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Performance of mutual funds during the Covid-19 pandemic compared to the 2008 financial crisis

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Abstract

Throughout this thesis we have investigated the American and Norwegian mutual funds' performance by employing Jensen's alpha (1968), Fama and French's Three-factor model (1993), Carhart's Four-factor model (1997), Fama and French's Five-factor model (2015), and further ran a bootstrap simulation similar to that of Kosowski et al. (2006) and Fama and French (2010). The purpose of this thesis is to examine how actively managed equity mutual funds have performed during the Covid-19 pandemic, which in this thesis is defined as the period between January 2019 to January 2021, compared to the 2008 financial crisis. Thus, we have evaluated performance on both the entire sample period consisting of data from 2007-2021, as well as sub-periods representing the two different crises where the market was in recession and a control period where the market was in expansion.

We do not find evidence that U.S. mutual funds on average are able to generate abnormal returns in any of the time periods, nor possess the sufficient skills to cover their cost in the full period, the control period, or during the Covid-19 pandemic. However, during the financial crisis, we did find an increase of alpha in all models with evidence of some good skill among the fund managers. The alphas are only statistically significant with regards to the total period and the control period.

We found, nevertheless, the opposite results in Norway. Our findings indicate that the alpha is significantly positive in the total period, and positive even during the financial crisis and the control period. In these periods the mutual fund managers did show evidence of skill after adjusting for luck. Despite this, the alpha is observed as negative through the Covid-19 pandemic, and our simulation indicates that this is due to poor skill.

Acknowledgements

This thesis marks the end of our Master of Science in Business with a major in Finance at BI Norwegian Business School. We have chosen a topic based on a genuine interest in whether actively managed funds actually do outperform their benchmark, especially during bear markets.

We want to express our greatest gratitude to our supervisor, Professor Kjell Jørgensen, at BI Norwegian Business School, for his patience, most valuable input and guidance.

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1.0 INTRODUCTION

Equity mutual funds are well-known to underperform passive benchmarks (Jensen, 1968; Carhart, 1997; Fama and French, 2010). For example, Carhart (1997) discovered that the more actively a mutual fund manager trades, the lower the benchmark-adjusted net returns are. There is no such thing as a “free lunch” even in financial theory, which translates that changing one’s asset distribution will not result in higher projected returns without raising risk (assuming no mispricing). Nevertheless, the mutual fund market continues to grow.

The financial crisis had its start in 2008 and there was only one mutual fund that turned a profit in 2008 according to Morningstar Data (Papagiannis, 2010) relative to the S&P 500 index which fell 38,5% (Steverman, 2009). During the Covid-19 pandemic, S&P 500 shed 34% of its value over a five week period from February 19 in 2020, which is the steepest decline in recorded history, before it rose by 52% to a new record high in 2020 (Statista, 2021b) and the S&P 500 continues to set new record highs into June 2021 (Ostroff, 2021).

One popular hypothesis is that active funds outperform passive funds in market recessions when investors value performance as the most important factor. Based on this, and previous research on mutual fund performance, made us want to investigate if an investor gets what she pays for when investing in an actively managed fund, or if you are better off by investing in an index fund during a crisis.

Throughout this master thesis, we will analyse the performance of American and Norwegian actively managed mutual funds’ performance during recessions and expansions from January 2007 to January 2021. The performance of mutual funds has previously been extensively studied, with divided findings on whether mutual funds actually do outperform the market. However, the Norwegian mutual fund industry has only been studied by a few researchers. We cannot rule out that there is a greater probability of abnormal returns in the Norwegian market due to a less competitive and efficient market, in comparison to, for example, the American market (Dyck et al., 2013). Hence, we chose both the Norwegian and American markets in our paper, to investigate if there exist any significant differences.

Our data consists of 25 Norwegian open-ended mutual equity funds and 30 American open-ended mutual equity funds, both collected and based on the highest fund size in each market. We selected the funds based on the highest fund size in both countries as this provides a better basis for comparison. This also increases the chance for a fund to survive both recessions.

The main purpose of this paper is to evaluate the performance of mutual funds during the ongoing Covid-19 pandemic in comparison to the 2008 financial crisis, and further to disclose whether the performance is due to skill or luck. The financial market has naturally and consequently reacted to the global pandemic we are currently amid. This situation offers a unique opportunity to conduct research, and apply financial theories and models to explore how the financial market has responded to the global Covid-19 pandemic compared to the financial crisis in 2008. Hence, we can examine whether previous findings on mutual fund performance during recessions are consistent or not. As a result, we aim to contribute to the existing research on mutual fund performance and to add value by investigating this into the context of the new and ongoing crisis; the Covid-19 pandemic.

To discover whether fund performance differs during recessions and expansions, we have divided the full-time series of monthly net returns into three sub-samples. We have defined the years 2007-2010 as the financial crisis. The definition of the period 2011-2018 is named the control period, as this period is signified by a market under relative control and in a state of general expansion, and the period 2019-2021 is defined by the ongoing Covid-19 pandemic.

We perform individual fund regressions and an equal-weighted portfolio regression by single- and multifactor models using the CAPM, Fama and French Three-factor model (1993), Carhart Four-factor model (1997), and Fama and French Five-factor model (2015). Finally, we apply the bootstrapping method developed by Kosowski et al. (2006) with the modifications made by Fama & French (2010) as several studies, such as Berk & Van Binsbergen (2015), stress that alpha alone cannot be considered a measure of skill. The methodology applied is employed to answer the following hypothesis:

H₀: Actively managed mutual funds are not able to successfully pick stocks in order to outperform their benchmark and the broad market

H_A: Actively managed mutual funds are able to successfully pick stocks in order to outperform their benchmark and the broad market

We do not find evidence that U.S. mutual funds, on average, are able to generate abnormal returns in any of the periods, nor possess the sufficient skills to cover their cost in all periods except the control period. Our findings are consistent with previous research by Jensen (1969), Elton et al. (1993), Malkiel (1995) and Fama & French (2010) who all found evidence of negative alphas in the U.S.

The results differ for the Norwegian mutual funds. In the full period from 2007-2021, the financial crisis and the control period, the alpha is positive, however only statistically significant positive during the full period. The outperformance is assessed due to manager skill, and the poor performing funds are performing poorly due to bad luck. Our findings of skill among the top performers are in line with previous research of Gallefoss et al. (2015), however, Gallefoss et al. (2015) found evidence of poor skill among the worst performers which contradicts our results. Our findings also contradict the research of Sørensen's (2009), who found lack of skill in the Norwegian mutual fund industry. It is our initial assessment that the discrepancy in results occurs as the role of luck can differ across different time horizons. During the Covid-19 pandemic, the fund managers lack skills and produce a negative alpha.

Considering that we are investigating 55 mutual funds, we cannot state if our results and conclusion are valid for all American and Norwegian mutual funds. However, our study's purpose is to provide a probable assessment of how the American and Norwegian fund managers have performed in two quite different crises, and if the underperformance/overperformance is due to luck or skill. As we include various economic cycles, bull and bear markets, we assess that this paper serves its purpose of providing a general picture of the market.

It is important to express that this thesis is not intended to include investment advice. We advise against individual investors using this research as a guide to select the best mutual fund. It is only intended to be a broad examination of the

industry. Therefore, we have not paid particular attention to transaction costs nor taxes, as these would vary greatly between entities.

The remainder of this paper is organized as follows. Section 2 provides previous literature on mutual fund performance. Section 3 presents an overview of the methodology we will use to analyse mutual fund performance. Section 4 presents an overview of the data used in this thesis and potential biases. Section 5 contains the empirical results from our tests described in section 3. The last section concludes this thesis.

2.0 LITERATURE REVIEW

In this chapter, we will review past studies and research on the performance of mutual funds. Through reviewing what we assess as the most important research on the topic of mutual fund performance, this chapter intends to inform the readers about the ideas and expertise built on content similar to ours.

One of the most relevant questions is whether actively managed funds outperform passive funds. The efficient market hypothesis states; beating the market should be a zero-sum game on average, since all current rates represent all available information, and therefore, outperforming the market will be a question of luck, not skill (Fama, 1970). The belief that actively managed funds have the expertise to outperform the market is contradicted by the efficient markets and several previous researchers.

2.1 Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) is essentially the foundation for our topic, and most of the other models we use in our thesis are built on this model. A fundamental question in finance is how the risk of investments affects the expected return. CAPM was one of the first models created to answer this question. The model was introduced by Treynor (1961), Sharpe (1964), Lintner (1965), and Mossin (1966) in the early 1960s, built on the work of Markowitz (1952). The model states that the return of an investment should equal its cost of capital and that beta is the only relevant measure of risk. A graphical representation of the CAPM

is called the Security Market Line (SML). It is important to note that the SML applies to both efficient portfolios as well as individual assets.

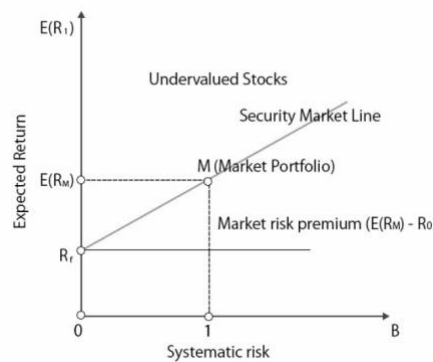


Figure 1: Security Market Line

The CAPM model is a straightforward model that was found by logic, but some of its predictions are unrealistic. For example, the model assumes that all information is free of charge, investors hold diversified portfolios, and that no processing costs exist (Bodie et al., 2018). Hence, the CAPM's validity has been doubted.

2.2 Jensen

Jensen's alpha was developed by Michael Jensen in 1968 and is derived from the CAPM. Provided the portfolio's beta and the expected market return, Jensen's alpha is the average excess return that is earned above the excess return of an asset with similar risk (Jensen, 1968). Thus, the model tries to explain if an investment has performed better or worse than its beta would imply. If Jensen's alpha is positive, then the portfolio is earning excess return and the fund manager has beat the market by picking good assets (Jensen, 1968). This measure is widely used, but it has been subject to criticism. The alpha is sensitive to the choice of benchmark (Murthi et al., 1997), does not allow for portfolios with varying risk thresholds to be compared (Cogneau & Hubner, 2009), and does not reflect the managers market timing skills. Jensen (1968) found that mutual funds were unable to generate excess return net of costs on average. These findings were consistent with the efficient market hypothesis (Fama, 1970).

In contrast to Jensen's results, Ippolito (1989) found that mutual funds' net of fees and expenses outperform index funds. However, the findings of Ippolito (1989) were assessed as unrepresentative by Elton et al. (1993), as the benchmark was chosen incorrectly. Elton et al. (1993) demonstrated that Ippolito's (1989)

outperformance was due to the funds in his study invested heavily in small stocks not listed in the S&P 500 benchmark, which outperformed the S&P 500 substantially during the period. When Elton et al. (1993) adjusted the benchmark, Jensen's alpha became negative. Multifactor models were developed in response to the problem of selecting a suitable benchmark.

2.3 Fama and French

The most well-known multifactor models are the Three-factor model developed by Fama and French (1993) and the Four-factor model by Carhart (1997). Several researchers, including Banz (1981), Keim (1983), and Fama and French (1993) found evidence of anomalies when using the CAPM. Funds focusing on low betas, small firms and value stocks often produce positive abnormal returns when compared to the CAPM forecasts. This is even if the fund managers lacked stock-picking skills. Thus, Fama and French included two new factors in addition to the market, the value- and size factor. This was on the basis that they found evidence that value stocks tend to outperform growth stocks and small-cap stocks tend to outperform large-cap stocks. Hence, the Three-factor model consists of the excess return on the market, returns of a size portfolio (SMB), and book-to-market values (HML). Fama and French (1993) argue that these factors may capture sensitivity to risk factors in the macroeconomy, and they also found evidence of positive ratios between return and other factors, such as debt ratio and the Price/Earnings ratio. However, Fama and French (1993) argue that these became superfluous in the regression, as the effect of these is captured in either the value or size factor.

In 2015, Fama and French extended their Three-factor model to a Five-factor model, to include profitability and investment. Research presented by Titman et al. (2004) and Novy-Marx (2012) concluded that the Three-factor model was an insufficient model for expected returns as it ignored a lot of the variance in average returns related to profitability and investment. The RMW factor is the return spread of the most profitable firms minus the least profitable, and the CMA factor is the return spread between firms that invest conservatively and aggressively.

According to Fama and French (2015), the main drawback of the Five-Factor model is that it fails to capture low average returns on small stocks whose returns perform like those of firms that invest a lot despite low profitability. The model's

performance is indifferent to the way its factors are determined. In addition, there is also some critique regarding the new model ignoring the momentum factor.

It is essential to note that these models, and the other multifactor models, are based on the Arbitrage Pricing Theory (APT). The theory is built on the argument that there can be no arbitrage opportunities among well-diversified portfolios, and if a portfolio diverges from the Security Market Line, it is because it is exposed to a different systematic risk factor (Ross, 1976). APT is often associated with multifactor models, which is important to our study as the models we're testing are indeed multifactor models with different systematic risk factors.

2.4 Carhart

Carhart (1997) further improved the Fama and French Three-factor model by introducing an additional factor, the momentum factor of Jegadeesh & Titman (1993). Jegadeesh & Titman (1993) and Fama and French (1996) find that equity portfolios that have performed well over the last three to 12 months will perform better in the coming months, whereas equities that have performed poorly in the same period will continue to perform poorly. The momentum factor in Carhart's model measures the excess return of buying last year's winners and selling last year's losers. Carhart claims that mutual funds' success is not a reflection of superior stock-picking skills, and the additional momentum factor added tends to describe a substantial part of the return and the managerial forecasting skills.

The inherent risk of momentum is a little more difficult to decipher than the Three-factor model, as momentum is one of the most academically researched effects with strong persistence. Nevertheless, some researchers have found evidence for momentum having the worst crashes. Even though momentum strategies, on average, provide high gross returns with little systematic risk, they are subject to infrequent but large losses (Daniel et. al, 2012).

2.5 Kosowski

Research regarding whether good/poor performance of mutual funds is due to skill/inability or luck/bad luck is a relatively new topic. Kosowski et. al (2006) examined the performance of U.S. open-ended mutual funds, where he applied a new statistical technique called bootstrapping. According to the authors, the

“bootstrap approach is necessary because the cross-section of mutual fund alphas has a complex non-normal distribution due to heterogeneous risk-taking by funds, as well as non-normalities in individual fund alpha distribution” (Kosowski et. al, 2006, p. 1). In contrast to Carhart and earlier studies, Kosowski et al. (2006) found that a significant number of managers picked stocks that performed to more than cover their costs, and that there is a persistence of these managers' superior alphas. Based on the research by Kosowski et al. (2006), Fama and French (2010) studied “luck vs skill” on both gross and net returns and concluded that mutual fund managers yield net returns that underperform their benchmarks by approximately the same as the costs in expense ratio. Fama and French (2010), unlike Kosowski et al. (2006), found no sign of stock-picking ability among the top performers, but both studies concluded that the worst performing mutual funds are due to bad skill, and not bad luck.

2.6 Mutual Fund Performance

Several research papers have used the methodology previously described to evaluate mutual funds' performance, such as the CAPM model, the different multifactor models, and the bootstrap procedure. There also exists additional literature which demonstrates that there is a discrepancy between the results. For instance, the research of Wermers (2000) found evidence of mutual funds holding stocks that outperformed the market by 1,3% per year, when examining the performance of mutual funds in the period of 1975 to 1994. However, due to transaction costs, the net returns showed an underperformance of 1%.

Malkiel (1995) examined the performance of equity mutual funds in the period of 1970-1991 and found evidence of underperformance compared to the market. He concluded that investors were better off purchasing a passive index fund compared to an actively managed mutual fund, as active management generally fails to provide excess return.

Research on the performance of mutual funds is mostly conducted on the U.S. market, and the described literature and the developed models mainly cover the performance of U.S. mutual funds. Due to this fact, we assessed that it would be useful to also cover research conducted on the performance of Norwegian mutual funds since our analysis consists of both U.S. and Norwegian mutual funds.

There are not many studies conducted on the performance of Norwegian mutual funds. However, Gjerde and Sættem (1991) were the first substantial contributors to the study of Norwegian mutual funds. They evaluated funds from 1982 to 1990 and found evidence of fund managers outperforming the market, but no evidence of superior stock-picking skills.

Sørensen (2009) extended the period and examined the performance of Norwegian equity mutual funds between 1982 and 2008, using a dataset free of survivorship bias. Similar to our study on the Norwegian market, he included Norwegian mutual funds that invest primarily in Norwegian equities, using the modified bootstrap method of Fama and French (2010) to evaluate the performance. In his research he found no statistically significant evidence of abnormal return for the aggregate Norwegian mutual funds, and no evidence of skill among the top performers, only evidence of poor skill among the worst performers.

Gallefoss et al. (2015) conducted a similar study as Sørensen (2009) for the period of 2000 to 2010, using the bootstrap method by Kosowski et al. (2006) to evaluate the performance of Norwegian mutual funds. They, on the other hand, found evidence of skill among the top performers and evidence of poor skill for the worst performers when using daily data. Notably, they did find evidence of underperformance for Norwegian mutual funds compared to the benchmark.

The Norwegian Consumer Council (Forbrukerrådet, 2018) examined the performance of passive mutual funds and actively managed mutual funds for global, Norwegian, Scandinavian, and European mutual funds from 1998 to 2017. They evaluated 157 different equity funds comparing the net return to the benchmark and found evidence of superior performance for the Norwegian mutual funds.

3.0 METHODOLOGY

When evaluating the performance of mutual funds it is important to not only look at the generated returns, but certainly also the risk taken. Our evaluation of performance will on that basis not only look at the historical returns, but also look at risk-adjusted alphas, followed by the bootstrap procedure to distinguish skill from luck in the performance of mutual fund managers.

3.1 Testing alpha

One can test performance by evaluating the alpha of different regressions, where the obtained alpha would indicate whether the mutual fund has performed better/worse than the market. This is the reason why we focus on regression analysis, with regressions including different factors.

The hypothesis we want to test for the CAPM model, Fama and French Three-factor model, Carhart Four-factor model, and Fama and French Five-factor model is as follows:

$$H_0: a_i = 0 \quad H_A: a_i \neq 0$$

where alpha is the intercept in our test regressions and will be further explained below. If alpha for fund i is significantly different from zero, H_0 is rejected with a 95% confidence, meaning that fund i creates a risk-adjusted return above or below the market and the additional factor returns.

3.1.1 CAPM

The Capital Asset Pricing Model (CAPM) is the first theory of factor risk and recognises that the risk of an asset does not only depend on the behaviour of the asset in isolation, but also in relation to the market as a whole. Based on a given asset's sensitivity to the market factor, this model describes the relationship between risk and returns.

$$r_i = r_f + \beta_{i,m}(r_m - r_f)$$

Equation 1: CAPM-model

r_i = expected return of asset i

r_f = risk – free rate

$r_m - r_f$ = market risk premium

$\beta_{i,m}$ = volatility of the stock to the market

3.1.2 Jensen's alpha

Jensen's alpha, also called Jensen's measure, measures the excess return adjusted for systematic risk and is used to evaluate a portfolio or a fund manager's ability to pick stocks.

Jensen's alpha is defined as:

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

Equation 2: Jensen's alpha

r_i = realized return of the portfolio or investment

r_m = realized return of the appropriate market index

r_f = risk-free rate

β_i = beta of the portfolio of investment with respect to chosen market index

According to the CAPM, the return of a portfolio should be fully explained by its beta. By subtracting the risk-free rate, which is the constant in the CAPM, the alpha should be equal to zero. If Jensen's alpha is positive, then the portfolio is earning excess return and the fund manager has beaten the market. Jensen's alpha is a popular index of performance, but researchers have proposed that the alpha is sensitive to the choice of benchmark model. When testing the performance of a fund, one must also consider the fact that if the manager obtains positive alpha by investing in higher beta stocks, investing in that fund might increase the volatility of the overall portfolio.

3.2 Multifactor models

We will use multifactor models to evaluate whether mutual funds generate returns above the returns generated from the respective factor models. By running time-series regressions using the multifactor models we can determine how the included risk factors contribute to the performance, where the model captures the return not accounted for in the intercept (the alpha). We will hence use the Fama and French Three-factor model, Carhart Four-factor model and Fama and French Five-factor model.

3.2.1 Fama and French Three-factor model

The Fama and French (1993) Three-factor model explains asset returns with factors to capture a size effect and a value/growth effect in addition to the traditional CAPM model. The small-minus-big (SMB) factor refers to the differential returns of small stocks minus big stocks, where small and big refer to the market capitalization of the stocks. The high-minus-low (HML) expresses the returns of a portfolio of high book-to-market stocks minus a portfolio of low book-to-market stocks, where the book-to-market ratio is book value divided by market capitalization.

$$r_{i,t} = \hat{\alpha}_i + \hat{\beta}_{1,i}MKT_t + \hat{\beta}_{2,i}SMB_t + \hat{\beta}_{3,i}HML_t + \hat{\varepsilon}_{i,t}$$

Equation 3: Fama and French Three-factor model

where $r_{i,t}$ is the excess net return of fund i , MKT_t is the excess return on the market portfolio, SMB_t is the size effect, and HML_t is the value effect.

3.2.2 Carhart Four-factor model

Carhart (1997) added a further addition to the Fama and French Three-factor model, a momentum return parameter. The momentum factor has different notations, such as winners minus losers (WML), PR1YR, and MOM, whereas we will use the notation MOM in our analysis. The aim is to capture an anomaly that past winners will continue to outperform, and past losers will continue to underperform, as Carhart states that greater historical returns will persist in the following years, and contrariwise. Carhart Four-factor model can be illustrated as follows:

$$r_{i,t} = \hat{\alpha}_i + \hat{\beta}_{1,i}MKT_t + \hat{\beta}_{2,i}SMB_t + \hat{\beta}_{3,i}HML_t + \hat{\beta}_4MOM_t + \varepsilon_{i,t}$$

Equation 4: Carhart's Four-factor model

The notation is the same as for equation 3, with MOM_t as the momentum factor. The factor is the difference between the average of the highest stock returns and the lowest stock returns the prior year.

3.2.3 Fama and French Five-factor model

Fama and French expanded their Three-factor model with two quality factors in 2015. The additional factors, robust-minus-weak (RMW) and conservative-minus-aggressive (CMA), aims to account for the increased performance of companies with high operating profitability and that companies with high growth in total assets tend to provide below average returns (Fama & French, 2015). The model can be illustrated as follows:

$$r_{i,t} = \hat{\alpha}_i + \hat{\beta}_{1,i}MKT_t + \hat{\beta}_{2,i}SMB_t + \hat{\beta}_{3,i}HML_t + \hat{\beta}_4RMW_t + \hat{\beta}_5CMA_t + \varepsilon_{i,t}$$

Equation 5: Fama and French Five-factor model

where RMW_t is the average return on the two robust operating profitability portfolios minus the two weak operating profitability portfolios, and CMA_t is the average return

on the two conservative investment portfolios minus the two aggressive investment portfolios.

3.3 Bootstrap - luck versus skill

We will use the bootstrapping method developed by Kosowski et al. (2006) with the modifications made by Fama and French (2010). The method is used to distinguish between managerial luck and skill, and will therefore be used to evaluate the performance of mutual funds during the 2008 financial crisis, control period, and the Covid-19 pandemic. In addition, it will give us further measures to evaluate whether the mutual funds that achieved higher alphas made strategic choices to accomplish this, or whether it was due to luck.

Bootstrapping by Kosowski et al. (2006) is conducted by performing independent simulations for each fund, while the Fama and French (2010) modifications jointly sample both funds and explanatory returns. This procedure will create a cross-sectional distribution of the alphas of the mutual funds, which allows us to assess managerial skill. As the procedure doesn't rely on distribution assumptions, the validity of the conclusion on the success of mutual funds can be greatly enhanced.

The bootstrapping simulations assume that the future returns will be drawn from the same distribution as the historical data (McDonald, 2013, p. 806). As we evaluate fund performance over 14 years, we find it useful to use the bootstrap procedure to find evidence of persistence, as persistence tests like Carhart's (1997) rank funds based on short-term past performance. Additionally, we assess that bootstrapping is particularly well-suited to the Norwegian market where there is a limited number of funds compared to the U.S. market (Kosowski et al 2006; Sørensen, 2009).

Both the Fama and French Three-factor model, and the Carhart Four-factor model, have been widely used when running the bootstrap procedure. However, Sørensen (2009) reports in his paper that unlike in the U.S., the momentum factor is not important for understanding mutual fund returns in Norway. In addition, the Fama and French Three-factor model is the industry norm, and the main model used in the research *Luck versus Skill in the Cross-Section of Mutual Fund Returns* by Fama and French (2010), and we will therefore use this model for our bootstrap procedure.

The hypothesis we want to test is:

$$H_0: a_i = 0 \quad H_A: a_i > 0$$

If alpha for fund i is larger than the 5% upper-tail cut off point from the estimated distribution, H_0 is rejected with a 95% confidence meaning that performance is due to skill and not luck.

The first step in the bootstrap procedure is to estimate the ordinary least squares (OLS) coefficients of Fama and French Three-factor model (Equation 3)

$$r_{i,t}^b = \hat{\alpha}_i + \hat{\beta}_{1,i}MKT_t + \hat{\beta}_{2,i}SMB_t + \hat{\beta}_{3,i}HML_t + \hat{\epsilon}_{i,t}^b$$

which can be illustrated by:

$$r_{i,t}^e = r_{i,t} - r_{f,t} = \hat{\alpha}_i + \sum_{j=1}^K \hat{\beta}_{i,j}f_{j,t} + \hat{\epsilon}_{i,t}$$

Equation 6: Fama and French Three-factor model

For each fund, we save the estimate of the alphas, betas, residuals, and the t-statistics of alpha. We will mainly focus on the t-statistics of alpha instead of alpha, as both Kosowski et al. (2006) and Fama & French (2010) highlight the fact that alpha generates a higher variance in the distribution whereas the t-stat of alpha gives higher precision when comparing funds. However, for completeness we will report both.

The next step is to create a set of simulations, for example 10.000 simulation runs. To do so we create a $(T \times 1)$ vector which represents a random sample of monthly observation data points which is drawn from a uniform distribution. T is equal to the number of periods in the data set (12 months * 14 years $\rightarrow T = 168$, from the first observation in January 2007 to January 2021). The set of simulation runs are the same for each fund in order to safeguard the cross-correlation of fund returns and comparability between models. The $(T \times 1)$ vector is multiplied by T and rounded to the nearest integer to represent an ordering of monthly observation from the data set (Fama & French (2010); Sørensen (2009)).

$$\tilde{T}_s = \text{round}(T \times \{U_t(0,1)\}_{t=1}^T), \quad s = 1, \dots, 10.000$$

where \tilde{T}_s is the time vector for bootstrap iteration with replacement from the historical distribution and $U(0,1)$ is a uniform distribution which generates random values between 0 and 1.

The third step is to construct two matrices for the simulated time indices, \tilde{T}_s . The factor return matrix with dimension (T x K) where K is the number of factor returns and a matrix consisting of the residuals for each fund in the sample, which will result in a (T x N) matrix where N is the number of funds in the sample.

The next step is to create a time series of fund returns in excess of the risk-free rate, and by construction give it the property of a zero true alpha ($\alpha = 0$) to test the null hypothesis of zero outperformance. And Equation 6 becomes:

$$r_{i,t}^{e,b} = \sum_{j=1}^K \hat{\beta}_{i,j} f_{j,t}^b + \hat{\varepsilon}_{i,t}^b$$

where $r_{i,t}^{e,b}$ is the bootstrapped factor return. These returns are then inserted in the original factor model (Equation 3) to obtain new simulated bootstrapped alphas and corresponding t-statistics for the 10.000 simulations. This gives rise to a matrix of bootstrapped alphas. Fama and French (2010) state that a fund must have at a minimum eight numbers of valid returns to be included.

The last step is to calculate the fraction of times the simulated alpha and $t(\alpha)$ is smaller or larger than actual alpha and $t(\alpha)$ for a certain percentile to assess the presence of skill. The fractions can be interpreted as p-values, and they help us to more formally assess whether actual performance differs significantly from simulation performance. We rank the simulated values from the five worst, five best and specific percentiles, ranging from the 10th worst percentile to the 90th percent best.

$$\begin{aligned} \% (Simulated < Actual)_{\alpha} &= \frac{1}{S} \sum_{s=1}^S 1[\alpha^{Simulated} < \alpha^{Actual}] \\ \% (Simulated < Actual)_{t(\alpha)} &= \frac{1}{S} \sum_{s=1}^S 1[t(\alpha)^{Simulated} < t(\alpha)^{Actual}] \end{aligned}$$

where S is the number of bootstrap iterations, in this thesis 10.000.

4.0 DATA

To ensure a comprehensive study we have invested a lot of time and effort to collect and structure our data sample. The accuracy of our findings is naturally heavily dependent on whether the data are collected correctly. Our primary data source is Morningstar Direct and Bloomberg.

4.1 Data description

According to Statistics Norway (2020), there were 398 mutual funds in Norway in 2019 with a total net income of NOK 189 347 million. The American market is certainly much bigger, and according to Statista (2021a) there exist approximately 123.000 mutual funds. We have for the purpose of this thesis collected data from 25 Norwegian open-ended mutual equity funds and 30 American open-ended mutual equity funds. We chose these 55 funds based on the highest fund size in each market and used Morningstar Direct to screen for these funds with the following criteria:

- The fund is an open-ended mutual fund
- The fund domicile in Norway/United States
- The fund base currency is NOK/USD
- The fund asset allocation in equity is greater than 80%
- The fund invests at least 80% of its assets in the Norwegian/American stock market
- The fund must have existed between December 2006 to January 2021

We selected the largest fund based on fund size in both countries as it provides a better basis for de-facto comparison. This also increases the chance for a fund to survive both recessions.

We limited the scope of our thesis to focus on investments in the stock market. As a result, funds with a Norwegian or American domicile and at least 80% of their assets invested in Norwegian or American equity, are included. Since Morningstar sorts funds based on investment style we have removed all funds that have the same investment style as index funds or have the word “index” in it. The data spans from December 2006 to January 2021 as we want to examine the mutual funds’ performance during the Covid-19 pandemic compared to the 2008 financial crisis. Thus, we define the financial crisis period between January 2007 to December 2010, the control period between January 2011 to December 2018, and the Covid-19 period between January 2019 to January 2021.

Fund returns retrieved from Bloomberg are based on monthly Net Asset Value (NAV), hence management fees are included in the returns. The monthly fund returns are defined as the change in NAV between time t and $t-1$:

$$r_{i,t} = \frac{NAV_{i,t}}{NAV_{i,t-1}} - 1$$

We have chosen to use monthly returns. This is because it corresponds best with the factor portfolios that are rebalanced each month. At the same time, we would have too few observations or high variance if we had used annual or daily observations respectively.

4.2 Descriptive statistics

Table 1: Descriptive statistics on the funds return in the U.S. in the period between 2007-2021

American Funds	Average	Variance	Std. Dev	Max	Min
American Fund Washington Mutual	0,30 %	0,00180	4,25 %	11,66 %	-16,21 %
American Fund Fundamental	0,43 %	0,00228	4,78 %	11,77 %	-18,77 %
American Fund Investment CO	0,27 %	0,00203	4,51 %	11,93 %	-14,97 %
Franklin Raising Dividends	0,55 %	0,00182	4,27 %	11,96 %	-12,93 %
Parnassus Core Equity Investor	0,53 %	0,00164	4,05 %	10,76 %	-15,41 %
JPMorgan US Equity L	0,44 %	0,00261	5,11 %	14,47 %	-20,19 %
T. Rowe Price Dividend Growth	0,59 %	0,00178	4,22 %	10,86 %	-17,34 %
Oakmark Investor	0,55 %	0,00317	5,63 %	17,88 %	-21,69 %
Vanguard Growth & Income Inv	0,40 %	0,00237	4,87 %	13,10 %	-18,65 %
Hartford Core Equity Y	0,74 %	0,00197	4,44 %	11,63 %	-19,08 %
Invesco Main Street A	0,30 %	0,00276	5,25 %	13,29 %	-23,88 %
Davis NY Venture A	0,03 %	0,00294	5,42 %	13,73 %	-19,71 %
GMO Quality IV	0,18 %	0,00193	4,40 %	11,96 %	-21,02 %
Fidelity* Growth & Income	0,33 %	0,00258	5,08 %	15,32 %	-21,00 %
ClearBridge Appreciation A	0,45 %	0,00181	4,26 %	11,30 %	-13,98 %
PRIMECAP Odyssey Stock	0,68 %	0,00215	4,64 %	13,89 %	-16,04 %
MFS Research A	0,56 %	0,00227	4,76 %	12,10 %	-18,69 %
ClearBridge Dividend Strategy A	0,34 %	0,00161	4,02 %	10,75 %	-16,65 %
Janus Henderson Growth And Income D	0,43 %	0,00249	4,99 %	14,21 %	-17,55 %
MFS Massachusetts Investors Tr A	0,43 %	0,00220	4,69 %	12,46 %	-19,23 %
Pioneer A	-0,06 %	0,00278	5,27 %	12,80 %	-21,91 %
GE RSP US Equity	0,34 %	0,00273	5,22 %	13,53 %	-18,11 %
State Farm Growth	0,43 %	0,00173	4,16 %	10,57 %	-14,42 %
T. Rowe Price U.S. Equity Research	0,60 %	0,00226	4,76 %	12,62 %	-16,78 %
TIAA-CREF Growth & Income Instl	0,48 %	0,00235	4,85 %	13,16 %	-16,63 %
JHancock Fundamental Large Cap Core A	0,78 %	0,00319	5,65 %	17,46 %	-22,38 %
JPMorgan US Research Enhanced Equity I	0,48 %	0,00238	4,88 %	13,31 %	-19,11 %
Mairs & Power Growth Inv	0,45 %	0,00231	4,80 %	14,65 %	-16,26 %
Russell Inv Tax-Managed US Large Cap S	0,70 %	0,00222	4,71 %	12,36 %	-17,13 %
Columbia Disciplined Core A	0,48 %	0,00233	4,82 %	13,18 %	-15,81 %

Table 2: Descriptive statistics on the funds return in Norway in the period between 2007-2021

Norwegian Funds	Average	Variance	Std. Dev	Max	Min
Danske Invest Norske Aksjer Inst II	0,80 %	0,00317	5,63 %	17,38 %	-22,73 %
Alfred Berg Gambak	0,95 %	0,00340	5,83 %	16,40 %	-27,38 %
ODIN Norge C	0,42 %	0,00261	5,11 %	13,42 %	-24,09 %
Alfred Berg Norge C	0,77 %	0,00330	5,75 %	17,10 %	-27,01 %
KLP AksjeNorge	0,70 %	0,00358	5,99 %	17,59 %	-29,77 %
Nordea Norge Verdi	0,70 %	0,00276	5,26 %	15,17 %	-24,46 %
Pareto Aksje Norge I	0,61 %	0,00309	5,56 %	18,12 %	-26,09 %
Nordea Kapital	0,73 %	0,00352	5,93 %	16,70 %	-25,72 %
Nordea Avkastning	0,74 %	0,00369	6,08 %	16,64 %	-26,18 %
Danske Invest Norske Aksjer Inst I	0,77 %	0,00319	5,65 %	17,35 %	-22,85 %
Handelsbanken Norge (A1 NOK)	0,79 %	0,00377	6,14 %	17,75 %	-28,82 %
Alfred Berg Aktiv	0,78 %	0,00344	5,86 %	17,29 %	-27,05 %
Eika Norge	0,51 %	0,00333	5,77 %	18,40 %	-26,63 %
C WorldWide Norge III	0,75 %	0,00337	5,80 %	16,09 %	-27,51 %
Pareto Investment Fund A	0,85 %	0,00445	6,67 %	20,69 %	-28,85 %
Danske Invest Norge II	0,77 %	0,00315	5,61 %	17,41 %	-23,28 %
Holberg Norge A	0,63 %	0,00318	5,64 %	17,12 %	-23,90 %
Delphi Norge A	0,92 %	0,00358	5,98 %	18,06 %	-24,25 %
Fondsfinans Norge	0,88 %	0,00363	6,02 %	17,18 %	-25,73 %
Storebrand Norge A	0,78 %	0,00348	5,90 %	16,65 %	-28,83 %
Danske Invest Norge I	0,71 %	0,00319	5,64 %	17,34 %	-23,86 %
C WorldWide Norge	0,68 %	0,00336	5,80 %	15,93 %	-27,52 %
Alfred Berg Humanfond	0,54 %	0,00323	5,69 %	16,12 %	-25,88 %
PLUSS Aksje	0,65 %	0,00277	5,27 %	14,42 %	-22,88 %
PLUSS Markedsverdi	0,66 %	0,00312	5,59 %	15,95 %	-25,03 %

Table 1 and table 2 show descriptive statistics on the funds' returns. All calculations are made on monthly data.

In the U.S., *JHancock Fundamental Large Cap Core A* has the highest average return and *Oakmark Investor* has the highest maximum return with its 17,88%. At the other end of the scale, we have *Pioneer A* with a negative average return and *Invesco Main Street A* which has the lowest minimum return with -23,88%.

Alfred Berg Gambak has the highest average return in Norway and *ODIN Norge C* has the lowest average return, but still positive at 0,42%. *Pareto Investment Fund A* has the highest maximum return with 20,69%, while *KLP AksjeNorge* has the lowest minimum return with -29,77%.

4.3 Benchmark indices

Benchmark indices are important as we use them to compare the returns of the different mutual funds. The goal of an index is to offer insight into the overall trends and developments in the financial market toward a stock or set of stocks representing certain sectors, categories, or geographies. Grinblatt and Titman (1989) argue that the choice of benchmark is likely to influence the performance

results. Thus, it is important to choose the appropriate benchmarks to avoid biased results.

For the actively managed Norwegian mutual funds there are several different indexes one could use as our benchmark. Oslo Stock Exchange Benchmark Index (OSEBX) is the most used index in Norway and consists of the shares mostly traded. However, this index does not consider the legislation forcing diversification that Norwegian mutual funds are subject to, which the Oslo Stock Exchange Mutual Fund Index (OSEFX) does. We therefore find it more appropriate to use the OSEFX as our benchmark for the Norwegian market. In addition, all the chosen Norwegian mutual funds have stated that they use OSEFX as their benchmark.

There are also several indexes useful for the American market, however, the actively managed mutual funds on the American market in our sample all use the Standards & Poor 500 (S&P 500) as their benchmark. The mutual funds only invest in the U.S. market, making the MSCI World index less appropriate. We will therefore use the S&P 500 benchmark for the American market, as this would best capture the variations in the funds' returns.

4.4 Risk-free rate of return

Since we will employ the asset pricing models, we need a proxy for the risk-free rates. We will use the 1-month NIBOR as the risk-free rate when evaluating the Norwegian funds. NIBOR for the period of December 2006 to November 2013 is obtained from the Norwegian Central Bank, and the remaining sample period is collected from Oslo Stock Exchange as the Norwegian Central Bank stopped reporting NIBOR after November 2013. As a proxy for the U.S. mutual funds, we will use the 1-month risk-free rate collected from Kenneth R. French Data Library (2021). We choose to use monthly frequency as this is the approach both Fama and French (1993) and Carhart (1997) suggest, and our dataset is based on monthly returns.

4.5 Multifactor models

The remaining factors used in this thesis, SMB, HML, MOM, RMW, and CMA are retrieved from Kenneth R. French Data Library (2021). For the U.S. mutual funds, we have used the factors for the *U.S. Research Returns Data*, and for the Norwegian

mutual funds, we have used the *Developed Markets Factors and Returns for the European Market*.

For further research on the Norwegian market it would be most appropriate to use similar factors constructed exclusively for the Norwegian market. Bernt Arne Ødegaard has made asset pricing factors for the Oslo Stock Exchange similar to those developed by Fama and French. However, these factors are only covering the period between 1980-2019 and consequently do not cover the necessary timeframe we need to conduct our analysis. Additionally, we find it more appropriate to use the factors developed by Fama and French for both the U.S. market and the Norwegian market as this would give us a better basis of comparison.

4.6 Biases

4.6.1 Survivorship bias

It is important to address survivorship bias because evidence shows that funds do not spontaneously leave the sample study. Alternatively, it is the worst performing funds that become defunct (Sørensen, 2009). Survivorship bias causes bond fund performance to appear better than it actually is (Blake & Gruber, 1993). For example, if liquidated funds are removed from the test sample, it could lead to overoptimistic returns. In addition, a stock can be dropped from a market index if defunct, so this is something we must keep in mind when gathering data from our benchmarks. Thus, by removing mutual funds that are not active at the end date, one risks ending up with a data set that contains only the best performing funds, while the worst performing funds are ignored.

It is difficult for our thesis to avoid survivorship bias as the Covid-19 pandemic is still an ongoing crisis, and to best compare how a mutual fund has performed during Covid-19 compared to the 2008 financial crisis, we decided to use funds that have been active through both periods. Hence, as we are looking at funds that are not discontinued, our results might be biased. It is important for us to highlight that we have chosen the funds with the highest fund size in both countries to provide the best possible basis for comparison, and there is a greater chance that the funds will survive times of recession. This in turn will decrease the likelihood of survivorship bias and we assess that the role of survivorship bias is minimal.

4.6.2 Incubation bias

Incubation bias might occur when returns of companies who operate several funds but only open their top performing fund to the public, is a part of the sample (Evans, 2010). This can lead to an upward bias, as only the returns of the best fund will be available in our sample. Evans (2010) states that a common approach to addressing the incubation bias is to remove funds below a certain size, as this would remove several of incubated funds. However, he further states that this will not eliminate the bias.

In our sample of mutual funds, we have selected the largest funds based on fund size in both countries, which will therefore decrease the number of incubated funds if present. Considering we have chosen to examine open-end funds we are not able to determine if there is an incubation bias in our sample.

5.0 RESULTS AND ANALYSIS

5.1 Multifactor models

We have performed time-series regressions for the CAPM, Fama and French Three-factor model, Carhart's Four-factor model, and Fama and French Five-factor model on all the active funds to evaluate whether the funds manage to create returns above their respective benchmark and the broad market. To get an overview of the overall performance, we have also created an equal-weighted (EW) portfolio for all actively managed mutual funds in both the U.S. and Norway.

In our regressions we have used the appropriate benchmarks as a proxy for the market, with the OSEFX as the benchmark for the Norwegian mutual funds and the S&P 500 as the benchmark for the U.S. mutual funds. The excess return of the individual funds and the excess return of the EW portfolio are used as the dependent variable in the regressions. To test for significance, we have tested on a 5% level as this is the most common practice.

5.1.1 Results from U.S. mutual funds

Table 3 shows the results from the time-series regressions on the U.S. EW portfolio, where we report the results from the CAPM model, Fama and French Three-factor

model, Carhart's Four-factor model, and Fama and French Five-factor model for the total period and the three different sub-periods.

From the total period, we do not find signs of superior performance for the actively managed funds in the U.S., but we do find evidence of underperformance. The results from the regressions show statistically significant negative alphas for all models during the total period. Our findings are consistent with previous research by Jensen (1969), Elton et al. (1993), Malkiel (1995), and Fama & French (2010) who all found evidence of negative alphas in the U.S.

Comparing the average fund performance of the total period with the three sub-periods, our results indicate that the average fund performed best under the 2008 financial crisis. During the total period, all four models give an alpha between -0,22% to -0,24%, whereas under the financial crisis the alphas are higher ranging from 0,00% to -0,03%. A monthly alpha of -0,22% would result in an annual underperformance of -2,67% compared to the benchmark return. However, the alphas during the financial crisis are statistically insignificant and therefore we cannot say if there is evidence of an increased performance compared to the market. On the other hand, we find evidence of underperformance during the control period where the market is in expansion. The alphas are slightly lower ranging from -0,35% to -0,36%, where all alphas are statistically significant. This would result in an annual underperformance ranging from 4,28% to 4,41%. This is in line with previous research by Moskowitz (2000) and Kosowski (2011) where both conclude that mutual fund alpha in recessions excels those in expansion.

The EW portfolio shows a high exposure towards the market, where the systematic risk (beta) is above 0.93 and close to 1 for all models. This is expected as the EW portfolio is considered a well-diversified portfolio. A high correlation with the market also indicates a passive investment strategy. There is however not a single significant value for any of the additional factors (SMB, HML, MOM, RMW, and CMA) besides the market beta.

One interesting observation to be noted is that one would expect the size factor (SMB) to be negative in times of recession, and positive in times of expansion, as during economic downturns investors flee from risky stocks and seek quality

companies. However, our analysis shows a positive size factor in all periods. This indicates that the fund managers favour small-cap stocks, indifferent to the market conditions. Elton et al. (2011) studied a universe of mutual funds and concluded that there was a general inclination for the funds to hold small-cap stocks as the mean SMB coefficient of the funds in the universe was positive 0.1628.

The value factor (HML) on the other hand is negative in all periods. There is a general perception that value stocks are riskier than growth stocks in bad times, implying that investors will turn from riskier investments to safer ones (Jagannathan & Wang, 1996; Zhang, 2005; Chen et al., 2008). Hence, as the value factor is negative it means that the mutual fund managers are more invested in growth stocks, which generally have lower returns than value companies, and this could explain some of the reasons why the American managers underperform.

The momentum factor (MOM) is negative and insignificant, and the alphas decrease when adding the momentum factor. A negative slope on the positive momentum factor should give an increase in alpha from the Fama and French Three-factor model to Carhart's Four-factor model, but this only occurs during the control period and the effect is minimal. Negative alpha contradicts Ippolito's (1989) findings that mutual fund managers outperform indexes, but is in line with the findings of e.g Jensen (1968), Elton et al. (1993), and the efficient market hypothesis (Fama, 1970). Comparing the momentum factor with the size- and value factors there is little difference. In recessions there are few stocks that are cheap and outperforming, and we would expect the momentum factor to be lower in those periods.

The RMW-coefficients are positive in all periods except period 1 (2007-2010), where we find a negative beta coefficient. The CMA-coefficient is however consistently negative in all periods. As previously stated, the RMW and CMA factors are not statistically significant. The negative alpha in the EW portfolio is worse under the Five-factor model than for the Four-factor model in all periods except during the Covid-19 period, but the decrease in alpha is minimal and we cannot tell if the Five-factor model attributes less of the returns to the management ability than the Four-factor model does.

Table 3: Regression results of various models' specifications for the equal-weighted portfolio of actively managed U.S. mutual funds

The table shows results for time series regressions for the CAPM model, Fama-French 3-factor model, Carharts 4-factor model and Fama-French 5-factor model on net returns of an equal-weighted portfolio of the actively managed U.S. mutual funds in our sample. The regressions are run on the total period (2007-2021) and divided into three time periods; period 1 (2007-2010), period 2 (2011-2018), and period 3 (2019-2021). Explanatory variables used are the benchmark as a proxy for the market excess return (S&P), a size factor (SMB), a value/growth factor (HML), a momentum factor (MOM), a profitability factor (RMW), and an investment factor (CMA) (see section 3 for descriptions of the factors). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R². The t-statistics are corrected according to Newey and West (1987) adjusted standard errors. The null hypothesis is alpha equal to zero, and significant values are in bold font.

Total Period (2007-2021)									
Model specification		α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	β_{MOM}	β_{RMW}	β_{CMA}	R^2_{Adj}
(1) Jensen's Alpha / CAPM	Coefficient	-0,0023	0,9873						94,80%
	t(Coefficient)	-2,8297	48,4414						
(2) Fama-French 3-factor model	Coefficient	-0,0023	0,9827	0,0308	-0,0141				94,80%
	t(Coefficient)	-2,8979	49,5872	1,2670	-0,7285				
(3) Carhart 4-factor model	Coefficient	-0,0022	0,9747	0,0277	-0,0268	-0,0212			94,80%
	t(Coefficient)	-2,8215	43,6107	1,1319	-1,2091	-1,4841			
(5) Fama-French 5-factor model	Coefficient	-0,0024	0,9829	0,0411	-0,0141		0,0359	-0,0698	94,80%
	t(Coefficient)	-2,8940	47,0215	1,7074	-0,5380		1,0635	-1,7480	
Period 1 (2007-2010)									
Model specification		α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	β_{MOM}	β_{RMW}	β_{CMA}	R^2_{Adj}
(1) Jensen's Alpha / CAPM	Coefficient	0,0000	0,9583						97,80%
	t(Coefficient)	-0,0058	68,1058						
(2) Fama-French 3-factor model	Coefficient	-0,0001	0,9572	0,0130	-0,0047				97,70%
	t(Coefficient)	-0,0594	60,8746	0,6516	-0,2482				
(3) Carhart 4-factor model	Coefficient	-0,0002	0,9436	0,0159	-0,0343	-0,0336			97,80%
	t(Coefficient)	-0,2141	52,0743	0,8338	-1,2192	-1,6527			
(5) Fama-French 5-factor model	Coefficient	-0,0003	0,9660	0,0212	-0,0453		-0,0021	-0,0044	97,70%
	t(Coefficient)	-0,2420	85,0973	0,8340	-1,8854		-0,0633	-0,0532	
Period 2 (2011-2018)									
Model specification		α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	β_{MOM}	β_{RMW}	β_{CMA}	R^2_{Adj}
(1) Jensen's Alpha / CAPM	Coefficient	-0,0036	1,0544						90,60%
	t(Coefficient)	-2,7194	20,5861						
(2) Fama-French 3-factor model	Coefficient	-0,0035	1,0489	0,0359	-0,0141				90,50%
	t(Coefficient)	-2,6886	20,6191	0,8961	-0,2391				
(3) Carhart 4-factor model	Coefficient	-0,0034	1,0454	0,0361	-0,0271	-0,0218			90,40%
	t(Coefficient)	-2,6042	20,1588	0,9152	-0,4166	-0,7707			
(5) Fama-French 5-factor model	Coefficient	-0,0035	1,0475	0,0475	0,0363		0,0690	-0,1195	90,40%
	t(Coefficient)	-2,6607	19,4711	1,0223	0,4238		0,7764	-1,2067	
Period 3 (2019-2021)									
Model specification		α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	β_{MOM}	β_{RMW}	β_{CMA}	R^2_{Adj}
(1) Jensen's Alpha / CAPM	Coefficient	-0,0033	0,9732						96,70%
	t(Coefficient)	-1,7973	58,2102						
(2) Fama-French 3-factor model	Coefficient	-0,0034	0,9657	0,0068	-0,0290				96,50%
	t(Coefficient)	-1,7191	49,9443	0,1524	-0,8990				
(3) Carhart 4-factor model	Coefficient	-0,0032	0,9563	-0,0040	-0,0353	-0,0176			96,30%
	t(Coefficient)	-1,4245	57,9426	-0,0822	-1,3736	-0,5799			
(5) Fama-French 5-factor model	Coefficient	-0,0028	0,9496	0,0196	0,0330		0,0221	-0,1372	96,20%
	t(Coefficient)	-0,9551	40,8128	0,3053	0,5324		0,3000	-1,8397	

It is important to note that the results from the EW portfolio can be misleading as they are an average of all mutual funds in our sample. Hence, we also report the results from the regressions run on all mutual funds in the appendix. The EW portfolio indicates that the additional factors from the different models are insignificant. However, as Fama and French (1993) found evidence of other factors than the market to matter empirically, and we still find evidence of the factors being

statistically significant for several of the individual mutual funds, we find it appropriate to report the results from different factor models and not omit these variables.

Table A1 in the appendix shows the results from the time series regressions for the CAPM of all mutual funds in the U.S. in the total period and the three sub-periods. We found that only two out of 30 mutual funds have an intercept equal to or above zero during the total period. However, these are not significant. 13 out of 30 funds have a significant alpha below zero, indicating that mutual funds in the U.S. do not outperform the market as promised, but rather underperforms compared to their benchmark. Nevertheless, these results differ during the different sub-periods. During the sub-periods where the market is in distress, the number of significant values has a notable decrease. During the financial crisis, two funds have a significant positive alpha, and only one fund has a significant negative alpha, while during the Covid-19 pandemic there is only one significant negative alpha.

In contrast, the number of significant alphas during the control period from 2011-2018 shows an increase, where 14 out of 30 funds have a significant negative alpha. These results indicate that mutual funds in the U.S. perform better during times of distress than in a normal market environment, although still worse than their benchmark. We also observe that all funds have a beta significantly different from 1. During the control period, more than half of the funds (21 of 30) have a beta above 1 which means they are overexposed to market risk. During period 1 and 2, there are significantly fewer.

Looking at the results for the Three-factor model (Table A2), the Four-factor model (Table A3), and the Five-factor model (Table A4) we do not find a significant difference in the results from the CAPM model of the EW portfolio. One thing we noticed that differs from the EW portfolio, is that we find more significant factors during the full period, financial crisis and the Covid-19 pandemic in all of the multifactor models. This indicates that the expanding market in the control period affects the funds' ability to deliver abnormal returns.

The findings from the individual fund regressions are in line with the results with the EW portfolio, increasing the validity of the average performance of the actively

managed mutual funds in our sample. However, from the regressions of all mutual funds we find that *Hartford Core Equity Y* is consistently among the top three performing funds in the total period, period 2 and period 3, but not among the top three during the financial crisis where we find that the average mutual funds perform better. *Hartford Core Equity Y* still manages to have a persistently positive alpha through all periods, although not statistically significant. We have explored to see if there exists a pattern among the funds that perform best and those who perform worst by looking at rating, investment style, fee levels, etc. We have found few, but interesting patterns, such as the funds who have performed best have a Morningstar rating between 3 and 5, whereas the worst performing funds have a rating between 2 and 5, where 5 is the highest possible rating. We also looked at the longest manager tenure. Here we found evidence that the funds who have performed best have a shorter manager tenure, apart from the financial crisis where the managers had a longer tenure. This is particularly interesting as our analysis shows that the average fund performed best during the 2008 financial crisis.

5.1.2 Results from Norwegian mutual funds

Table 4 shows the results from the time-series regressions on the Norwegian EW portfolio, where we report the results from the CAPM model, Fama and French Three-factor model, Carhart's Four-factor model, and Fama and French Five-factor model for the total period and the three different sub-periods.

From the total period, we find evidence of superior performance for the Fama and French Three-factor model and the Carhart Four-factor model with an alpha of 0,13% for both models. This would result in an annual outperformance of 1,57% compared to the benchmark return and the broad market. In contrast to the U.S. EW portfolio results, the alphas are positive for the total period and sub-period 1 and 2. Similar to the U.S. actively managed mutual funds, the Norwegian mutual funds also performed better during the financial crisis. The alphas show an increase in positive values with the alpha ranging between 0,20% to 0,25% for the different models in period 2, although not statistically significant.

Our findings are in line with previous research of Gjerde and Sættem (1991), who found evidence for the Norwegian funds in their sample to consistently outperform the market. However, the results differ during the Covid-19 pandemic, where

Norwegian actively managed mutual funds had a negative performance compared to the broad market. This is in line with Kapital's (Framstad & Fyksen, 2020) review of 417 funds in the Norwegian market where 94% of the funds delivered a negative return in the crisis month of March 2020, and 88% of the funds had a negative return since the turn of the year 2020. As none of the sub-periods creates a significantly positive alpha, the EW portfolio is not able to create abnormal returns.

The market beta is significant in all four test periods for all four models in the EW portfolio. Beta is lowest during the financial crisis where it is approximately 0,89, whereas during the Covid-19 pandemic all betas are above 1. It is our assessment that this is an indication of the managers being more risk-averse during the financial crisis, but still managed to provide positive alphas.

The Fama and French Three-factor model give positive exposure to the size factor (SMB) in Norway, similar to the U.S. The positive slope of SMB indicates that fund returns are driven relatively more by small-cap equities. This can, as previously mentioned, be due to the general inclination for the funds to hold small-cap stocks. In the control period, there is a negative exposure to the value factor (HML) whereas the value factor is positive during recessions. Thus, the funds preferred growth stocks, which generally have lower returns and lower risk compared to value stocks in the control period, but not during the two crises.

Our analysis shows that the momentum factor (MOM) is higher in Norway than in the U.S. Generally, Norway has consistently had a lower cumulative return than other regions (Kenneth R. French Data Library). Adding the momentum factor makes no difference in alphas, but the t-values decrease. One would expect the alpha to decrease as well when there are more risk factors to consider. Grundy and Martin (2001) argue that momentum has significant negative beta following bear markets and positive after bull markets. This is surprising, as our results show the opposite.

The RMW- coefficients are positive in all periods except period 2, where we find a negative beta coefficient. The CMA-coefficient is however negative in all periods except period 2, where we find a positive beta coefficient. Neither factors are

statistically significant in any of the periods. We find the opposite results in Norway compared to the U.S., where the EW alpha is higher for the Five-factor model than for the Four-factor model for all periods except during the Covid-19 pandemic. However, as the increase in alpha is minimal, we cannot tell if the Five-factor model attributes more of the returns to the management ability than the Four-factor model does.

We observe that the adjusted R^2 increases going from the CAPM to the Fama and French Three-factor model for all time periods except for period 3, because during the total period, period 1 and period 2 the SMB factor is statistically significant. During the total period, the SMB coefficient is also significantly higher ranging from 0,1830 to 0,900 for the Norwegian EW portfolio, compared to 0,0277 to 0,0411 for the U.S. EW portfolio. This indicates that the Norwegian mutual funds are more exposed to small companies compared to the U.S. mutual funds. However, considering the U.S. mutual funds all use the S&P 500 as their benchmark, which is a market-capitalization-weighted index of the 500 largest publicly traded companies in the U.S., this is less surprising. There is no increase/decrease in adjusted R^2 from the Fama and French Three-factor model to Carhart's Four-factor model. However, Sørensen (2009) found that momentum does not appear to be a significant risk factor in the cross-section of equities on the Oslo Stock Exchange.

Table 4: Regression results of various models' specifications for the equal-weighted portfolio of actively managed Norwegian mutual funds

The Table shows results for time series regressions for the CAPM model, Fama-French 3-factor model, Carharts 4-factor model, and Fama-French 5-factor model on net returns of an equal-weighted portfolio of the actively managed Norwegian mutual funds in our sample. The regressions are run on the total period (2007-2021) and divided into three time periods; period 1 (2007-2010), period 2 (2011-2018), and period 3 (2019-2021). Explanatory variables used are the benchmark as a proxy for the market excess return (S&P), a size factor (SMB), a value/growth factor (HML), a momentum factor (MOM), a profitability factor (RMW), and an investment factor (CMA) (see section 3 for descriptions of the factors). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R^2 . The t-statistics are corrected according to Newey and West (1987) adjusted standard errors. The null hypothesis is alpha equal to zero, and significant values are in bold font.

Total Period (2007-2021)									
Model specification		α	β_{OEFX}	β_{SMB}	β_{HML}	β_{MOM}	β_{RMW}	β_{CMA}	R^2_{Adj}
(1) Jensen's Alpha / CAPM	Coefficient	0,0010	0,9334						97,70%
	t(Coefficient)	1,3890	43,3964						
(2) Fama-French 3-factor model	Coefficient	0,0013	0,9211	0,1830	0,0589				97,90%
	t(Coefficient)	1,9662	51,3685	3,3882	1,5269				
(3) Carhart 4-factor model	Coefficient	0,0013	0,9181	0,1839	0,0495	-0,0120			97,90%
	t(Coefficient)	2,0781	50,5117	3,4176	1,0951	-0,7221			
(5) Fama-French 5-factor model	Coefficient	0,0012	0,9201	0,1900	0,0455		0,0085	-0,0118	97,90%
	t(Coefficient)	1,7960	51,5220	3,1737	0,7570		0,0855	-0,2066	
Period 1 (2007-2010)									
Model specification		α	β_{OEFX}	β_{SMB}	β_{HML}	β_{MOM}	β_{RMW}	β_{CMA}	R^2_{Adj}
(1) Jensen's Alpha / CAPM	Coefficient	0,0025	0,8993						99,00%
	t(Coefficient)	1,8253	65,6864						
(2) Fama-French 3-factor model	Coefficient	0,0024	0,8923	0,1287	0,0709				99,10%
	t(Coefficient)	1,8616	67,6926	2,0075	1,3484				
(3) Carhart 4-factor model	Coefficient	0,0024	0,8916	0,1287	0,0674	-0,0029			99,10%
	t(Coefficient)	1,8272	61,4979	1,9846	1,2082	-0,1095			
(5) Fama-French 5-factor model	Coefficient	0,0020	0,8856	0,1371	0,1051		0,1098	-0,0452	99,10%
	t(Coefficient)	1,4881	58,7601	2,0396	1,5673		0,6971	-0,6332	
Period 2 (2011-2018)									
Model specification		α	β_{OEFX}	β_{SMB}	β_{HML}	β_{MOM}	β_{RMW}	β_{CMA}	R^2_{Adj}
(1) Jensen's Alpha / CAPM	Coefficient	0,0005	0,9536						96,00%
	t(Coefficient)	0,6108	35,2751						
(2) Fama-French 3-factor model	Coefficient	0,0007	0,9528	0,1908	-0,0198				96,40%
	t(Coefficient)	0,9203	38,1023	3,0747	-0,3731				
(3) Carhart 4-factor model	Coefficient	0,0007	0,9536	0,1908	-0,0167	0,0056			96,40%
	t(Coefficient)	0,7528	36,9398	3,0552	-0,2941	0,2131			
(5) Fama-French 5-factor model	Coefficient	0,0012	0,9357	0,1494	-0,1206		-0,1834	0,0523	96,50%
	t(Coefficient)	1,3197	33,0176	1,9727	-1,3935		-1,6814	0,5671	
Period 3 (2019-2021)									
Model specification		α	β_{OEFX}	β_{SMB}	β_{HML}	β_{MOM}	β_{RMW}	β_{CMA}	R^2_{Adj}
(1) Jensen's Alpha / CAPM	Coefficient	-0,0019	1,0735						97,70%
	t(Coefficient)	-1,1094	38,2468						
(2) Fama-French 3-factor model	Coefficient	-0,0013	1,0494	0,1090	0,0363				97,60%
	t(Coefficient)	-0,5208	27,9668	0,7185	0,5997				
(3) Carhart 4-factor model	Coefficient	-0,0013	1,0357	0,1318	0,0118	-0,0287			97,50%
	t(Coefficient)	-0,5225	29,8452	0,9690	0,1426	-0,6373			
(5) Fama-French 5-factor model	Coefficient	-0,0016	1,0069	0,1077	0,2690		0,1878	-0,5603	98,20%
	t(Coefficient)	-1,0100	85,3427	1,2825	3,1057		0,9177	-4,4876	

Table A5 in the appendix shows the results from the time series regressions for the CAPM of all mutual funds in Norway in the total period and the three sub-periods. Looking at the results from the CAPM regression only two funds have a significant alpha during the total period, whereas these are both positive. During the financial crisis, this number increased to seven significant positive alphas, but no alphas are significant during the control period. However, we find three significant alphas during the Covid-19 pandemic, where two out of three are negative.

All funds have significant betas different than 1 in all periods. During the 2008 financial crisis, there were no funds with a beta higher than 1. This means that all funds are neutral or underexposed to market risk. In the control period only five of 25 funds have beta above 1, but during the Covid-19 pandemic over half of the funds (16 of 25) funds have beta above 1. Hence, higher risk and overexposure to the market in this period did not pay off for the Norwegian mutual fund managers.

Similar to the U.S. mutual funds, we do not find a significant difference from the CAPM model to the Three-factor model (Table A6), Four-factor model (Table A7),

and the Five-factor model (Table A8). We still find the different factors significant for several of the Norwegian mutual funds and find it appropriate to not omit these variables. The findings of the individual mutual funds are also in line with the EW portfolio.

For the Norwegian mutual funds, we do not find any specific fund that is consistently among the top three performing funds during the different periods, but we observed two funds that consistently are among the bottom three. *ODIN Norge C* is among the bottom three funds for the total period, period 1 and period 2 for all models, while *Alfred Berg Humanfond* is among the bottom three for the total period, period 1 and period 3 for all models except the CAPM model.

We have also tried to check whether there exists a pattern among the best or worst performing mutual funds in Norway. Generally, the top performing funds have a higher Morningstar rating ranging from 3 to 5, whereas the worst performing funds have a rating between 1 and 4. Regarding management tenure, we find an opposite pattern in Norway compared to the U.S. The best performing funds have a higher manager tenure than the worst performing funds, except for the Covid-19 period where the worst performing funds had a higher tenure than the best performing funds. There is a perception of the longer the management tenure is, the stronger is the correlation for a fund not underperforming. Hence, we find these results particularly interesting as the Norwegian mutual funds had a negative performance during the Covid-19 pandemic.

To summarise, the results indicate that the value of active management for the investor differs between the two countries. Active equity mutual funds are known to underperform their benchmark, net of fees (Jensen 1968; Elton et al. 1993; Fama & French 2010; and others). Notably, one popular hypothesis is that investors are willing to tolerate this underperformance as the mutual funds outperform in periods that are important to investors - recessions. Our results somewhat contradict this, as the mutual funds in the U.S. perform better during recessions than in an expanding market, but do not beat their benchmark. In Norway, the managers have outperformed their benchmark during the financial crisis and control period, but not during the Covid-19 pandemic.

The performance of active management on an international level has been previously researched, and our findings are not surprising as it is in line with previous literature. Dyck et al. (2013) conclude in their research paper that active management outperforms in less competitive and efficient markets. They found that in very efficient markets, like U.S. equities, the average abnormal returns are offset by costs and fees, ultimately yielding negative average return after fees and costs. However, in developed markets of Europe they found evidence that active management outperforms the market.

5.2 Bootstrap results

The results from our previous analyses indicate that mutual fund managers are performing better during the 2008 financial crisis than in the control period, but worse during the Covid-19 pandemic. In the U.S., the funds are underperforming their benchmark in all periods, whereas in Norway the managers are able to provide higher returns than the respective benchmark in period 1 and 2. However, this might not eliminate the likelihood that certain managers possess skill. We apply the bootstrap procedure described in section 3.3 and create a distribution of cross-sectional draws of alpha and their t-statistics. Hence, we can distinguish skill from luck.

Panel A is based on the funds alpha and can be found in the appendix (Table A9), whereas Panel B is based on the funds t-statistics of alpha. According to Sørensen (2009) and Fama & French (2010), it is better to rank the fund based on t-statistics rather than alpha as the precision of the alpha estimation increases with the historical length of return history and the degree of diversification. Another benefit of using t-statistics is that it accounts for variations in risk-taking, making risk having less of an effect on the outcomes (Kosowski et al., 2006). Thus, our focus will be on Panel B. The results are presented in ascending order given ranks and percentiles, where the percentiles are based on interpolations between the ranks closest to the given percentile.

The first column, Actual, in Table 5 shows the results from the benchmark regression based on the Fama and French Three-factor model. These are the same numbers as in Table A2 and Table A6. The second column, simulated average, is the average of α or $t(\alpha)$ based on the average of 10.000 bootstrap simulations. The

last column provides the fraction of simulations yielding a lower result than the actual fund return observations and can be interpreted as a p-value.

When it comes to evaluating the success of active management performance, it is critical to recognize the role that luck can play across different time horizons. Given the ad hoc nature of global economies, there will often be a handful of managers who outperform a given benchmark by chance (Fama & French, 2010).

In the U.S. full-time period, the actual $t(\alpha)$ for the 10th percentile is -3,23 which means that 10% of funds have $t(\alpha)$ below -3,23. The average value corresponding to the same percentile from the bootstrap simulation is -0,89. Thus, the actual fund returns are lower than the average value. The last column reveals that only 0,01% of the simulated values are lower than the actual value for the 10th percentile funds, and for the worst performing fund the simulated $t(\alpha)$ is greater than actual in 100% of the draws. This indicates extremely bad skill. In the U.S. we observe that the simulated values are above the actual values in all of the simulation runs in the full period, 2011-2018 and 2019-2021. This indicates “bad skill” or value destruction by the fund managers and we can reject a null hypothesis that poor performance is due to bad luck.

However, in the period around the financial crisis (2007-2010) the actual $t(\alpha)$ estimates are above the simulated average from the 30th percentile to the best ranked fund. Hence, there exists some skill among the fund managers and we can reject a null hypothesis that good performance is only due to luck. This is in line with the findings of Ferson and Schadt (1996) and Kosowski (2011) which state that cash-holdings within a fund will be high in a recession, and that funds lower the market beta loading. We also observe that it applies in more than half of the simulation runs from the same percentile.

The results in Norway are quite different. We observe that the actual $t(\alpha)$ values are above the simulated average in all of the periods, except for under the Covid-19 pandemic. When the actual $t(\alpha)$ is greater than the simulated average for all ranks and percentiles it suggests evidence of skill rather than luck. Hence, the null hypothesis is not rejected. For the worst funds the negative excess return must be due to bad luck. In both the full-time and 2008 financial crisis period, over half of

the funds have actual $t(\alpha)$ above simulated in 95% of the times which indicate that the fund managers have abnormal skills. These results are especially interesting as Sørensen's (2009) research concluded that skills were lacking in the Norwegian Mutual fund industry. During the Covid-19 pandemic however, the simulated average returns are above the actual value even for the best fund. 60% of the simulation runs produce higher values of $t(\alpha)$ than from the actual fund returns for the best fund. This indicates that the fund managers in Norway lack skills during this period. On the other hand, it is only for the worst and second worst fund where the findings are significant.

One thing to note in this context is that the funds just below the best performing fund have a higher percentage of simulated values that are lower than the actual value. This is due to the relative performance among funds, meaning that the third or fourth best fund does exceptionally well among the third or fourth best fund.

Table 5: Rank and percentiles of $t(\alpha)$ for actual and simulated mutual fund returns based on the Fama and French 3-factor model

Panel B shows actual mutual fund returns (Actual) for different ranks and percentiles, simulated average estimation estimated by 10.000 bootstrap simulations (Simulated average) and percentage of simulation runs that produce lower values of $t(\alpha)$ at a given rank and percentile than the ones from the actual fund returns ($\% < \text{Actual}$). The estimates are based on the Fama and French 3-factor model, where the explanatory variables are the market excess return, a size factor (SMB), and a value factor (HML). We use OLS estimation and standard errors corrected for heteroscedasticity and autocorrelation with the Newey and West (1986) method.

USA: full period				Norway: full period			
Panel B: $t(\alpha)$				Panel B: $t(\alpha)$			
Rank/ percentile	Actual	Simulated average	% < Act	Rank/ percentile	Actual	Simulated average	% < Act
Worst	-4,3522	-1,5330	0	Worst	-1,3196	-1,6835	66,41
2nd	-3,3915	-1,1783	0,02	2nd	-0,5398	-1,3504	86,69
3rd	-3,3219	-0,9692	0,01	3rd	-0,3263	-1,1402	87,66
4th	-3,1436	-0,8198	0,01	4th	0,2315	-0,9897	96,67
5th	-2,8966	-0,6987	0,02	5th	0,5644	-0,8395	98,59
10 %	-3,2327	-0,8945	0,01	10 %	-0,3263	-1,1402	87,66
20 %	-2,6283	-0,5527	0,07	20 %	0,6855	-0,7769	98,93
30 %	-2,1077	-0,3149	0,27	30 %	0,8211	-0,4969	98,26
40 %	-1,9425	-0,1154	0,28	40 %	0,9638	-0,2595	97,54
50 %	-1,8092	0,0742	0,23	50 %	1,1240	-0,0371	96,86
60 %	-1,5973	0,2688	0,29	60 %	1,3960	0,1826	97,43
70 %	-1,2167	0,4896	0,65	70 %	1,6035	0,4168	96,85
80 %	-0,6850	0,7669	1,99	80 %	1,7676	0,6913	95,07
90 %	-0,0140	1,1864	5,11	90 %	2,1501	1,0442	94,12
5th	-0,3270	0,9425	4,17	5th	1,8286	0,7526	94,96
4th	-0,0229	1,0910	6,98	4th	2,0476	0,8949	95,34
3rd	-0,0051	1,2817	4,05	3rd	2,1501	1,0442	94,12
2nd	0,1234	1,5627	2,64	2nd	2,2059	1,2443	90,83
Best	1,1648	2,1078	18,59	Best	2,3181	1,5726	84,14

USA: 2007-2010				Norway: 2007-2010			
Panel B: t(a)				Panel B: t(a)			
Rank/ percentile	Actual	Simulated average	% < Act	Rank/ percentile	Actual	Simulated average	% < Act
Worst	-2,7524	-1,9097	12,17	Worst	-0,7534	-1,8441	89,76
2nd	-1,6075	-1,4484	36,65	2nd	-0,3026	-1,4660	93,56
3rd	-1,3907	-1,1973	34,07	3rd	-0,1927	-1,2195	92,24
4th	-1,1492	-1,0154	38,4	4th	0,1652	-1,0486	96,43
5th	-1,0568	-0,8696	34,91	5th	0,5738	-0,8825	98,91
10 %	-1,2699	-1,1063	36,07	10 %	-0,1927	-1,2195	92,24
20 %	-0,7880	-0,6904	42,1	20 %	0,5824	-0,8148	98,64
30 %	-0,3674	-0,4000	52,24	30 %	0,7795	-0,5092	98,2
40 %	-0,1343	-0,1587	52,46	40 %	0,9180	-0,2479	97
50 %	0,1020	0,0711	54,79	50 %	1,1222	-0,0034	96,37
60 %	0,4599	0,3138	60,93	60 %	1,4992	0,2387	97,48
70 %	0,6376	0,5924	58,65	70 %	1,6988	0,4990	96,59
80 %	1,0506	0,9526	61,12	80 %	2,1750	0,8097	97,38
90 %	1,5699	1,5294	60,34	90 %	2,4613	1,2104	94,75
5th	1,3205	1,1877	61,76	5th	2,2442	0,8784	97,11
4th	1,4969	1,3940	61,49	4th	2,3318	1,0419	95,75
3rd	1,6429	1,6647	59,19	3rd	2,4613	1,2104	94,75
2nd	2,2811	2,0769	62,62	2nd	2,5962	1,4399	92,2
Best	2,8550	2,9169	59,01	Best	3,0793	1,8045	91,59

USA: 2011-2018				Norway: 2011-2018			
Panel B: t(a)				Panel B: t(a)			
Rank/ percentile	Actual	Simulated average	% < Act	Rank/ percentile	Actual	Simulated average	% < Act
Worst	-4,2838	-1,3648	0,01	Worst	-1,1492	-1,6344	73,52
2nd	-3,4100	-1,0222	0,03	2nd	-0,7779	-1,2890	76
3rd	-2,9584	-0,8139	0,12	3rd	-0,4777	-1,0799	81,53
4th	-2,7397	-0,6677	0,22	4th	-0,3783	-0,9256	79,53
5th	-2,6295	-0,5533	0,19	5th	-0,1487	-0,7871	83,57
10 %	-2,8491	-0,7408	0,15	10 %	-0,4777	-1,0799	81,53
20 %	-2,5424	-0,4172	0,21	20 %	-0,1468	-0,7261	81,53
30 %	-2,2425	-0,1985	0,3	30 %	0,2059	-0,4510	84,47
40 %	-2,0553	-0,0173	0,38	40 %	0,3597	-0,2143	81,84
50 %	-1,9061	0,1550	0,38	50 %	0,4234	0,0075	74,46
60 %	-1,7580	0,3316	0,37	60 %	0,8556	0,2311	83,42
70 %	-1,3842	0,5314	0,87	70 %	1,0899	0,4682	83,07
80 %	-0,9300	0,7921	2,05	80 %	1,3166	0,7453	80,77
90 %	-0,6275	1,2198	1,42	90 %	1,6473	1,1098	78,26
5th	-0,8179	0,9633	1,66	5th	1,3319	0,8080	78,69
4th	-0,7406	1,1180	1,36	4th	1,3324	0,9529	71,96
3rd	-0,5144	1,3216	1,47	3rd	1,6473	1,1098	78,26
2nd	0,2007	1,6367	8	2nd	1,7284	1,3226	72,56
Best	0,3617	2,2898	4,56	Best	1,7602	1,6723	56,85

USA: 2019-2021				Norway: 2019-2021			
Panel B: t(a)				Panel B: t(a)			
Rank/ percentile	Actual	Simulated average	% < Act	Rank/ percentile	Actual	Simulated average	% < Act
Worst	-2,9258	-1,6585	6,64	Worst	-3,9876	-1,6009	2,5
2nd	-2,8101	-1,2562	2,55	2nd	-3,7010	-1,2181	1,68
3rd	-2,5248	-1,0208	2,08	3rd	-2,0581	-0,9818	10,9
4th	-2,5181	-0,8546	1,33	4th	-1,8996	-0,8363	11,1
5th	-2,3800	-0,7190	1,27	5th	-1,6521	-0,6743	11,81
10 %	-2,5215	-0,9377	1,52	10 %	-2,0581	-0,9818	10,9
20 %	-1,9648	-0,5524	2,24	20 %	-1,4363	-0,6124	15,19
30 %	-1,6540	-0,2814	2,67	30 %	-1,0903	-0,3367	17,23
40 %	-1,2832	-0,0484	4,69	40 %	-0,6710	-0,1009	24,08
50 %	-1,0643	0,1752	5,47	50 %	-0,2126	0,1191	35,82
60 %	-0,7429	0,4158	8,54	60 %	-0,0896	0,3339	33,03
70 %	-0,3415	0,7020	14,24	70 %	0,2196	0,5644	39,1
80 %	-0,1711	1,0762	11,32	80 %	0,3447	0,8456	34,84
90 %	0,0327	1,7278	5,47	90 %	0,5263	1,2300	30,28
5th	-0,0298	1,3329	10,5	5th	0,3743	0,9116	34,06
4th	0,0039	1,5621	7,2	4th	0,4538	1,0566	32,94
3rd	0,0615	1,8936	4,52	3rd	0,5263	1,2300	30,28
2nd	0,9608	2,4169	20,71	2nd	0,5363	1,4835	23,2
Best	1,7965	3,6986	25,13	Best	1,4356	2,0401	40,2

Figure 2 provides a visualization of the distributions of our observations. Cuthbertson et al. (2008) used this approach to determine how many funds are likely to produce a given degree of alpha by chance alone, as well as the number of funds that actually realized that level of alpha. The dotted line depicts the simulated $t(\alpha)$ distribution if performance is solely due to luck, while the solid line depicts the actual $t(\alpha)$ distribution. Our focus is still on the t-statistics. One of the most remarkable observations is the difference between the two countries we analyse.

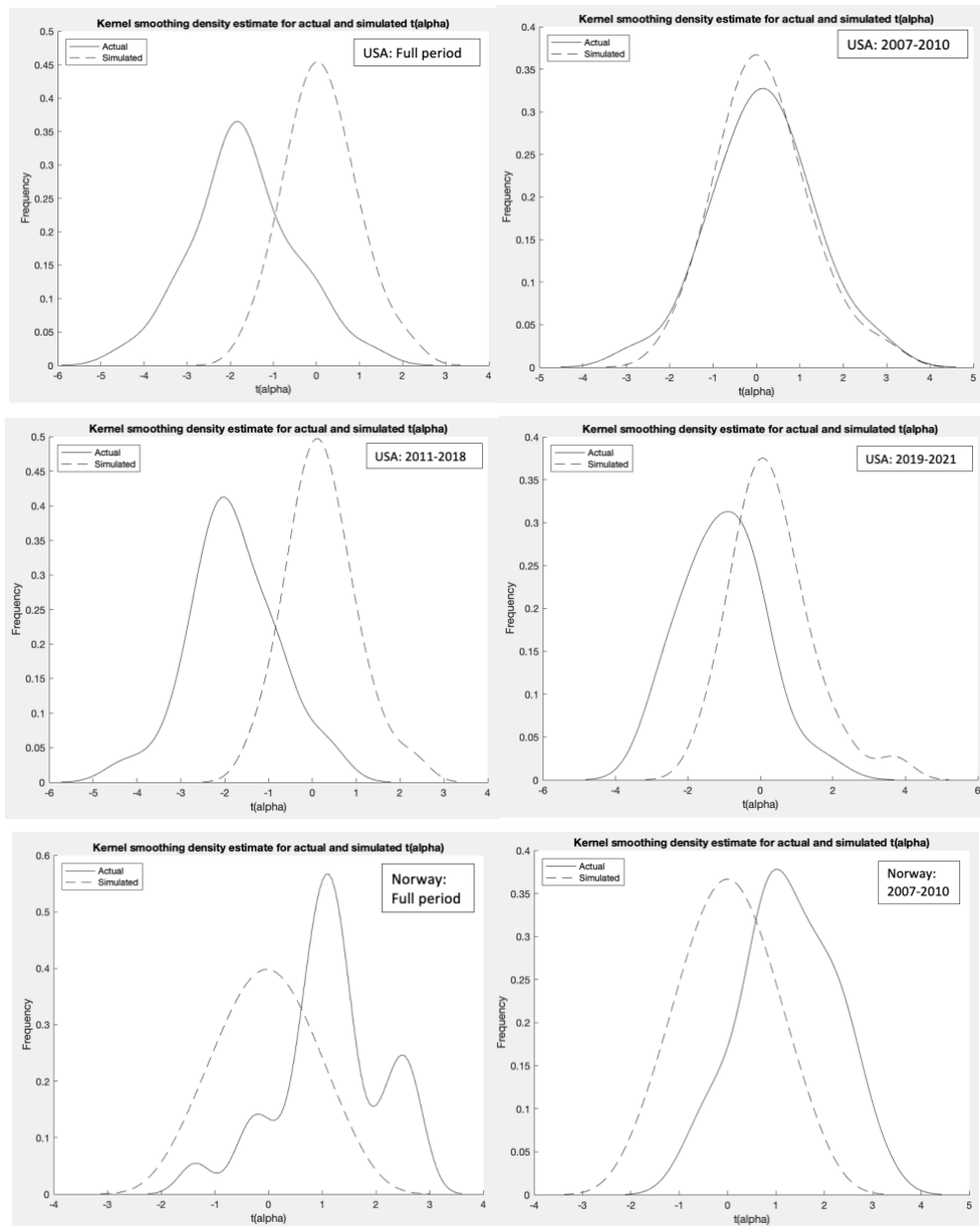
In the U.S. the actual $t(\alpha)$ distribution is overpopulated in the left-tail, compared to the simulated line (luck-distribution). This implies that fund managers cannot use bad luck as an explanation for poor performance, and indicate bad skill. The differences in the tail are larger on the left-hand side than on the right. On the extreme right tail, we observe that the luck-distribution line lies outside of the actual $t(\alpha)$. This observation indicates that outperformance is due to luck. The difference is smaller during the 2008 financial crisis, which is in line with our previous findings. In addition, as the actual distributions are left-tailed this implies that the actual mean is lower than the simulated mean. This can be explained by fees.

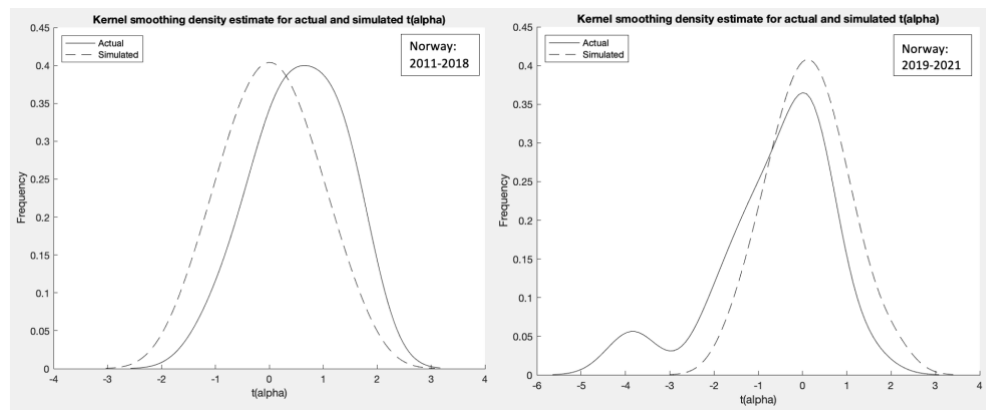
In Norway the simulated line (luck-distribution) lies over the actual line on the left-hand side in the full period, 2007-2010 and 2011-2018 period. This implies that poor performance is due to bad luck. On the right tail, the actual $t(\alpha)$ distribution lies outside the simulated line, which gives evidence for good performance is not

solely due to luck and signal presence of some outperforming funds. During the Covid-19 pandemic, the actual $t(\alpha)$ distribution is overpopulated in the left-tail. Thus, the fund managers cannot use bad luck to explain poor performance in this period. Generally in Norway, the actual distributions are right-tailed which indicates that the actual mean is higher than the simulated mean in all periods.

Figure 2: Kernel density estimates of actual and simulated $t(\alpha)$ fund returns

The figure shows actual and simulated t -statistics of alpha estimates based on the kernel smoothing density function (KSDF). The panel is based on the actual and simulated $t(\alpha)$ values from table 5. We have used the standard bandwidth optimal for normal densities.





To summarise the bootstrap results, the mutual fund managers in the U.S. have bad skills during the full period, 2011-2018 and 2019-2021 and cannot use bad luck as an explanation. During the control period they show evidence of skill, and this is not solely due to luck. Our findings are in line with Fama and French (2010) findings who analysed 3516 actively managed funds from 1984 to 2006 who also concluded that most active fund managers do worse than expected by random chance. Huang et al. (2020) re-estimated Fama and French's fund performance over a longer time to include data up to the year-end of 2018 and had the same conclusion of poor performance.

In Norway, our results show evidence of skill in all periods except for the 2019-2021 period. In all periods, except for 2019-2021, the poor performance is due to bad luck, but during 2019-2021 the fund managers cannot use bad luck to explain the poor performance. Our findings of skill among top performers are in line with the research of Gallefoss et al. (2015). However, they found evidence of poor skill for the worst performers which contradicts our results. Although, it is important to note that Gallefoss et al. (2015) examined the performance over the period of 1982-1990, and as previously stated the role of luck can differ across different time horizons. This could therefore explain the discrepancy in the results.

6.0 CONCLUSION

In this paper we have investigated the performance of actively managed mutual funds' performance during recessions and expansions from January 2007 to January 2021 in Norway and in the U.S. The main purpose of the selected time period is to evaluate the performance of the ongoing Covid-19 pandemic during 2019-2021 in comparison to the financial crisis in 2007-2010 while using the period of 2011-2018 as our control period where the market is in a state of general expansion and signified under relative control.

Our sample consists of 30 actively managed mutual funds in the U.S. and 25 in Norway. We replicate the methodology of Jensen (1968), Carhart (1997), Fama and French (1993; 2015) and the bootstrapping method developed by Kosowski et. al.(2006) with the modifications made by Fama & French (2010).

We do not find evidence that U.S. mutual funds on average are able to generate abnormal returns in any of the time periods, nor possess the sufficient skills to cover their cost in the full period, the period of 2011-2018 and 2019-2021. This is in line with previous research where active equity mutual funds are found to have underperformed their benchmark, net of fees (Jensen 1968; Elton et.al. 1993, Fama and French 2010). However, during the financial crises we found an increase of alpha for all models, though not statistically significant. There is also evidence for some skill among the fund managers in this period and we can reject a null hypothesis that good performance is only due to luck. Hence, actively managed American mutual funds are not able to successfully pick stocks to outperform their benchmark and the broad market, and the null hypothesis we aim to answer in this thesis is not rejected.

The results differ for the Norwegian mutual funds, where the alpha is positive in all periods except 2019-2021, and we found evidence of abnormal return for the full period using the Fama and French Three-factor model and Carhart Four-factor model. During 2019-2021 the alpha is negative for all models, though not statistically significant. There is also evidence of the mutual fund managers possessing abnormal skills in all periods except for 2019-2021, and the worst performing funds are performing poorly due to bad luck. In the latter period, the fund managers cannot use bad luck to explain poor performance and we find

evidence of bad skill. Our findings during the Covid-19 pandemic are in line with research made by Pastor & Vorsatz (2020). They analysed daily returns from 3626 equity funds between February 20 and April 30 in 2020 and discovered that a vast number of actively managed funds underperformed their respective benchmark indices. As a result, the null hypothesis this thesis aims to address is rejected for the full period, 2007-2010 and 2011-2018 and not rejected in the period between 2019-2021.

Our research is somewhat limited regarding the time period, considering the fact that we are currently amid the Covid-19 pandemic. We will therefore recommend further research in the future of the performance of mutual funds during the Covid-19 pandemic, including a longer time period covering the period after January 2021. As some of our findings contradict previous research, it can be interesting and valuable to investigate whether the results will be different post-Covid. Another important improvement could be to extend the dataset by including more funds as we have only studied the funds with the highest fund size in each market. This will improve the validity of the research.

When examining management skill, we propose looking at whether it is attributed to the fund manager's market forecasting or stock-picking skills (or both), as some U.S.-based evidence, such as Kacperczyk et al. (2014), suggests.

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8.0 APPENDIX

Table A1: Regression results of the CAPM model of actively managed U.S. mutual funds

The table shows results for time series regressions for the CAPM model on net returns of actively managed U.S. mutual funds in our sample. The regressions are run on the total period (2007-2021) and divided into three time periods; period 1 (2007-2010), period 2 (2011-2018) and period 3 (2019-2021). Explanatory variables used are the benchmark as a proxy for the market excess return (S&P). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R^2 . The null hypothesis is alpha equal to zero, and significant values are in bold font.

TOTAL PERIOD					
Fund	Jensens α		β - systematic risk		R^2_{Adj}
	α	t-stat	β	t-stat	
American Funds Washington Mutual A	-0,0031	-3,2289	0,9051	42,0720	0,9130
American Funds Fundamental Invs A	-0,0025	-2,3979	1,0215	43,9160	0,9200
American Funds Invtm Co of Amer A	-0,0037	-3,0962	0,9444	35,3820	0,8820
Franklin Rising Dividends A	-0,0006	-0,5822	0,9041	39,4940	0,9030
Parnassus Core Equity Investor	-0,0004	-0,3358	0,8308	30,6250	0,8480
JPMorgan US Equity L	-0,0027	-1,7228	1,0502	30,8410	0,8500
T, Rowe Price Dividend Growth	-0,0004	-0,4842	0,9153	54,9890	0,9470
Oakmark Investor	-0,0022	-1,4402	1,1744	34,1060	0,8740
Vanguard Growth & Income Inv	-0,0029	-2,5315	1,0337	40,1580	0,9060
Hartford Core Equity Y	0,0009	1,1652	0,9640	56,2710	0,9500
Invesco Main Street A	-0,0040	-2,3029	1,0575	27,2220	0,8150
Davis NY Venture A	-0,0069	-3,6995	1,0820	26,2440	0,8040
GMO Quality IV	-0,0037	-1,9342	0,8075	18,8560	0,6780
Fidelity® Growth & Income	-0,0040	-3,5497	1,0872	44,2130	0,9210
ClearBridge Appreciation A	-0,0016	-1,4983	0,8978	37,6360	0,8940
PRIMECAP Odyssey Stock	0,0002	0,1607	0,9756	36,7350	0,8890
MFS Research A	-0,0012	-1,0140	1,0051	38,3550	0,8970
ClearBridge Dividend Strategy A	-0,0023	-1,9705	0,8293	31,5970	0,8560
Janus Henderson Growth And Income D	-0,0027	-1,9237	1,0391	33,9900	0,8730
MFS Massachusetts Investors Tr A	-0,0024	-1,9900	0,9881	37,7600	0,8950
Pioneer A	-0,0069	-2,7474	0,9273	16,6850	0,6230
GE RSP US Equity	-0,0036	-2,0171	1,0460	26,6760	0,8090
State Farm Growth	-0,0017	-1,6808	0,8789	38,7330	0,8990
T, Rowe Price U.S, Equity Research	-0,0009	-0,9517	1,0259	50,1240	0,9370
TIAA-CREF Growth & Income Instl	-0,0019	-1,4144	1,0053	33,2610	0,8680
JHancock Fundamental Large Cap Core A	0,0002	0,0872	1,1477	29,0020	0,8330
JPMorgan US Research Enhanced Equity I	-0,0022	-1,9907	1,0416	43,0710	0,9170
Mairs & Power Growth Inv	-0,0020	-1,2525	0,9640	26,8940	0,8110
Russell Inv Tax-Managed US Large Cap S	0,0000	0,0713	1,0377	84,9210	0,9770
Columbia Disciplined Core A	-0,0021	-1,9500	1,0312	43,9360	0,9200

PERIOD 1 (2007-2010)					
Fund	Jensens α		β - systematic risk		R^2_{Adj}
	α	t-stat	β	t-stat	
American Funds Washington Mutual A	-0,0031	-1,7057	0,9054	28,4320	0,9450
American Funds Fundamental Invs A	0,0008	0,4118	1,0048	28,8930	0,9470
American Funds Invtm Co of Amer A	-0,0016	-0,9991	0,9011	32,0020	0,9560
Franklin Rising Dividends A	0,0000	-0,0173	0,8474	23,0550	0,9190
Parnassus Core Equity Investor	0,0032	1,3698	0,8725	21,3600	0,9060
JPMorgan US Equity L	0,0006	0,2173	0,9963	19,3380	0,8880
T, Rowe Price Dividend Growth	0,0000	0,0042	0,9248	37,5620	0,9680
Oakmark Investor	0,0011	0,3237	1,0996	18,4020	0,8780
Vanguard Growth & Income Inv	-0,0035	-1,3260	1,0263	21,7760	0,9100
Hartford Core Equity Y	0,0008	0,5059	0,9463	32,1780	0,9570
Invesco Main Street A	-0,0017	-0,5456	1,0458	18,5900	0,8800
Davis NY Venture A	0,0004	0,2655	1,0485	36,4120	0,9660
GMO Quality IV	-0,0006	-0,3065	0,7123	19,1780	0,8860
Fidelity® Growth & Income	-0,0075	-2,5634	1,1315	21,7610	0,9100
ClearBridge Appreciation A	-0,0008	-0,3775	0,8407	23,7830	0,9230
PRIMECAP Odyssey Stock	0,0030	1,4178	0,9354	25,3710	0,9320
MFS Research A	0,0034	3,0305	0,9930	49,3600	0,9810
ClearBridge Dividend Strategy A	-0,0046	-1,5039	0,7513	14,0060	0,8060
Janus Henderson Growth And Income D	-0,0018	-0,5028	1,0133	16,0440	0,8450
MFS Massachusetts Investors Tr A	0,0006	0,3554	0,9225	31,3310	0,9540
Pioneer A	-0,0008	-0,4273	1,0014	31,8560	0,9660
GE RSP US Equity	-0,0002	-0,0969	1,0057	22,5110	0,9150
State Farm Growth	0,0003	0,1932	0,8497	27,3680	0,9410
T, Rowe Price U.S, Equity Research	0,0004	0,4277	0,9924	52,0150	0,9830
TIAA-CREF Growth & Income Instl	0,0026	2,0330	0,9291	41,4140	0,9730
JHancock Fundamental Large Cap Core A	0,0074	1,6036	1,0250	12,4820	0,7670
JPMorgan US Research Enhanced Equity I	0,0011	1,8686	0,9987	99,3450	0,9950
Mairs & Power Growth Inv	0,0011	0,3481	0,9541	17,1260	0,8610
Russell Inv Tax-Managed US Large Cap S	0,0017	1,4973	1,0554	51,4000	0,9830
Columbia Disciplined Core A	-0,0026	-1,4031	1,0199	30,9630	0,9530

PERIOD 2 (2011-2018)					
Fund	Jensens α		β - systematic risk		R^2_{Adj}
	α	t-stat	β	t-stat	
American Funds Washington Mutual A	-0,0022	-1,6951	0,9083	23,0210	0,8480
American Funds Fundamental Invs A	-0,0040	-2,8647	1,0944	26,1890	0,8780
American Funds Invtm Co of Amer A	-0,0053	-2,7973	1,0362	18,2460	0,7770
Franklin Rising Dividends A	-0,0013	-0,9936	0,9428	23,8350	0,8570
Parnassus Core Equity Investor	-0,0019	-1,2239	0,8332	17,8290	0,7690
JPMorgan US Equity L	-0,0054	-2,8073	1,1971	20,8550	0,8200
T, Rowe Price Dividend Growth	-0,0006	-0,6292	0,9480	32,2680	0,9160
Oakmark Investor	-0,0029	-1,9138	1,1642	25,9800	0,8760
Vanguard Growth & Income Inv	-0,0028	-1,9393	1,0772	25,2370	0,8700
Hartford Core Equity Y	0,0005	0,5188	1,0025	32,3880	0,9170
Invesco Main Street A	-0,0057	-2,3073	1,1535	15,5700	0,7180
Davis NY Venture A	-0,0112	-3,9293	1,1420	13,4080	0,6530
GMO Quality IV	-0,0063	-2,1169	0,9583	10,7130	0,5450
Fidelity® Growth & Income	-0,0012	-1,2908	1,0481	38,7540	0,9400
ClearBridge Appreciation A	-0,0022	-1,7231	0,9883	25,3850	0,8710
PRIMECAP Odyssey Stock	0,0001	0,0901	1,0242	27,9530	0,8910
MFS Research A	-0,0039	-2,1349	1,1027	20,3750	0,8130
ClearBridge Dividend Strategy A	-0,0011	-0,9140	0,8690	24,3240	0,8610
Janus Henderson Growth And Income D	-0,0028	-1,9019	1,1412	25,6910	0,8740
MFS Massachusetts Investors Tr A	-0,0045	-2,7039	1,1355	23,1170	0,8490
Pioneer A	-0,0110	-2,6107	0,9080	7,2350	0,3510
GE RSP US Equity	-0,0066	-2,4532	1,1779	14,7660	0,6960
State Farm Growth	-0,0035	-2,3146	0,9470	21,2730	0,8260
T, Rowe Price U.S, Equity Research	-0,0025	-1,6239	1,0813	23,7730	0,8560
TIAA-CREF Growth & Income Instl	-0,0048	-2,2874	1,1246	18,1240	0,7750
JHancock Fundamental Large Cap Core A	-0,0050	-2,7426	1,2678	23,2600	0,8500
JPMorgan US Research Enhanced Equity I	-0,0040	-2,5658	1,1413	24,6020	0,8640
Mairs & Power Growth Inv	-0,0034	-1,6610	1,0685	17,5710	0,7640
Russell Inv Tax-Managed US Large Cap S	-0,0007	-1,0209	1,0614	49,1030	0,9620
Columbia Disciplined Core A	-0,0007	-0,6178	1,0881	33,0270	0,9200

PERIOD 3 (2019-2021)					
Fund	Jensens α		β - systematic risk		R^2_{Adj}
	α	t-stat	β	t-stat	
American Funds Washington Mutual A	-0,0069	-2,0233	0,9113	20,0970	0,9440
American Funds Fundamental Invs A	-0,0048	-1,7720	0,9865	21,3200	0,9500
American Funds Invtm Co of Amer A	-0,0043	-2,0613	0,9242	26,1190	0,9660
Franklin Rising Dividends A	-0,0013	-0,4712	0,9668	20,1070	0,9440
Parnassus Core Equity Investor	-0,0004	-0,1005	0,7696	11,8480	0,8530
JPMorgan US Equity L	-0,0018	-0,3751	0,9839	12,2780	0,8620
T, Rowe Price Dividend Growth	-0,0001	-0,0223	0,8578	21,9830	0,9530
Oakmark Investor	-0,0094	-1,6045	1,3653	13,6370	0,8850
Vanguard Growth & Income Inv	-0,0031	-1,1114	0,9902	20,9440	0,9480
Hartford Core Equity Y	0,0015	1,0521	0,9470	37,9740	0,9840
Invesco Main Street A	-0,0034	-0,8464	0,9709	14,0670	0,8910
Davis NY Venture A	-0,0067	-1,2229	1,1106	11,7780	0,8520
GMO Quality IV	-0,0046	-0,9356	0,8174	9,7013	0,7950
Fidelity® Growth & Income	-0,0056	-1,6464	1,0375	17,6680	0,9280
ClearBridge Appreciation A	-0,0038	-1,0028	0,9023	14,0780	0,8910
PRIMECAP Odyssey Stock	-0,0072	-1,3284	1,0256	11,1080	0,8360
MFS Research A	-0,0015	-0,4939	0,9331	17,6700	0,9280
ClearBridge Dividend Strategy A	-0,0059	-2,0654	0,9229	18,9590	0,9370
Janus Henderson Growth And Income D	-0,0056	-2,0412	0,9729	20,6470	0,9470
MFS Massachusetts Investors Tr A	-0,0038	-1,1408	0,9476	16,6480	0,9200
Pioneer A	-0,0006	-0,1392	0,8305	10,6320	0,8240
GE RSP US Equity	-0,0012	-0,3047	0,9693	14,1650	0,8930
State Farm Growth	-0,0008	-0,3670	0,8574	23,8040	0,9590
T, Rowe Price U.S, Equity Research	0,0010	1,0529	1,0219	62,5420	0,9940
TIAA-CREF Growth & Income Instl	-0,0039	-1,0417	1,0295	16,1430	0,9150
JHancock Fundamental Large Cap Core A	0,0001	0,0370	1,2686	29,3350	0,9730
JPMorgan US Research Enhanced Equity I	-0,0041	-0,9689	1,0210	13,9740	0,8900
Mairs & Power Growth Inv	-0,0044	-0,8973	0,8761	10,3820	0,8160
Russell Inv Tax-Managed US Large Cap S	0,0000	0,0437	0,9845	59,3310	0,9930
Columbia Disciplined Core A	-0,0074	-1,5914	0,9928	12,4430	0,8650

Table A2: Regression results of the Fama-French 3-factor model of actively managed U.S. mutual funds

The table shows results for time series regressions for the Fama-French 3-factor model on net returns of actively managed U.S. mutual funds in our sample. The regressions are run on the total period (2007-2021) and divided into three time periods; period 1 (2007-2010), period 2 (2011-2018) and period 3 (2019-2021). Explanatory variables used are the benchmark as a proxy for the market excess return (S&P), a size factor (SMB) and a value/growth factor (HML) (see section 3 for descriptions of the factors). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R². The t-statistics are corrected according to Newwy and West (1987) adjusted standard errors. The null hypothesis is alpha equal to zero, and significant values are in bold font.

USA - FULL PERIOD					
	α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	R^2_{Adj}
American Fund Washington Mutual	-0,0031	0,9157	-0,0689	0,0121	0,9140
American Fund Fundamental	-3,3219	51,3527	-1,8317	0,3502	0,9210
American Fund Investment CO	-2,3872	35,0559	0,6893	-1,9180	0,8800
Franklin Raising Dividends	-0,0038	0,9468	-0,0124	-0,0183	0,8800
Pamassus Core Equity Investor	-3,3915	34,8643	-0,2937	-0,6061	0,9040
JPMorgan US Equity L	-0,0007	0,8927	0,0779	-0,0434	0,9040
T. Rowe Price Dividend Growth	-0,7309	30,0670	2,3934	-1,1746	0,8460
Oakmark Investor	-0,0004	0,8325	-0,0107	0,0002	0,8460
Vanguard Growth & Income Inv	-0,3270	36,3624	-0,1941	0,0038	0,8480
Hartford Core Equity Y	0,0027	1,0458	0,0311	-0,0231	0,8480
Invesco Main Street A	-1,8306	24,3785	0,7116	-0,6670	0,9470
Davis NY Venture A	-0,0004	0,9135	0,0142	-0,0194	0,9470
GMO Quality IV	-0,6390	52,1680	0,4575	-0,9252	0,8810
Fidelity® Growth & Income	-0,0022	1,1409	0,2009	0,0748	0,8810
ClearBridge Appreciation A	-1,3449	25,6761	2,7575	0,8168	0,9040
PRIMECAP Odyssey Stock	-0,0029	1,0342	-0,0038	0,0014	0,9040
MFS Research A	-2,8694	53,8917	-0,0983	0,0558	0,9510
ClearBridge Dividend Strategy A	0,0008	0,9647	0,0058	-0,0746	0,9510
Janus Henderson Growth And Income D	1,1648	39,0580	0,2136	-2,8263	0,8130
MFS Massachusetts Investors Tr A	-0,0041	1,0549	0,0204	-0,0270	0,8130
Pioneer A	-2,2298	22,9953	0,3445	-0,5951	0,8090
GE RSP US Equity	-0,0069	1,0520	0,1815	0,0532	0,8090
State Farm Growth	-4,3522	24,0015	2,1855	0,6202	0,6820
T. Rowe Price U.S. Equity Research	-0,0039	0,8237	-0,0875	-0,1014	0,6820
TIAA-CREF Growth & Income Instl	-2,0689	15,1177	-1,1537	-1,7597	0,9260
JHancock Fundamental Large Cap Core A	-0,0039	1,0656	0,1231	0,0907	0,9260
JPMorgan US Research Enhanced Equity	-2,8966	23,1166	2,7018	1,9682	0,8950
Mairs & Power Growth Inv	-0,0016	0,9091	-0,0668	-0,0325	0,8950
Russell Inv Tax-Managed US Large Cap S	-1,6988	36,3428	-2,3169	-1,5547	0,8950
Columbia Disciplined Core A	0,0001	0,9484	0,1680	0,0232	0,8950
American Fund Washington Mutual	0,1234	34,9238	3,3098	0,5674	0,8980
American Fund Fundamental	-0,0013	0,9998	0,0437	-0,0723	0,8980
American Fund Investment CO	-1,0886	29,6064	0,8679	-2,1148	0,8570
Franklin Raising Dividends	-0,0024	0,8396	-0,0571	-0,0548	0,8570
Pamassus Core Equity Investor	-1,8859	19,2417	-1,3624	-1,1925	0,8720
JPMorgan US Equity L	-0,0027	1,0321	0,0432	0,0063	0,8720
T. Rowe Price Dividend Growth	-1,7877	25,7678	0,8151	0,1155	0,8940
Oakmark Investor	-0,0024	0,9886	0,0017	-0,0304	0,8940
Vanguard Growth & Income Inv	-2,1464	25,4751	0,0428	-0,9804	0,8940
Hartford Core Equity Y	-0,0069	0,9420	-0,0889	-0,0234	0,6200
Invesco Main Street A	-3,1436	27,2967	-0,7778	-0,2433	0,6200
Davis NY Venture A	-0,0036	1,0409	0,0354	-0,0224	0,8070
GMO Quality IV	-2,0508	29,6250	0,5209	-0,5233	0,8070
Fidelity® Growth & Income	-0,0016	0,8882	-0,0645	0,0393	0,9000
ClearBridge Appreciation A	-1,7659	51,0849	-1,3442	0,8917	0,9000
PRIMECAP Odyssey Stock	-0,0010	1,0250	0,0115	-0,0412	0,9370
MFS Research A	-1,0748	53,5542	0,3730	-1,4116	0,9370
ClearBridge Dividend Strategy A	-0,0021	0,9964	0,0706	-0,1013	0,8710
Janus Henderson Growth And Income D	-1,4957	27,2701	1,4629	-2,5446	0,8710
MFS Massachusetts Investors Tr A	-0,0001	1,1277	0,1392	-0,0919	0,8360
Pioneer A	-0,0229	18,9878	2,7988	-1,4882	0,8360
GE RSP US Equity	-0,0022	1,0367	0,0293	0,0119	0,9160
State Farm Growth	-1,9071	31,8918	0,8889	0,5004	0,9160
T. Rowe Price U.S. Equity Research	-0,0019	0,9337	0,1714	0,1357	0,8240
TIAA-CREF Growth & Income Instl	-1,3749	27,2802	2,5361	2,6268	0,8240
JHancock Fundamental Large Cap Core A	0,0000	1,0330	0,0319	-0,0171	0,9770
JPMorgan US Research Enhanced Equity	-0,0051	63,7331	1,2835	-0,8394	0,9770
Mairs & Power Growth Inv	-0,0021	1,0382	-0,0426	-0,0130	0,9190
Russell Inv Tax-Managed US Large Cap S	-1,9778	44,1993	-1,1480	-0,4659	0,9190
Columbia Disciplined Core A					

USA - PERIOD 1 (2007-2010)					
	α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	R^2_{Adj}
American Fund Washington Mutual	-0,0023	0,9252	-0,1769	0,0335	0,9480
American Fund Fundamental	-1,1492	45,2929	-3,2241	0,6656	0,9490
American Fund Investment CO	0,0009	1,0237	-0,0122	-0,1186	0,9490
Franklin Raising Dividends	0,5130	18,9012	-0,1746	-1,5701	0,9550
Pamassus Core Equity Investor	-0,0014	0,9103	-0,0400	-0,0249	0,9550
JPMorgan US Equity L	-0,8783	32,5539	-0,9626	-0,8753	0,9150
T. Rowe Price Dividend Growth	-0,0002	0,8403	0,0397	0,0109	0,9150
Oakmark Investor	-0,1096	16,3018	0,6489	0,1103	0,9130
Vanguard Growth & Income Inv	0,0022	0,8378	0,2267	0,0221	0,9130
Hartford Core Equity Y	0,9074	23,1937	1,9309	0,3012	0,8830
Invesco Main Street A	0,0008	1,0015	-0,0309	-0,0060	0,8830
Davis NY Venture A	0,2672	37,6870	-0,9284	-0,2621	0,9670
GMO Quality IV	-0,0003	0,9159	0,0658	-0,0018	0,9670
Fidelity® Growth & Income	-0,2677	31,0917	1,1009	-0,0735	0,9130
ClearBridge Appreciation A	0,0003	1,0461	0,1583	0,2176	0,8910
PRIMECAP Odyssey Stock	0,1055	25,2626	1,2609	2,1829	0,9060
MFS Research A	-0,0035	1,0219	-0,0057	0,0354	0,9060
ClearBridge Dividend Strategy A	-1,3907	59,7142	-0,1375	1,2061	0,9560
Janus Henderson Growth And Income D	0,0009	0,9538	0,0023	-0,0543	0,9560
MFS Massachusetts Investors Tr A	0,6328	20,0060	0,0314	-0,1810	0,8750
Pioneer A	-0,0016	1,0519	-0,0227	-0,0202	0,8750
GE RSP US Equity	-0,4663	39,4702	-0,3118	-0,2959	0,9650
State Farm Growth	0,0006	1,0494	-0,0528	0,0442	0,9650
T. Rowe Price U.S. Equity Research	0,4069	23,2863	-0,9102	1,0158	0,8970
TIAA-CREF Growth & Income Instl	0,0002	0,7490	-0,1854	-0,0756	0,8970
JHancock Fundamental Large Cap Core A	0,0985	20,4146	-1,8606	-1,2231	0,9130
JPMorgan US Research Enhanced Equity	-0,0086	1,0995	0,2563	-0,0253	0,9130
Mairs & Power Growth Inv	-2,7524	16,4726	1,8660	-0,2824	0,9220
Russell Inv Tax-Managed US Large Cap S	-0,0004	0,8547	-0,0876	-0,0122	0,9220
American Fund Washington Mutual	-0,2685	33,6260	-2,2979	-0,4636	0,9430
American Fund Fundamental	0,0018	0,8912	0,2635	0,0521	0,9430
American Fund Investment CO	0,9794	25,1013	3,1515	0,9502	0,9820
Franklin Raising Dividends	0,0032	0,9927	0,0635	-0,0590	0,9820
Pamassus Core Equity Investor	2,8550	36,9698	1,5310	-2,0197	0,7990
JPMorgan US Equity L	-0,0045	0,7597	0,0033	-0,0612	0,7990
T. Rowe Price Dividend Growth	-1,6075	8,6153	0,0302	-0,5276	0,8400
Oakmark Investor	-0,0022	1,0081	0,0915	-0,0522	0,8400
Vanguard Growth & Income Inv	-0,5600	11,0190	0,6786	-0,3067	0,9520
Hartford Core Equity Y	0,0007	0,9235	-0,0215	0,0137	0,9520
Invesco Main Street A	0,5414	42,2995	-0,3950	0,5055	0,9570
Davis NY Venture A	-0,0013	0,9806	1,2566	0,0224	0,9570
GMO Quality IV	-0,6976	46,0864	1,4661	0,5584	0,9110
Fidelity® Growth & Income	-0,0004	0,9987	0,0342	0,0150	0,9110
ClearBridge Appreciation A	-0,1591	34,1758	0,5456	0,4078	0,9520
PRIMECAP Odyssey Stock	0,0013	0,8894	-0,2062	-0,0756	0,9520
MFS Research A	1,1218	36,6426	-3,5205	-1,6612	0,9830
ClearBridge Dividend Strategy A	0,0007	0,9978	-0,0571	0,0176	0,9830
Janus Henderson Growth And Income D	0,6424	63,2311	-1,5496	0,5400	0,9720
MFS Massachusetts Investors Tr A	0,0026	0,9327	-0,0058	-0,0193	0,9720
Pioneer A	1,6429	28,1785	-0,1295	-0,3596	0,7720
GE RSP US Equity	0,0079	1,0685	-0,0826	-0,2213	0,7720
State Farm Growth	1,4969	8,4214	-0,7170	-1,2088	0,9950
T. Rowe Price U.S. Equity Research	0,0012	1,0009	-0,0417	0,0252	0,9950
TIAA-CREF Growth & Income Instl	2,2811	75,4159	-1,7834	2,3088	0,8840
JHancock Fundamental Large Cap Core A	0,0002	0,8944	0,1830	0,2362	0,8840
JPMorgan US Research Enhanced Equity	0,0722	14,8912	1,3087	1,8943	0,9820
Mairs & Power Growth Inv	0,0015	1,0507	0,0638	-0,0288	0,9820
Russell Inv Tax-Managed US Large Cap S	1,3205	36,0994	1,2742	-0,5364	0,9560
American Fund Washington Mutual	-0,0019	1,0462	-0,1575	-0,0302	0,9560
American Fund Fundamental	-1,0568	37,8436	-1,8943	-0,5917	0,9560

USA - PERIOD 2 (2011-2018)					
	α	β_{SR}	β_{SMB}	β_{HML}	R^2_{Adj}
American Fund Washington Mutual	-0.0023	0.9190	-0.0756	0.0602	0.8480
American Fund Fundamental	-1.9503	27.9859	-1.4165	1.0017	
American Fund Investment CO	-0.0041	1.0975	-0.0166	-0.0085	0.8760
Franklin Raising Dividends	-2.7397	21.2180	-0.2854	-0.1089	
Pamassus Core Equity Investor	-0.0054	1.0440	-0.0457	-0.0009	0.7730
JPMorgan US Equity L	-2.9584	18.3763	-0.6331	-0.0098	
T. Rowe Price Dividend Growth	-0.0011	0.9245	0.1121	-0.0173	0.8590
Oakmark Investor	-0.8179	15.1138	2.9550	-0.2712	
Vanguard Growth & Income Inv	-0.0021	0.8472	-0.0795	-0.0184	0.7680
Hartford Core Equity Y	-1.4301	26.8827	-1.1053	-0.3589	
Invesco Main Street A	-0.0053	1.1838	0.0874	-0.0418	0.8190
Davis NY Venture A	-2.5375	13.0126	1.3269	-0.5000	
GMO Quality IV	-0.0006	0.9461	0.0144	-0.0133	0.9150
Fidelity® Growth & Income	-0.7406	42.1080	0.3265	-0.2364	
ClearBridge Appreciation A	-0.0026	1.1510	0.0534	0.1211	0.8790
PRIMECAP Odyssey Stock	-1.3384	15.2778	0.8226	2.0117	
MFS Research A	-0.0028	1.0736	0.0309	-0.0459	0.8680
Janus Henderson Growth And Income D	-1.8785	20.0943	0.5150	-0.6664	
State Farm Growth	0.0004	1.0045	0.0160	-0.1371	0.9220
TIAA-CREF Growth & Income Instl	0.3617	19.2959	0.4040	-2.8965	
JHancock Fundamental Large Cap Core A	-0.0056	1.1431	0.0654	-0.0154	0.7130
Russell Inv Tax-Managed US Large Cap S	-1.8553	8.6766	0.6526	-0.1362	
Columbia Disciplined Core A	-0.0105	1.1028	0.1902	0.2045	0.6640
American Fund Washington Mutual	-4.2838	12.4430	1.4889	1.2419	
American Fund Fundamental	-0.0068	0.9729	-0.0434	-0.2070	0.5470
American Fund Investment CO	-2.1689	7.2318	-0.3482	-1.4216	
Franklin Raising Dividends	-0.0008	1.0317	0.0587	0.1887	0.9540
Pamassus Core Equity Investor	-0.9897	32.6683	1.4501	6.3035	
JPMorgan US Equity L	-0.0023	0.9934	-0.0250	-0.0246	0.8690
T. Rowe Price Dividend Growth	-1.8152	20.7998	-0.5937	-0.4417	
Oakmark Investor	0.0002	1.0117	0.0874	-0.0636	0.8930
Vanguard Growth & Income Inv	0.2007	21.6418	1.3350	-1.2088	
Hartford Core Equity Y	-0.0038	1.0909	0.0952	-0.1229	0.8160
Invesco Main Street A	-1.9337	12.9912	1.5460	-1.3515	
Davis NY Venture A	-0.0012	0.8815	-0.0829	0.0414	0.8630
GMO Quality IV	-0.9392	16.0666	-1.9627	0.8569	
Fidelity® Growth & Income	-0.0026	1.1303	0.0469	0.0872	0.8740
ClearBridge Appreciation A	-2.2148	22.2373	0.8727	1.0765	
PRIMECAP Odyssey Stock	-0.0045	1.1364	0.0061	-0.0557	0.8460
MFS Research A	-2.5473	12.9817	0.0923	-0.6370	
Janus Henderson Growth And Income D	-0.0117	0.9424	-0.1639	-0.1961	0.3500
MFS Massachusetts Investors Tr A	-3.4100	11.0271	-0.7848	-0.7540	
ClearBridge Dividend Strategy A	-0.0065	1.1651	0.0937	-0.0858	0.6920
State Farm Growth	-2.3429	15.8486	0.8749	-0.7612	
T. Rowe Price U.S. Equity Research	-0.0033	0.9451	-0.0191	0.1466	0.8310
TIAA-CREF Growth & Income Instl	-2.6295	35.1750	-0.2821	1.8376	
JHancock Fundamental Large Cap Core A	-0.0025	1.0788	0.0363	-0.1051	0.8560
JPMorgan US Research Enhanced Equity	-1.7008	25.1834	0.6902	-1.3823	
Mais & Power Growth Inv	-0.0048	1.1145	0.1022	-0.2031	0.7830
Russell Inv Tax-Managed US Large Cap S	-2.2703	15.3502	1.3733	-2.2657	
Columbia Disciplined Core A	-1.9791	15.4318	3.2501	1.5686	
American Fund Washington Mutual	-0.0039	1.1317	0.0581	-0.0051	0.8620
American Fund Fundamental	-2.1314	13.1589	1.0268	-0.0719	
American Fund Investment CO	-0.0027	1.0251	0.2482	0.0472	0.7790
Franklin Raising Dividends	-1.4921	14.2834	3.8201	0.5112	
Pamassus Core Equity Investor	-0.0007	1.0595	0.0162	-0.0250	0.9620
JPMorgan US Equity L	-0.9209	39.6575	0.4528	-0.7586	
T. Rowe Price Dividend Growth	-0.0007	1.0859	0.0182	-0.0248	0.9180
Oakmark Investor	-0.5144	18.8376	0.4825	-0.5896	

USA - PERIOD 3 (2019-2021)					
	α	β_{SR}	β_{SMB}	β_{HML}	R^2_{Adj}
American Fund Washington Mutual	-0.0073	0.8807	0.0947	-0.0566	0.9430
American Fund Fundamental	-2.9258	16.7342	1.9315	-1.5216	
American Fund Investment CO	-0.0054	0.9351	0.1693	-0.0854	0.9560
Franklin Raising Dividends	-2.8101	26.2246	3.2759	-1.8956	
Pamassus Core Equity Investor	-0.0045	0.9062	0.0645	-0.0247	0.9640
JPMorgan US Equity L	-2.5181	39.5598	1.4481	-0.6148	
T. Rowe Price Dividend Growth	-0.0014	0.9485	-0.0054	-0.0922	0.9440
Oakmark Investor	-0.5976	24.6431	-0.0909	-2.2422	
Vanguard Growth & Income Inv	0.0000	0.7836	-0.1725	-0.0953	0.8600
Hartford Core Equity Y	0.0039	12.8251	-2.7679	-1.7657	
Invesco Main Street A	-0.0015	0.9946	-0.0926	-0.0360	0.8520
Davis NY Venture A	-0.4281	18.6597	-1.1491	-0.3952	
GMO Quality IV	-0.0001	0.8464	-0.0414	-0.0933	0.9560
Fidelity® Growth & Income	-0.0298	16.7582	-0.6179	-2.2452	
ClearBridge Appreciation A	-0.0111	1.2533	0.5171	-0.0467	0.9080
PRIMECAP Odyssey Stock	-2.5248	14.5957	3.1230	-0.3583	
MFS Research A	-0.0029	1.0020	-0.0725	-0.0121	0.9450
Janus Henderson Growth And Income D	-1.6186	45.4447	-1.0051	-0.3261	
MFS Massachusetts Investors Tr A	0.0015	0.9396	-0.0146	-0.0488	0.9840
Invesco Main Street A	0.9608	40.8775	-0.3619	-2.1459	
Davis NY Venture A	-0.0034	0.9639	-0.0597	-0.0890	0.8870
GMO Quality IV	-0.9214	21.3266	-0.7503	-1.5145	
Fidelity® Growth & Income	-0.0078	1.0409	0.3111	-0.0392	0.8560
ClearBridge Dividend Strategy A	-1.7086	14.1650	1.7746	-0.2433	
PRIMECAP Odyssey Stock	-0.0041	0.8511	-0.1583	0.0116	0.7840
MFS Research A	-1.1697	12.1664	-1.1726	0.1370	
Janus Henderson Growth And Income D	-0.0063	1.0063	0.2544	0.0907	0.9420
MFS Massachusetts Investors Tr A	-2.3800	11.4037	3.5130	2.2075	
ClearBridge Appreciation A	-0.0033	0.9265	-0.1733	-0.0478	0.8920
PRIMECAP Odyssey Stock	-0.8882	27.9933	-2.6524	-0.8752	
MFS Research A	-0.0078	0.9929	0.2494	0.0786	0.8380
Janus Henderson Growth And Income D	-1.6400	13.8208	1.8889	0.8080	
MFS Massachusetts Investors Tr A	-0.0012	0.9454	-0.1610	-0.0924	0.9350
ClearBridge Dividend Strategy A	-0.5339	33.2481	-2.0558	-2.3926	
State Farm Growth	-0.0058	0.9165	-0.0604	-0.0872	0.9380
T. Rowe Price U.S. Equity Research	-1.6679	18.4579	-0.9264	-2.2727	
TIAA-CREF Growth & Income Instl	-0.0057	0.9627	0.0090	-0.0401	0.9420
JHancock Fundamental Large Cap Core A	-2.0876	24.5352	0.1333	-0.9978	
JPMorgan US Research Enhanced Equity	-0.0038	0.9408	-0.0364	-0.0665	0.9160
Mais & Power Growth Inv	-1.1985	25.6737	-0.5817	-1.4684	
Russell Inv Tax-Managed US Large Cap S	0.0003	0.8854	-0.2858	-0.0074	0.8330
Columbia Disciplined Core A	0.0615	12.1128	-3.3993	-0.1308	
American Fund Washington Mutual	-0.0007	0.9980	-0.1772	-0.0302	0.8910
American Fund Fundamental	-0.2454	23.8844	-1.8081	-0.5031	
American Fund Investment CO	-0.0005	0.8871	-0.0348	0.1085	0.9650
Franklin Raising Dividends	-0.2549	26.4109	-0.5892	2.3893	
Pamassus Core Equity Investor	0.0010	1.0185	-0.0205	-0.0352	0.9940
JPMorgan US Equity L	1.7965	50.9475	-0.6056	-1.7634	
T. Rowe Price Dividend Growth	-0.0040	1.0141	-0.0074	-0.0801	0.9110
Oakmark Investor	-1.3679	35.4459	-0.0813	-1.5495	
Vanguard Growth & Income Inv	-0.0003	1.2433	0.1243	-0.0035	0.9730
Hartford Core Equity Y	-0.1856	29.3037	2.1142	-0.0786	
Invesco Main Street A	-0.0041	1.0257	-0.0022	0.0203	0.8800
Davis NY Venture A	-1.0224	31.0872	-0.0435	0.4186	
GMO Quality IV	-0.0041	0.9006	-0.0585	0.0614	0.8020
Fidelity® Growth & Income	-1.1063	20.7070	-0.4801	0.8437	
ClearBridge Appreciation A	-0.0001	0.9699	0.0313	-0.0398	0.9940
PRIMECAP Odyssey Stock	-0.1566	73.5843	0.7143	-2.5279	
MFS Research A	-0.0074	0.9917	0.0132	0.0071	0.8520
Janus Henderson Growth And Income D	-1.8419	20.3687	0.1723	0.0782	

Table A3: Regression results of the Carhart 4-factor model of actively managed U.S. mutual funds

The table shows results for time series regressions for the Carhart 4-factor model on net returns of actively managed U.S. mutual funds in our sample. The regressions are run on the total period (2007-2021) and divided into three time periods; period 1 (2007-2010), period 2 (2011-2018) and period 3 (2019-2021). Explanatory variables used are the benchmark as a proxy for the market excess return (S&P), a size factor (SMB), a value/growth factor (HML) and a momentum factor (MOM) (see section 3 for descriptions of the factors). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R². The t-statistics are corrected according to Newby and West (1987) adjusted standard errors. The null hypothesis is alpha equal to zero, and significant values are in bold font.

USA - FULL PERIOD						
	α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	β_{MOM}	R^2_{adj}
American Fund Washington Mutual	-0.0030	0.9058	-0.0727	-0.0035	-0.0262	0.9140
American Fund Fundamental	-3.2653	49.3362	-2.0049	-0.0990	-1.0266	
American Fund Investment CO	-0.0025	1.0030	0.0211	-0.0900	-0.0413	0.9210
Franklin Raising Dividends	-0.0006	0.8758	0.0715	-0.0699	-0.0445	0.9050
Pamassus Core Equity Investor	-0.0005	0.8437	-0.0064	0.0179	0.0298	0.8460
JPMorgan US Equity L	-0.0027	1.0412	0.0293	-0.0305	-0.0123	0.8470
T. Rowe Price Dividend Growth	-0.0003	0.9044	0.0107	-0.0336	-0.0239	0.9470
Oakmark Investor	-0.0017	1.0654	0.1719	-0.0443	-0.1996	0.9010
Vanguard Growth & Income Inv	-0.0029	1.0321	-0.0046	-0.0019	-0.0056	0.9040
Hartford Core Equity Y	0.0007	0.9788	0.0113	-0.0523	0.0373	0.9520
Invesco Main Street A	-0.0040	1.0344	0.0126	-0.0592	-0.0540	0.8140
Davis NY Venture A	-0.0065	0.9981	0.1608	-0.0318	-0.1425	0.8190
GMO Quality IV	-0.0039	0.8305	-0.0849	-0.0907	-0.0180	0.8890
Fidelity® Growth & Income	-0.0036	1.0301	0.1094	0.0347	-0.0937	0.9310
ClearBridge Appreciation A	-0.0016	0.9057	-0.0682	-0.0379	-0.0092	0.8940
PRIMECAP Odyssey Stock	0.2046	33.0227	3.2766	0.0871	-1.4049	
MFS Research A	-0.0014	1.0082	0.0470	-0.0590	0.0223	0.8980
ClearBridge Dividend Strategy A	-0.0023	0.8280	-0.0616	-0.0731	-0.0306	0.8570
Janus Henderson Growth And Income D	-0.0026	1.0171	0.0374	-0.0174	-0.0397	0.8720
MFS Massachusetts Investors Tr A	-0.0024	0.9882	0.0015	-0.0311	-0.0011	0.8930
Pioneer A	-0.0071	0.9638	-0.0805	0.0110	0.0576	0.6200
GE RSP US Equity	-0.0035	1.0256	0.0295	-0.0465	-0.0404	0.8070
State Farm Growth	-0.0017	0.8954	-0.0617	0.0506	0.0190	0.9000
T. Rowe Price U.S. Equity Research	-0.0009	1.0187	0.0091	-0.0511	-0.0166	0.9370
TIAA-CREF Growth & Income Instl	-0.0022	1.0108	0.0762	-0.0785	0.0383	0.8710
JHancock Fundamental Large Cap Core A	-0.0002	1.1432	0.1451	-0.0675	-0.0409	0.8360
JPMorgan US Research Enhanced Equity	-0.0022	1.0350	0.0286	0.0093	-0.0044	0.9160
Mairs & Power Growth Inv	-0.0018	0.9135	0.1637	0.1038	-0.0534	0.8250
Russell Inv Tax-Managed US Large Cap	0.0299	54.5951	1.2161	-1.0450	-0.4070	
Columbia Disciplined Core A	-0.0021	1.0456	-0.0398	-0.0013	0.0195	0.9190
	-2.0224	41.4276	-1.0715	-0.0449	1.0960	

USA - PERIOD 1 (2007-2010)						
	α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	β_{MOM}	R^2_{adj}
American Fund Washington Mutual	-0.0024	0.9133	-0.1744	0.0076	-0.0294	0.9480
American Fund Fundamental	-1.1505	34.4794	-2.9814	0.1685	-0.8354	
American Fund Investment CO	0.0007	1.0060	-0.0085	-0.1571	-0.0437	0.9500
Franklin Raising Dividends	0.4155	18.3462	-1.2255	-1.9113	-1.8859	
Pamassus Core Equity Investor	-0.0016	0.8931	-0.0364	-0.0624	-0.0426	0.9560
JPMorgan US Equity L	-0.0015	25.5844	-0.8745	-1.8994	-1.2555	
T. Rowe Price Dividend Growth	-0.0005	0.8147	0.0450	-0.0450	-0.0633	0.9190
Oakmark Investor	-0.2537	15.9562	0.6653	-0.4864	-1.6426	
Vanguard Growth & Income Inv	0.0022	0.8384	-0.2265	0.0235	0.0016	0.9110
Hartford Core Equity Y	0.8847	23.2792	1.9093	0.2864	0.0609	
Invesco Main Street A	0.0005	0.9826	-0.0270	-0.0473	-0.0468	0.8830
Davis NY Venture A	0.1758	30.5983	-0.7442	-0.8863	-0.8711	
GMO Quality IV	-0.0005	0.8950	0.0701	-0.0474	-0.0517	0.9700
Fidelity® Growth & Income	-0.4779	24.7777	1.2999	-1.4388	-2.102	
ClearBridge Appreciation A	-0.0006	0.9747	0.1732	0.0620	-0.1764	0.9130
PRIMECAP Odyssey Stock	-0.2163	21.8005	1.5258	0.6750	-3.1607	
MFS Research A	-0.0037	1.0057	-0.0023	-0.0001	-0.0402	0.9050
ClearBridge Dividend Strategy A	-1.3263	39.2748	-0.0490	-0.0017	-0.6977	
Janus Henderson Growth And Income D	0.0010	0.9643	0.0001	-0.0315	0.0258	0.9550
MFS Massachusetts Investors Tr A	0.6718	21.1312	0.0016	-0.5453	1.0391	
Pioneer A	-0.0022	1.0025	-0.0123	-0.1280	-0.1222	0.8850
GE RSP US Equity	-0.6243	34.0099	-0.1949	-1.4973	-2.1272	
State Farm Growth	0.0000	0.9968	-0.0418	-0.0705	-0.1302	0.9800
T. Rowe Price U.S. Equity Research	0.0091	37.4725	-0.7001	-2.1179	-7.1064	
JHancock Fundamental Large Cap Core A	0.0005	0.7750	-0.1908	-0.0189	0.0643	0.9030
JPMorgan US Research Enhanced Equity	0.2258	21.1475	-1.9945	-0.3103	1.7383	
Mairs & Power Growth Inv	-0.0091	1.0583	0.2649	-0.1151	-0.1018	0.9190
Russell Inv Tax-Managed US Large Cap	-2.9099	14.8242	1.9781	-1.5114	-1.3919	
Columbia Disciplined Core A	-0.0006	0.8341	-0.0833	-0.0571	-0.0509	0.9230
PRIMECAP Odyssey Stock	-0.4063	31.6425	-2.1420	-1.3668	-1.6016	
MFS Research A	0.0017	0.8815	0.2656	0.0309	-0.0241	0.9430
ClearBridge Dividend Strategy A	0.9145	23.2474	3.1712	0.5387	-0.9267	
Janus Henderson Growth And Income D	0.0033	1.0000	0.0620	-0.0431	0.0180	0.9820
MFS Massachusetts Investors Tr A	2.8866	33.0348	1.3992	-1.3836	1.1181	
Pioneer A	-0.0048	0.7376	0.0079	-0.1094	-0.0546	0.7990
GE RSP US Equity	-1.6603	8.6799	0.0753	-0.8019	-1.2326	
State Farm Growth	-0.0026	0.9682	0.0998	-0.1392	-0.0987	0.8450
T. Rowe Price U.S. Equity Research	-0.7206	11.4240	0.7434	-0.6864	-2.3307	
JHancock Fundamental Large Cap Core A	0.0006	0.9159	-0.0199	-0.0030	-0.0189	0.9520
JPMorgan US Research Enhanced Equity	0.4433	37.7127	-0.3536	-0.0810	-0.6820	
Mairs & Power Growth Inv	-0.0012	0.9908	0.1235	0.0447	0.0252	0.9560
Russell Inv Tax-Managed US Large Cap	-0.6270	49.4385	1.4187	1.1649	1.7588	
Columbia Disciplined Core A	-0.0007	0.9702	0.0402	-0.0472	-0.0705	0.9140
PRIMECAP Odyssey Stock	-0.2971	28.4069	0.6560	-0.7837	-1.8184	
MFS Research A	0.0014	0.9006	-0.2086	-0.0511	0.0278	0.9520
ClearBridge Dividend Strategy A	1.2162	32.1073	-3.8787	-0.8989	1.1198	
Janus Henderson Growth And Income D	0.0007	0.9945	-0.0564	0.0104	-0.0081	0.9820
MFS Massachusetts Investors Tr A	0.5813	63.2352	-1.4738	0.2545	-0.4746	
Pioneer A	0.0028	0.9488	-0.0091	0.0158	0.0397	0.9740
GE RSP US Equity	1.7681	30.5082	-0.1928	0.3079	2.4285	
State Farm Growth	0.0082	1.0960	-0.0885	-0.1598	0.0697	0.7710
T. Rowe Price U.S. Equity Research	1.5206	8.3910	-0.7419	-0.8940	1.3947	
JHancock Fundamental Large Cap Core A	0.0012	0.9956	-0.0406	0.0138	-0.0129	0.9960
JPMorgan US Research Enhanced Equity	2.2701	74.6754	-1.7905	1.1256	-1.4758	
Mairs & Power Growth Inv	-0.0003	0.8543	0.1914	0.1486	-0.0993	0.8920
Russell Inv Tax-Managed US Large Cap	-0.1113	14.0706	1.3424	1.2472	-2.6139	
Columbia Disciplined Core A	0.0015	1.0502	0.0639	-0.0298	-0.0012	0.9820
PRIMECAP Odyssey Stock	1.3393	33.3102	1.2526	-0.5103	-0.0527	
MFS Research A	-0.0019	1.0496	-0.1582	-0.0228	0.0084	0.9550
ClearBridge Dividend Strategy A	-0.9885	36.6087	-1.8905	-0.3869	0.3485	

USA - PERIOD 2 (2011-2018)							USA - PERIOD 3 (2019-2021)						
	α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	β_{RMW}	R^2_{adj}		α	$\beta_{S\&P}$	β_{SMB}	β_{HML}	β_{RMW}	R^2_{adj}
American Fund Washington Mutual	-0.0024	0.9210	-0.0757	0.0679	0.0130	0.8470	American Fund Washington Mutual	-0.0071	0.8691	0.0815	-0.0643	-0.0216	0.9400
American Fund Fundamental	-1.9945	28.1485	-1.4052	0.9354	0.3063		American Fund Fundamental	-2.4276	13.0594	1.5665	-1.6958	-0.3670	0.9570
American Fund Investment CO	-0.0039	1.0910	-0.0162	-0.0331	-0.0411	0.8750	American Fund Investment CO	-2.0289	29.2721	2.5665	-3.1128	-2.6781	0.9630
Franklin Raising Dividends	-0.0051	1.0313	-0.0448	-0.0488	-0.0802	0.7740	Franklin Raising Dividends	-0.0014	0.9478	-0.0062	-0.0926	-0.0013	0.9410
Pamassus Core Equity Investor	-0.7206	15.0402	3.0571	-0.5123	-0.6304		Pamassus Core Equity Investor	-0.5571	28.5330	-0.0758	-2.5485	-0.0201	0.8820
JPMorgan US Equity L	-0.0022	0.8513	-0.0798	-0.0030	0.0258	0.7660	JPMorgan US Equity L	-0.0026	0.9028	-0.0356	-0.0159	0.2235	0.8440
T. Rowe Price Dividend Growth	-1.5039	28.5821	-1.0988	-0.0543	0.5403		T. Rowe Price Dividend Growth	-0.6711	21.1204	-0.4087	-0.2529	3.3895	0.9530
Oakmark Investor	-0.0051	1.1788	0.0877	-0.0607	-0.0316	0.8170	Oakmark Investor	-0.0018	1.0088	-0.0763	-0.0266	0.0266	0.9270
Vanguard Growth & Income Inv	-2.4322	12.6716	1.3442	-0.6220	-0.6282		Vanguard Growth & Income Inv	-0.4774	15.8018	-0.8618	-0.2996	0.4106	0.9420
Hartford Core Equity Y	-0.0006	0.9449	0.0145	-0.0176	-0.0072	0.9140	Hartford Core Equity Y	-0.0001	0.8459	-0.0420	-0.0936	-0.0009	0.9330
Invesco Main Street A	-0.7217	42.5164	0.3275	-0.3111	-0.2460		Invesco Main Street A	-0.0203	14.8845	-0.5629	-2.9987	-0.0128	0.8830
Davis NY Venture A	-0.0022	1.1374	0.0544	0.0699	-0.0856	0.8810	Davis NY Venture A	-0.0070	1.0681	0.3043	-0.1702	-0.3473	0.9400
GMO Quality IV	-1.1341	14.8649	0.8567	0.9861	-1.8153		GMO Quality IV	-1.4623	21.5237	3.3052	-2.4050	-5.5266	0.9420
Fidelity® Growth & Income	-0.0029	1.0770	0.0307	-0.0331	0.0213	0.8670	Fidelity® Growth & Income	-0.0031	1.0130	-0.0599	-0.0047	0.0206	0.9420
ClearBridge Appreciation A	-1.9677	19.8061	0.5056	-0.4145	0.6017		ClearBridge Appreciation A	-1.6195	39.7130	-0.6997	-0.1207	0.4908	0.9830
PRIMECAP Odyssey Stock	0.0001	1.0149	0.0152	-0.0982	0.0650	0.9240	PRIMECAP Odyssey Stock	0.0015	0.9399	-0.0142	-0.0486	0.0007	0.9830
MFS Research A	0.1190	19.5085	0.3873	-1.7530	2.0814		MFS Research A	0.8169	28.6330	-0.3388	-2.4384	0.0200	0.9330
ClearBridge Dividend Strategy A	-0.0055	1.1381	0.0657	-0.0340	-0.0311	0.7100	ClearBridge Dividend Strategy A	-0.0042	1.0031	-0.0147	-0.0629	0.0735	0.8830
Janus Henderson Growth And Income D	-1.8170	8.4259	0.6569	-0.2572	-0.4759		Janus Henderson Growth And Income D	-1.0515	21.1824	-0.1743	-0.9824	1.1180	0.8660
MFS Massachusetts Investors Tr A	-0.1000	1.0839	0.1915	0.1335	-0.1189	0.6650	MFS Massachusetts Investors Tr A	-0.0048	0.9069	-0.1573	-0.1285	-0.2511	0.8660
Pioneer A	-3.9099	11.3113	1.5085	0.7376	-0.9510		Pioneer A	-1.1306	11.0185	0.9189	-0.9281	-1.8752	0.8660
GE RSP US Equity	-0.0065	0.9603	-0.0426	-0.2544	-0.0794	0.5440	GE RSP US Equity	-0.0025	0.7774	-0.2429	-0.0376	-0.1382	0.7820
State Farm Growth	-2.0261	6.8534	-0.3449	-1.6058	-0.7507		State Farm Growth	-0.6977	9.2652	-1.9684	-0.3540	-1.1781	0.8660
T. Rowe Price U.S. Equity Research	-0.0003	1.0142	0.0599	0.1231	-0.1098	0.9600	T. Rowe Price U.S. Equity Research	-0.0041	0.9082	0.1418	0.0250	-0.1838	0.9510
IIAA-CREF Growth & Income Instl	-0.4182	35.0918	1.5640	3.1165	-3.0896		IIAA-CREF Growth & Income Instl	-1.6662	11.0654	2.3106	0.5828	-3.3896	0.9510
JHancock Fundamental Large Cap Core A	-0.0024	0.9971	-0.0252	-0.0108	0.0232	0.8680	JHancock Fundamental Large Cap Core A	-0.0037	0.9452	-0.1519	-0.0353	0.0351	0.8870
JPMorgan US Research Enhanced Equity	-1.8542	20.4646	-0.5917	-0.1716	0.7284		JPMorgan US Research Enhanced Equity	-0.9158	38.8157	-1.9147	-0.8551	0.6444	0.8870
Mairs & Power Growth Inv	0.0003	1.0089	0.0876	-0.0740	-0.0174	0.8920	Mairs & Power Growth Inv	-0.0067	0.9413	0.1902	0.0442	-0.0966	0.8320
Russell Inv Tax-Managed US Large Cap	0.2492	21.7937	1.3358	-1.2124	-0.4001		Russell Inv Tax-Managed US Large Cap	-1.2463	12.0945	1.2564	0.4850	-1.0686	0.8320
Columbia Disciplined Core A	-0.0038	1.0910	0.0952	-0.1220	0.0015	0.8140	Columbia Disciplined Core A	-0.0007	0.9240	-0.1856	-0.1066	-0.0401	0.9330
	0.1895	12.7194	1.5426	-1.1655	0.0336			0.8169	28.6330	-0.3388	-2.4384	0.0200	0.9330
	-0.0013	0.8824	-0.0829	0.0448	0.0056	0.8610		-0.0056	0.9051	-0.0736	-0.0948	-0.0214	0.9350
	-0.9350	15.8319	-1.9480	0.7953	0.1429			-1.3511	14.0129	-1.2075	-2.2826	-0.3398	0.9350
	-0.0025	1.1269	0.0472	0.0745	-0.0213	0.8730		-0.0060	0.9758	0.0241	-0.0314	0.0245	0.9400
	-2.1222	20.9983	0.8751	0.8398	-0.4804			-1.9839	19.5602	0.2923	-0.6979	0.3871	0.9400
	-0.0045	1.1356	0.0061	-0.0586	-0.0049	0.8450		-0.0037	0.9357	-0.0422	-0.0699	-0.0094	0.9110
	-2.4953	12.7828	0.0930	-0.5930	-0.1180			-1.0322	23.3247	-0.6052	-1.6777	-0.1783	0.9110
	-0.0120	0.9551	-0.1648	-0.1484	0.0799	0.3450		-0.0027	1.0207	-0.1305	0.0828	0.2536	0.8570
	-3.4177	11.4809	-0.7879	-0.5262	1.1281			-0.6717	16.5986	-1.8583	1.1086	2.9701	0.8570
	-0.0061	1.1512	0.0947	-0.1380	-0.0873	0.6910		-0.0006	0.9942	-0.1815	-0.0327	-0.0071	0.8860
	-2.2689	16.3444	0.9008	-1.1247	-1.2592			-0.2050	17.6871	-1.7309	-0.5680	-0.1341	0.8860
	-0.0030	0.9339	-0.0183	0.1045	-0.0705	0.8320		-0.0016	0.9383	0.0239	0.1426	0.0959	0.9680
	-2.5752	33.7324	-0.2779	1.5544	-1.8867			-0.7472	30.0360	0.5159	3.5933	2.0862	0.9680
	-0.0024	1.0719	0.0368	-0.1312	-0.0436	0.8560		0.0015	0.9966	-0.0457	-0.0498	-0.0411	0.9950
	-1.6043	25.1273	0.7120	-1.6148	-1.1442			-0.2778	40.9959	-2.0607	-3.0887	-1.3748	0.9950
	-0.0049	1.1190	0.1019	-0.1862	0.0283	0.7810		-0.0046	1.0440	0.0270	-0.0602	0.0561	0.9070
	-2.3337	15.0278	1.3617	-1.8415	0.6531			-1.5266	26.8752	0.2586	-1.3010	1.0151	0.9070
	-0.0045	1.2354	0.1916	0.1107	0.0214	0.8580		0.0003	1.2145	0.0913	-0.0227	-0.0539	0.9720
	-1.9461	14.9884	3.2220	1.4830	0.3503			-0.1728	33.3621	1.2914	-0.6669	-0.7706	0.9720
	-0.0038	1.1283	0.0583	-0.0177	-0.0210	0.8610		-0.0042	1.0302	0.0030	0.0233	0.0084	0.8740
	-2.0483	12.7360	1.0355	-0.2204	-0.5516			-0.9736	17.5191	0.0523	0.3704	0.1497	0.8740
	-0.0026	1.0196	0.2485	0.0265	-0.0345	0.7770		-0.0038	8.8840	-0.0775	0.0504	-0.0311	0.7930
	-1.3796	13.8770	3.8503	0.2780	-0.5748			-0.9305	19.3654	-0.5705	0.7610	-0.4168	0.7930
	-0.0006	1.0545	0.0166	-0.0438	-0.0316	0.9620		0.0003	0.9517	0.0104	-0.0519	-0.0342	0.9940
	-0.7807	40.1783	0.4621	-1.0089	-1.1014			0.4201	86.1166	0.2399	-3.6872	-1.6733	0.9940
	-0.0007	1.0871	0.0181	-0.0201	0.0079	0.9180		-0.0078	1.0088	0.0329	0.0185	0.0321	0.8450
	-0.5134	18.3150	0.4759	-0.4172	0.3022			-1.7577	21.2100	0.3183	0.2090	0.4326	0.8450

Table A4: Regression results of the Fama and French 5-factor model of actively managed U.S. mutual funds

The table shows results for time series regressions for the Carhart 4-factor model on net returns of actively managed U.S. mutual funds in our sample. The regressions are run on the total period (2007-2021) and divided into three time periods; period 1 (2007-2010), period 2 (2011-2018) and period 3 (2019-2021). Explanatory variables used are the benchmark as a proxy for the market excess return (S&P), a size factor (SMB), a value/growth factor (HML), a profitability factor (RMW) and an investment factor (CMA) (see section 3 for descriptions of the factors). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R². The t-statistics are corrected according to Newby and West (1987) adjusted standard errors. The null hypothesis is alpha equal to zero, and significant values are in bold font.

USA - FULL PERIOD							
	α	β_{CAP}	β_{SM}	β_{RM}	β_{RMW}	β_{CMA}	R^2_{adj}
American Fund Washington Mutual	-0.0029	0.9119	-0.0659	0.0673	0.0479	0.0642	0.9150
American Fund Fundamental	-3.3337	48.6553	-1.9088	1.9704	4.8887	0.8930	0.9220
American Fund Investment CO	-0.0026	1.0160	0.0234	-0.0402	-0.0489	-0.1423	0.9220
American Fund Investment CO	-3.2390	34.0165	0.5664	-0.7047	-0.8847	-1.9948	0.9860
Franklin Raising Dividends	-0.0042	0.9622	-0.0071	-0.0701	0.0128	0.0647	0.9800
Franklin Raising Dividends	-3.3660	35.2158	-0.1695	-2.0235	2.2665	1.0103	0.9860
Franklin Raising Dividends	-0.0009	0.8991	0.0936	-0.0111	0.1275	0.0594	0.9800
Pamassus Core Equity Investor	-0.9464	31.5496	2.5854	-0.0217	1.9412	1.2448	0.8490
Pamassus Core Equity Investor	-0.0011	0.8500	0.0281	-0.0430	0.1759	0.0306	0.8490
JP Morgan US Equity L	-0.8536	30.3726	0.5202	-0.8594	1.9612	0.3958	0.8490
JP Morgan US Equity L	-0.0031	1.0543	0.0364	-0.0774	-0.0092	-0.0869	0.8490
T. Rowe Price Dividend Growth	-0.0006	0.9210	0.0172	-0.0450	-0.0082	0.0511	0.9470
T. Rowe Price Dividend Growth	-0.9085	49.5458	0.5207	-1.3627	-0.1794	0.9313	0.9470
Oakmark Investor	-0.0010	1.0802	0.2073	0.2719	0.0986	-0.3124	0.8960
Oakmark Investor	-0.7151	28.2950	3.0095	4.6547	1.7661	-2.8942	0.8960
Vanguard Growth & Income Inv	-0.0032	1.0402	0.0056	-0.0207	0.0431	-0.0081	0.9040
Vanguard Growth & Income Inv	-2.8375	45.9524	0.1503	-0.5457	0.9683	-0.1121	0.9450
Hartford Core Equity Y	0.0005	0.9717	0.0158	-0.0760	-0.0043	-0.1160	0.9540
Hartford Core Equity Y	0.7104	42.6887	0.5172	-1.9375	-0.1041	-2.4813	0.9540
Invesco Main Street A	-0.0045	1.0630	0.0402	-0.0480	0.0782	-0.0900	0.8130
Invesco Main Street A	-2.2783	21.4295	0.6417	-1.0905	0.8886	0.9712	0.8130
Davis NY Venture A	-0.0057	0.9950	0.1686	0.2397	0.0271	-0.3281	0.8190
Davis NY Venture A	-3.4990	23.3318	2.1798	3.8058	0.2612	-2.8148	0.8190
GMO Quality IV	-0.0053	0.8617	-0.0165	-0.1375	0.2802	-0.0351	0.6930
GMO Quality IV	-2.7463	15.1427	-0.2048	-2.2982	2.6296	-0.3421	0.6930
Fidelity® Growth & Income	-0.0019	1.0445	0.0725	-0.0982	0.1986	0.0507	0.9310
Fidelity® Growth & Income	-2.3113	21.9734	1.5091	-1.3585	-2.2739	1.0998	0.9310
ClearBridge Appreciation A	-0.0021	0.9247	-0.0467	-0.0434	0.0904	0.0288	0.8950
ClearBridge Appreciation A	-2.1654	39.9990	-1.6054	-1.4479	2.0817	0.4329	0.8950
PRIMECAP Odyssey Stock	0.0003	0.9293	0.1918	0.0546	0.0925	-0.1756	0.8980
PRIMECAP Odyssey Stock	-0.2816	31.4849	4.4047	1.0554	1.7610	-2.2996	0.8980
MFS Research A	-0.0016	1.0026	0.0570	-0.0686	0.0072	-0.1632	0.9010
MFS Research A	-1.2652	28.2996	1.2629	-1.5545	1.2121	-2.0977	0.9010
ClearBridge Dividend Strategy A	-0.0030	0.8550	-0.0268	-0.0562	0.1087	-0.0166	0.8570
ClearBridge Dividend Strategy A	-2.3868	22.0205	-0.5581	-0.7276	1.3727	-0.1637	0.8570
Janus Henderson Growth And Income D	-0.0024	1.0366	0.0403	-0.0949	0.0642	-0.0314	0.8730
Janus Henderson Growth And Income D	-2.2868	28.4021	0.9550	-1.1567	-1.1557	0.4149	0.8730
MFS Massachusetts Investors Tr A	-0.0025	0.9883	0.0555	-0.0340	-0.0260	-0.1033	0.8940
MFS Massachusetts Investors Tr A	-2.0243	23.7148	0.1360	-0.7769	-0.4659	-1.5833	0.8940
Pioneer A	-0.0067	0.9349	-0.1109	-0.0195	-0.1472	-0.2016	0.6220
Pioneer A	-3.3357	18.0039	-1.0664	-0.2155	-0.8126	-1.1682	0.6220
GE RSP US Equity	-0.0019	1.0396	0.0457	-0.0536	-0.1982	-0.0245	0.8110
GE RSP US Equity	-2.0910	27.3158	0.7244	-0.9158	-1.902	-2.1497	0.8110
State Farm Growth	-0.0022	0.9114	-0.0505	-0.0287	0.1149	0.2257	0.9050
State Farm Growth	-2.3160	61.4255	-1.0127	-0.9136	2.1223	3.8856	0.9050
T. Rowe Price U.S. Equity Research	-0.0012	1.0285	0.0200	-0.0485	0.0027	-0.1019	0.9380
T. Rowe Price U.S. Equity Research	-1.2890	33.9088	0.6676	-1.2535	0.0704	-1.5556	0.9380
TIAA-CREF Growth & Income Instl	-0.0027	1.0060	0.0975	-0.1008	0.0779	-0.1729	0.8750
TIAA-CREF Growth & Income Instl	-1.8344	29.1180	2.1675	-1.8332	1.1685	-2.2771	0.8750
JHancock Fundamental Large Cap Core A	-0.0001	1.1139	0.1504	-0.0409	0.0049	-0.4035	0.8450
JHancock Fundamental Large Cap Core A	-0.0410	17.3874	2.6742	-0.3465	0.0441	-3.1644	0.8450
JP Morgan US Research Enhanced Equity I	-0.0019	1.0396	0.0457	-0.0536	-0.1982	-0.0245	0.9160
JP Morgan US Research Enhanced Equity I	-1.9293	30.2161	1.1647	-1.4138	1.2983	1.3056	0.9160
Mains & Power Growth Inv	-0.0020	0.9312	0.1895	0.0352	0.0943	0.1549	0.8220
Mains & Power Growth Inv	-1.3993	23.5469	2.7577	1.3856	0.9788	1.5270	0.8220
Russell Inv Tax-Managed US Large Cap S	-3.6382	1.0313	0.0311	-0.0322	-0.0394	-0.0927	0.9790
Russell Inv Tax-Managed US Large Cap S	-0.0658	66.4592	1.2065	-1.1681	-1.2553	-2.5258	0.9790
Columbia Disciplined Core A	-0.0020	1.0247	-0.0365	0.0029	0.0339	-0.0710	0.9190
Columbia Disciplined Core A	-1.8725	42.2850	-0.8374	0.7455	0.6148	-1.1393	0.9190

USA - PERIOD 1 (2007-2010)							
	α	β_{CAP}	β_{SM}	β_{RM}	β_{RMW}	β_{CMA}	R^2_{adj}
American Fund Washington Mutual	-0.0027	0.9370	-0.2009	0.0780	0.1064	0.1983	0.9520
American Fund Washington Mutual	-1.2494	42.0336	-4.5501	1.7483	1.3991	1.6476	0.9520
American Fund Fundamental	0.0003	1.0513	0.0061	-0.1839	-0.0163	-0.1232	0.9560
American Fund Fundamental	0.2175	26.2554	0.0872	-2.5816	-0.1904	-1.2093	0.9560
American Fund Investment CO	-0.0016	0.9254	-0.0503	-0.0860	-0.0503	-0.1183	0.9550
American Fund Investment CO	-0.0061	38.0851	-1.1125	-2.7998	-0.0715	-1.0282	0.9550
Franklin Raising Dividends	0.0007	0.7961	-0.0025	0.1848	-0.0147	0.0478	0.9280
Franklin Raising Dividends	0.3133	27.5316	-0.0350	2.2569	-0.0865	0.3229	0.9280
Pamassus Core Equity Investor	0.0008	0.8676	0.2641	-0.0590	0.2035	-0.0845	0.9160
Pamassus Core Equity Investor	0.3131	17.1398	2.1999	-0.4859	1.5214	-0.5825	0.9160
JP Morgan US Equity L	-0.0014	1.0235	-0.0406	-0.0973	0.0345	-0.1897	0.8810
JP Morgan US Equity L	0.1288	30.2534	-0.1000	-1.4946	-0.4838	0.9414	0.8810
T. Rowe Price Dividend Growth	-0.0010	0.9405	0.0630	-0.0706	0.0686	0.1063	0.9670
T. Rowe Price Dividend Growth	-0.9783	31.4138	1.0198	-1.6406	1.2585	1.1964	0.9670
Oakmark Investor	0.0004	1.0229	0.1756	0.2392	0.1470	0.0520	0.8920
Oakmark Investor	0.1176	25.4350	1.2886	2.8995	0.8126	-0.1991	0.8920
Vanguard Growth & Income Inv	-0.0038	0.9337	-0.0055	-0.0171	0.0173	0.0857	0.9100
Vanguard Growth & Income Inv	-1.3545	45.0101	-0.1086	-0.3403	0.2321	0.4592	0.9100
Hartford Core Equity Y	0.0005	0.9750	0.0271	-0.1580	-0.0598	-0.0596	0.9620
Hartford Core Equity Y	0.3723	30.7065	0.3415	-3.1429	-0.5985	0.8161	0.9620
Invesco Main Street A	-0.0026	1.0851	0.0030	-0.0934	0.0882	-0.0274	0.8720
Invesco Main Street A	-2.2783	21.4295	0.6417	-1.0905	0.8886	0.9712	0.8720
Davis NY Venture A	0.0008	1.0287	-0.0136	0.1589	0.1210	-0.2805	0.9690
Davis NY Venture A	0.5371	25.5665	-0.1925	2.4402	1.3359	-1.9361	0.9690
GMO Quality IV	-0.0005	0.7832	-0.2173	-0.2173	0.0588	0.1503	0.8980
GMO Quality IV	-0.2462	16.6278	-2.1488	-0.8449	0.3185	1.4262	0.8980
Fidelity® Growth & Income	-0.0016	1.0445	0.0725	-0.0982	0.1986	0.0507	0.9310
Fidelity® Growth & Income	-2.0192	16.1535	1.7505	-0.4818	-1.8150	0.5522	0.9310
ClearBridge Appreciation A	-0.0008	0.8774	-0.1019	-0.0595	0.0180	0.1611	0.9120
ClearBridge Appreciation A	-0.5273	39.2889	-2.5284	-1.5674	0.1618	1.2509	0.9120
PRIMECAP Odyssey Stock	0.0022	0.9797	0.3029	-0.0512	-0.0907	-0.2384	0.9440
PRIMECAP Odyssey Stock	0.2926	31.4849	4.4047	1.0554	1.7610	-2.2996	0.9440
MFS Research A	0.0027	1.0082	0.0704	-0.0984	0.0170	-0.1519	0.9830
MFS Research A	2.4628	40.9678	1.9809	-4.4929	0.2624	-0.2205	0.9830
ClearBridge Dividend Strategy A	-0.0044	0.7741	0.0578	-0.2193	-0.1832	-0.2479	0.8270
ClearBridge Dividend Strategy A	-1.6942	15.4155	0.4567	-2.9258	-1.1674	-1.0705	0.8270
Janus Henderson Growth And Income D	-0.0024	1.0366	0.0403	-0.0949	0.0642	-0.0314	0.8730
Janus Henderson Growth And Income D	-0.8020	31.7177	1.2367	-2.5887	-0.3001	-0.1664	0.8730
MFS Massachusetts Investors Tr A	0.0009	0.9278	-0.0183	-0.0638	-0.0997	0.0965	0.9520
MFS Massachusetts Investors Tr A	0.6050	37.8555	-0.3369	-1.5936	-1.9988	0.9102	0.9520
Pioneer A	-0.0010	0.9716	0.1274	-0.0141	-0.0629	-0.0139	0.9540
Pioneer A	-0.5546	25.1195	1.3992	-0.2280	-0.5415	-0.1166	0.9540
GE RSP US Equity	-0.0025	1.0966	0.2121	-0.0590	-0.3001	-0.1496	0.9090
GE RSP US Equity	-0.1495	36.0935	1.0311	-0.9717	-0.6052	-0.5518	0.9090
State Farm Growth	0.0004	0.9181	-0.2500	0.0201	0.1850	0.1303	0.9520
State Farm Growth	0.2332	31.2887	-3.7816	0.9311	1.3905	1.4390	0.9520
T. Rowe Price U.S. Equity Research	0.0003	1.0148	-0.0377	-0.0430	0.0250	-0.0089	0.9830
T. Rowe Price U.S. Equity Research	0.2820	33.9088	0.6676	-1.2535	0.0704	-1.5556	0.9830
TIAA-CREF Growth & Income Instl	0.0022	0.9569	0.0058	-0.1458	-0.0627	-0.1015	0.9770
TIAA-CREF Growth & Income Instl	1.4201	42.6660	0.1321	-3.1832	-0.6780	1.4299	0.9770
JHancock Fundamental Large Cap Core A	0.0071	1.1053	-0.0232	-0.2523	0.0274	-0.5555	0.7980
JHancock Fundamental Large Cap Core A	1.3434	8.7114	-0.2028	-1.1964	0.1102	-2.4668	0.7980
JP Morgan US Research Enhanced Equity I	-0.0019	1.0396	0.0457	-0.0536	-0.1982	-0.0245	0.9160
JP Morgan US Research Enhanced Equity I	2.2880	78.6799	-1.4969	-0.1173	-1.1628	0.5548	0.9160
Mains & Power Growth Inv	0.0004	0.8630	0.1844	0.2726	0.1296	0.2033	0.9000
Mains & Power Growth Inv	0.1491	22.8654	1.3645	2.7615	0.6474	1.2135	0.9000
Russell Inv Tax-Managed US Large Cap S	0.0013	1.0629	0.0839	-0.1172	-0.0578	-0.0505	0.9850
Russell Inv Tax-Managed US Large Cap S	1.4001						

Table A5: Regression results of the CAPM model of actively managed Norwegian mutual funds

The table shows results for time series regressions for the CAPM model on net returns of actively managed Norwegian mutual funds in our sample. The regressions are run on the total period (2007-2021) and divided into three time periods; period 1 (2007-2010), period 2 (2011-2018) and period 3 (2019-2021). Explanatory variables used are the benchmark as a proxy for the market excess return (OSEFX). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R². The null hypothesis is alpha equal to zero, and significant values are in bold font.

TOTAL PERIOD					
Fund	Jensens α		β - systematic risk		R_{Adj}^2
	α	t-stat	β	t-stat	
Danske Invest Norske Aksjer Inst II	0,0018	2,0185	0,9263	63,0400	0,9590
Alfred Berg Gambak	0,0033	2,1858	0,9235	36,8040	0,8900
ODIN Norge C	-0,0012	-0,7698	0,9709	30,5720	0,8470
Alfred Berg Norge C	0,0013	1,9479	0,9536	84,5770	0,9770
KLP AksjeNorge	0,0005	0,4517	0,9812	58,4470	0,9530
Nordea Norge Verdi	0,0014	0,9894	0,8252	33,8080	0,8720
Pareto Aksje Norge I	0,0003	0,1796	0,8518	28,9490	0,8330
Nordea Kapital	0,0007	1,0253	0,9839	83,2110	0,9760
Nordea Avkastning	0,0007	0,8292	1,0035	69,7120	0,9670
Danske Invest Norske Aksjer Inst I	0,0015	1,7401	0,9300	63,7260	0,9600
Handelsbanken Norge (A1 NOK)	0,0013	1,1239	0,9996	51,8160	0,9410
Alfred Berg Aktiv	0,0014	1,3049	0,9575	54,0690	0,9460
Eika Norge	-0,0011	-0,9660	0,9348	47,1850	0,9300
C WorldWide Norge III	0,0011	1,4320	0,9609	77,9370	0,9730
Pareto Investment Fund A	0,0016	0,8811	1,0534	35,6200	0,8830
Danske Invest Norge II	0,0015	1,6788	0,9223	61,1210	0,9570
Holberg Norge A	0,0005	0,2569	0,8662	29,3050	0,8360
Delphi Norge A	0,0029	1,7806	0,9421	34,9080	0,8790
Fondsfinans Norge	0,0024	1,6347	0,9578	38,3140	0,8970
Storebrand Norge A	0,0014	1,2042	0,9606	51,1380	0,9400
Danske Invest Norge I	0,0009	0,9783	0,9277	61,8130	0,9580
C WorldWide Norge	0,0004	0,5150	0,9612	80,0720	0,9740
Alfred Berg Humanfond	-0,0008	-0,9904	0,9369	66,2010	0,9630
PLUSS Aksje	0,0007	0,7245	0,8610	55,1750	0,9480
PLUSS Markedsverdi	0,0004	0,5828	0,9240	74,2230	0,9700

PERIOD 1 (2007-2010)					
Fund	Jensens α		β - systematic risk		R_{Adj}^2
	α	t-stat	β	t-stat	
Danske Invest Norske Aksjer Inst II	0,0051	2,4378	0,8942	38,3540	0,9690
Alfred Berg Gambak	0,0028	0,8400	0,9256	25,2930	0,9310
ODIN Norge C	-0,0018	-0,4185	0,7228	15,5240	0,8360
Alfred Berg Norge C	0,0028	2,0649	0,9615	64,8320	0,9890
KLP AksjeNorge	0,0031	1,2414	0,9341	33,6350	0,9600
Nordea Norge Verdi	-0,0005	-0,1807	0,7672	23,8540	0,9240
Pareto Aksje Norge I	0,0032	0,8376	0,7819	18,5680	0,8800
Nordea Kapital	0,0018	1,7914	0,9453	84,0800	0,9930
Nordea Avkastning	0,0010	0,9473	0,9536	85,2020	0,9940
Danske Invest Norske Aksjer Inst I	0,0044	2,0683	0,9023	37,8300	0,9680
Handelsbanken Norge (A1 NOK)	0,0018	0,8413	0,9999	42,8530	0,9750
Alfred Berg Aktiv	0,0021	0,9302	0,9453	37,9540	0,9680
Eika Norge	0,0021	0,8104	0,9107	32,2480	0,9570
C WorldWide Norge III	0,0019	1,3185	0,9483	60,2480	0,9870
Pareto Investment Fund A	0,0018	0,8619	0,9758	41,7590	0,9740
Danske Invest Norge II	0,0049	2,2088	0,8872	36,2500	0,9650
Holberg Norge A	0,0005	0,1620	0,7839	23,4940	0,9210
Delphi Norge A	0,0037	1,2598	0,8693	26,7730	0,9380
Fondsfinans Norge	0,0070	2,8814	0,8952	33,0220	0,9590
Storebrand Norge A	0,0016	1,4070	0,9654	75,1740	0,9920
Danske Invest Norge I	0,0041	1,8805	0,8946	36,7120	0,9660
C WorldWide Norge	0,0012	0,9188	0,9488	67,0580	0,9900
Alfred Berg Humanfond	-0,0005	-0,2706	0,9399	49,5690	0,9810
PLUSS Aksje	0,0043	2,0716	0,8276	35,8630	0,9650
PLUSS Markedsverdi	0,0037	2,0679	0,9018	45,3820	0,9780

PERIOD 2 (2011-2018)					
Fund	Jensens α		β - systematic risk		R_{Adj}^2
	α	t-stat	β	t-stat	
Danske Invest Norske Aksjer Inst II	0,0011	1,3366	0,9734	45,7740	0,9570
Alfred Berg Gambak	0,0032	1,7129	0,8848	17,8210	0,7690
ODIN Norge C	-0,0018	-1,2792	0,8885	23,0320	0,8480
Alfred Berg Norge C	0,0015	1,7929	0,9354	43,0970	0,9510
KLP AksjeNorge	-0,0008	-0,8873	1,0138	40,4310	0,9450
Nordea Norge Verdi	0,0028	1,6475	0,8260	18,2960	0,7780
Pareto Aksje Norge I	-0,0007	-0,3138	0,8848	15,9660	0,7280
Nordea Kapital	0,0007	0,8174	1,0038	46,5770	0,9580
Nordea Avkastning	0,0005	0,5066	1,0152	41,9100	0,9490
Danske Invest Norske Aksjer Inst I	0,0011	1,3747	0,9667	46,6880	0,9580
Handelsbanken Norge (A1 NOK)	0,0017	0,9727	0,9789	21,2500	0,8260
Alfred Berg Aktiv	0,0017	1,2872	0,9585	27,5690	0,8890
Eika Norge	-0,0024	-1,5966	0,9899	25,0550	0,8680
C WorldWide Norge III	0,0005	0,5744	1,0076	39,9560	0,9440
Pareto Investment Fund A	0,0023	1,1098	0,9770	17,9640	0,7720
Danske Invest Norge II	0,0008	0,9732	0,9733	46,1400	0,9570
Holberg Norge A	-0,0013	-0,6782	0,8723	16,7200	0,7460
Delphi Norge A	-0,0003	-0,1529	0,9816	19,7490	0,8040
Fondsfinans Norge	0,0005	0,2609	1,0405	19,7650	0,8040
Storebrand Norge A	0,0013	0,7866	0,8574	18,9790	0,7910
Danske Invest Norge I	0,0002	0,2391	0,9754	45,9670	0,9570
C WorldWide Norge	-0,0001	-0,0751	1,0071	39,7220	0,9430
Alfred Berg Humanfond	-0,0002	-0,1985	0,9330	34,0390	0,9240
PLUSS Aksje	0,0005	0,4766	0,9345	34,9650	0,9280
PLUSS Markedsverdi	0,0004	0,4859	0,9597	49,1200	0,9620

PERIOD 3 (2019-2021)					
Fund	Jensens α		β - systematic risk		R_{Adj}^2
	α	t-stat	β	t-stat	
Danske Invest Norske Aksjer Inst II	-0,0039	-1,4895	1,0211	22,1030	0,9530
Alfred Berg Gambak	0,0050	1,2990	0,9726	14,4090	0,8960
ODIN Norge C	-0,0015	-0,5247	0,9598	19,1310	0,9380
Alfred Berg Norge C	-0,0016	-0,7286	0,9524	25,0560	0,9630
KLP AksjeNorge	-0,0023	-1,0778	1,1664	31,0150	0,9760
Nordea Norge Verdi	-0,0028	-0,7311	1,1061	16,5060	0,9190
Pareto Aksje Norge I	-0,0053	-1,4153	1,1501	17,7200	0,9290
Nordea Kapital	-0,0032	-1,3520	1,1467	27,5480	0,9690
Nordea Avkastning	-0,0013	-0,3978	1,2291	20,8990	0,9480
Danske Invest Norske Aksjer Inst I	-0,0041	-1,5478	1,0194	22,1160	0,9530
Handelsbanken Norge (A1 NOK)	-0,0010	-0,6659	1,0360	40,5080	0,9860
Alfred Berg Aktiv	-0,0018	-0,5926	1,0210	19,6510	0,9410
Eika Norge	-0,0043	-1,5163	0,9735	19,7970	0,9420
C WorldWide Norge III	0,0006	0,2599	0,9479	25,1950	0,9640
Pareto Investment Fund A	-0,0051	-0,9045	1,5630	15,7830	0,9120
Danske Invest Norge II	-0,0042	-1,5983	1,0251	22,0950	0,9530
Holberg Norge A	0,0032	0,5497	1,2495	12,4250	0,8650
Delphi Norge A	0,0097	2,0899	1,2201	14,9960	0,9030
Fondsfinans Norge	-0,0027	-0,6758	1,1437	16,3670	0,9170
Storebrand Norge A	0,0017	0,6411	1,1054	23,2590	0,9570
Danske Invest Norge I	-0,0048	-1,8031	1,0258	22,1210	0,9530
C WorldWide Norge	-0,0004	-0,1770	0,9496	25,3160	0,9640
Alfred Berg Humanfond	-0,0039	-1,4296	0,9348	19,6480	0,9410
PLUSS Aksje	-0,0078	-3,6767	0,9239	24,8830	0,9630
PLUSS Markedsverdi	-0,0070	-4,3908	0,9921	35,4570	0,9810

Table A6: Regression results of the Fama-French 3-factor model of actively managed Norwegian mutual funds

The table shows results for time series regressions for the CAPM model, Fama-French 3-factor model, Carharts 4-factor model and Fama-French 5-factor model on net returns of an equal weighted portfolio of the actively managed Norwegian mutual funds in our sample. The regressions are run on the total period (2007-2021) and divided into three time periods; period 1 (2007-2010), period 2 (2011-2018) and period 3 (2019-2021). Explanatory variables used are the benchmark as a proxy for the market excess return (OSEFX), a size factor (SMB) and a value/growth factor (HML) (see section 3 for descriptions of the factors). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R^2 . The t-statistics are corrected according to Newby and West (1987) adjusted standard errors. The null hypothesis is alpha equal to zero, and significant values are in bold font.

Norway - FULL PERIOD						Norway - PERIOD 1 (2007-2010)					
	α	β_{OSEFX}	β_{SMB}	β_{HML}	R^2_{Adj}		α	β_{OSEFX}	β_{SMB}	β_{HML}	R^2_{Adj}
Danske Invest Norske Aksjer Inst II	0.0023	0.9191	0.0249	0.1427	0.9620	Danske Invest Norske Aksjer Inst II	0.0052	0.8900	0.0597	0.1352	0.9690
Alfred Berg Gambak	2.3181	37.1389	0.4106	2.9703	0.9030	Alfred Berg Gambak	2.4613	37.9210	0.4774	1.2350	0.9330
ODIN Norge C	1.7066	43.0272	3.7833	-2.8910	0.8650	ODIN Norge C	0.5911	34.7488	1.7124	-1.3822	0.8740
Alfred Berg Norge C	-0.0005	0.7598	0.4528	0.1569	0.9780	Alfred Berg Norge C	-0.0024	0.6801	0.7712	0.4928	0.9890
KLP AksjeNorge	-0.3263	21.9345	4.2024	1.9710	0.9780	KLP AksjeNorge	-0.7534	17.3765	4.0024	2.4199	0.9890
Nordea Norge Verdi	0.0011	0.9496	0.1218	-0.0639	0.9780	Nordea Norge Verdi	0.0026	0.9589	0.0652	-0.0643	0.9590
Pareto Aksje Norge I	1.3735	87.7954	2.2565	-1.6051	0.9560	Pareto Aksje Norge I	1.6179	82.7449	0.7806	-1.2112	0.9590
Nordea Kapital	0.0009	0.9666	0.1966	0.0963	0.9560	Nordea Kapital	0.0031	0.9281	0.0993	0.1129	0.9590
Nordea Avkastning	0.9415	29.5710	2.6596	2.3871	0.9560	Nordea Avkastning	1.4578	25.7080	0.6500	0.1960	0.9250
Danske Invest Norske Aksjer Inst I	0.0023	0.8034	0.2379	0.2149	0.8810	Danske Invest Norske Aksjer Inst I	-0.0006	0.7559	0.1906	0.2058	0.9250
Handelsbanken Norge (A1 NOK)	1.6974	25.0829	2.0883	2.4005	0.8500	Handelsbanken Norge (A1 NOK)	-0.1927	18.8002	1.1634	1.8151	0.8830
Alfred Berg Aktiv	0.0014	0.8198	0.3823	0.2713	0.8500	Alfred Berg Aktiv	0.0026	0.7619	0.4084	-0.0384	0.8830
Eika Norge	0.9861	23.2795	3.1438	2.7455	0.9770	Eika Norge	0.7702	21.1753	1.8172	-0.1684	0.9930
C WorldWide Norge III	0.0008	0.9772	0.1057	0.0234	0.9770	C WorldWide Norge III	0.0018	0.9439	0.0293	-0.0052	0.9930
Pareto Investment Fund A	1.1619	47.3051	1.5120	0.4241	0.9670	Pareto Investment Fund A	1.5407	77.8824	0.4292	-0.2152	0.9930
Danske Invest Norge II	0.0008	0.9957	0.1360	0.0090	0.9670	Danske Invest Norge II	0.0009	0.9515	0.0420	0.0018	0.9930
Holberg Norge A	0.9399	39.5498	1.5574	0.1245	0.9670	Holberg Norge A	0.7869	88.9649	0.5750	0.0597	0.9670
Delphi Norge A	0.0020	0.9237	0.0208	0.1257	0.9620	Delphi Norge A	0.0044	0.8991	0.0540	0.0641	0.9670
Fondsfinans Norge	2.0476	42.6976	0.3024	2.5612	0.9430	Fondsfinans Norge	2.1059	39.6953	0.3584	0.6812	0.9760
Storebrand Norge A	0.0011	0.9914	0.2013	-0.0671	0.9430	Storebrand Norge A	0.0014	0.9928	0.1686	-0.1510	0.9760
Danske Invest Norge I	0.8125	65.3874	2.0979	-1.1338	0.9490	Danske Invest Norge I	0.5738	54.7509	1.1173	-1.3250	0.9670
C WorldWide Norge	0.0012	0.9484	0.2173	-0.0656	0.9490	C WorldWide Norge	0.0020	0.9428	0.0604	-0.0496	0.9670
Alfred Berg Humanfond	1.0455	54.9082	2.6941	-1.1700	0.9320	Alfred Berg Humanfond	0.7795	56.9825	0.5241	-0.4488	0.9580
PLUSS Aksje	-0.0007	0.9212	0.1614	0.1172	0.9320	PLUSS Aksje	0.0021	0.9013	0.1509	0.2126	0.9580
PLUSS Markedsverdi	-0.5398	43.4549	2.3028	2.1711	0.9730	PLUSS Markedsverdi	0.8888	39.3532	1.3402	1.5096	0.9870
	0.0008	0.9643	-0.0111	-0.0697	0.9730		0.0019	0.9525	-0.0698	-0.0767	0.9870
	1.1240	73.0333	-0.1952	-1.7644	0.8930		1.6988	80.9210	-0.7284	-1.0808	0.9730
	0.0023	1.0228	0.4430	0.1580	0.8930		0.0019	0.9764	-0.0216	0.0591	0.9730
	1.4186	22.0677	2.6890	1.2490	0.9600		0.9471	39.4528	-0.1784	0.6582	0.9660
	0.0021	0.9131	0.0496	0.1577	0.9600		0.0049	0.8793	0.1256	0.1903	0.9660
	2.1501	37.9823	0.8371	3.2833	0.8450		2.3318	40.2260	1.0108	1.6837	0.9260
	0.0010	0.8410	0.3620	0.1339	0.8450		0.0005	0.7708	0.2077	0.3241	0.9260
	0.5644	15.6170	2.6506	1.4126	0.8930		0.1652	19.0258	1.6575	1.8932	0.9470
	0.0030	0.9142	0.5175	-0.0056	0.8930		0.0031	0.8428	0.5034	0.1606	0.9470
	1.8286	26.1533	4.9239	-0.0747	0.9080		0.9892	36.4404	3.6231	1.4212	0.9590
	0.0031	0.9287	0.4124	0.1615	0.9080		0.0067	0.8824	0.2482	0.0458	0.9590
	2.2059	23.6196	4.2558	2.1585	0.9410		3.0793	28.5720	1.4721	0.3478	0.9910
	0.0015	0.9496	0.1895	0.0164	0.9410		0.0016	0.9646	0.0117	0.0166	0.9910
	1.6035	35.5756	2.0063	0.2600	0.9610		1.4217	46.3096	0.1790	0.2151	0.9670
	0.0014	0.9186	0.0493	0.1565	0.9610		0.0041	0.8867	0.1265	0.1827	0.9670
	1.5455	41.1982	0.8303	3.3467	0.9750		2.0410	42.3938	1.0166	1.6584	0.9890
	0.0002	0.9636	0.0005	-0.0571	0.9750		0.0012	0.9512	-0.0403	-0.0399	0.9890
	0.2315	75.4417	0.0089	-1.4772	0.9640		1.1222	85.1746	-0.4568	-0.6878	0.9810
	-0.0011	0.9386	0.0347	-0.0851	0.9640		-0.0005	0.9447	-0.0749	-0.1293	0.9810
	-1.3196	84.7871	0.5668	-1.9822	0.9480		-0.3026	75.7001	-0.8890	-1.6019	0.9670
	0.0009	0.8641	-0.1030	0.0590	0.9480		0.0047	0.8351	-0.1798	0.1711	0.9670
	0.8066	29.4001	-1.6035	1.0915	0.9710		2.5962	36.2443	-1.4594	2.0039	0.9780
	0.0007	0.9215	-0.0144	0.0794	0.9710		0.0038	0.8995	0.0195	0.1456	0.9780
	0.8211	40.8734	-0.2403	1.6241			2.2442	36.8093	0.1614	1.4222	

Norway - PERIOD 2 (2011-2018)						Norway - PERIOD 3 (2019-2021)					
	α	β_{OSEFX}	β_{SMB}	β_{HML}	R^2_{Adj}		α	$\beta_{\text{S&P}}$	β_{SMB}	β_{HML}	R^2_{Adj}
Danske Invest Norske Aksjer Inst II	0,0011	0,9738	0,0158	-0,0088	0,9560	Danske Invest Norske Aksjer Inst II	0,0007	0,9959	-0,1847	0,2566	0,9660
	1,3013	38,3541	0,2381	-0,1846			0,2320	19,6389	-1,0252	3,2101	
Alfred Berg Gambak	0,0034	0,8932	0,4359	-0,23801	0,8030	Alfred Berg Gambak	0,0018	0,9407	0,4551	-0,1790	0,9090
	1,7284	19,3250	2,9077	-2,1520			0,3743	15,2377	1,8361	-1,4733	
ODIN Norge C	-0,0014	0,8854	0,3566	-0,0054	0,8620	ODIN Norge C	-0,0008	0,9454	0,0406	0,0401	0,9330
	-0,7779	15,7538	3,6742	-0,0535			-0,2126	18,7767	0,2413	0,2991	
Alfred Berg Norge C	0,0015	0,9384	0,1702	-0,0873	0,9570	Alfred Berg Norge C	-0,0035	0,9583	0,1062	-0,1063	0,9630
	1,7602	41,8819	2,9746	-2,0801			-1,2205	19,8765	0,6958	-1,1705	
KLP AksjeNorge	-0,0005	1,0095	0,2576	0,0317	0,9510	KLP AksjeNorge	-0,0017	1,1601	-0,0059	0,0346	0,9740
	-0,4777	38,2896	3,5321	0,5824			-0,7949	24,7334	-0,0473	0,4897	
Nordea Norge Verdi	0,0031	0,8203	0,1723	0,0741	0,7790	Nordea Norge Verdi	0,0020	1,0182	0,2233	0,2604	0,9270
	1,6473	19,2299	1,4706	0,6274			0,5263	10,9264	0,8828	2,1511	
Pareto Aksje Norge I	0,0004	0,8617	0,3760	0,3651	0,7610	Pareto Aksje Norge I	-0,0009	1,1058	-0,0349	0,2392	0,9320
	0,2059	14,8464	2,6349	2,6125			-0,2002	13,3343	-0,1571	0,2080	
Nordea Kapital	0,0007	1,0067	0,0779	-0,0677	0,9590	Nordea Kapital	-0,0033	1,1280	0,1274	-0,0028	0,9670
	0,7585	46,9361	1,1614	-1,0866			-1,0939	25,7609	0,7777	-0,0326	
Nordea Avkastning	0,0004	1,0188	0,0846	-0,0822	0,9500	Nordea Avkastning	-0,0022	1,2127	0,1715	-0,0466	0,9450
	0,4163	44,4016	1,1732	-0,9275			-0,5470	18,4544	0,8154	-0,3863	
Danske Invest Norske Aksjer Inst I	0,0011	0,9669	0,0122	-0,0047	0,9570	Danske Invest Norske Aksjer Inst I	0,0007	0,9942	-0,1929	0,2627	0,9670
	1,3319	42,4259	0,1880	-0,0992			0,2196	19,9444	-1,0868	3,3285	
Handelsbanken Norge (A1 NOK)	0,0018	0,9830	0,2300	-0,1188	0,8310	Handelsbanken Norge (A1 NOK)	-0,0007	1,0148	0,1209	0,0141	0,9850
	0,8843	19,6116	1,3581	-1,0028			-0,3705	32,1908	0,7993	0,2550	
Alfred Berg Aktiv	0,0019	0,9619	0,3175	-0,1214	0,9030	Alfred Berg Aktiv	-0,0041	1,0119	0,2362	-0,1291	0,9430
	1,2526	23,8238	3,3935	-1,8808			-1,0462	14,5799	1,1684	-1,0481	
Eika Norge	-0,0019	0,9807	0,1895	0,1382	0,8720	Eika Norge	-0,0055	0,9643	0,1545	-0,0687	0,9400
	-1,1492	19,5511	1,6929	1,7389			-2,0581	17,4737	0,7224	-0,9001	
C WorldWide Norge III	0,0004	1,0111	-0,0050	-0,0639	0,9430	C WorldWide Norge III	-0,0018	0,9529	0,1446	-0,1297	0,9660
	0,4234	34,9781	-0,0582	-1,0419			-1,0933	20,6144	1,1977	-1,2684	
Pareto Investment Fund A	0,0026	0,9782	0,4098	-0,0973	0,7870	Pareto Investment Fund A	-0,0008	1,3949	0,7875	0,2338	0,9280
	1,3324	12,6960	2,6097	-0,7959			-0,1605	19,8928	2,8096	1,6417	
Danske Invest Norge II	0,0008	0,9736	0,0191	-0,0088	0,9560	Danske Invest Norge II	0,0004	0,9998	-0,1843	0,2570	0,9650
	0,9548	39,0819	0,2941	-0,1843			0,1365	19,5962	-1,0180	3,1809	
Holberg Norge A	-0,0008	0,8678	0,4503	0,0005	0,7650	Holberg Norge A	0,0037	1,2510	-0,0471	0,0273	0,8520
	-0,3783	11,5916	3,0498	0,0044			0,4538	8,8900	-0,1112	0,1303	
Delphi Norge A	0,0000	0,9833	0,3354	-0,0941	0,8140	Delphi Norge A	0,0081	1,1291	0,7215	-0,0895	0,9200
	-0,0017	17,9716	2,5887	-0,7944			1,4356	12,6864	3,7597	-0,7238	
Fondsfinans Norge	0,0014	1,0291	0,6177	0,1006	0,8360	Fondsfinans Norge	0,0011	1,1018	-0,0106	0,2094	0,9170
	0,8269	17,9347	5,3327	0,6740			0,3152	13,8850	-0,0376	2,7091	
Storebrand Norge A	0,0016	0,8557	0,1872	-0,0017	0,7910	Storebrand Norge A	0,0015	1,0623	0,3031	-0,0144	0,9590
	1,0899	12,4557	1,1670	-0,0131			0,5363	27,4411	1,8795	-0,2568	
Danske Invest Norge I	0,0002	0,9755	0,0192	-0,0045	0,9560	Danske Invest Norge I	-0,0001	0,9998	-0,1832	0,2595	0,9660
	0,2519	38,5815	0,2933	-0,0947			-0,0186	19,6924	-1,0058	3,2667	
C WorldWide Norge	-0,0002	1,0103	0,0000	-0,0591	0,9430	C WorldWide Norge	-0,0027	0,9541	1,1450	-0,1279	0,9660
	-0,1487	34,2085	0,0000	-0,9483			-1,6521	20,5911	1,2108	-1,2577	
Alfred Berg Humanfond	-0,0002	0,9358	0,1323	-0,0765	0,9270	Alfred Berg Humanfond	-0,0067	0,9644	0,0171	-0,1551	0,9420
	-0,1449	43,4486	2,1731	-1,4266			-1,8996	16,4145	0,0810	-1,4928	
PLUSS Aksje	0,0003	0,9378	-0,0712	-0,0473	0,9270	PLUSS Aksje	-0,0101	0,9576	-0,0519	-0,1247	0,9640
	0,3249	24,6246	-1,2648	-0,7642			-3,9876	24,5219	-0,3726	-1,7087	
PLUSS Markedsverdi	0,0003	0,9610	-0,0250	-0,0198	0,9610	PLUSS Markedsverdi	-0,0073	1,0152	-0,1314	-0,0148	0,9810
	0,3945	33,5448	-0,5627	-0,5536			-3,7010	32,9561	-1,0728	-0,2494	

Table A7: Regression results of the Carhart 4-factor model of actively managed Norwegian mutual funds

The table shows results for time series regressions for the Carhart 4-factor model on net returns of actively managed Norwegian mutual funds in our sample. The regressions are run on the total period (2007-2021) and divided into three time periods; period 1 (2007-2010), period 2 (2011-2018) and period 3 (2019-2021). Explanatory variables used are the benchmark as a proxy for the market excess return (OSEFX), a size factor (SMB), a value/growth factor (HML) and a momentum factor (MOM) (see section 3 for descriptions of the factors). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R². The t-statistics are corrected according to Newby and West (1987) adjusted standard errors. The null hypothesis is alpha equal to zero, and significant values are in bold font.

Norway - FULL PERIOD						
	α	β_{ROSEFX}	β_{SMB}	β_{HML}	β_{MOM}	R^2_{adj}
Danske Invest Norske Aksjer Inst II	0.0027	0.5056	0.0290	0.0993	-0.0553	0.9620
Alfred Berg Gambak	2.7297	34.3024	0.4757	2.0687	-2.1643	
ODIN Norge C	-0.0004	0.7551	0.4542	0.1420	-0.0189	0.8650
Alfred Berg Norge C	-0.2339	19.0994	4.2076	1.6845	-0.5114	
KLP AksjeNorge	0.0009	0.9562	0.1198	-0.0428	0.0268	0.9780
Nordea Norge Vendi	1.1093	80.2096	2.1776	-1.0940	1.7126	
Pareto Aksje Norge I	0.0010	0.9616	0.1981	0.0803	-0.0204	0.9560
Nordea Kapital	1.0877	32.5651	2.6512	1.8434	-0.5651	
Nordea Avkastning	0.0031	0.7741	0.2467	0.1209	-0.1194	0.8860
Danske Invest Norske Aksjer Inst I	2.3379	21.4506	2.1447	1.1187	-0.8785	
Handelsbanken Norge (A1 NOK)	0.0016	0.8116	0.3848	0.2452	-0.0332	0.8490
Alfred Berg Aktiv	1.1547	21.7277	3.1719	2.2445	-0.6910	
Eika Norge	0.0010	0.9730	0.1069	0.0099	-0.0171	0.9770
C WorldWide Norge III	1.3399	46.0034	1.5295	0.1536	-0.9009	
Pareto Investment Fund A	0.0009	0.9920	0.1371	-0.0031	-0.0153	0.9670
Danske Invest Norge II	1.0812	37.1908	1.5728	-0.0372	-0.6517	
Holberg Norge A	0.0022	0.9137	0.0239	0.0936	-0.0409	0.9620
Delphi Norge A	2.3402	38.7365	0.3446	1.9746	-1.6106	
Fondsfinans Norge	0.0013	0.9852	0.2032	-0.0869	-0.0251	0.9430
Storebrand Norge A	0.9039	57.0703	2.1292	-1.2807	-0.7851	
Danske Invest Norge I	0.0009	0.9601	0.2138	-0.0279	0.0479	0.9490
C WorldWide Norge	0.7644	51.9118	2.6220	-0.4781	2.1341	
PLUSS Aksje	0.0000	0.8975	0.1686	0.0410	-0.0968	0.9350
PLUSS Markedsventi	-0.0292	37.6771	2.5524	0.7056	-2.0636	
Alfred Berg Humanfond	0.0003	0.9819	-0.0164	-0.0131	0.0719	0.9750
PLUSS Aksje	0.4519	76.2224	-0.2987	-0.3378	3.7718	
PLUSS Markedsventi	0.0021	1.0273	0.4416	0.1725	0.0185	0.8920
Alfred Berg Humanfond	1.2560	28.8615	2.6981	1.1613	0.3519	
PLUSS Aksje	0.0025	0.8986	0.0540	0.1113	-0.0590	0.9610
PLUSS Markedsventi	2.5601	33.8703	0.9028	2.4266	-2.1621	
Alfred Berg Humanfond	0.0016	0.8212	-0.3680	0.0701	-0.0811	0.8460
PLUSS Aksje	0.8736	14.5771	2.7269	0.6380	-1.7350	
PLUSS Markedsventi	0.0026	0.9287	0.5131	0.0411	0.0593	0.8940
Alfred Berg Humanfond	1.4647	25.6497	4.9238	0.5131	1.3146	
PLUSS Aksje	0.0037	0.9087	0.4185	0.0973	-0.0817	0.9100
PLUSS Markedsventi	2.6427	23.6014	4.4230	1.0401	-1.7194	
Alfred Berg Humanfond	0.0013	0.9547	0.1880	0.0328	0.0209	0.9410
PLUSS Aksje	1.3991	36.8850	1.9869	0.4451	0.6855	
PLUSS Markedsventi	0.0018	0.9044	0.0536	0.1111	-0.0578	0.9620
Alfred Berg Humanfond	1.9613	36.3880	0.8956	2.4854	-2.1619	
PLUSS Aksje	-0.0003	0.9822	-0.0052	0.0029	0.0763	0.9760
PLUSS Markedsventi	-0.4645	79.0286	-0.0983	0.0785	4.1975	
Alfred Berg Humanfond	-0.0012	0.9411	0.0340	-0.0771	0.0102	0.9630
PLUSS Aksje	-1.3643	71.2131	0.5523	-1.7610	0.4280	
PLUSS Markedsventi	0.0008	0.8675	-0.1040	0.0699	0.0139	0.9480
PLUSS Markedsventi	0.6997	28.5482	-1.6049	1.2344	0.4976	
PLUSS Markedsventi	0.0007	0.9217	-0.0145	0.0801	0.0009	0.9710
PLUSS Markedsventi	0.8004	36.9416	-0.2412	1.5572	0.0450	

Norway - PERIOD 1 (2007-2010)						
	α	β_{ROSEFX}	β_{SMB}	β_{HML}	β_{MOM}	R^2_{adj}
Danske Invest Norske Aksjer Inst II	0.0053	0.8830	0.0598	0.1011	-0.0290	0.9680
Alfred Berg Gambak	2.6318	32.2834	0.4720	0.8925	-0.5791	
ODIN Norge C	0.0017	0.9377	0.2607	-0.0770	0.0970	0.9350
Alfred Berg Norge C	0.4661	25.3584	1.6792	-0.5028	1.8275	
KLP AksjeNorge	-0.0024	0.6802	0.7712	0.4934	0.0005	0.8710
Nordea Norge Vendi	-0.7478	14.4393	3.9556	2.2314	0.0078	
Pareto Aksje Norge I	0.0024	0.9674	0.0651	-0.0228	0.0352	0.9890
Nordea Kapital	1.5285	64.3216	0.7553	-0.3703	1.6635	
Nordea Avkastning	0.0030	0.9295	0.0993	0.1199	0.0059	0.9580
Danske Invest Norske Aksjer Inst I	1.3271	27.7432	0.6436	1.3636	0.0814	
Handelsbanken Norge (A1 NOK)	0.0004	0.7131	0.1912	-0.0021	-0.1767	0.9360
Alfred Berg Aktiv	0.1359	18.8540	1.2347	-0.0221	-3.5476	
Eika Norge	0.0027	0.7576	0.4085	-0.0592	-0.0177	0.8800
C WorldWide Norge III	0.7854	16.5792	1.7969	-0.2290	-0.2398	
Pareto Investment Fund A	0.0018	0.9413	0.0293	-0.0179	-0.0108	0.9930
Danske Invest Norge II	1.6576	91.8148	0.4218	-0.4786	-0.6486	
Holberg Norge A	0.0009	0.9494	0.0240	-0.0085	-0.0087	0.9930
Delphi Norge A	0.8460	101.6701	0.5663	-0.2086	-0.5774	
Fondsfinans Norge	0.0045	0.8940	0.0541	0.0394	-0.0210	0.9660
Storebrand Norge A	2.2311	33.6810	0.3541	0.4103	-0.5670	
Danske Invest Norge I	0.0015	0.9888	0.1687	-0.1703	-0.0164	0.9760
Alfred Berg Humanfond	0.5941	49.0332	1.1093	-1.3302	-0.5123	
PLUSS Aksje	0.0016	0.9600	0.0602	0.0344	0.0714	0.9680
PLUSS Markedsventi	0.6545	42.6520	0.5196	0.2849	2.0396	
Alfred Berg Humanfond	0.0029	0.8640	0.1514	0.0312	-0.1542	0.9640
C WorldWide Norge	1.3899	31.6639	1.5642	0.2102	-3.2067	
PLUSS Aksje	0.0015	0.9684	-0.0701	0.0006	0.0657	0.9880
PLUSS Markedsventi	1.3577	77.2398	-0.7274	0.0909	2.3940	
PLUSS Markedsventi	0.0016	0.9909	-0.0218	0.1300	0.0602	0.9730
Alfred Berg Humanfond	0.7509	40.8749	-0.1886	1.3119	1.6336	
PLUSS Aksje	0.0050	0.8715	0.1257	0.1526	-0.0320	0.9660
PLUSS Markedsventi	2.4992	31.7869	0.9948	1.4494	-0.7673	
Alfred Berg Humanfond	0.0010	0.7501	0.2080	0.2236	-0.0854	0.9280
PLUSS Aksje	0.3236	16.8372	1.6850	1.1402	-1.3235	
PLUSS Markedsventi	0.0026	0.8646	0.5031	0.2663	0.0898	0.9480
Alfred Berg Humanfond	0.8450	31.0869	3.5687	2.6569	2.8304	
PLUSS Aksje	0.0069	0.8763	0.2483	0.0161	-0.0253	0.9590
PLUSS Markedsventi	3.0128	23.6398	1.4748	0.0668	-0.3082	
Alfred Berg Humanfond	0.0015	0.9685	0.0117	0.0355	0.0160	0.9910
PLUSS Aksje	1.2910	40.2992	0.1756	0.4297	0.7158	
PLUSS Markedsventi	0.0043	0.8789	0.1266	0.1446	-0.0324	0.9670
Alfred Berg Humanfond	2.2017	33.1058	1.0013	1.1412	-0.7937	
PLUSS Aksje	0.0008	0.9696	-0.0406	0.0501	0.0765	0.9910
PLUSS Markedsventi	0.7935	85.1486	-0.4676	1.0086	2.9463	
Alfred Berg Humanfond	-0.0006	0.9480	-0.0749	-0.1134	0.0135	0.9810
PLUSS Aksje	-0.3416	57.4599	-0.8796	-1.4883	0.3346	
PLUSS Markedsventi	0.0047	0.8370	-0.1799	0.1803	0.0079	0.9660
PLUSS Markedsventi	2.5663	32.3491	-1.4387	1.8597	0.2140	
PLUSS Markedsventi	0.0038	0.8986	0.0195	0.1413	-0.0037	0.9770
PLUSS Markedsventi	2.2704	31.5177	0.1597	1.3251	-0.1574	

Norway - PERIOD 2 (2011-2018)						
	α	β_{ROSEFX}	β_{SMB}	β_{HML}	β_{MOM}	R^2_{adj}
Danske Invest Norske Aksjer Inst II	0.0014	0.9684	0.0160	-0.0281	-0.0347	0.9560
Alfred Berg Gambak	1.5272	37.1400	0.2397	-0.5537	-1.5463	
ODIN Norge C	0.0028	0.9043	0.4355	-0.1981	0.0718	0.8030
Alfred Berg Norge C	1.3313	18.9161	2.8569	-1.6112	1.2453	
KLP AksjeNorge	-0.0013	0.8839	0.3567	-0.0104	-0.0091	0.8600
Nordea Norge Vendi	-0.6482	14.8996	3.6690	-0.0969	-0.1929	
Pareto Aksje Norge I	0.0015	0.9382	0.1703	-0.0878	-0.0010	0.9560
Nordea Kapital	1.5694	39.7830	2.9613	-1.9492	-0.0365	
Nordea Avkastning	-0.0004	1.0091	0.2576	0.0303	-0.0027	0.9510
Danske Invest Norge II	-0.3943	38.2612	3.5191	0.5397	-0.8228	
Holberg Norge A	0.0036	0.8108	0.1727	0.0398	-0.0617	0.7780
Delphi Norge A	1.7527	18.3462	1.4159	0.3155	-0.9825	
Fondsfinans Norge	0.0004	0.8614	0.3760	0.3640	-0.0020	0.7580
Storebrand Norge A	0.1984	14.1975	2.6190	2.4770	-0.0254	
Danske Invest Norge I	0.0009	1.0021	0.0781	-0.0839	-0.0293	0.9590
PLUSS Aksje	0.9712	47.5731	1.1514	-1.3126	-0.9910	
PLUSS Markedsventi	0.0007	1.0141	0.0848	-0.0989	-0.0301	0.9500
Danske Invest Norske Aksjer Inst I	0.6232	43.1597	1.1641	-1.1011	-0.9172	
Handelsbanken Norge (A1 NOK)	0.0012	0.9651	0.0123	-0.0112	-0.0116	0.9570
Alfred Berg Aktiv	1.3501	39.8398	0.1878	-0.2229	-0.4919	
Eika Norge	0.0021	0.9781	0.2302	-0.1365	-0.0320	0.8300
C WorldWide Norge III	0.9020	19.0380	1.2687	-1.0228	-0.3490	
Pareto Investment Fund A	0.0017	0.9646	0.3174	-0.1117	0.0173	0.9020
Danske Invest Norge I	1.0757	33.3525	3.3628	-1.5696	0.4233	
Alfred Berg Humanfond	-0.0019	0.9799	0.1895	0.1354	-0.0051	0.8710
C WorldWide Norge	-0.9696	19.6414	1.6871	1.5631	-0.0663	
PLUSS Aksje	-0.0004	1.0257	-0.0056	-0.0114	0.0945	0.9470
PLUSS Markedsventi	-0.3083	36.1851	-0.0700	-0.1641	2.3380	
Alfred Berg Humanfond	0.0025	0.9808	0.4097	-0.0881	0.0165	0.7850
PLUSS Aksje	1.1304	12.3903	2.5923	-0.6047	0.2133	
PLUSS Markedsventi	0.0011	0.9682	0.0194	-0.0281	-0.0348	0.9560
Alfred Berg Humanfond	1.2104	37.5353	0.2956	-0.5563	-1.5455	
PLUSS Aksje	-0.0008	0.8685	0.4503	0.0028	0.0042	0.7630
PLUSS Markedsventi	-0.3514	11.6290	3.0267	0.0235	0.0461	
Alfred Berg Humanfond	-0.0010	1.0006	0.3347	-0.0318	0.1121	0.8170
PLUSS Aksje	-0.4340	16.0153	2.6375	-0.2590	1.4087	
PLUSS Markedsventi	0.0024	1.0122	0.6184	0.0399	-0.1094	0.8380
Alfred Berg Humanfond	1.1568	18.1881	5.4081</			

Explanatory variables used are the benchmark as a proxy for the market excess return (OSEFX), a size factor (SMB), a value/growth factor (HML), a profitability factor (RMW) and an investment factor (CMA) (see section 3 for descriptions of the factors). Results from the regressions that are shown are the intercept and coefficient estimates with corresponding t-statistics and the regression adjusted R². The t-statistics are corrected according to Newby and West (1987) adjusted standard errors. The null hypothesis is alpha equal to zero, and significant values are in bold font.

Norway - FULL PERIOD							
	α	β_{OSEFX}	β_{SMB}	β_{HML}	β_{RMW}	β_{CMA}	R_{adj}^2
Danske Invest Norske Aksjer Inst II	0,0023	0,9193	0,0354	0,1315	-0,0150	0,0080	0,9610
	2,5222	39,7002	0,5815	1,6696	-0,1420	0,0644	
Alfred Berg Gambak	0,0028	0,8898	0,3829	-0,408	0,0592	-0,1890	0,9030
	1,7077	37,6112	3,6542	-1,2922	0,4379	-1,1345	
ODIN Norge C	-0,0003	0,7653	0,4361	0,0332	-0,1705	0,0580	0,8640
	-0,2152	19,7262	3,6995	0,2589	-0,8561	0,3373	
Alfred Berg Norge C	0,0011	0,9393	0,1226	-0,0263	0,0438	-0,0937	0,9780
	1,3149	64,5305	2,2901	-0,4371	0,5211	-1,2497	
KLP AksjeNorge	0,0008	0,9660	0,2052	0,0830	0,0169	-0,0095	0,9550
	0,7749	30,9546	2,6411	1,3590	0,1305	-0,0845	
Nordea Norge Verdi	0,0031	0,7601	0,2028	0,2843	-0,1456	-0,3378	0,8840
	2,2641	21,2963	1,4732	2,1714	-0,6260	-3,0303	
Pareto Aksje Norge I	0,0013	0,8123	0,3752	0,2665	0,0194	-0,0767	0,8470
	0,9269	19,7705	2,9260	1,8446	0,0944	-0,4167	
Nordea Kapital	0,0007	0,9761	0,1170	0,0290	0,0399	-0,0151	0,9770
	0,9429	49,9649	1,4738	0,3809	0,3478	-0,2519	
Nordea Avkastning	0,0006	0,9927	0,1524	0,0347	0,0876	-0,0382	0,9670
	0,6620	40,6293	1,5290	0,3500	0,5993	-0,5612	
Danske Invest Norske Aksjer Inst I	0,0020	0,9224	0,0286	0,1184	-0,0200	-0,0036	0,9610
	2,2023	42,0097	0,4225	1,6138	-0,2078	-0,0327	
Handelsbanken Norge (A1 NOK)	0,0015	0,9771	0,1877	-0,0791	-0,1090	-0,1038	0,9430
	1,0536	60,5133	1,9642	-0,9778	-0,8856	-1,2620	
Alfred Berg Aktiv	0,0011	0,9418	0,2241	-0,0391	0,0748	-0,0702	0,9480
	0,8937	42,3965	2,7293	-0,4150	0,5374	-0,6217	
Eika Norge	-0,0004	0,9072	0,1492	0,1162	-0,0873	-0,1041	0,9320
	-0,2634	38,0660	2,0623	1,0173	-0,4907	-0,7294	
C WorldWide Norge III	0,0007	0,9762	-0,0071	-0,1119	-0,0104	0,0987	0,9730
	0,9186	62,2671	-0,1188	-2,1927	-0,1357	1,6486	
Pareto Investment Fund A	0,0016	1,0438	0,4861	0,0682	0,0850	0,1564	0,8930
	0,9394	21,1049	2,4471	0,3755	0,3050	0,9511	
Danske Invest Norge II	0,0021	0,9161	0,0599	0,1302	-0,0275	0,0321	0,9590
	2,3463	41,6659	1,0080	1,6315	-0,2361	0,2470	
Holberg Norge A	0,0009	0,8441	0,3738	0,0853	0,0005	0,0197	0,8430
	0,4559	17,1053	2,4039	0,5302	0,0016	0,1008	
Delphi Norge A	0,0023	0,9414	0,5585	-0,1237	0,0812	0,2035	0,8940
	1,2660	20,2142	4,6731	-1,1725	0,4469	1,2414	
Fondsfinans Norge	0,0036	0,9188	0,3954	0,0822	-0,1959	-0,0591	0,9080
	2,4315	25,7751	3,9116	0,6682	-1,1360	-0,3579	
Storebrand Norge A	0,0009	0,9610	0,2262	0,0189	0,1758	0,0663	0,9410
	0,8817	35,5547	2,1261	0,2205	1,3904	0,8271	
Danske Invest Norge I	0,0015	0,9199	0,0579	0,1335	-0,0316	0,0185	0,9600
	1,7063	42,4597	0,9718	1,6764	-0,2759	0,1442	
C WorldWide Norge	0,0000	0,9773	0,0039	-0,1126	-0,0265	0,1165	0,9750
	0,0520	69,5831	0,0665	-2,2708	-0,3592	2,0972	
Alfred Berg Humanfond	-0,0013	0,9263	0,0547	0,0089	0,1646	-0,1226	0,9640
	-1,3952	56,9693	0,9677	0,1383	1,4786	-1,5290	
PLUSS Aksje	0,0004	0,8778	-0,0757	0,0714	0,1393	0,0960	0,9490
	0,3287	26,0009	-1,0519	1,1924	1,1215	0,9523	
PLUSS Markedsverdi	0,0005	0,9293	-0,0019	0,0913	0,0629	0,0559	0,9710
	0,4465	31,7070	-0,0291	1,2971	0,5470	0,7186	

Norway - PERIOD 1 (2007-2010)							
	α	β_{OSEFX}	β_{SMB}	β_{HML}	β_{RMW}	β_{CMA}	R_{adj}^2
Danske Invest Norske Aksjer Inst II	0,0046	0,8945	0,0808	0,1459	0,1019	0,0332	0,9670
	2,2821	24,5566	0,6367	0,9228	0,3897	0,1928	
Alfred Berg Gambak	0,0004	0,8936	0,2875	0,0054	0,5763	-0,1425	0,9340
	0,1083	18,8953	1,8433	0,0244	2,0654	-0,4776	
ODIN Norge C	-0,0038	0,7024	0,7871	0,3987	0,1805	0,1373	0,8680
	-1,0011	14,4887	4,2058	1,8157	0,4162	0,5182	
Alfred Berg Norge C	0,0027	0,9518	0,0589	-0,0493	0,0138	-0,0499	0,9880
	1,4879	46,1573	0,6538	-0,6018	0,1327	-0,4205	
KLP AksjeNorge	0,0029	0,9104	0,1092	0,1876	0,1403	-0,1179	0,9580
	1,1546	25,5435	0,7478	1,6662	0,3762	-0,6453	
Nordea Norge Verdi	0,0018	0,7091	0,1620	0,1713	-0,4223	-0,3122	0,9270
	0,6966	17,0219	0,9885	1,1077	-1,0387	-1,5359	
Pareto Aksje Norge I	0,0029	0,7283	0,3908	0,0119	0,0434	-0,2335	0,8780
	0,7050	15,2383	1,7288	0,0481	0,0817	-0,8745	
Nordea Kapital	0,0022	0,9433	0,0217	-0,0405	-0,1095	-0,0045	0,9930
	1,8033	65,1372	0,3176	-0,8089	-0,9274	-0,0679	
Nordea Avkastning	0,0012	0,9480	0,0363	-0,0194	-0,0820	-0,0240	0,9930
	1,0117	74,904	0,4858	-0,3702	-0,6721	-0,4093	
Danske Invest Norske Aksjer Inst I	0,0044	0,9004	0,0638	0,0514	-0,0052	0,0109	0,9660
	2,0055	24,5000	0,4400	0,3733	-0,0187	0,0656	
Handelsbanken Norge (A1 NOK)	0,0015	0,9657	0,1732	-0,0783	0,0840	-0,1809	0,9760
	0,5060	39,7716	1,1506	-0,4547	0,3319	-1,3134	
Alfred Berg Aktiv	0,0004	0,9748	0,0794	0,0745	0,4208	-0,0094	0,9680
	0,1569	26,4207	0,7378	0,4742	1,8925	-0,0489	
Eika Norge	0,0020	0,8625	0,1762	0,3525	0,2081	-0,2536	0,9580
	0,8582	30,6885	1,3789	1,8338	0,6314	-1,5505	
C WorldWide Norge III	0,0013	0,9511	-0,0595	-0,0117	0,1743	-0,0083	0,9870
	1,0203	45,4232	-0,6203	-0,1243	0,8729	-0,0859	
Pareto Investment Fund A	0,0012	1,0024	-0,0168	0,0102	0,0446	0,1724	0,9720
	0,5305	42,3829	-0,1390	0,0885	0,1862	1,3743	
Danske Invest Norge II	0,0045	0,8880	0,1417	0,1626	0,0367	0,0602	0,9650
	2,2672	25,1817	1,1593	1,0866	0,1199	0,3396	
Holberg Norge A	-0,0005	0,7804	0,2212	0,3388	0,2094	0,0607	0,9240
	-0,1620	18,2482	1,8315	1,8310	0,5097	0,1916	
Delphi Norge A	0,0018	0,8354	0,5371	0,2153	0,3247	-0,0517	0,9460
	0,5287	17,4107	3,7913	1,1444	1,0417	-0,1944	
Fondsfinans Norge	0,0047	0,8785	0,2962	0,1872	0,5378	-0,0245	0,9610
	2,0264	26,4000	1,8409	0,9391	1,6788	-1,4500	
Storebrand Norge A	0,0014	0,9571	0,0148	0,0631	0,0945	-0,0565	0,9910
	1,0241	36,9543	0,2114	0,8613	0,6683	-0,7436	
Danske Invest Norge I	0,0038	0,8937	0,1418	0,1576	0,0305	0,0481	0,9660
	1,9719	24,7780	1,1550	1,0495	0,1004	0,2703	
C WorldWide Norge	0,0008	0,9550	-0,0355	-0,0184	0,0857	0,0256	0,9890
	0,6720	64,2203	-0,3936	-0,2261	0,4863	0,3351	
Alfred Berg Humanfond	-0,0017	0,9272	-0,0371	0,0528	0,4308	-0,1107	0,9830
	-1,0558	32,4229	-0,4575	0,4765	2,2227	-0,7420	
PLUSS Aksje	0,0052	0,8261	-0,1911	0,1991	-0,0559	-0,0590	0,9660
	2,4257	22,6957	-1,5012	1,7589	-0,2415	-0,4386	
PLUSS Markedsverdi	0,0025	0,9728	-0,0150	0,0684	-0,3201	-0,0592	0,9780
	2,1232	23,3788	-0,1142	0,6113	-1,2274	-0,4790	

Norway - PERIOD 2 (2011-2018)							
	α	β_{OSEFX}	β_{SMB}	β_{HML}	β_{RMW}	β_{CMA}	R_{adj}^2
Danske Invest Norske Aksjer Inst II	0,0014	0,9610	-0,0096	-0,0527	-0,1090	0,0119	0,9550
	1,5343	32,7702	-0,1273	-0,6767	-1,1434	0,1159	
Alfred Berg Gambak	0,0045	0,8482	0,3165	-0,4887	-0,4704	0,1261	0,8070
	2,0117	12,8709	1,6324	-2,5990	-1,7675	0,8144	
ODIN Norge C	-0,0005	0,8419	0,2546	-0,0911	-0,3053	-0,1175	0,8640
	-0,2901	14,9826	2,1579	-0,5409	-1,5388	-0,7004	
Alfred Berg Norge C	0,0020	0,9201	0,1260	-0,1695	-0,1722	0,0211	0,9570
	2,0208	32,2418	1,9295	-1,7249	-1,2746	0,2329	
KLP AksjeNorge	-0,0003	1,0015	0,2382	-0,0373	-0,1041	0,0386	0,9510
	-0,2371	30,0217	2,4887	-0,4094	-0,8073	0,1957	
Nordea Norge Verdi	0,0048	0,7294	-0,0348	0,0802	-0,4709	-0,4381	0,7940
	2,3548	14,0192	-0,2348	0,5986	-1,8958	-2,8255	
Pareto Aksje Norge I	0,0003	0,8628	0,3770	0,3110	-0,0394	0,0230	0,7560
	0,1697	12,6206	2,3306	1,6645	-0,1420	0,0949	
Nordea Kapital	0,0009	0,9901	0,0485	-0,0262	-0,0460	-0,1531	0,9590
	0,9691	38,4985	0,5583	-0,3049	-0,4276	-1,3715	
Nordea Avkastning	0,0005	1,0101	0,0739	-0,0171	0,0184	-0,1578	0,9500

Table A9: Ranks and percentiles of alpha for actual and simulated mutual fund returns based on the Fama and French 3-factor model

Panel A shows actual mutual fund returns (Actual) for different ranks and percentiles, simulated average estimation estimated by 10.000 bootstrap simulations (Simulated average) and percentage of simulation runs that produce lower values of alpha at a given rank and percentile than the ones from the actual fund returns (% < Actual). The estimates are based on the Fama French 3-factor model, where the explanatory variables are the market excess return, a size factor (SMB) and a value factor (HML). We use OLS estimation and standard errors corrected for heteroscedasticity and autocorrelation with the Newey and West (1986) method.

USA: full period				Norway: full period			
Panel A: α				Panel A: α			
Rank/ percentile	Actual	Simulated average	% < Act	Rank/ percentile	Actual	Simulated average	% < Act
Worst	-0,0069	-0,0026	0,88	Worst	-0,0011	-0,0020	80,45
2nd	-0,0069	-0,0018	0,02	2nd	-0,0007	-0,0015	82,98
3rd	-0,0041	-0,0014	1,75	3rd	-0,0005	-0,0012	82,41
4th	-0,0039	-0,0012	1,5	4th	0,0002	-0,0010	95,78
5th	-0,0039	-0,0010	0,98	5th	0,0007	-0,0009	99,34
10 %	-0,0040	-0,0013	1,57	10 %	-0,0005	-0,0012	82,41
20 %	-0,0037	-0,0008	0,67	20 %	0,0007	-0,0008	99,33
30 %	-0,0028	-0,0005	1,43	30 %	0,0008	-0,0005	98,48
40 %	-0,0025	-0,0002	1,16	40 %	0,0009	-0,0003	97,53
50 %	-0,0022	0,0000	1,08	50 %	0,0011	0,0000	96,89
60 %	-0,0020	0,0002	0,77	60 %	0,0014	0,0002	97,45
70 %	-0,0015	0,0005	1,1	70 %	0,0020	0,0004	98,8
80 %	-0,0006	0,0008	4,82	80 %	0,0023	0,0007	98,08
90 %	0,0000	0,0013	4,91	90 %	0,0027	0,0012	96,84
5th	-0,0004	0,0010	4,07	5th	0,0023	0,0008	97,28
4th	-0,0001	0,0012	6,36	4th	0,0023	0,0010	95,46
3rd	0,0000	0,0014	4,1	3rd	0,0027	0,0012	96,84
2nd	0,0001	0,0018	2,53	2nd	0,0030	0,0014	95,31
Best	0,0008	0,0025	5	Best	0,0031	0,0019	87,23

USA: 2007-2010				Norway: 2007-2010			
Panel A: α				Panel A: α			
Rank/ percentile	Actual	Simulated average	% < Act	Rank/ percentile	Actual	Simulated average	% < Act
Worst	-0,0086	-0,0046	6,52	Worst	-0,0024	-0,0039	76,76
2nd	-0,0045	-0,0033	20,9	2nd	-0,0006	-0,0030	93,73
3rd	-0,0035	-0,0027	24,62	3rd	-0,0005	-0,0024	91,02
4th	-0,0023	-0,0023	38,79	4th	0,0005	-0,0020	97,62
5th	-0,0022	-0,0020	34,31	5th	0,0009	-0,0017	98,27
10 %	-0,0029	-0,0025	31,11	10 %	-0,0005	-0,0024	91,02
20 %	-0,0018	-0,0016	34,14	20 %	0,0010	-0,0016	98,44
30 %	-0,0009	-0,0010	44,03	30 %	0,0016	-0,0009	98,85
40 %	-0,0002	-0,0005	51,81	40 %	0,0019	-0,0004	98,44
50 %	0,0002	-0,0001	57,22	50 %	0,0021	0,0000	96,82
60 %	0,0007	0,0003	59,49	60 %	0,0026	0,0004	96,92
70 %	0,0009	0,0008	53,83	70 %	0,0031	0,0010	95,78
80 %	0,0014	0,0014	52,17	80 %	0,0043	0,0016	96,71
90 %	0,0024	0,0022	55,21	90 %	0,0049	0,0026	91,43
5th	0,0018	0,0017	52,72	5th	0,0044	0,0018	96,18
4th	0,0022	0,0020	54,73	4th	0,0047	0,0021	94,52
3rd	0,0026	0,0024	55,8	3rd	0,0049	0,0026	91,43
2nd	0,0032	0,0030	57,17	2nd	0,0052	0,0031	87,55
Best	0,0079	0,0043	93,88	Best	0,0067	0,0040	89,12

USA: 2011-2018				Norway: 2011-2018			
Panel A: α				Panel A: α			
Rank/ percentile	Actual	Simulated average	% < Act	Rank/ percentile	Actual	Simulated average	% < Act
Worst	-0,0117	-0,0036	0,79	Worst	-0,0019	-0,0024	61,2
2nd	-0,0105	-0,0023	0,12	2nd	-0,0014	-0,0017	58,49
3rd	-0,0068	-0,0018	1,3	3rd	-0,0008	-0,0013	73,56
4th	-0,0065	-0,0015	0,95	4th	-0,0005	-0,0011	77,87
5th	-0,0056	-0,0013	1,38	5th	-0,0002	-0,0009	83,79
10 %	-0,0066	-0,0016	1,08	10 %	-0,0008	-0,0013	73,56
20 %	-0,0053	-0,0010	1,21	20 %	-0,0002	-0,0008	81,8
30 %	-0,0045	-0,0006	1,31	30 %	0,0002	-0,0005	84,06
40 %	-0,0038	-0,0003	1,33	40 %	0,0003	-0,0002	79,73
50 %	-0,0027	0,0000	3,12	50 %	0,0004	0,0000	74,05
60 %	-0,0026	0,0003	2,12	60 %	0,0009	0,0002	84,4
70 %	-0,0022	0,0006	1,55	70 %	0,0014	0,0005	90,8
80 %	-0,0009	0,0010	6,45	80 %	0,0017	0,0008	86,85
90 %	-0,0006	0,0016	2,63	90 %	0,0026	0,0013	92,44
5th	-0,0007	0,0013	5,4	5th	0,0018	0,0009	87,44
4th	-0,0007	0,0015	3,68	4th	0,0019	0,0011	83,9
3rd	-0,0006	0,0018	2,16	3rd	0,0026	0,0013	92,44
2nd	0,0002	0,0022	6,93	2nd	0,0031	0,0017	91,92
Best	0,0004	0,0034	3,29	Best	0,0034	0,0023	81,21

USA: 2019-2021				Norway: 2019-2021			
Panel A: α				Panel A: α			
Rank/ percentile	Actual	Simulated average	% < Act	Rank/ percentile	Actual	Simulated average	% < Act
Worst	-0,0111	-0,0069	14,5	Worst	-0,0101	-0,0063	16,88
2nd	-0,0078	-0,0051	17,09	2nd	-0,0073	-0,0040	15,42
3rd	-0,0078	-0,0040	11,66	3rd	-0,0067	-0,0032	12,33
4th	-0,0074	-0,0033	10,14	4th	-0,0055	-0,0027	15,46
5th	-0,0073	-0,0029	8,57	5th	-0,0041	-0,0023	23,34
10 %	-0,0076	-0,0037	10,92	10 %	-0,0067	-0,0032	12,33
20 %	-0,0061	-0,0023	9,98	20 %	-0,0038	-0,0021	24,1
30 %	-0,0050	-0,0015	9,79	30 %	-0,0027	-0,0013	26,26
40 %	-0,0041	-0,0008	9,34	40 %	-0,0017	-0,0006	29,64
50 %	-0,0036	-0,0001	7,26	50 %	-0,0008	0,0000	33,46
60 %	-0,0022	0,0005	9,37	60 %	-0,0004	0,0007	31,62
70 %	-0,0009	0,0012	14,05	70 %	0,0007	0,0014	39,1
80 %	-0,0002	0,0020	14,31	80 %	0,0013	0,0022	37,79
90 %	0,0001	0,0035	5,82	90 %	0,0020	0,0035	33,33
5th	-0,0001	0,0026	10,59	5th	0,0015	0,0024	38,43
4th	0,0000	0,0031	7,23	4th	0,0018	0,0029	36,94
3rd	0,0003	0,0039	5,17	3rd	0,0020	0,0035	33,33
2nd	0,0010	0,0050	5,62	2nd	0,0037	0,0045	45,16
Best	0,0015	0,0069	2,98	Best	0,0081	0,0066	68,14