have their own index, the "OMX Nordic 40" (n.d.). Just like the ETF used for emerging markets the data series has been downloaded and are used for the Nordic funds only.

The main differences are found in the significance of the fee coefficient for emerging markets, where this regression shows the coefficient estimate to be significantly negative in regression 8 and 9, as opposed to the original regression which showed an estimate insignificantly different from zero. On the other hand, the R-squared value in this regression is just about the half of what it was in the original regression. This means that the conclusions from this goes two ways.

Firstly, the reduced R-squared values indicates that the local index for emerging markets actually fits the data worse than the global index. This could be due to that there is a lot of differences across the countries included in the definition emerging markets. Some are more correlated with the global market where US and Europe are the main markets, and some are almost only correlated with themselves. An example of the first type could be Indonesia, which is generally regarded as more western-like than some of its neighbour countries. An example of a country which is almost only correlated with itself could be Russia, where the stocks are very dependent on oil and gas prices and very much on the political environment in Russia. When there is that big differences across countries, an index of these will by definition be a very poor indicator and that is exactly what the R-squared value could suggest here. The fact that the global index actually fits the data better also confirms that the choice of using the global index in the first place was the best solution for emerging markets.

Secondly, the other side of the results above is, that there is an indication of a negative relationship between the fee of the fund and the return, which are now significantly negative. The fact that the R-squared value has decreased that much decreases the reliability of this conclusion slightly, but nevertheless it indicates this relationship. The change that the coefficient estimate is now significantly negative for emerging markets means that passively managed funds should now be preferred to actively managed funds, when investigating equity-focused funds with a focus on

emerging markets. This conclusion is drawn based on the statistically significant negative relationship between management fees and the performance of the funds.
For the Nordic markets the conclusions are very much the same as the original conclusions. There seems to be a slight positive relationship between fee and return, but it is far from significant with p-values as high as 0.77 and 0.78, which can be seen in appendix 18. Also, the R-squared values are much lower for the Nordic markets now, implying the same as for emerging markets above, that using the global index was the right decision in the first place, as the model estimated using this index has significantly higher R-squared values, meaning it explains the variation in the data much better.

6.3.3 Nordic Fund Markets

This section will seek to extend the analysis already presented so that instead of using data for Nordic markets this section uses data for funds listed in Switzerland. The reason for doing this is mainly that it will strengthen the reliability of the conclusions drawn regarding the Nordic markets if the same findings appear for another market. The Nordic market is quite narrow and with the investment market being further globalised in the sense that it gets easier to buy funds listed in other countries, it would enhance the conclusions if the same conclusions can be drawn on data from Switzerland. As mentioned earlier, the reasoning behind choosing Switzerland as the country to compare with are mainly that the data in the Datastream database is very complete in Switzerland, meaning that data is obtainable for almost all funds without extra work. It could have been any other market and as long as the countries are remotely comparable it makes sense, but Switzerland also has a somewhat equivalent number of funds.

The data for the Swiss funds has been downloaded using the exact same approach as the data for the Nordic markets. This is done to ease the data gathering process and because it makes sense to have the data in the same format in order to remake the analysis in the easiest way possible. For Switzerland there is a total of 2,618 funds included in the data with almost half of them being equity focused. The overview table below shows how the 2,618 funds are distributed across geographical focus areas and asset classes the funds focus on. This table has the Swiss market instead of the Nordic markets, which in this section will be considered the home market, just like the Nordic markets are the home markets for Nordic funds.

	Asset Type				
	Equity	Bond	Mixed Assets	Money Market	**Total**
Emerging Markets	146	10	-	-	**156**
Swiss Market	420	304	200	44	**968**
Global Markets	377	335	228	27	**967**
Other Markets	320	146	12	49	**527**
Total	**1,263**	**795**	**440**	**120**	**2,618**

Table 6.5: Overview table of regression figures using Swiss fund data

Worth noting in the table is that there are quite few funds focusing on emerging markets and no funds focusing on emerging markets and on the asset classes Mixed assets and Money markets. Almost 80% of all the funds are focused on the Swiss market and the global market, making the analysis of these more reliable compared to the ones for emerging markets.

Using this data and the same methodological approach used for the original analysis gives the same overview table as provided in the summary of the empirical findings, table 5.23. A similar table, table 6.6, can be seen below with the exact same format which eases the comparison between the obtained results. The full output for each regression can be seen in appendix 19.

As mentioned earlier, this extension is done to be compared to the original, meaning that it is done using the original choices of a time horizon of five years and using global indices, which the original analysis was extended with in the previous paragraphs. The results using Swiss fund data is seen below.

Regression number	Asset classes included	Geographical focus area	Theoretical framework	Coefficient estimate			Significance at 95% confidence level?			
				Intercept	Market Return	Fee	Intercept	Market Return	Fee	R-squared
1	All	All	None	0.0037	0.0000	0.0582	Yes	N/A	Yes	0.0001
2	All	All	CAPM	0.0034	0.0543	0.0525	Yes	Yes	Yes	0.0005
3	Equity-focused funds	All	CAPM	0.0070	0.0232	-0.0277	Yes	Yes	No	0.0001
4	Equity-focused funds	All	Fama-French Three-Factor	0.0071	0.0047	-0.0267	Yes	No	No	0.0018
5	Bond-focused funds	All	CAPM	0.0003	0.3452	0.1028	No	Yes	Yes	0.0065
6	Money market-focused funds	All	CAPM	0.0022	-3.5370	-3.3040	No	No	Yes	0.0049
7	Mixed assets-focused funds	All	CAPM	0.0033	0.0331	-0.0136	Yes	Yes	No	0.0008
8	All	Emerging Markets	CAPM	-0.0013	0.2999	0.2116	No	Yes	No	0.0090
9	Equity-focused funds	Emerging Markets	CAPM	-0.0012	0.2999	0.2099	No	Yes	No	0.0090
10	Equity-focused funds	Emerging Markets	Fama-French Three-Factor	-0.0012	0.2960	0.2096	No	Yes	No	0.0087
11	All	Swiss Market	CAPM	0.0044	-0.0471	0.0910	Yes	Yes	Yes	0.0016
12	Equity-focused funds	Swiss Market	CAPM	0.0095	-0.0947	-0.0095	Yes	Yes	No	0.0039
13	Equity-focused funds	Swiss Market	Fama-French Three-Factor	0.0096	-0.1061	-0.0086	Yes	Yes	No	0.0076
14	All	Global Markets	CAPM	0.0027	0.1090	-0.0204	Yes	Yes	No	0.0013
15	Equity-focused funds	Global Markets	CAPM	0.0078	0.0715	-0.2561	Yes	Yes	Yes	0.0018
16	Equity-focused funds	Global Markets	Fama-French Three-Factor	0.0080	0.0515	-0.2553	Yes	Yes	Yes	0.0041

Table 6.6: Overview table of regression figures using Swiss fund data

One of the main ideas behind this is that for the Swiss data Switzerland can be used as a home market just like the Nordic markets were used in the original regressions. This means that the conclusions can be compared in a way that if these regressions show the same for Switzerland as the original regressions did for the Nordic markets, then there is a clear indication about how fund fees are related to performance for home markets, whether they seem to perform better, the higher the fee or vice versa.

The first important observation from the table above is that the R-squared values are much smaller than the ones observed for the Nordic funds. It is very surprising that there is that big a difference. The main takeaway from that is that the model seems to fit the Nordic funds much better when trying to explain variance in return using this methodology. The fact that the R-squared values are that much lower means that the conclusions drawn are less reliable, simply because the model fits the data to a much lower extent. That said, the main area of interest is the conclusions regarding the fee variable and significance of the coefficient estimate. The conclusions drawn regarding that will still be trusted in the following.

The conclusion regarding significance of the fee coefficient estimate are for many of the regressions the same. For regression 3, 4, 6, 7 and 8 the conclusions have changed, meaning that for regressions 3, 4, 7 and 8 the fee coefficient estimate is now insignificant whereas it was significant before. For regression 6 the coefficient estimate is now significant. The most interesting of this is regression 3 and 4, which concludes that for Swiss equity-focused funds there is no significant relationship between the fee of the fund and the return it delivers on a general level, meaning that regression 3 and 4 includes all equity-focused funds and are not focused on a specific geographical region. This conclusion is different to that of the Nordic funds, where a significant negative relationship was found. Relating this to active versus passive investing means that for Swiss funds investors should have no preference between actively and passively managed equity-focused funds, as there is no significant relationship between the fee and the performance found in the data.

Other than that, the table shows that the conclusions regarding the home market, in this example the Swiss market are the same as for the Nordic funds. The conclusion is that there seems to be no relationship between the fee of equity-focused funds and the return of these funds for funds focusing on their home market. This strengthens the conclusions obtained for the Nordic funds, as this is not only relevant for Nordic funds but seems to be a thing which can be highly generalized. Generalizing this to active and passive investing gives the indication, that for equity-focused funds investing in home markets, investors should not prefer passively managed funds over actively managed funds.

Lastly, it is worth noting that for equity-focused funds focusing on Emerging markets and global markets the conclusions are the same. This means that the regressions for Emerging markets are unable to find any significant relationship between the fee of the fund and the return it delivers. On the contrary to that, the regressions involving equity-focused funds focusing on global markets find a significant negative relationship between fee and return. These two conclusions are the same as the ones drawn in the original analysis. Relating this back to the discussion of active versus passive investing it means that investors should not prefer passively managed equity-focused funds to actively managed equity-focused funds in emerging markets, while on global markets investors should prefer passively managed equity-focused funds to actively managed equity-focused funds.

6.4 Implication of Operationalisation

Even though a lot has been done to overcome the most important limitations of this paper, there are still some elements which can be criticised. The elements are hard to overcome and they are all a result of the methodology chosen. The implication of the operationalisation used will be discussed in the following, as this is the main limitation not addressed this far.

As mentioned earlier in section 4.1.2, this paper heavily relies on the operationalisation of using the management fee of the funds as a proxy for whether the funds are actively or passively managed. This operationalisation is not a perfect match. The implementation is done as it allows for a less strict definition of whether funds are actively or passively managed, because the only factor used is the management fee. It also eases the data gathering as that process otherwise would include looking into all 3,437 funds and assessing whether they have a passive or active management philosophy. Because of this, the operationalisation has been used and this section seeks to discuss the relevant constraints that puts on the conclusions.

The main problem with the operationalisation is that the link between fees and whether they are actively or passively managed is non-linear. What is meant by that is that it is impossible to conclude from the fee solely whether the funds are actively or passively managed. Instead the paper relies on the assumption that, all else equal, passively managed funds must have a lower fee than actively managed funds. Even though this assumption seems fair, this relationship cannot be assumed linear. Besides that, the conclusions drawn in this paper focuses only on whether there is a relationship between fee and performance and how that relationship is. It does not focus on whether there are differences in the relationship dependent on the level. It could be that instead of a negative relationship indicating that passively managed funds tend to outperform actively managed funds, it could indicate that cheap actively managed funds tend to perform better than expensive actively managed funds. This is an outcome of the operationalisation which is hard to overcome.

The implication of this is that the validity of the conclusions drawn are lowered a bit, since the last point above indicates that the relationship we find could be a consequence of something else, hence the wrong thing is measured. Apart from that, the overall reliability is also lowered from this, since this non-linear relationship makes the link from conclusions on relationship between fee and performance to the discussion of active versus passive investing cumbersome.

7. Conclusion

7.1 Summary of Study

The general purpose of this paper is to investigate if a relationship between management fees of funds and the performance of the funds exists and relate this to what effect it has on an investors choice between actively and passively managed funds. This purpose is operationalised by using the management fee as a proxy for whether the fund is actively or passively managed. From this data regression analyses are carried out to determine whether a statistically significant relationship exists. The aim is to allow for conclusions to be drawn which answers the research question: *"Does active management add value to the investor in the Nordic investment funds market?"*

The scope of this paper is centred around investment funds in the Nordic countries and as these markets hold a total of 3,437 funds there is unlikely to be problems with scarcity of data. These funds are focused on investing in equities, bonds, money markets or mixed assets and are geographically focused on the defined areas of Nordic markets, emerging markets, global markets and other markets. The paper focuses mainly on the equity-focused funds as these funds counts for the majority of the funds included in the data sample. Furthermore, the majority of previous research is centred on equity-focused funds.

Previous research has not shown consistent conclusions about actively versus passively managed investment funds, indicating that in some fields one might be preferred to the other but not giving a clear answer to this question. The methodology of the analysis conducted in this paper can be explained as firstly giving an overview based on the overall market of funds. After this it progresses to zoom in on funds investing in specific asset classes and funds having specific geographical focus areas. It relies heavily on two of the most well-known theoretical frameworks in the Capital Asset Pricing Model and the Fama-French Three-Factor Model.

The initial analysis suggested that for equity-focused funds there is a statistically significantly negative relationship between fee and performance, implying the higher the return, the lower the return. This practically means that investors should prefer passively managed funds to actively managed funds, since, all else equal, passively managed funds have a lower fee than their actively managed counterparts. When looking at specific geographical focus areas, the equity-focused funds focusing on global markets show a statistically significant negative relationship between fee and

performance, implying investors should prefer passively managed equity-focused funds to actively managed equivalents. For Nordic and emerging markets there are no statistically significant results found, meaning investors should have no preference between actively and passively managed funds, but for Nordic markets the coefficient estimate turned positive, implying that active management seems to be value-adding in Nordic markets. This result is however far from significant.

The paper has further sought to increase the ability to generalise the results by investigating the impact of the limitations done. Overall, it seems that by extending the time-horizon from five to ten years, using Swiss instead of Nordic fund data and using other benchmarks generally gives the same results. Main takeaways from these extensions are firstly, that it seems active management are more value-adding in 'home markets' as Swiss fund data also show a positive, however insignificant, coefficient estimate for equity-focused funds. Secondly, there seems to be evidence pointing towards a significantly negative relationship between fee and performance for equity-focused funds in emerging markets, implying that also for emerging markets, passively managed funds should be preferred for investors. Finally, it seems that for both emerging markets and Nordic markets the fund returns are better explained by the global market index compared to an index covering that specific region only.

7.2 Practical Implications

The practical implications from the research done in this paper are centred around the choices of an investor when investing in funds. The research finds that for equity-focused funds listed in the Nordic countries, investors should choose to invest in passively managed funds over actively managed funds. This is especially the case if the fund is focused on investing in global markets or, as some of the evidence suggests, in emerging markets. If the funds instead are focused on investing in the home market – in this situation the Nordic equity markets – then the investor should have no preference between actively and passively managed funds.

7.3 Suggestion for further research

While this paper covers some interesting research gaps it certainly also gives rise to some new areas of research which are related to methodology choices and results obtained. This section seeks to introduce these areas and explain why these areas are found particularly interesting to do further research on.

Extension of Theoretical Framework

The analysis focuses mainly on the equity-focused funds for many reasons. One of the main reasons is that the theoretical frameworks applied are constructed with the purpose of explaining variance in equity markets, hence the logical deduction is that they will fit better to equity-focused funds than funds focusing on other asset classes. Nevertheless, the same methodology is applied for both bond-focused, money market-focused and mixed assets-focused funds. An extension to that analysis could be to first of all asses if the theoretical frameworks applied are the ones most suited for the analysis of those funds, and second of all, if there are better frameworks which could strengthen the reliability of the conclusions drawn regarding these funds. An easy way of answering the first question would be to look at the R-squared values for the regressions including on the funds focusing on other asset classes than the equity-focused funds. An example of that is regressions 5, 6 and 7 in table 5.23, section 5.2.5.

From that table it is clear to see that the frameworks used are the best fit for equity-focused funds (regression 3), compared to the other asset classes. However, it seems that it actually fits very well for mixed assets-focused funds as well. This can be explained by the fact that these funds most likely hold a large fraction of equities anyway. For bond-focused funds it is much lower and again even lower for money market-focused funds.

It is things like these that should be investigated, and from the results discussed above it could seem that another methodological framework than CAPM could benefit the reliability of the conclusions drawn regarding bond-focused and money market-focused funds.

R-squared Values in Swiss Data

As mentioned earlier, it is very surprising that the R-squared values obtained from the regressions on Swiss data are so low, compared to the regressions using Nordic data. This paper does not dig into why this is the case, as it is clearly out of scope, but it could be interesting to see whether it is other market dynamics causing it, whether other theoretical frameworks could be applied to overcome this or what else could increase the reliability of the conclusions drawn.

Choice of Benchmarks

As the main analysis of this paper uses global indices, but heavily bases its conclusions on regressions only including a specific geographical focus area, the latter part of the paper sought to discuss and analyse whether it would be more inappropriate to use a local index to explain the variance in these regressions. The discussion was centred around an analysis similar to the original analysis, applying the local indices where it made sense. The outcome most interesting was that the global index actually was a better fit, which was very surprising. A suggestion for an area of further research could therefore be to look into why this is the case. A hypothesis could be that it could mean that the equities in each market are more correlated with the world index than it is with the index it is actually placed in locally.

Breakdown of Returns

Another interesting area to focus on from this paper is that it uses another term for returns than what is used in most previous literature. Therefore, to align the methodology with previous research, it could be interesting to split of returns in gross returns, fees and net returns, as most of previous literature does similar analysis on gross returns, subtracts fees and thereafter concludes based on net returns. What they find is that active management often adds value using gross returns but when fees are subtracted, the outperformance of actively managed funds does not outperform passively managed funds anymore. Doing this extension would increase the resolution of the analysis and thereby creating more transparency in the results.

Measure of Activeness

This paper uses a certain operationalisation of activity in a fund, to overcome the need for classifying funds in another way. This operationalisation is not at all the only way to overcome this. Another way of classifying the funds could be to use their tracking error to the benchmark, as a higher tracking error would indicate a more active fund, as it is then deviating more from the benchmark. This could also be done by using the funds correlation with the benchmark. Using these measures and setting up rules for when a fund is active or not and would therefore allow other types of analyses to be done. Using this could also eliminate the problem of some passive funds being "classified" as active, as they are charging a high fee.

Bibliography

Andersen, L. (2017). Passive aktiefonde har aldrig solgt bedre i Danmark - men væksten halter langt efter USA. Retrieved February 26, 2018, from https://finans.dk/privatokonomi/ECE9749321/passive-aktiefonde-har-aldrig-solgt-bedre-i-danmark-men-vaeksten-halter-langt-efter-usa/?ctxref=ext

Aronsson, O. (2017). Ny attack på dyra fonder – från Zalandos förre Norden-boss. Retrieved February 26, 2018, from https://www.breakit.se/artikel/8425/ny-attack-pa-dyra-fonder-fran-zalandos-forre-norden-boss

Barclay, M. J., Pearson, N. D., & Weisbach, M. S. (1998). Open-end mutual funds and capital-gains taxes. *Journal of Financial Economics*, *49*(1), 3–43. https://doi.org/http://dx.doi.org/10.1016/S0304-405X(98)00016-6

Bergstresser, D., & Poterba, J. (2002). Do after-tax returns affect mutual fund inflows? *Journal of Financial Economics*, *63*(3), 381–414. https://doi.org/10.1016/S0304-405X(02)00066-1

Berk, J., & DeMarzo, P. (2014). *Corporate Finance*. *Corporate Finance*.

Berner, Å. (2015). Varför går ETF:er inte bättre i Sverige? Retrieved February 27, 2018, from https://www.finansliv.se/artikel/varfor-gar-etfer-inte-battre-i-sverige/

Bryman, A., & Bell, E. (2015). *Business research methods* (4. ed.). Oxford.

Carhart, M. (1997). On Persistence in Mutual Fund Performance. *The Journal of Finance*, *52*(1), 57–82.

Chambers, D., Dimson, E., & Ilmanen, A. (2012). The Norway Model. *The Journal of Portfolio Management*, *38*(2), 67–81. https://doi.org/10.3905/jpm.2012.38.2.067

Christensen, M. (2003). *Evaluating Danish Mutual Fund Performance*. https://doi.org/10.1111/0022-1082.00397

Christensen, M. (2005). *Danish Mutual Fund Performance: Selectivity, Market Timing and Persistence*. *Department of Finance, Aarhus School of Business*.

Cremers, K. J. M., & Petajisto, A. (2009). How Active Is Your Fund Manager A New Measure That Predicts Performance. *Review of Financial Studies*, *22*(9), 3329–3365. https://doi.org/10.1093/rfs/hhp057

Cuthbertson, K., Nitzsche, D., & O'Sullivan, N. (2010). Mutual Fund Performance: Measurement and Evidence. *The Journal of Business*, *39*, 119. https://doi.org/10.1086/294846

Dahlquist, M., Engstrom, S., & Söderlind, P. (2000). Performance and Characteristics of Swedish Mutual Funds. *Journal of Financial and Quantitative Analysis*, *35*(3), 409–423.

Dall, U. (2018). Første årsresultat: 2017 gav pæne afkast – de aktive fonde slog de passive. Retrieved February 26, 2018, from https://www.shareholders.dk/investorviden/103230/foerste-aarsresultat-2017-gav-paene-afkast--de-aktive-fonde-slog-de-passive

Fama, E. F., & French, K. R. (1992). The Cross-section of Expected Stock Returns. *The Journal of Finance*, *47*(2), 427–465. https://doi.org/10.1561/104.00000024

Fama, E. F., & French, K. R. (1996). Multifactor Explanations of Asset Pricing Anomalies. *Journal of Finance*, *51*(1), 55–84. Retrieved from https://faculty.chicagobooth.edu/john.cochrane/teaching/35904_Asset_Pricing/Fama_French_multifactor_explanations.pdf

Fama, E. F., & French, K. R. (2004). The Capital Asset Pricing Model: Theory and Evidence. *Source: The Journal of Economic Perspectives*, *18*(3), 25–46. Retrieved from http://www.jstor.org/stable/3216805

Fama, E. F., & French, K. R. (2010). Luck Versus Skill in the Cross-Section of Mutual Fund Returns. *The Journal of Finance*, *47*(2), 427–465.

Fama, E. F., & Macbeth, J. D. (1973). Risk, Return, and Equilibrium: Empirical Tests. *The Journal of Political Economy*, *81*(3), 607–636. Retrieved from http://links.jstor.org/sici?sici=0022-3808%28197305%2F06%2981%3A3%3C607%3ARRAEET%3E2.0.CO%3B2-J

Ferreira, M. A., Keswani, A., Miguel, A. F., & Ramos, S. B. (2013). The Determinants of mutual fund performance: A cross-country study. *Review of Finance*, *17*(2), 483–525. https://doi.org/10.1093/rof/rfs013

Financial Times. (2017). Some tracker funds cost 10 times more than rivals.

French, K. R. (n.d.). Kenneth R. French - Data Library. Retrieved May 25, 2017, from http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Grinblatt, M., & Titman, S. (1989). Mutual Fund Performance : An Analysis of Quarterly Portfolio Holdings. *The Journal of Business*, *62*(3), 393–416.

Grinblatt, M., & Titman, S. (1993). Performance Measurement without Benchmarks : An Examination of Mutual Fund Returns. *The Journal of Business*, *66*(1), 47–68.

Grinblatt, M., & Titman, S. (1994). A study of monthly mutual fund returns and performance evaluation techniques. *Journal of Financial and Quantitative Analysis*, *29*(3), 419–444. https://doi.org/10.2307/2331338

Guermat, C. (2014). Yes, the CAPM is testable. https://doi.org/10.1016/j.jbankfin.2014.05.001

Haslem, J. A., Baker, H. K., & Smith, D. M. (2008). Performance and Characteristics of Actively Managed Retail Equity Mutual Funds with Diverse Expense Ratios. *Financial Services Review*, *17*(1), 49–68. https://doi.org/10.3905/joi.2007.686410

Helgesson, H. (2016). Sverige fortfarande världsbäst på att spara i fonder. Retrieved February 26, 2018, from http://fondkollen.se/fondbloggen/inlagg/sverige-fortfarande-varldsbast-pa-att-spara-i-fonder/

Hendricks, D., Patel, J., & Zeckhauser, R. (1993). Hot Hands in Mutual Funds : Short-Run Persistence of Relative Performance. *The Journal of Finance*, *48*(1), 93–130.

Henriksen, K. (2007). ETF hvad er det? Retrieved April 16, 2018, from http://www.morningstar.dk/dk/news/90965/etf-hvad-er-det.aspx

iShares MSCI Emerging Markets ETF. (n.d.). Retrieved April 10, 2018, from http://www.morningstar.dk/dk/etf/snapshot/snapshot.aspx?id=0P0000MVMN

iShares Short Treasury Bond ETF. (n.d.). Retrieved March 12, 2018, from http://www.morningstar.dk/dk/etf/snapshot/snapshot.aspx?id=0P0000M4UG

Jensen, M. C. (1968). PROBLEMS IN SELECTION OF SECURITY PORTFOLIOS. *The Journal of Finance*, *23*(2).

Jensen, M., Scholes, M., & Black, F. (1972). The Capital Asset Pricing Model: Some Empirical Tests. *Studies in the Theory of Capital Markets*. Retrieved from http://papers.ssrn.com/abstract=908569

Jones, R. C., & Wermers, R. (2011). Active management in mostly efficient markets. *Financial Analysts Journal*, *67*(6), 29–45. https://doi.org/10.2469/faj.v67.n6.5

Korkeamaki, T. P., & Smythe, T. I. (2004). Effects of market segmentation and bank concentration on mutual fund expenses and returns: Evidence from Finland. *European Financial Management*, *10*(3), 413–438. https://doi.org/10.1111/j.1354-7798.2004.00257.x

Liljeblom, E., & Löflund, A. (2000). Evaluating mutual funds on a small market: Is benchmark selection crucial? *Scandinavian Journal of Management*, *16*(1), 67–84. https://doi.org/10.1016/S0956-5221(98)00033-5

Lindmark, J. (2016). Få fördelar med ETF. Retrieved February 27, 2018, from http://www.morningstar.se/Articles/Chronicle.aspx?title=fa-fordelar-etf-sverige

Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics*, *47*(1), 13. https://doi.org/10.2307/1924119

Markowitz, H. M. (1952). Portfolio Selection. *The Journal of Finance*, *7*(1), 77–91. https://doi.org/10.1111/j.1540-6261.1952.tb01525.x

Markowitz, H. M. (1959). *Portfolio Selection: Efficient Diversification of Investments*. New York: John Wiley & Sons, Inc.

Morningstar. (n.d.). Total Expense ratio. Retrieved March 5, 2018, from http://www.morningstar.dk/dk/glossary/100564/total-expense-ratio.aspx

Mossin, J. (1966). Equilibrium in a Capital Asset Market. *Econometrica*, *34*(4), 768. https://doi.org/10.2307/1910098

MSCI. (n.d.). Market classification. Retrieved April 12, 2018, from https://www.msci.com/market-classification

MSCI. (2018). MSCI EMERGING MARKETS INDEX (USD). Retrieved from

https://www.msci.com/documents/10199/c0db0a48-01f2-4ba9-ad01-226fd5678111

Newbold, P., Carlson, W. L., & Thorne, B. M. (2013). *Statistics for Business and Economics* (Global edi). Pearson Education.

OMX Nordic 40. (n.d.). Retrieved from http://www.nasdaqomxnordic.com/index/index_info?Instrument=SE0001809476

Pettersson, F., Helgesson, H. & Hård af Segerstad, F. (2009). *30 Years of Investment Funds*.

Rohleder, M., Scholz, H., & Wilkens, M. (2010). Survivorship bias and mutual fund performance: Relevance, significance, and methodical differences. *Review of Finance*, *15*(2), 441–474. https://doi.org/10.1093/rof/rfq023

Rune, G. (2002). Sverige bäst på fondsparande. Retrieved February 26, 2018, from https://www.sydsvenskan.se/2002-12-02/sverige-bast-pa-fondsparande

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research methods for business students* (7. ed.). Harlow.

Serhan, A., West, C., Wolper, G., Miller, J., Chan, W., & Donnell, K. O. (2017). Morningstar Global Fund Investor Experience Study 2017 Project management and quantitative analysis Table of Contents, (1), 1–209.

Sharpe, W. F. (1964). Capital asset prices: A theroy of market equilibrium under conditions of risk. *The Journal of Finance*, *19*(3), 425–442. https://doi.org/10.2307/2329297

Sjöholm, P., & Schauman, P. (2017). Fondsparare se upp! Håller dina fonder vad de lovar? Retrieved May 3, 2018, from https://svenska.yle.fi/artikel/2017/06/04/fondsparare-se-upp-haller-dina-fonder-vad-de-lovar

SPC. (2016). Are the Skewness and Kurtosis Useful Statistics? Retrieved February 6, 2018, from https://www.spcforexcel.com/knowledge/basic-statistics/are-skewness-and-kurtosis-useful-statistics#skewness

The Economist. (2008). Ins and outs - Acronyms BRIC out all over. Retrieved April 12, 2018, from https://www.economist.com/node/12080703

Thomson Reuters Datastream. (n.d.). Thomson Reuters Datastream. Retrieved from https://financial.thomsonreuters.com/en/products/tools-applications/trading-investment-tools/datastream-macroeconomic-analysis.html

Treynor, J. L. (1961). Market Value, Time, And Risk. *Unpublished Manuscript*. Retrieved from http://ssrn.com/abstract=447580

Vanguard All-World ETF. (n.d.). Retrieved March 12, 2018, from http://www.morningstar.dk/dk/etf/snapshot/snapshot.aspx?id=0P0000YXJO

Vanguard Total Bond Market ETF. (n.d.). Retrieved March 12, 2018, from http://www.morningstar.dk/dk/etf/snapshot/snapshot.aspx?id=0P0000M4YZ

Wermers, R. (1997). Momentum Investment Strategies of Mutual Funds, Performance Persistence, and Survivorship Bias. *Unpublished Working Paper, University of Colorado,[…*, (1996), 1–29. Retrieved from http://jpkc.whu.edu.cn/jpkc2003/investment/kcwz/wxxd/art%5CM%5Cmomentum investment strategies,mutual funds.pdf

Wermers, R. (2000). Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs and Expenses. *The Journal of Finance*, *55*(4).

Appendix

The appendix section includes the following appendices:

Appendix 1: Return statistics per asset class

Appendix 2: Residual plots for regression 2

Appendix 3: Residual plots for regression 3

Appendix 4: Residual plots for regression 4

Appendix 5: Residual plots for regression 5

Appendix 6: Residual plots for regression 6

Appendix 7: Residual plots for regression 7

Appendix 8: Residual plots for regression 8

Appendix 9: Residual plots for regression 9

Appendix 10: Residual plots for regression 10

Appendix 11: Residual plots for regression 11

Appendix 12: Residual plots for regression 12

Appendix 13: Residual plots for regression 13

Appendix 14: Residual plots for regression 14

Appendix 15: Residual plots for regression 15

Appendix 16: Residual plots for regression 16

Appendix 17: Regression outputs for regressions with time-horizon of 10 years

Appendix 18: Regression outputs for regressions with local benchmarks

Appendix 19: Regression outputs for regressions with Swiss data

Appendix 1 – return statistics per asset class

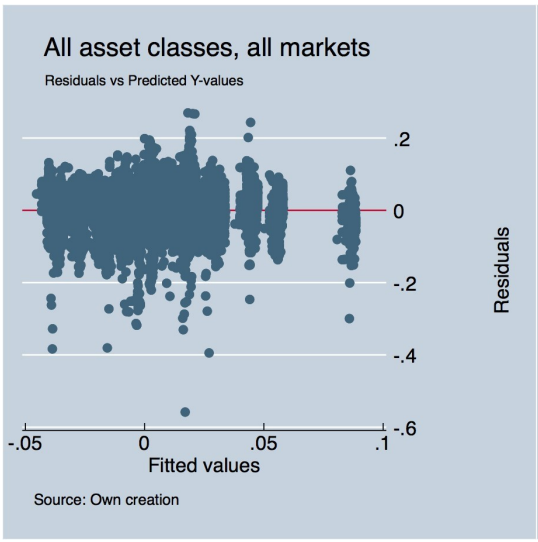
Equities	2013	2014	2015	2016	2017
Mean	0.11	0.12	0.09	0.09	0.10
Standard deviation	0.13	0.14	0.13	0.12	0.10
Median	0.13	0.14	0.10	0.10	0.10
25% quartile	0.04	0.07	0.04	0.04	0.05
75% quartile	0.19	0.19	0.15	0.15	0.15
Skewness	-0.25	-2.05	-0.91	-0.67	-1.28

Bonds	2013	2014	2015	2016	2017
Mean	0.01	0.04	0.00	0.04	0.03
Standard deviation	0.07	0.04	0.03	0.03	0.03
Median	0.02	0.04	0.00	0.03	0.03
25% quartile	0.00	0.02	-0.01	0.02	0.01
75% quartile	0.04	0.07	0.01	0.06	0.05
Skewness	-8.89	-0.85	-2.05	0.90	0.00

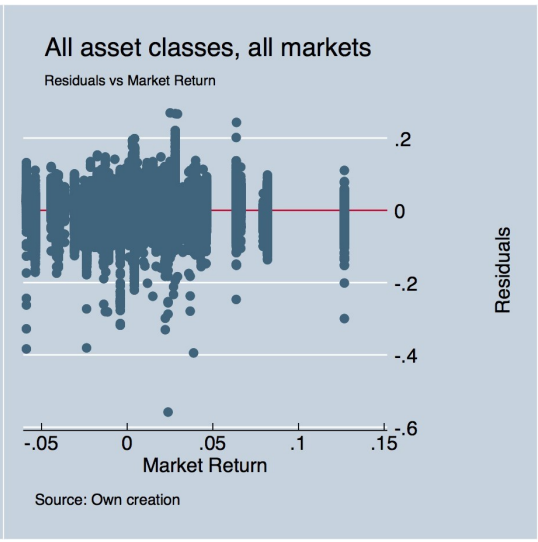
Mixed Assets	2013	2014	2015	2016	2017
Mean	0.06	0.09	0.05	0.05	0.05
Standard deviation	0.06	0.05	0.07	0.06	0.05
Median	0.06	0.09	0.05	0.05	0.05
25% quartile	0.03	0.06	0.02	0.02	0.03
75% quartile	0.10	0.12	0.08	0.08	0.07
Skewness	-0.78	-0.02	2.14	-3.21	-0.05

Money Markets	2013	2014	2015	2016	2017
Mean	0.01	0.01	0.01	0.01	0.00
Standard deviation	0.02	0.02	0.02	0.02	0.02
Median	0.01	0.01	0.00	0.00	0.00
25% quartile	0.00	0.00	0.00	0.00	0.00
75% quartile	0.02	0.02	0.01	0.02	0.01
Skewness	-1.94	2.41	5.44	1.05	-3.86

Appendix 2 – residual plots for CAPM regression, all asset classes, all markets



Source: Own creation



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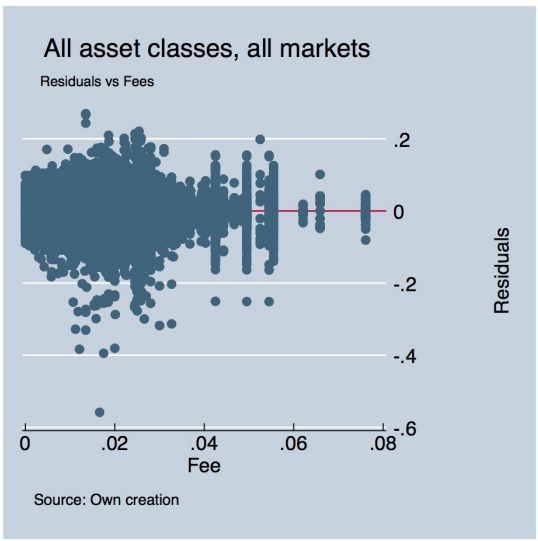
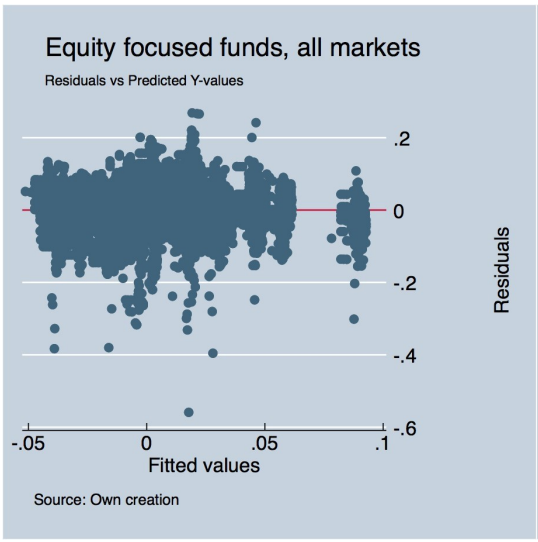
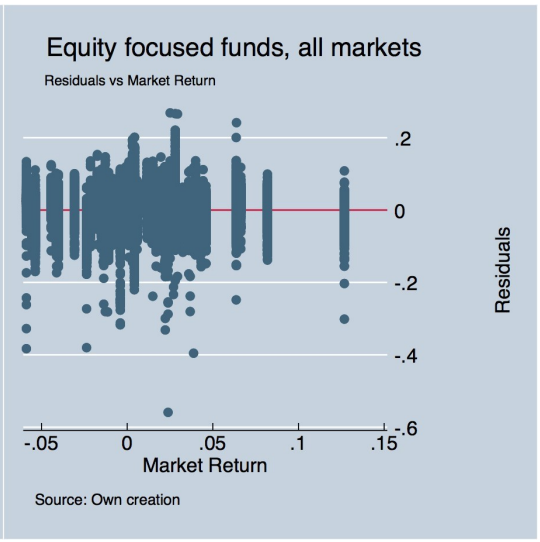
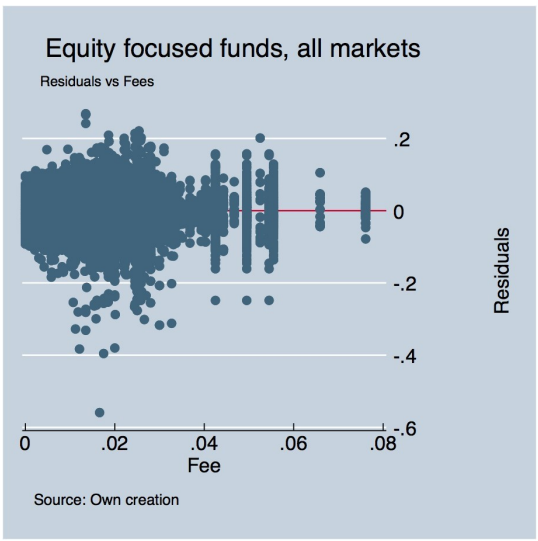


Source: Own creation

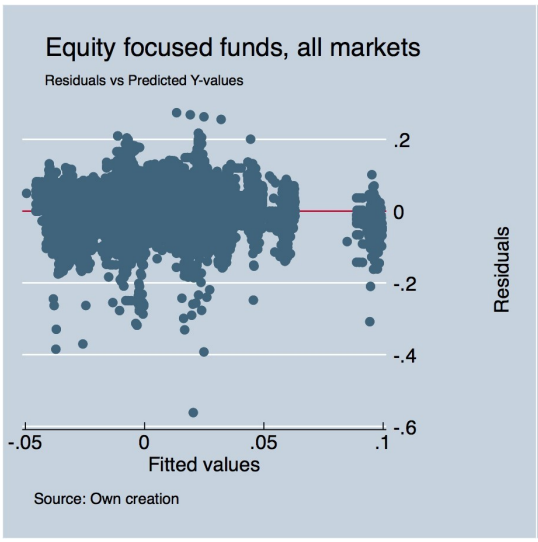
Appendix 3 – residual plots for CAPM regression, equity focused funds, all markets

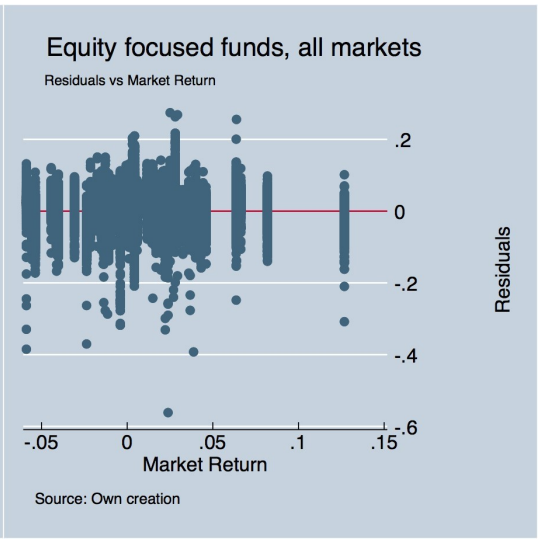


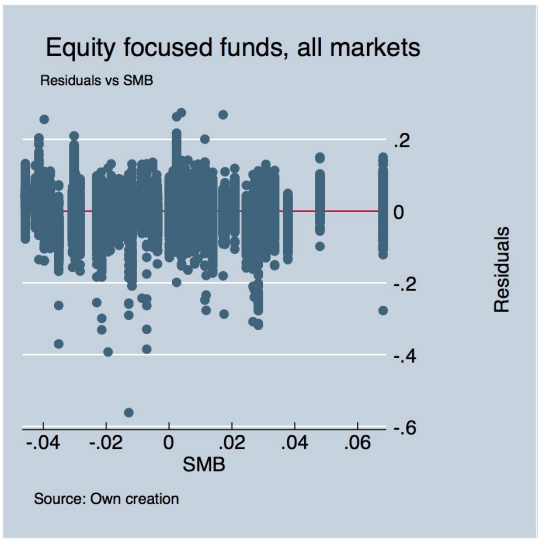


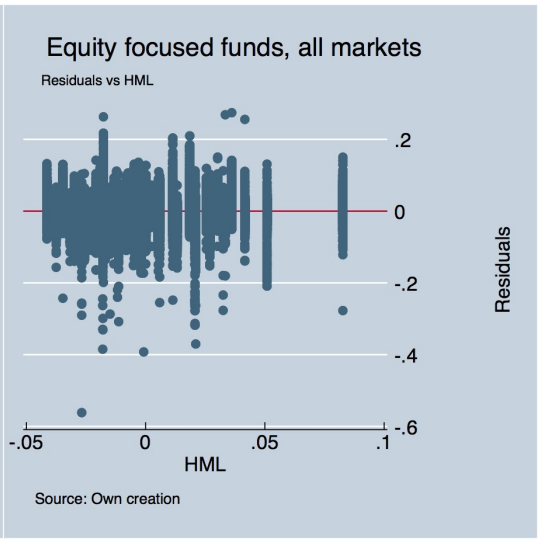


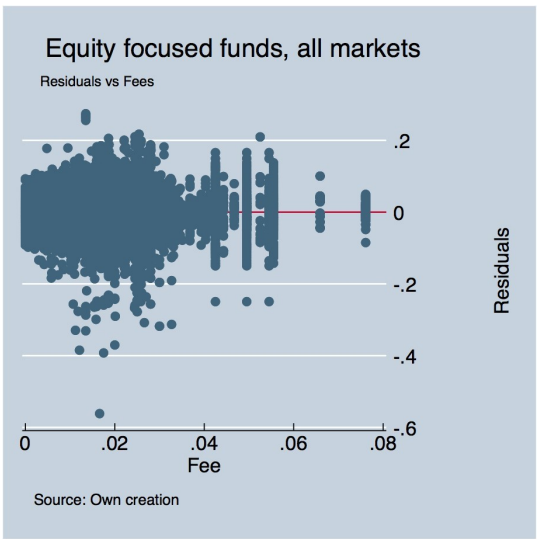
Appendix 4 – residual plots for Fama-French regression, equity focused funds, all markets



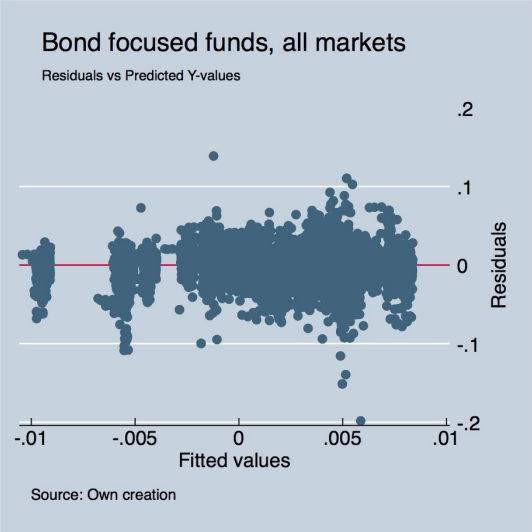


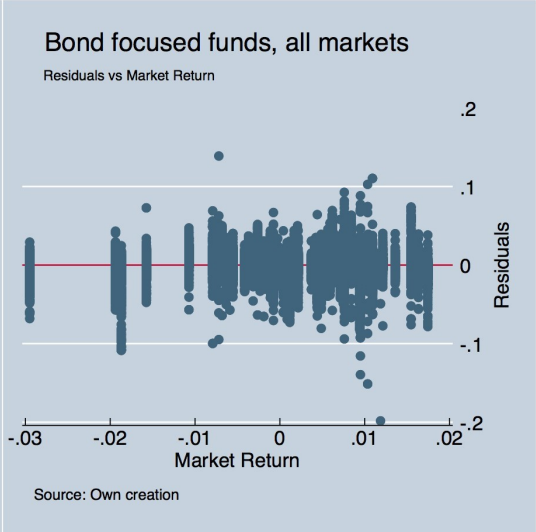


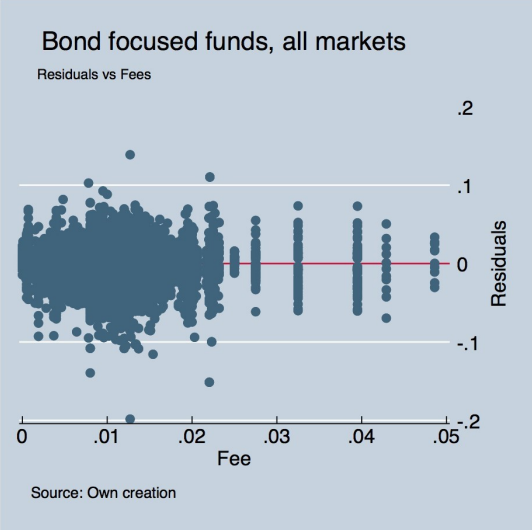




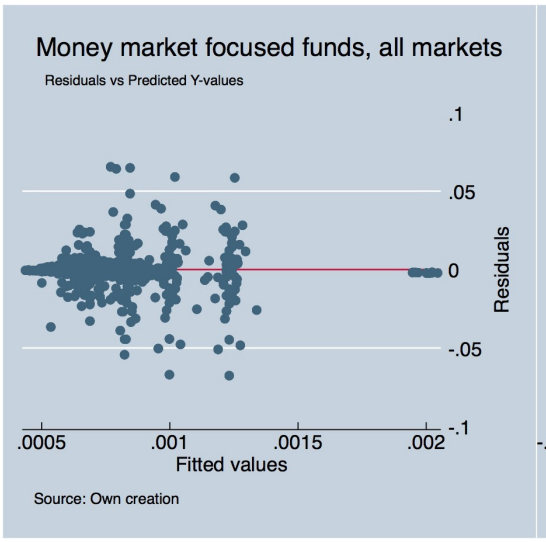
Appendix 5 – residual plots for CAPM regression, bond focused funds, all markets

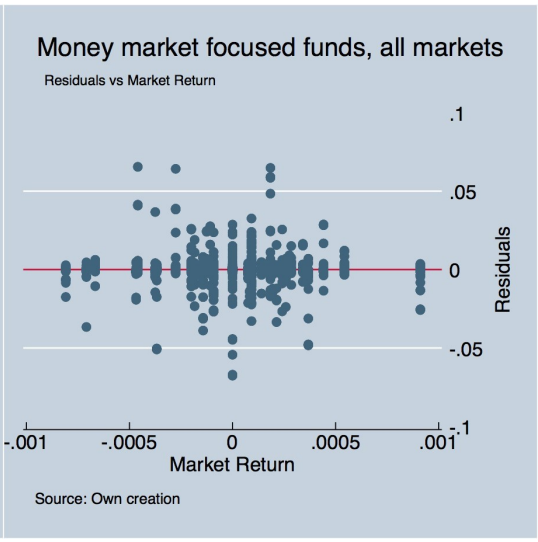


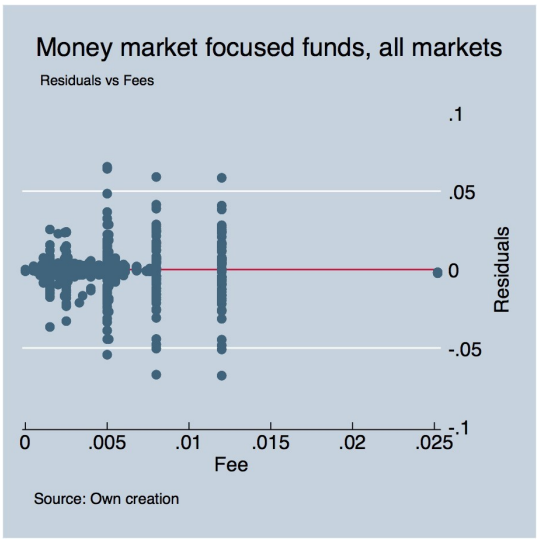




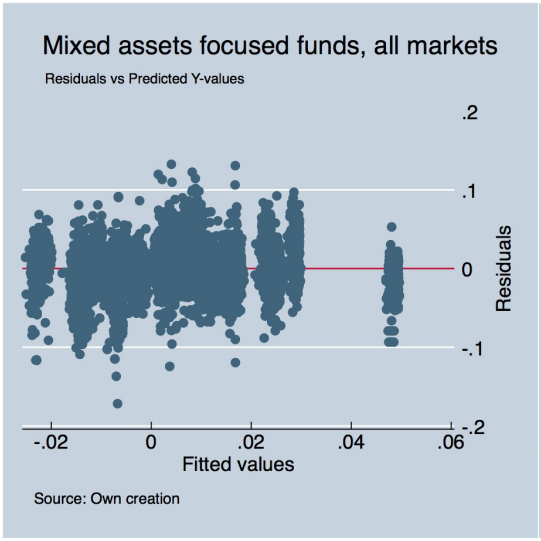
Appendix 6 – residual plots for CAPM regression, money market focused funds, all markets

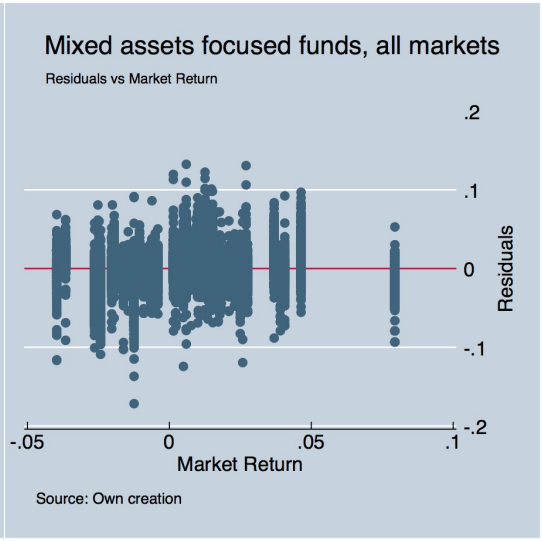


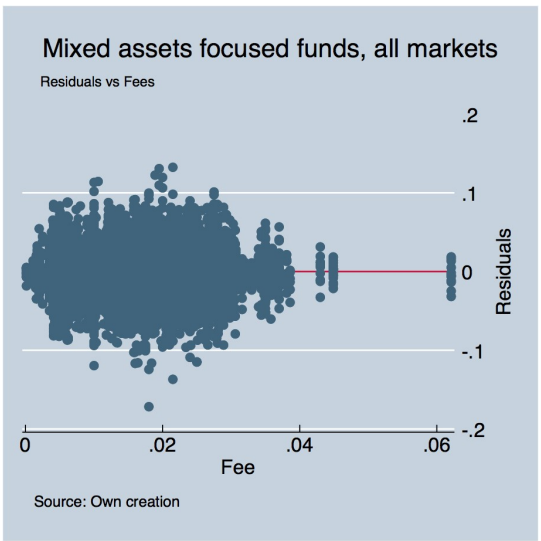




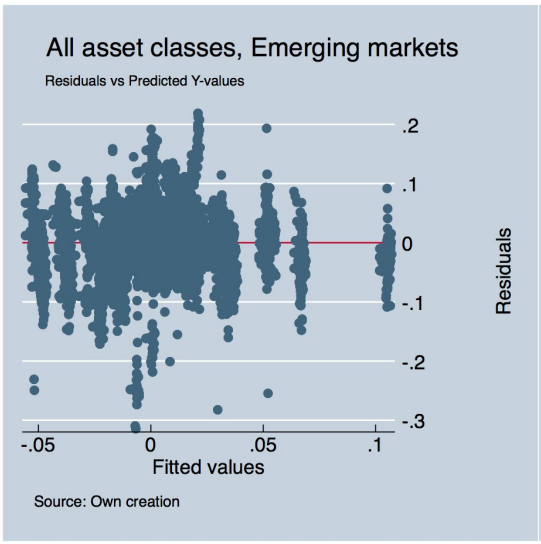
Appendix 7 – residual plots for CAPM regression, mixed assets focused funds, all markets

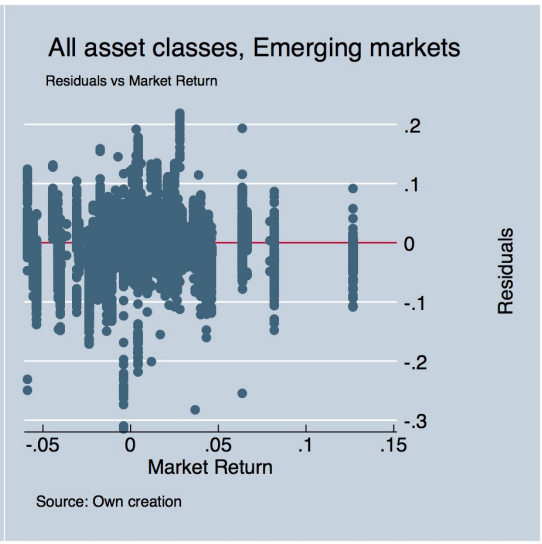


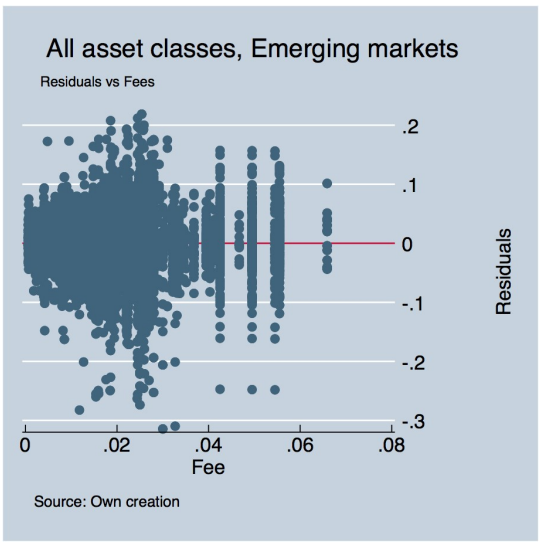




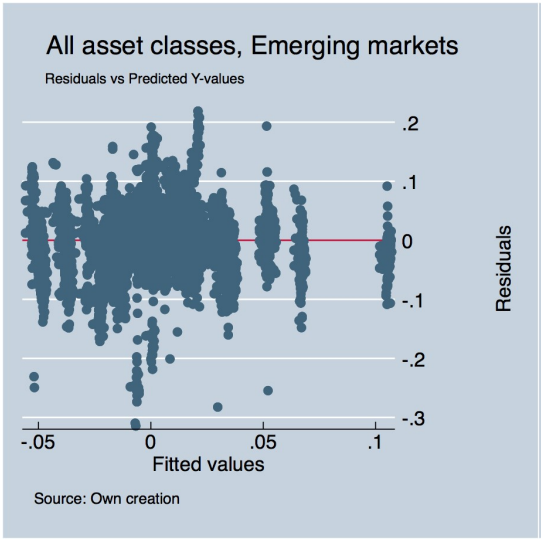
Appendix 8 – residual plots for CAPM regression, all asset classes, Emerging markets

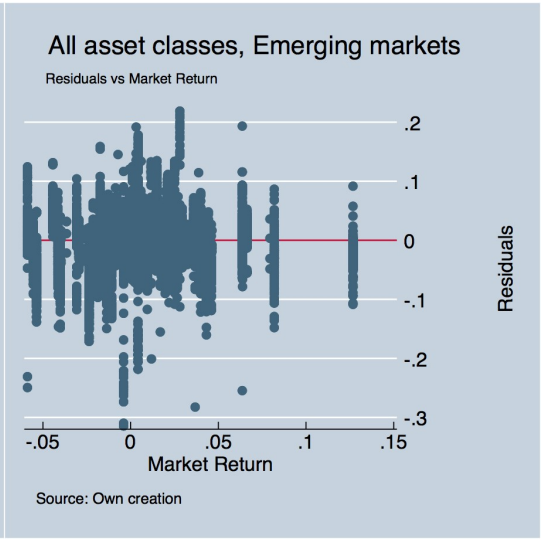


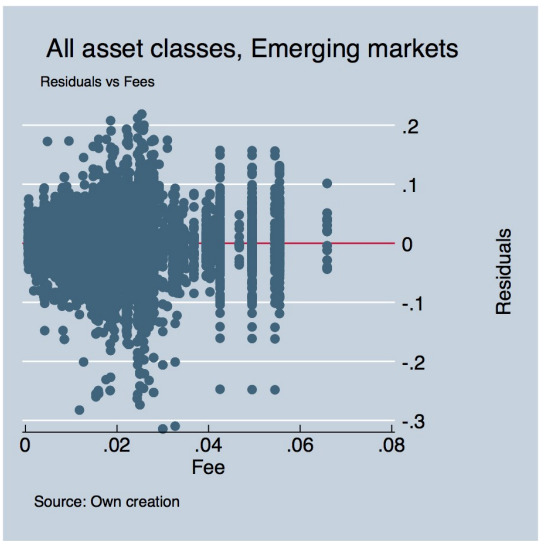




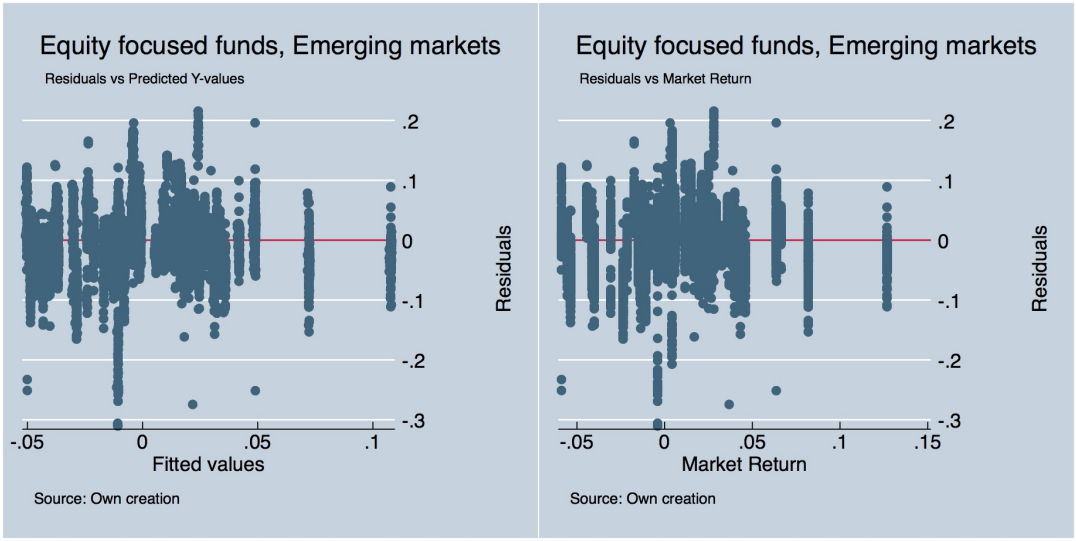
Appendix 9 – residual plots for CAPM regression, equity focused funds, Emerging markets

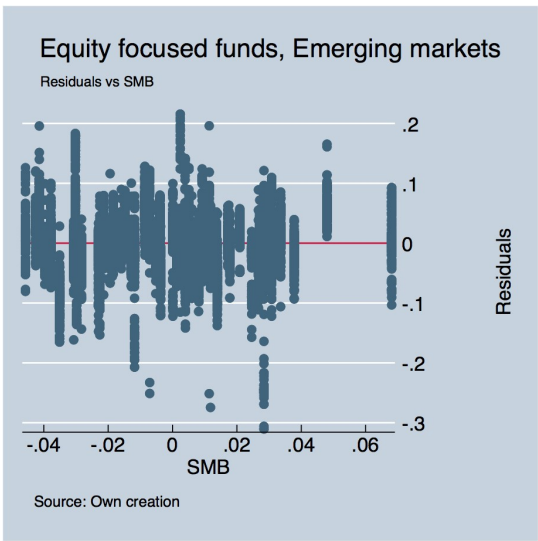


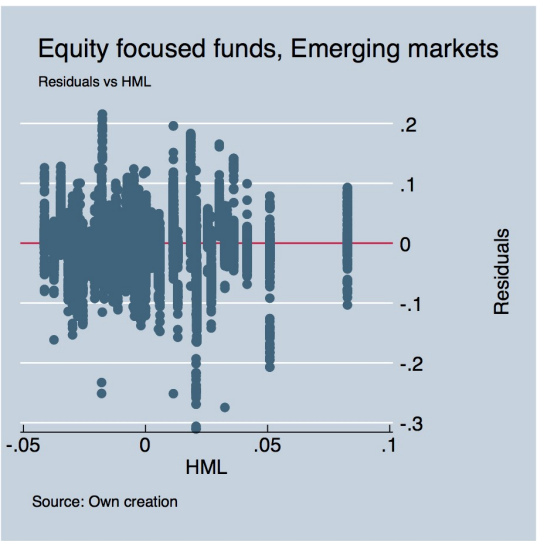


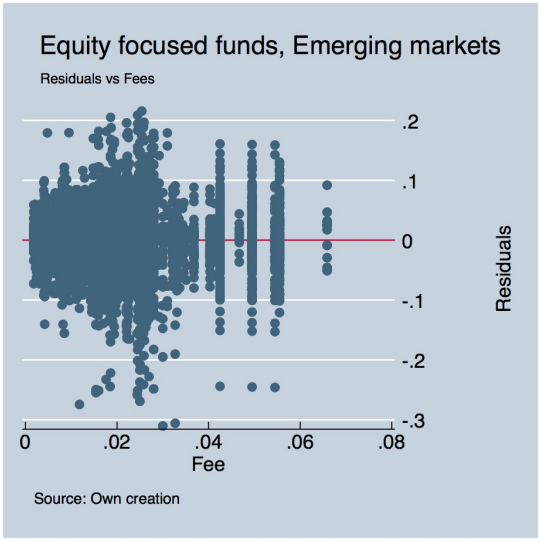


Appendix 10 – residual plots for Fama-French regression, equity focused funds, Emerging markets

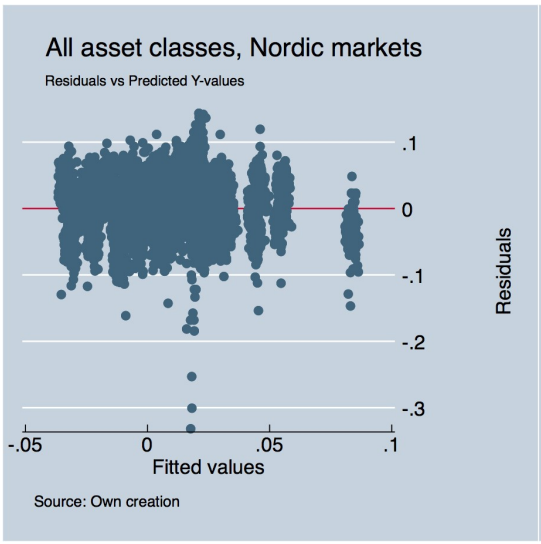


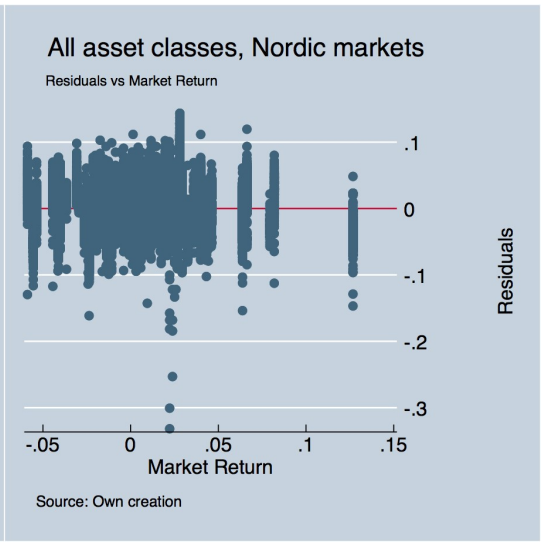


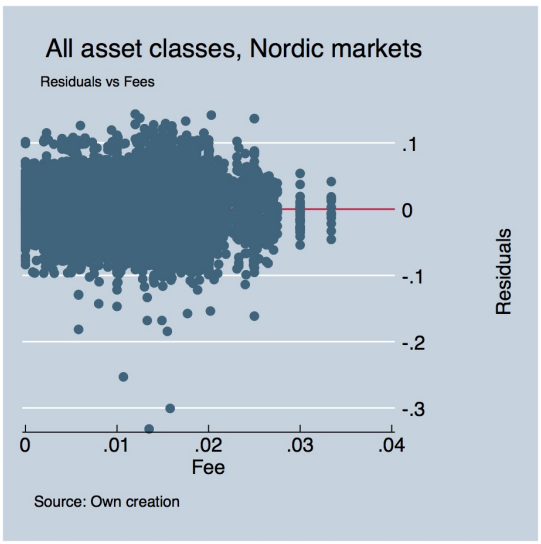



Equity focused funds, Emerging markets
Residuals vs Fees
.2
.1
0
-.1
-.2
-.3
Residuals
0
.02
.04
.06
.08
Fee
Source: Own creation

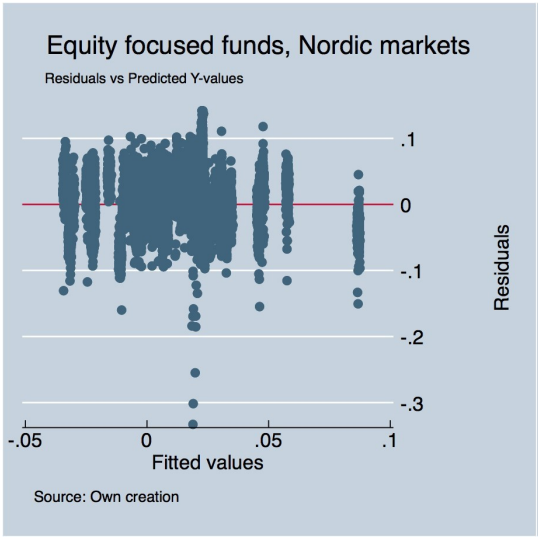
Appendix 11 – residual plots for CAPM regression, all asset classes, Nordic markets

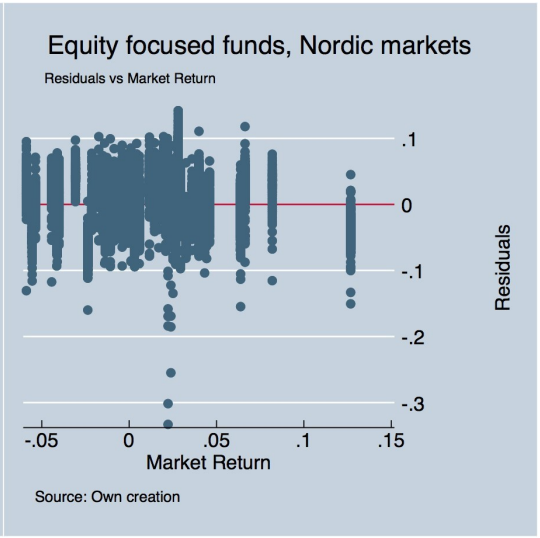


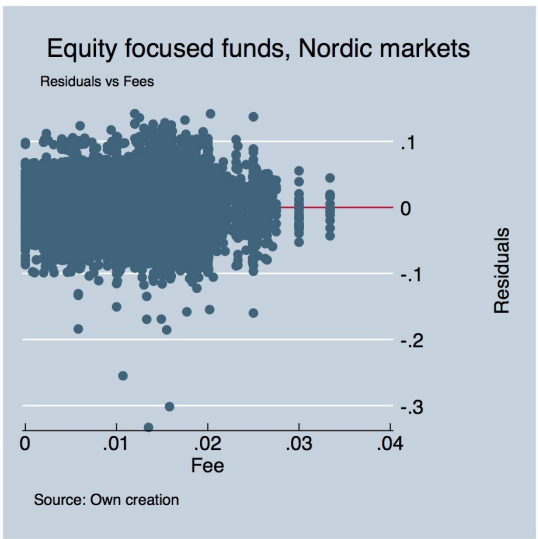




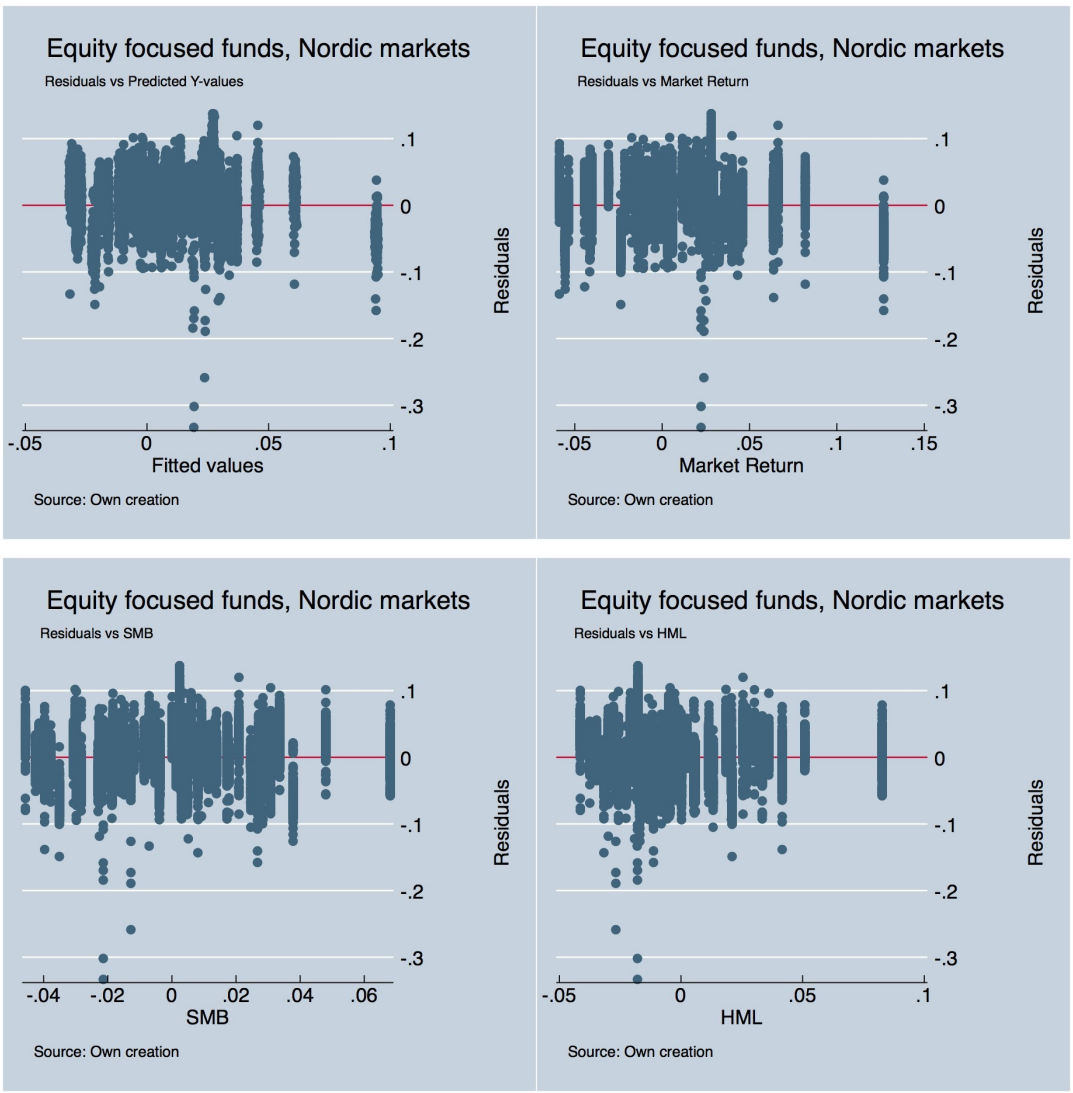
Appendix 12 – residual plots for CAPM regression, equity focused funds, Nordic markets

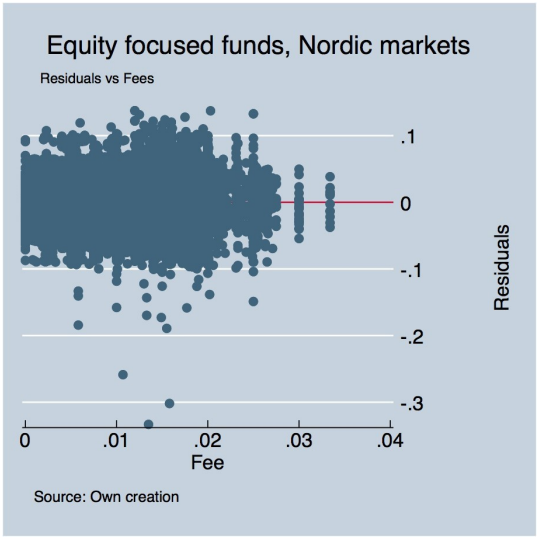




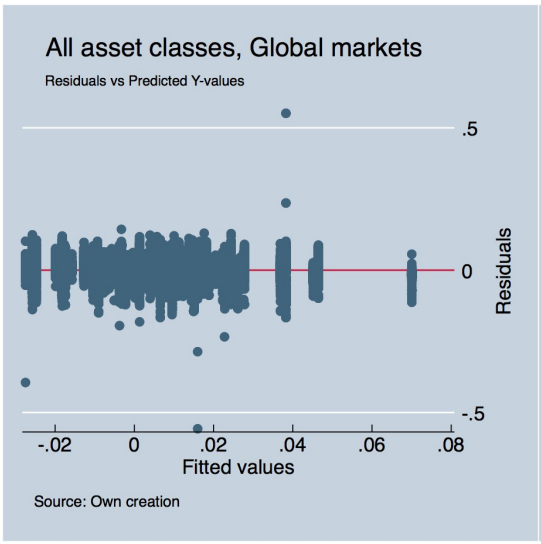


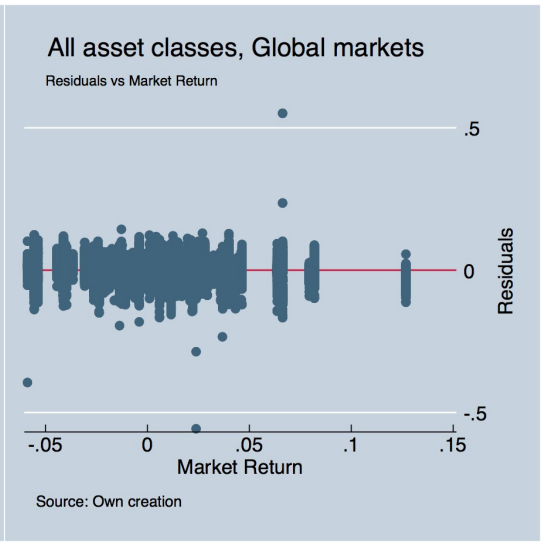
Appendix 13 – residual plots for Fama-French regression, equity focused funds, Nordic markets

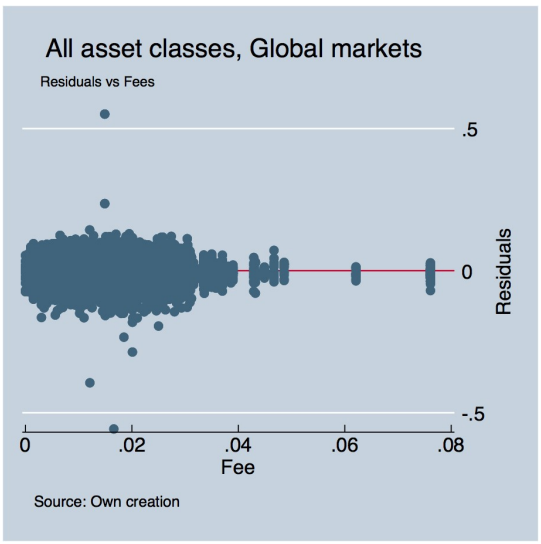



Equity focused funds, Nordic markets
Residuals vs Fees
.1
0
-.1
-.2
-.3
Residuals
0
.01
.02
.03
.04
Fee
Source: Own creation

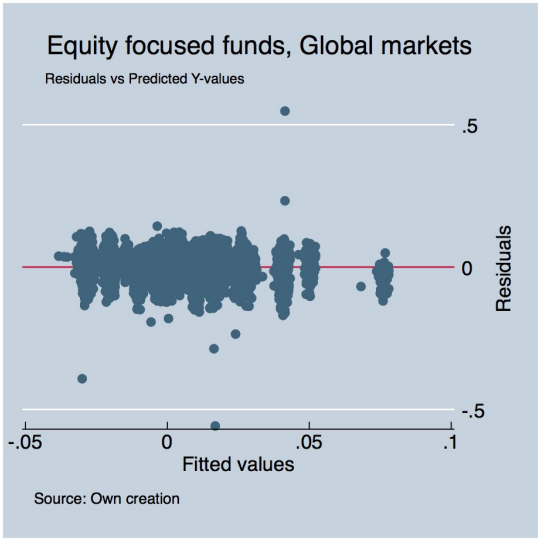
Appendix 14 – residual plots for CAPM regression, all asset classes, Global markets

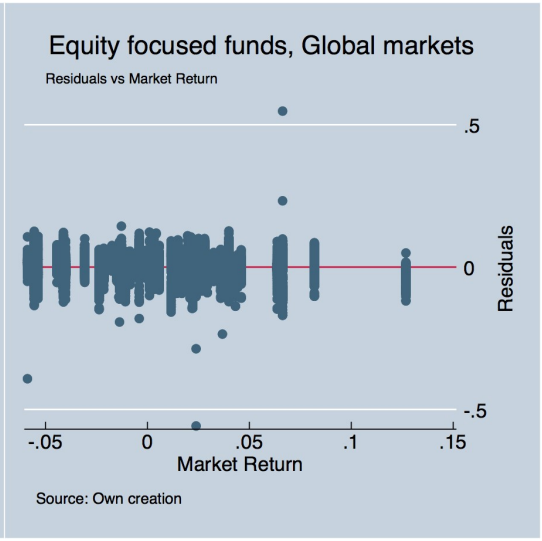


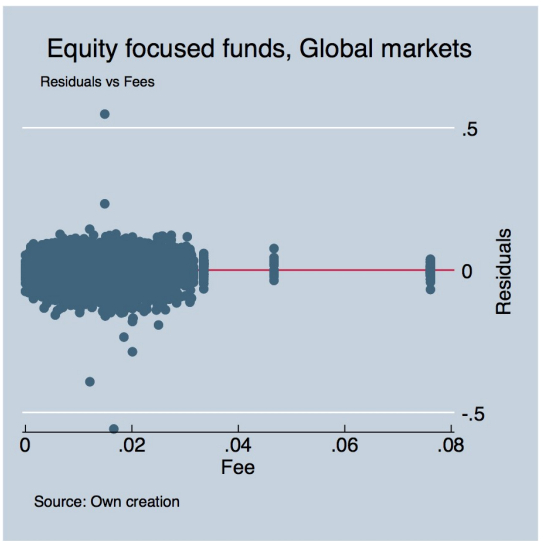




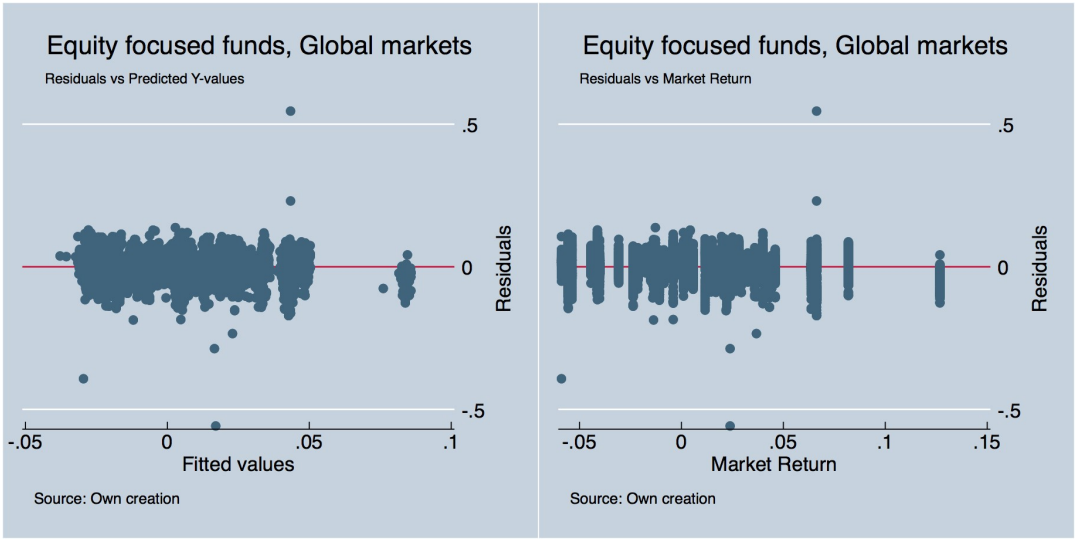
Appendix 15 – residual plots for CAPM regression, equity focused funds, Global markets

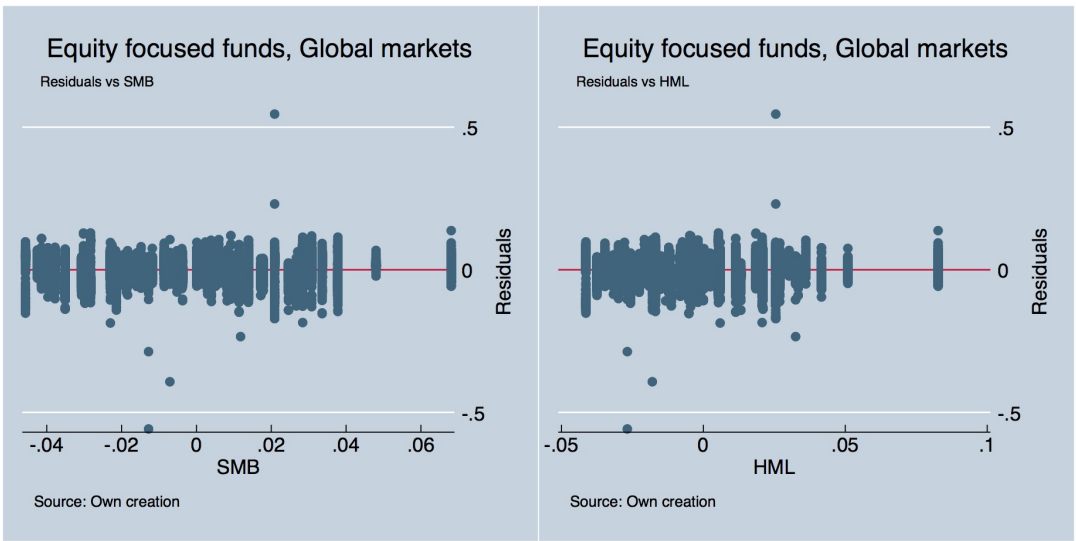


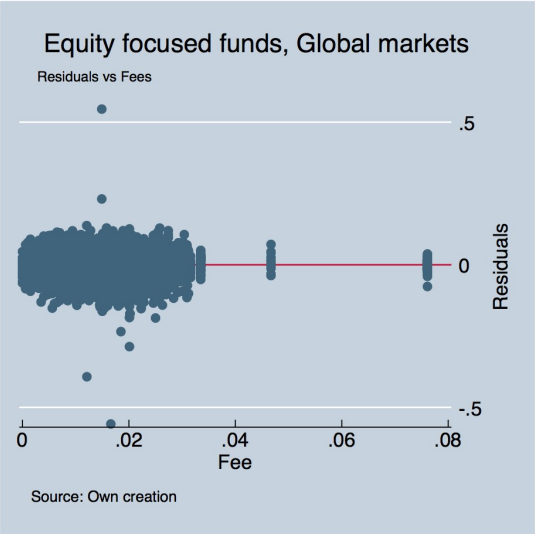




Appendix 16 – residual plots for Fama-French regression, equity focused funds, Global markets







Appendix 17 – regression results with time horizon of 10 years

Regression 1:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0046	0.0001	34.97	0.00	0.0043	0.0048
Fee	0.0544	0.0083	6.52	0.00	0.0381	0.0708

Regression 2:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0024	0.0001	20.55	0.00	0.0021	0.0026
Market Return	0.6587	0.0024	274.87	0.00	0.6540	0.6634
Fee	-0.0603	0.0074	-8.21	0.00	-0.0747	-0.0459

Regression 3:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0048	0.0003	18.77	0.00	0.0043	0.0053
Market Return	0.6772	0.0034	201.19	0.00	0.6706	0.6838
Fee	-0.1734	0.0140	-12.39	0.00	-0.2009	-0.1460

Regression 4:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0048	0.0003	18.77	0.00	0.0043	0.0053
Market Return	0.6769	0.0034	197.68	0.00	0.6702	0.6836
SMB	0.0131	0.0049	2.66	0.01	0.0035	0.0227
HML	-0.0400	0.0049	-8.25	0.00	-0.0495	-0.0305
Fee	-0.1733	0.0140	-12.38	0.00	-0.2007	-0.1459

Regression 5:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0016	0.0001	17.74	0.00	0.0015	0.0018
Market Return	0.3693	0.0055	67.21	0.00	0.3586	0.3801
Fee	0.0260	0.0091	2.86	0.00	0.0082	0.0438

Regression 6:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0001	0.0000	1.86	0.07	0.0000	0.0002
Market Return	0.0042	0.1170	0.04	0.97	-0.2251	0.2335
Fee	0.0417	0.0112	3.71	0.00	0.0197	0.0636

Regression 7:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0023	0.0002	10.63	0.00	0.0019	0.0028
Market Return	0.5763	0.0051	113.34	0.00	0.5664	0.5863
Fee	-0.0667	0.0133	-5.03	0.00	-0.0927	-0.0407

Regression 8:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0019	0.0006	3.30	0.00	0.0008	0.0030
Market Return	0.8031	0.0083	96.59	0.00	0.7868	0.8194
Fee	-0.1790	0.0273	-6.55	0.00	-0.2326	-0.1254

Regression 9:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0008	0.0008	1.07	0.28	-0.0007	0.0024
Market Return	0.8042	0.0094	85.64	0.00	0.7858	0.8227
Fee	-0.1476	0.0349	-4.23	0.00	-0.2160	-0.0793

Regression 10:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0007	0.0008	0.83	0.41	-0.0009	0.0022
Market Return	0.8278	0.0095	87.13	0.00	0.8092	0.8464
SMB	-0.1741	0.0135	-12.94	0.00	-0.2005	-0.1478
HML	-0.0454	0.0134	-3.39	0.00	-0.0716	-0.0191
Fee	-0.1463	0.0347	-4.21	0.00	-0.2144	-0.0782

Regression 11:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0009	0.0002	4.75	0.00	0.0005	0.0012
Market Return	0.6534	0.0043	150.44	0.00	0.6449	0.6619
Fee	0.1467	0.0141	10.42	0.00	0.1191	0.1743

Regression 12:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0044	0.0005	8.80	0.00	0.0034	0.0054
Market Return	0.6744	0.0062	108.03	0.00	0.6621	0.6866
Fee	-0.0155	0.0306	-0.51	0.61	-0.0755	0.0445

Regression 13:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0044	0.0005	8.81	0.00	0.0034	0.0054
Market Return	0.6733	0.0064	105.74	0.00	0.6608	0.6858
SMB	0.0331	0.0093	3.55	0.00	0.0148	0.0514
HML	-0.0660	0.0091	-7.28	0.00	-0.0837	-0.0482
Fee	-0.0160	0.0306	-0.52	0.60	-0.0759	0.0440

Regression 14:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0029	0.0002	15.99	0.00	0.0025	0.0033
Market Return	0.5893	0.0034	171.79	0.00	0.5825	0.5960
Fee	-0.0701	0.0114	-6.17	0.00	-0.0924	-0.0478

Regression 15:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0051	0.0004	12.32	0.00	0.0043	0.0059
Market Return	0.5940	0.0052	115.08	0.00	0.5839	0.6041
Fee	-0.1520	0.0243	-6.24	0.00	-0.1997	-0.1042

Regression 16:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0052	0.0004	12.55	0.00	0.0044	0.0060
Market Return	0.5834	0.0052	111.43	0.00	0.5731	0.5937
SMB	0.0854	0.0074	11.53	0.00	0.0709	0.1000
HML	-0.0226	0.0074	-3.06	0.00	-0.0371	-0.0081
Fee	-0.1524	0.0243	-6.27	0.00	-0.2001	-0.1048

Appendix 18 – regression results with local indices as benchmarks

Regression 9:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0065	0.0009	7.59	0.00	0.0048	0.0082
Market Return	0.4841	0.0078	62.18	0.00	0.4688	0.4993
Fee	-0.1502	0.0380	-3.95	0.00	-0.2247	-0.0757

Regression 10:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0065	0.0009	7.56	0.00	0.0048	0.0081
Market Return	0.4811	0.0078	61.59	0.00	0.4658	0.4964
SMB	-0.0247	0.0141	-1.75	0.08	-0.0525	0.0030
HML	-0.0532	0.0150	-3.55	0.00	-0.0826	-0.0238
Fee	-0.1496	0.0380	-3.94	0.00	-0.2240	-0.0751

Regression 12:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0087	0.0005	16.87	0.00	0.0077	0.0097
Market Return	0.2405	0.0063	38.01	0.00	0.2281	0.2529
Fee	0.0092	0.0318	0.29	0.77	-0.0531	0.0716

Regression 13:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0088	0.0005	17.09	0.00	0.0078	0.0098
Market Return	0.2257	0.0064	35.26	0.00	0.2132	0.2383
SMB	0.0976	0.0093	10.47	0.00	0.0794	0.1159
HML	-0.1192	0.0100	-11.97	0.00	-0.1388	-0.0997
Fee	0.0091	0.0317	0.29	0.78	-0.0530	0.0712

Appendix 19 – regression results for regressions using Swiss data

Regression 1:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0037	0.0002	15.67	0.00	0.0032	0.0042
Fee	0.0582	0.0206	2.82	0.01	0.0177	0.0986

Regression 2:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0034	0.0002	14.36	0.00	0.0030	0.0039
Market Return	0.0543	0.0075	7.23	0.00	0.0396	0.0690
Fee	0.0525	0.0207	2.54	0.02	0.0121	0.0930

Regression 3:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0070	0.0004	15.96	0.00	0.0061	0.0078
Market Return	0.0232	0.0102	2.27	0.02	0.0032	0.0433
Fee	-0.0277	0.0326	-0.85	0.40	-0.0917	0.0362

Regression 4:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0071	0.0004	16.34	0.00	0.0063	0.0080
Market Return	0.0047	0.0104	0.45	0.65	-0.0157	0.0251
SMB	0.1319	0.0136	9.67	0.00	0.1052	0.1587
HML	-0.0853	0.0143	-5.96	0.00	-0.1134	-0.0573
Fee	-0.0267	0.0326	-0.82	0.41	-0.0906	0.0371

Regression 5:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0003	0.0003	1.06	0.29	-0.0003	0.0009
Market Return	0.3452	0.0224	15.41	0.00	0.3013	0.3891
Fee	0.1028	0.0514	2.00	0.04	0.0021	0.2035

Regression 6:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval	
					Lower limit	Upper limit
Intercept	0.0022	0.0019	1.17	0.20	-0.0015	0.0060
Market Return	-3.5370	4.9331	-0.72	0.47	-13.2058	6.1317
Fee	-3.3040	0.6400	-5.16	0.00	-4.5584	-2.0497

Regression 7:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0033	0.0002	14.50	0.00	0.0028	0.0037
Market Return	0.0331	0.0079	4.19	0.00	0.0176	0.0486
Fee	-0.0136	0.0152	-0.89	0.37	-0.0433	0.0162

Regression 8:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	-0.0013	0.0020	-0.69	0.49	-0.0052	0.0025
Market Return	0.2999	0.0386	7.76	0.00	0.2242	0.3757
Fee	0.2116	0.1480	1.43	0.15	-0.0785	0.5016

Regression 9:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	-0.0012	0.0021	-0.60	0.55	-0.0053	0.0028
Market Return	0.2999	0.0398	7.53	0.00	0.2218	0.3779
Fee	0.2099	0.1556	1.35	0.18	-0.0952	0.5150

Regression 10:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	-0.0012	0.0021	-0.59	0.56	-0.0053	0.0029
Market Return	0.2960	0.0404	7.32	0.00	0.2167	0.3752
SMB	0.0241	0.0527	0.46	0.65	-0.0791	0.1274
HML	-0.0341	0.0558	-0.61	0.54	-0.1434	0.0753
Fee	0.2096	0.1557	1.35	0.18	-0.0954	0.5147

Regression 11:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0044	0.0002	22.93	0.00	0.0041	0.0048
Market Return	-0.0471	0.0064	-7.33	0.00	-0.0597	-0.0345
Fee	0.0910	0.0170	5.34	0.00	0.0576	0.1244

Regression 12:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0095	0.0004	22.80	0.00	0.0087	0.0104
Market Return	-0.0947	0.0104	-9.12	0.00	-0.1151	-0.0744
Fee	-0.0095	0.0281	-0.34	0.74	-0.0646	0.0456

Regression 13:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0096	0.0004	22.94	0.00	0.0088	0.0104
Market Return	-0.1061	0.0105	-10.07	0.00	-0.1267	-0.0854
SMB	0.0669	0.0138	4.84	0.00	0.0398	0.0939
HML	-0.1232	0.0144	-8.53	0.00	-0.1515	-0.0949
Fee	-0.0086	0.0281	-0.31	0.76	-0.0636	0.0465

Regression 14:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0027	0.0004	6.41	0.00	0.0019	0.0035
Market Return	0.1090	0.0140	7.76	0.00	0.0815	0.1365
Fee	-0.0204	0.0356	-0.57	0.57	-0.0903	0.0494

Regression 15:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0078	0.0008	9.79	0.00	0.0062	0.0093
Market Return	0.0715	0.0172	4.16	0.00	0.0378	0.1052
Fee	-0.2561	0.0663	-3.86	0.00	-0.3861	-0.1260

Regression 16:

	Coefficient estimate	Standard error	t-statistic	p-value	95% confidence interval Lower limit	Upper limit
Intercept	0.0080	0.0008	10.04	0.00	0.0064	0.0095
Market Return	0.0515	0.0174	2.95	0.00	0.0173	0.0857
SMB	0.1413	0.0229	6.16	0.00	0.0963	0.1862
HML	-0.0865	0.0242	-3.58	0.00	-0.1339	-0.0391
Fee	-0.2553	0.0663	-3.85	0.00	-0.3852	-0.1255