Analysing the Effect of Manager Tenure on European Mutual Fund Performance

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Master Thesis

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Abstract

Individual investors look at many different factors when making investment decisions, even when selecting mutual funds which can invest their savings on the investors behalf. One of these possible factors is the manager tenure of mutual funds. Next to measuring the performance of the mutual funds, this paper therefore investigates the impact of manager tenure on fund performance. By using four different asset pricing models in order to measure the performance, it is found that in this data sample, on average, the funds tend to underperform the benchmark. Next, the regressions in this paper show no significant effect of manager tenure on fund performance. However, the results of the robustness tests do hint that there might be a correlation present between the longer tenure periods and fund performance.

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Introduction

Investing can be relative complex for the average person as it requires a great amount of knowledge about the stock market in order to generate consistent profitable returns. Together with the fact that the risk of losing a great amount of money is quite large, people tend to stay away from investing their money on their own behalf. The risks of the financial markets even increased during the COVID-19 crisis worldwide (Zhang, Hu & Ji, 2020). However, with the increasing economy and in combination with rising inflation rates and very low interest rates, the majority of people still want to invest their money in order to increase their total wealth and go against the depreciation of their savings. It is that mainly because of the risks that come with investing, that individuals tend to turn to mutual funds in order to invest their money with relative less risk.

Apart from the risks of lacking certain expertise or knowledge about the investment environment these investors encounter, they could also be subject to certain behavioural biases which can affect their investment decisions (Abhijeet & Dinesh, 2010). They find that certain behavioural biases, such as conservatism, opportunitism, under-confidence and representativeness, play a significant role when it comes to investment decisions by these individual investors.

Given all these risks that come with investing for individual investors, it becomes clear that many become hesitant to invest on their own behalf. However, as many individuals still want to invest in order to generate higher returns than their savings account, they can turn to mutual funds. The managers of these funds control a large pool of money of many different individuals and invest that money according to the risk preference of those individuals.

When individual investors are considering the mutual funds in which they want to invest their money in, they keep several factors in mind when making those investment decisions. Wilcox (2003) finds that the majority of the investors mainly focus on the past performance of the funds and overweigh the management fees or charges for sales that come with the investments. However, not every investor looks at the same factors when selecting mutual funds and thus, some factors can be overlooked which can be of importance when making those investment decisions. In this paper, I examine whether it can be interesting for the individual investors if they also factor in the manager tenure of a fund. This specifically for the funds in Europe. Next to this, I also research how these European funds perform relative to the chosen benchmark.

It is seen that. even with the amount of information and expertise these managers have access to, and the diversification possibilities they can utilize, it is often shown that the performance of the mutual funds relative to their benchmark is not substantial. When looking at the mutual funds for the United States and the United Kingdom, around zero to five percent of the mutual funds actually can deliver a positive alpha, indicating overperformance relative to the benchmark (Cuthbertson, Nitzsche & O'Sullivan (2010). They also find that around 20 percent of the funds generate a negative alpha, indicating underperformance and the remaining funds have an alpha around zero and thus equal performance relative to their benchmark. These findings of underperformance by the funds are also confirmed by Vidal-García (2013), where the author looked specifically at European mutual funds, and further confirmed by French and French (2010), Malkiel (1995) and others.

On the contrary, European mutual funds can be found to be better performing funds relative to the mutual funds based in the US. Otten & Schweitzer (2002) find that when regressing the returns of the funds against their benchmark, European funds have a better average performance relative to the funds in the US (Otten & Schweitzer, 2002). This is explained by the European industry being smaller and more fixated towards fixed income, with the US and the UK having lower concentration ratios. When looking at the performance of European mutual funds specifically, one could see better average performance, as indicated by the paper of Otten & Bams (2008). The authors conclude that their results deviate from the majority of the studies done on US mutual funds, by arguing that the European mutual funds are able to add value, which is indicated by positive alphas (Otten & Bams, 2008).

The performance of the mutual funds can differ significantly and this can be due to different factors. Prather, Bertin & Henker (2004) find that there are some different factors which affects the performance of mutual funds, these being Price-Earnings, market capitalization, cashflow-to-book value and market capitalization. Additionally, Golec (1996) mentions that manager tenure is one of the most significant predictors when it comes to the performance of the mutual funds. The author concludes that individual investors are better off by selecting mutual funds which have a relatively young manager, but who has managed that fund for a relatively longer period of time (Golec, 1996). A possible explanation for this can for example be that when the average manager tenure is relatively low, the fund has to adjust more to changing policies which can lead to inefficiencies. Khorana, Servaes & Wedge (2007) confirm, in a more recent study, this effect by concluding that the higher performing funds do have longer average managerial tenure.

So, the performance of individual mutual funds can vary and one fund can perform relatively better than the other. This can be due to several different factors which can influence the performance of the funds either positively or negatively. One of these factors is the average manager tenure. This paper will be focussed on the effect of this factor on the performance of mutual funds in Europe. Therefore, the main research question can then be formulated as:

What is the effect of the manager tenure on the performance of mutual funds in Europe in the period of 2013 to 2023?

Followed by the second question of this research:

How do mutual funds in Europe perform relative to their benchmark in the period of 2013 to 2023?

Where many papers found a positive significant relation between manager tenure and fund performance, the results of this paper might imply that there is no significant relation found between the two. Furthermore, I found a significant negative performance of the funds, which is consistent with the majority of research papers.

Next, the theoretical framework will be discussed on which the hypothesis for this research will be formed. Following the theoretical framework, the data and methodology on which this paper will be based, will be discussed. After, the results based on the dataset and methodology will be interpreted and elaborated in the Results section. Then, in the Discussion section will the findings of this research be discussed as well as possible limitations and extensions for further research. Lastly, the last section of this paper will be the conclusion based on the results.

Theoretical Framework

In order to test the level of performance of the mutual funds in this data sample, several well-known capital asset pricing models will be used in order to retrieve the alpha which represents the performance. The first model used in this research is the Capital Asset Pricing Model (CAPM), which is founded Sharpe with the thought that the expected return should be used instead of the average rate of return and that the expected return should be proportional to the risk premium (Sharpe, 1966). Secondly, the Fama and French Three-Factor model is used as an extension on the CAPM. The authors argued that the CAPM could lead to limitations in explaining the variation of the returns as, in the model, it is assumed that expected returns is

only affected by the market risk premium. In their Three-Factor model, the additional two variables, the SMB and the HML factors, were found to have a positive and significant effect in explaining the variation of returns (Fama and French, 1992). Next, the Carhart Four-Factor model builds on the Fama and French Three-Factor further with the extension of the momentum factor. This factor was also found to be significant in the addition of explaining the variation of returns (Carhart, 1997). Lastly, similar to the Carhart Four-Factor model, the Fama and French Five-Factor model is again an extension on their own Three-Factor model. They extend this model with two additional variables, the RMW and CMA factors. They found that their Five-Factor model significantly outperforms their Three-Factor model (Fama and French, 2015).

The performance of mutual funds has been investigated thoroughly and extensively by many different researchers. The conclusion on whether or not mutual funds over- or underperform differs widely. Petajisto (2013) analyses the performance and the fees of mutual funds globally. He concluded that the majority of the funds underperform relative to their benchmark when accounting for the management fees. The author also mentioned that 'closet indexing' would be a common practise among the managers of the fund. Meaning that managers would then claim to actively manage a fund, but in practise they would just closely track a benchmark, which then can result in relative higher fees for the investors.

Glode (2011) arrived at the same conclusion of underperformance of mutual funds relative to their benchmark and attributed this to several different factors. The first factor is that the underperformance is related to the growing size of the industry. As more mutual funds tend to exist, it becomes increasingly more difficult for the fund managers to diverge from the benchmark without taking extra risk. This then causes it to be more difficult for the funds to generate positive alpha, leading to underperformance of the funds.

Next to this, Cuthbertson, Nitzsche and O'Sullivan (2014) find that the vast majority of the mutual funds indeed do not outperform their benchmark. Most of these funds tend to neither underperform nor overperform their benchmarks, thus executing an 'index strategy'. In their sample only 3.7 percent of all the funds are able to outperform the benchmark. Their performance was not based on luck but due to long-run skill by the managers. Additionally, around 22 percent of the funds in their sample underperformed their benchmark, which is a significant larger portion relative to the firms which outperform their benchmark.

Similar findings are found in the paper by Kosowski, Timmerman, Wermers & White (2006), where they investigated the stock picking skill by managers of US mutual funds in the period

between 1975 to 2002. They concluded that a considerable minority of the managers are able to pick stocks which perform well enough in order to cover the management costs and with that, a persistence in the positive alphas of these managers was found.

In contrary to the literature mostly confirming the underperformance of the mutual fund, there is also some existing literature supporting the overperformance of mutual funds. Kosowski (2011) mentions that the average underperformance by mutual funds mainly occurs in expansion periods. This is when funds tend to have significant negative risk-adjusted performance. In not-recession periods, the risk-adjusted performance seem to be significantly positive, thus indicating overperformance of the funds (Kosowski, 2011).

Moreover, Busse, Goyal & Wahal (2010) examined the mutual fund performance in the US and control for both the Fama and French Three-Factor and the Carhart Four-Factor model. Using a large dataset, free of survivorship bias, they conclude that the persistence of the overperformance of the mutual funds is modest when it comes to the Three-Factor model. Similar results are found for the Carhart model where market premium, value, size and that the persistence is nearly non-existent when also controlling for the momentum factor.

Lastly, an academic study of Jones, CFA & Wermers (2011) on the performance of active management has produced recommendations and conclusions on the literature they have reviewed. They cover many different papers, with many different datasets, methodologies and period of interest in order to try to find an overall conclusion on the performance of active managed funds. They conclude that when adjusted for risk, fees and other expenses, active return will average to be close to zero across time and managers (Jones, CFA & Wermers, 2011). In efficient markets, the role of active management is critical, as it leads to an increase in the wealth for both the managers and the society as a whole, they conclude. Superior managers who earn higher fees, are able to generate positive alphas on a total portfolio basis with moderate additional risk (Jones, CFA & Wermers, 2011).

The managers of mutual funds are a major factor when it comes to the performance. Hence, the performance can be influenced by the characteristics of the manager. Some examples of these characteristics are their risk-taking level, investment decisions, the age of the manager and manager tenure of the fund.

It is well-known that the level of returns depend on the risk-level of that investment. Higher risk-level investments are more likely to generate higher returns, relative to lower levels of risk-

return. Therefore, the level of risk taking by the manager of a mutual fund can affect the performance of that fund. Chevalier & Ellison (1997) investigate whether performance incentives can alter the strategies of mutual funds. In their paper, examining a flow-performance relationship, they find that when the incentives are skewed towards higher returns, the managers are more likely to take on more risk. This also holds for managers who are compensated with a larger share and those who have a higher job security. The authors also conclude that this higher level of risk-taking is not necessarily also in the best interest of the individual investors. Thus, showing that additional risk does not necessarily will lead to higher rewards.

To add to this, Massa & Patgiri (2009) also find that higher contractual incentives lead to a higher level of risk-taking by the managers which they tested for by looking at the volatility and the beta. Thereby confirming the findings of Chevalier & Ellison (1997). However, they also show that funds with higher incentives persistently outperform the funds with lower incentives and therefore contradicting the findings of Chevalier & Ellison. This higher performance is explained by active rebalancing of the portfolio.

Thirdly, Kempf, Ruenzi & Thiele (2009) investigate the influence of both the employment risk and performance incentives on the level of risk taking. Their findings conclude that the employment risk is a larger influence than the performance incentives. This is seen by managers who have a high risk of losing their job due to a poor midyear performance, tend to decrease their risk taking in order to protect their job. However, when the risk of unemployment is low, the incentives have a greater influence in the risk taking. Then, the managers with a poor midyear performance will try to make up for it by increasing the risk.

Next to the level of risk-taking, another characteristic of managers which can influence the performance of funds is the amount of experience the managers have throughout their career. One could for example expect better performance by managers which have more experience relative to those who have less experience. This is confirmed by the paper of Kempf, Manconi & Spalt (2017). They investigate whether managers are able to outperform industries in which they have gained experience. Their main findings indicate that fund managers with more experience, on average, do pick better stocks and that their trades generate higher abnormal returns relative to those with less experience.

Similar findings are found in the paper of Chen et al. (2017), where they researched the effect of experience when managers have previously worked as macro-analysts or as an industrial analyst. They hypothesized that there would be a positive relation between the level of

experience and the performance of that manager. Where the managers with a better industrial analyst background are expected to perform better at picking stocks, are the macro-analysts expected to have better market-timing skills. These hypotheses are proved to be correct by the data after controlling for observable manager and fund characteristics. This finding cannot be attributed to luck, as they performed a bootstrap analysis to test the significance of difference in performance.

However, there also seems some evidence in favour of younger managers to be able to generate higher returns. Chevalier & Ellison (2002) find that older managers seem to perform worse. The explanation they provide is that this would be the case due to younger managers being more willing to work harder as they want to grow their career. Older managers would be less concerned about their future career, as they would be less likely to be fired when performing poorly. Additionally, younger managers seem to be better educated as a consequence of reverse selection where 'better' managers tend to leave their industry before getting old (Chevalier & Ellison, 2002).

In line with the level of experience of managers, the average manager tenure of a mutual fund can also play a significant role in the performance of the fund. As Craig (1998) found that mutual funds where the average manager tenure is higher than six years, have greater performance and overall better performing characteristics. A possible reason mentioned by Craig for this, is the fact that managers with longer tenure, feel more job safety and therefore can think on the longer investment horizon, instead of the short term (Craig, 1998). The increase in performance of mutual funds where the average manager tenure is higher, is also confirmed by Hu & Chang (2008). They conclude that the performance of funds also increase with an increase in the education of the manager, size of the fund and previous performances.

Furthermore, the age of a fund seems to be strongly positively correlated with manager tenure, therefore also indicating a positive relation between the average manager tenure and the performance of the fund (Li et al. 2011). However, these authors also find that younger and less experienced managers have higher performances relative to the older mangers. This can be explained by a possible difference in talent and motivation. The younger managers could be more motivated as they have a relative long career path ahead of them.

Contradicting the supporting literature regarding the positive relation between manager tenure and the performance, Gaba et al. (2022) investigate the effect of performance feedback managers received, on the decisions made in the future. Their findings suggest that past negative

performance feedback can alter the problem-solving behaviour in corporations for the negative (Gaba et al., 2022). Managers who are more experienced, tend to be overconfident more often relative to the lesser experienced managers, which leads to reduction in the perception of possible performance problems and therefore leading to less change. Furthermore, they also conclude that recognition and responses to performance problems could be hindered by individual experiences, which then could negatively impact the future performance of the firm (Gaba et al., 2022).

Additionally to the contradicting literature, Porter and Trifts (2012) conclude on an inverse relation between the manager tenure and the average annual returns. Their findings indicate that the managers who have been manager for more than ten years, were most likely performing equal or better than the market in the first three years of their management. Furthermore, all of the 'very best' managers were able to generate positive alpha, but were not able to continue this level of performance after the first three years. Their explanation for the inverse relationship is based on mean-reversion. The 'very best' managers would perform excessively well in their first three years mainly due to choosing the correct strategy by luck. After this period, the strategy would underperform which caused their returns to revert to their long time mean (Porter & Trifts, 2012). Their strategies could have performed well during that early period, but would underperform after. Moreover, it would make sense that managers who performed well early in their career due to skill, would retain if not improve their performance due to an increase in experience. The authors did not find evidence for this hypothesis. The performance of the managers would actually decline, which further confirms their hypothesis that managers who obtain abnormal returns early in their career, most likely did not generate it by their skill.

After conducting the existing literature on the topic of the effect of average manager tenure on the performance of mutual funds, the hypothesis for this research is that there is expected to be a positive and significant relation between the average manager tenure and the performance of the fund. Apart from the substantial part of the literature supporting the positive relation, it also seems logical that a manager with more experience at the fund has a better understanding of the ideology and functionality of the fund and can therefore enhance to strategy in order to perform at a better level. Additionally, when the average manager tenure is low, the managers keep on having to adjust to the ideology of the fund which can be seen as inefficient and could therefore hurt the overall performance. Thus, the hypotheses for this research can be formulated as follows, for the main research question:

H0: The effect of manager tenure on mutual fund performance is negative and significant or no effect at all.

HA: The effect of manager tenure on mutual fund performance is positive and significant.

And for the second research question:

H0: The mutual funds in Europe outperform relative to their benchmark, indicated by a positive and significant alpha, or have an alpha of zero.

HA: The mutual funds in Europe underperform relative to their benchmark indicated by a negative and significant alpha.

This paper contributes to the existing literature by investigating the effect on the manager tenure on European mutual fund performance, and their performance in general. The majority of the literature is focussed on the fund market in the United States. Therefore, by focussing on the European market and comparing the results to the market of the US, we can see whether the performance differs when considering geographical factors. Next to the literary contribution, this paper is also beneficial for individual investors who are deciding on which fund to select in order to invest their savings. By using the results of this paper, these investors might want to adapt their deciding factors for selecting mutual funds. Perhaps these investors would benefit more by looking in to the length of the manager at a certain fund which then might correlate with the performance of the fund. On top of the benefits for the individual investors, the managers of the fund could also benefit from the results of this paper. If a positive relation is found, the managers could then for example put more emphasis on long-term performance as they might overweigh short-term performances. This could then be more aligned with the long-run objectives of the fund which could then lead to improved performance.

Data

In order to perform the analysis proposed in this paper, the Morningstar Database has been consulted to retrieve the data necessary to test the hypotheses. The sample for this research is gathered from the Morningstar database, a comprehensive database consisting of a sufficient amount of information regarding mutual funds and is also widely recognized. The data gathered consists of 200 randomly chosen mutual funds across Europe in order to maintain

representativeness and statistical validity and to prevent selection bias. The funds selected all have monthly returns from the period of January 1st 2013 until January 1st 2023 and the information on the average manager tenure available and have complete data across the whole data period. The data is also free of Survivorship bias. This prevents the results from being skewed in the direction of overperformance. The funds chosen all have the US Dollar as base currency in order to prevent currency bias. Furthermore, in order to calculate the excess return, a risk-free rate has to be chosen and used. For this research, the U.S. Treasure Rate is used, which is retrieved from the Yahoo Finance website that is publicly available. Lastly, in order to provide the most accurate results, the factors used in order to measure the performance of the mutual funds, are retrieved from the Fama and French database where the factor for Europe mutual funds are available.

Methodology

The manager tenure variable is one variable per each individual fund, making it therefore an average of the fund. In order to then regress the monthly returns of the funds with the tenure variable and other control variables, the funds will firstly each be individually regressed by the four different capital asset pricing models. These alphas then are also an estimate of the average performance of the fund. With these retrieved alphas, a regression will be done with the control variables, other than the factors of the models. This way, the effect of the manager tenure can be estimated and interpreted.

So in order to conduct the analysis on the performance of the mutual funds, four different models will be used, namely the CAPM, Fama and French Three-Factor Model, Carhart Four-Factor model and the Fama and French Five-Factor model. The CAPM is relatively speaking the most basic of the four, with the formula for this model consisting of several different factors, the $E(R_i)$, also known as R_{it}-R_{ft}, which stands for the expected return of an investment. R_f, represents the risk-free rate. For this research the U.S. Treasury rate is used as R_f. This benchmark is chosen as the mutual funds are located in Europe, but they do not limit their investment solely to European allocations. Therefore by using this benchmark, the results can be better compared to the mutual funds in the US and there also does not arise a currency bias, as the mutual funds have the US dollar as base currency. The Beta (β), indicates the sensitivity of the movements of the market. $E(R_m)$, is also used to show the expected return of the market portfolio. The specific market used for β is the return for a value-weighted portfolio of the

market of the region Europe, subtracted by the one-month Treasury Bill rate. Lastly, ε illustrates the risk that can be diversified away, the unsystematic risk. This all is represented in the following formula:

$$E(R_i) = R_f + \beta_i*(E(R_m)-R_f) + \varepsilon.$$

Secondly, the Fama and French Three-Factor model adds the Size (SMB) and the Value (HML) factors. The Size factor illustrates the outperformance of smaller market capitalization companies relative to companies with larger market capitalization. The idea behind this factor is therefore that small-cap stocks seem to generate higher returns, potentially because of higher risk levels. Next, the Value factor represents the outperformance of value stocks compared to growth stocks. These factors together represent the following Fama and French Three-Factor regression:

$$E(R_i) = R_f + \beta_1*(E(R_m)-R_f) + \beta_2*SMB + \beta_3*HML + \varepsilon.$$

Thirdly, the Carhart Four-Factor model adds the momentum factor to the Fama and French Three-Factor model. . The momentum factor represents the return of a fund based on their recent past performance. Those that have a poor past performance tend to continue performing poorly in the future and funds that have performed well, tend to keep performing well. This factor is indicated by 'WML'. This follows into the following regression:

$$E(R_i) = R_f + \beta_1*(E(R_m)-R_f) + \beta_2*SMB + \beta_3*HML + \beta_4*WML + \varepsilon.$$

Lastly, the final model used in this research is the Fama and French Five-Factor model. This model is an extension to their Three-Factor model and does not include the momentum factor of Carhart. The two additional factors are the profitability (RMW) factor and the investment (CMA) factor. RMW indicates the relation between the profitability of a fund and their returns. It suggests that high-profitability stocks outperform lower profitability stocks and therefore hinting that profitability can be a significant determinant for returns. CMA captures the effect of the investment policies of a fund on their returns and it suggests that funds with a low investment ratio tend to outperform funds with a higher investment ratio. The regression with the five variables is given as:

$$E(R_i) = R_f + \beta_1*(E(R_m)-R_f) + \beta_2*SMB + \beta_3*HML + \beta_4*RMW + \beta_5*CMA + \varepsilon.$$

Next to the capital asset pricing models which measure the performance of the funds, a variety of control variables will be used in order to measure their effect on the fund performance. The data for these control variables are gathered from different sources, these being the Morningstar database, the database of the Financial Times and the database of CityWire. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. Finally, the manager tenure is the average amount of years a manager has managed that specific fund.

Baseline results

This section will present the results which have been retrieved with the use of the aforementioned empirical analysis and models in order to investigate the effect of the average manager tenure on the performance of mutual funds across Europe. Therefore, the primary objective of this research was to see whether the length of the period a manager has been in function at a mutual fund could be associated with the performance of the fund. Firstly, this research has employed multiple asset pricing models, these being the CAPM, Fama and French Three-factor model, Carhart Four-factor model and Fama and French Five-factor model. Via these models the alpha is found for every fund individually which then are used as dependent variable with the control variables as independent variables.

Table 1 shows the summary statistics, stated in the appendix, for the funds and Table 2, also in the appendix, shows the alphas of the funds for the four different capital asset pricing models and their significance levels. It can be seen that the majority of the alphas are negative with different levels of significance. For the significant negative alphas we can state that for the CAPM, Fama and French Three-Factor model and the Fama and French Five-Factor model, on average, the funds underperform relative to the benchmark. We cannot conclude the same for the other funds as their alphas are insignificant. However, the vast majority of the alphas for the Carhart Four-Factor model are positive, again with different levels of significance. This hints

at the fact that when using the Carhart model, the management of the fund have been able to generate excess return and therefore tend to outperform the benchmark. The difference in the level of performance of the Carhart model can be attributed to the momentum factor.

After computing the alphas, the alphas are then used as dependent variables which then will be controlled for by various control variables. The first regression uses the alphas computed with the CAPM and controlled by the turnover ratio, expense ratio, fund size, fund age, management fee and the manager tenure. Table 3 shows a significant and negative performance even after controlling for the variables mentioned before. This further confirms that, on average, the funds underperform relative to the benchmark. The variables turnover, expense, management fee and tenure have no significant impact and therefore cannot conclude anything on those variables. Even though the coefficient of the manager tenure variable is insignificant, the coefficient and its robust standard error seem to imply that there the impact on fund performance is near zero. Showing that the tenure variable does not have a significant impact on fund performance. Even if significant, when looking at the size of the coefficient, the effect of the tenure would also not be substantial. The fund performance seems therefore not to be really associated with the experience of the manager at that fund, which first was thought to have a positive effect. The variables fund size and fund age do have a significant effect, where the coefficient of fund size is close to zero (0.000) and the coefficient of fund age is just above zero (0.005). This would indicate that the larger the firm is and the earlier their date of launch is, the better their performance would be, on average. The robust standard errors are relatively small and therefore indicate that the coefficients have a high level of precision in this model and probably result in consistent coefficients, where they will not deviate when looking at other, but similar data samples. Robust standard errors are used in order to correct for possible heteroscedasticity of the data. By using robust standard errors, it ensures that the variance of the residuals is constant. Next to the standard errors of the regression, the level of the R-squared seems rather low, which means that a significant fraction of the variability of the model remains unexplained by the control variables.

Table 3: Regression output CAPM

This table shows the regression output with the alphas of the CAPM as the dependent variable. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The

*manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Regression Statistics	
Multiple R	0.244072
R Square	0.059571
Adjusted R Square	0.030183
Robust Standard Error	0.234192
Observations	199

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.667049	0.111175	2.027037	0.063907
Residual	192	10.53043	0.054846		
Total	198	11.19748			

	Coefficients	*Robust Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.195*	0.086	-2.168	0.031	-0.373	-0.018	-0.373	-0.018
Turnover	0.000	0.000	-0.476	0.635	0.000	0.000	0.000	0.000
Expense	-0.052	0.049	-1.176	0.241	-0.138	0.035	-0.138	0.035
Fund Size	0.000*	0.000	2.095	0.038	0.000	0.000	0.000	0.000
Fund Age	0.005*	0.002	2.031	0.044	0.000	0.010	0.000	0.010
Management fee	-2.836	6.305	-0.574	0.567	-12.580	6.909	-12.580	6.909
Tenure	-0.002	0.004	-0.492	0.623	-0.010	0.006	-0.010	0.006

The alphas of the Fama and French Three-Factor model are used as dependent variables for the second regression and shown in Table 4. The performance of this regression hints at a more significant negative performance relative to the CAPM regression results. This can be explained by the additional factors that come with the Three-Factor model, which accounts for the value stocks and the small cap stocks. Some of the funds in this data sample could be more sensitive to these factors and the control variables than others in this same data sample. This could therefore lead to the coefficients being less significant. In this model, the intercept (constant) and fund age are significant with coefficients of (-0.559) and (0.010), respectively. Fund size is insignificant in this model whereas it was significant in the CAPM regression. The positive coefficient of fund age hints at the fact that the performance of funds on average increases the

longer the fund is in operation. The manager tenure variable is, similar to the CAPM, not significant and the coefficient being close to zero, indicating that, again, the manager tenure does not seem to have a substantial impact on fund performance. Furthermore, the robust standard error of the constant has increased, relative to the CAPM, indicating that the coefficient in the Fama and French regression could be less precise. The robust standard error of the variable fund size is still relatively small and therefore still providing a precise coefficient estimate. Furthermore, the R-squared of the regression also has slightly decreased, meaning that there is a small increase in the unexplained portion of the variability. This could be explained by the fact that the additional variables of the Fama and French model need more control factors to be added in order to correctly explain the variability relative to the CAPM.

Table 4: Regression output Fama and French Three-Factor model

*This table shows the regression output with the alphas of the Fama and French Three-Factor model as the dependent variable. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Regression Statistics	
Multiple R	0.230532
R Square	0.053145
Adjusted R Square	0.023556
Robust Standard Error	0.371405
Observations	199

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.486544	0.247757	1.7961	0.101787
Residual	192	26.48483	0.137942		
Total	198	27.97138			

	Coefficients	*Robust Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.559***	0.138	-3.911	0.000	-0.840	-0.277	-0.840	-0.277
Turnover	0.000	0.000	-0.628	0.530	0.000	0.000	0.000	0.000

Expense	-0.022	0.079	-0.316	0.753	-0.159	0.115	-0.159	0.115
Fund Size	0.000	0.000	1.717	0.088	0.000	0.000	0.000	0.000
Fund Age	0.010*	0.003	2.475	0.014	0.002	0.018	0.002	0.018
Management fee	0.321	10.398	0.041	0.967	-15.133	15.775	-15.133	15.775
Tenure	-0.005	0.007	-0.756	0.450	-0.018	0.008	-0.018	0.008

Thirdly, the alphas of the Carhart Four-Factor model are used as dependent variables and regressed against the same control variables and the results are displayed in Table 5. The performance of this model results in significant less underperformance of the funds relative to the Three-Factor model. Here, the constant, expense ratio and management fee have a significant effect. The positive and significant effect of the expense ratio might seem counterintuitive as higher returns would be considered with lower expense ratios. But, active management comes with an increased level of costs, such as trading activities, research and fees. Because of this, the level of expertise of these active management could outweigh the level of expenses and therefore generate higher excess returns. Furthermore, these funds could potentially also assess more risk to their investments by investing in volatile market which can yield higher returns. These investment strategies then require a higher level of costs but can also yield higher levels of excess returns. Moreover, the coefficient for the management fee variable seems very strong. Similar to the previous models, the coefficient of this variable is considerably large and therefore hinting at a strong relation between the fees and the performance of the funds. With the Carhart mode, the alphas generated already hinted at a better performance of the funds. These two strong relations together possibly explain the large effect of the management fee variable. However, when looking at the robust standard error of the variable, it is noteworthy that the estimate is not precise and can deviate heavily. So, one should be careful interpreting this effect. In contrast to the previous two regressions, the sign of the coefficient of the manager tenure is positive for this regression. Even though the coefficient is again not significant, this could hint that when accounting for momentum strategies, that the tenure periods of managers do seem to have a positive effect on fund performance. But one should keep in mind that the coefficient is not significant and therefore no firm conclusions can be drawn from this coefficient. The R-squared of the model has increased relative to the other models, indicating that this model explains a larger portion of the variability of the fund performance. This higher level of R-squared would suggest that for this data set, this model is the best fit.

Table 5: Regression output Carhart Four-Factor model

*This table shows the regression output with the alphas of the Carhart Four-Factor model as the dependent variable. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Regression Statistics	
Multiple R	0.449509
R Square	0.202058
Adjusted R Square	0.177122
Robust Standard Error	0.495206
Observations	199

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	11.92281	1.987135	8.103167	8.17E-08
Residual	192	47.08406	0.245229		
Total	198	59.00687			

	Coefficients	*Robust Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.441*	0.195	-2.317	0.022	-0.817	-0.066	-0.817	-0.066
Turnover	0.000	0.000	-0.204	0.839	0.000	0.000	0.000	0.000
Expense	0.381***	0.095	4.117	0.000	0.199	0.564	0.199	0.564
Fund Size	0.000	0.000	-0.124	0.901	0.000	0.000	0.000	0.000
Fund Age	0.010	0.006	1.942	0.054	0.000	0.021	0.000	0.021
Management fee	28.974**	12.666	2.773	0.006	8.368	49.579	8.368	49.579
Tenure	0.004	0.009	0.418	0.677	-0.014	0.021	-0.014	0.021

Lastly, in Table 6 are the final coefficients shown where the alphas of the Fama and French Five-Factor model is de dependent variable. The coefficient of the constant is significant and negative. Relative to the other models, the coefficient of the Five-Factor model is the most negative and thus indicates on average the most underperformance of the mutual funds. The Five-Factor model incorporates the most amount of factors in order to measure the performance of mutual funds when adjusted for risk. When incorporating more factors, the model can

perhaps better capture the level of managerial skill present when having excess returns. Since the constant coefficient is more negative, that would imply that the actual performance of the mutual funds is actually lower than what is expected relative to the exposure of the risk factors. Next to the coefficient of the constant, the coefficient of the fund age variable is the only other significant variable. The relation of the fund age variable (0.011) is similar to the Carhart model coefficient, but in this model the variable is significant. The coefficient of the manager tenure variable is similar to the coefficient of the Three-Factor regression, where a slight negative, but insignificant effect is found. Therefore, a similar conclusion of the tenure variable can be drawn relative to the Three-Factor model. The R-squared of this regression is comparable to the CAPM and Three-Factor model regression with a statistic of 0.057. Similar to those models, the model only explains a relative small portion of the variability of the fund performance.

Table 6: Regression output Fama and French Five-Factor model

*This table shows the regression output with the alphas of the Fama and French Five-Factor model as the dependent variable. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Regression Statistics	
Multiple R	0.239012
R Square	0.057127
Adjusted R Square	0.027662
Robust Standard Error	0.380743
Observations	199

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.686358	0.28106	1.938811	0.076482
Residual	192	27.83328	0.144965		
Total	198	29.51964			

	Coefficients	*Robust Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.608***	0.141	-4.151	0.000	-0.896	-0.319	-0.896	-0.319
Turnover	0.000	0.000	-0.649	0.517	0.000	0.000	0.000	0.000
Expense	-0.023	0.079	-0.330	0.742	-0.164	0.117	-0.164	0.117
Fund Size	0.000	0.000	1.537	0.126	0.000	0.000	0.000	0.000
Fund Age	0.011**	0.003	2.743	0.007	0.003	0.019	0.003	0.019
Management fee	2.419	10.582	0.301	0.764	-13.424	18.261	-13.424	18.261
Tenure	-0.005	0.007	-0.713	0.477	-0.018	0.008	-0.018	0.008

With the use of the different regressions, the average effect of the manager tenure can be interpreted for this data sample. The coefficient for the manager tenure variable for the CAPM is -0.002 and for both the Fama and French Three- and Five-Factor models the coefficient is -0.005. Only the Carhart Four-Factor model produces a positive coefficient (0.004). Even though the coefficients are relatively small, they are insignificant and therefore we cannot make any statistical conclusions on those results. These insignificant coefficients might imply that the average manager tenure of a fund does not directly impact the performance of the fund. It could be said that the other managerial characteristics play a more significant role in determining fund performance. Examples of these characteristics are their investment decisions and strategies and their view towards risks of investments.

Robustness Test

To further investigate the relation between the manager tenure and the performance of the fund, firstly, four different quintile portfolios are formed. For each capital asset pricing model, the funds are ranked based on their average manager tenure and the results of the regressions will be compared. The first quintile are the funds with the lowest manager tenure, where the cutoff is at a tenure period length of 4.08 years, and the fifth quintile are the funds with the highest manager tenure, with a cutoff of 23.25. By doing this, we can see whether the coefficient of manager tenure has a more significant impact with the funds where their tenure is higher.

When looking at the first quintile portfolio, of the CAPM, we can see in Table 7 in the appendix, that for the first four quintiles of the tenure coefficient are insignificant. However, when looking at the fifth quintile, where the funds are ranked which have the highest manager tenure, it can be noticed that the tenure variable has a positive and significant effect. This therefore might indicate that among the firms which have longer tenures, the longer-tenured mangers on average

do outperform relative to those who have shorter tenure periods. Furthermore, the expense ratio tends to have a more significant impact on the performance of funds which have lower manager tenure periods than those who have longer periods. The coefficient (-0.251) indicates a negative relation with fund performance. An explanation for this is that the funds which have a lower manager tenure might then be managed by manager who are less experienced and might therefore have a less effective or efficient strategy in order to manage the expenses of the funds.

Next, Table 8 in the appendix shows the results of the quintile portfolio for the Three-Factor model and similar findings can be seen relative to the quintile portfolio of the CAPM. This indicates that for the quintiles portfolio regressions, the models behave comparable. The constant of the two portfolios for the fifth quintile shows significant underperformance of the funds which have the longest manager tenure periods. Additionally, the expense ratio in the first quintile shows again a negative and significant effect (-0.296), of which the effect is similar relative to the CAPM regression. Different to the CAPM regression, is the turnover coefficient for the first quintile. Here it shows a significant and slight negative relation with fund performance. Moreover, the tenure coefficient of the fifth quintile is, in the Three-Factor, not significant. The significance level of the fifth quintile does appear to be most significant, among the different quintiles. This could then imply that similar findings are found in the CAPM quintile portfolio, where the effect of manager tenure appears to be the largest in the funds which have the highest average manager tenure periods.

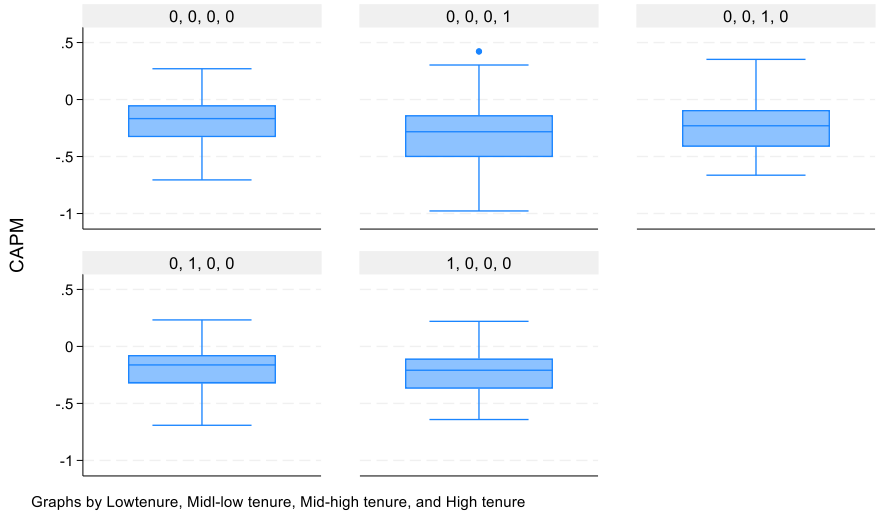
Thirdly, the quintile portfolio of the Four-Factor model has been regressed and shown in Table 9 in the appendix. This model also finds a significant underperformance in the fifth quintile (-1.420) and the other quintiles, as found in the other models, have no significant performance. The turnover coefficient in the second quintile finds a similar effect compared to the Three-Factor model regression (-0.002). The expense ratio is positive and significant for every quintile with the exception of the fourth quintile. This finding is akin to the findings of the main regression of the Carhart model stated earlier, where the effect of the expense ratio also is positive and significant and where the constant is negative. Furthermore, in the third quintile, management fee has an exceptionally high coefficient, which is significant. Even though this coefficient is significant and could reflect a strong relation with the performance of the fund, one should be again careful with interpreting this relation. When looking at the tenure variable, we again see no statistical significance for all the different quintiles. However, when looking at the level of significance, we can clearly see that the significance levels of the fourth and fifth quintiles have improved and perhaps hinting at a positive correlation between the effect of the

manager tenure among firms that have longer tenure periods. Nevertheless, these coefficients are insignificant and we.

Lastly, the same quintile portfolio regression is performed for the alphas of the Five-Factor model and the results are shown in Table 10 in the appendix. Similar to the other quintile portfolios, the coefficient of the constant in the fifth quintile is significantly negative, indicating underperformance. The coefficient of the turnover ratio factor is identical to the coefficient of the Carhart model with a slight negative and significant effect (-0.002). This similar effect also holds for the expense ratio and the management fee coefficients, where the expense ratio is only significant in the first quintile and the management fee in the second quintile. The significance level of the manager tenure is the most favourable for the fifth quintile, which has also been found in the other quintile portfolios. This then further adds on the possible correlation of the positive effect of the manager tenure on fund performance when looking at the funds which have the longest manager tenure periods.

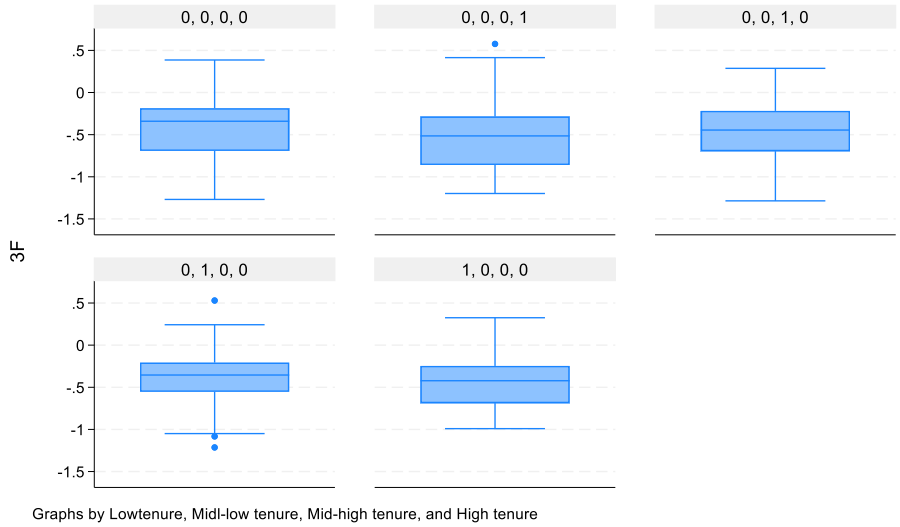
Furthermore, in order to get an insight of the distribution of the data in this research, boxplots are used for the different models. By using boxplots we can determine the level of symmetry and skewness of the data as well as possible outliers. The first boxplot (labelled 0,0,0,0) can be considered as a reference group. Following, '0,0,0,1' can be assigned to the Lowtenure variable, '0,0,1,0' represents the Mid-low tenure, '0,1,0,0' shows the boxplot for the Mid-high tenure and lastly, '1,0,0,0' indicated the boxplot for the High-tenure variable. These assignments hold for all the different boxplots in this paper. Figure 1 shows the boxplots when the dummy variables are graphed with the alphas of the CAPM. The median of this boxplot shows that the distribution of these data samples is relatively symmetric, indicated by the line in the box being close to the centre. The mid-high tenure boxplot does seem to have a slightly more positively skewed distribution, which is indicated by the line being more towards the top of the box. Only for the Mid-low tenure boxplot there is an outlier found, which is seen by the dot above the whisker. Seeing that there are furthermore hardly any outliers found in this dataset, this might imply that the data set is of good quality and representative. When looking at the different levels of tenure, we can see that the boxplot, which represents the longest manager tenure periods, has the smallest spread of the whiskers. Showing that the range of the data in that dummy variable is the smallest and this is the highest for the Lowtenure variable. This might imply that the data for the Hightenure variable is more consistent and precise than the Lowtenure variable.

Figure 1: Boxplot results for CAPM with four dummy variables



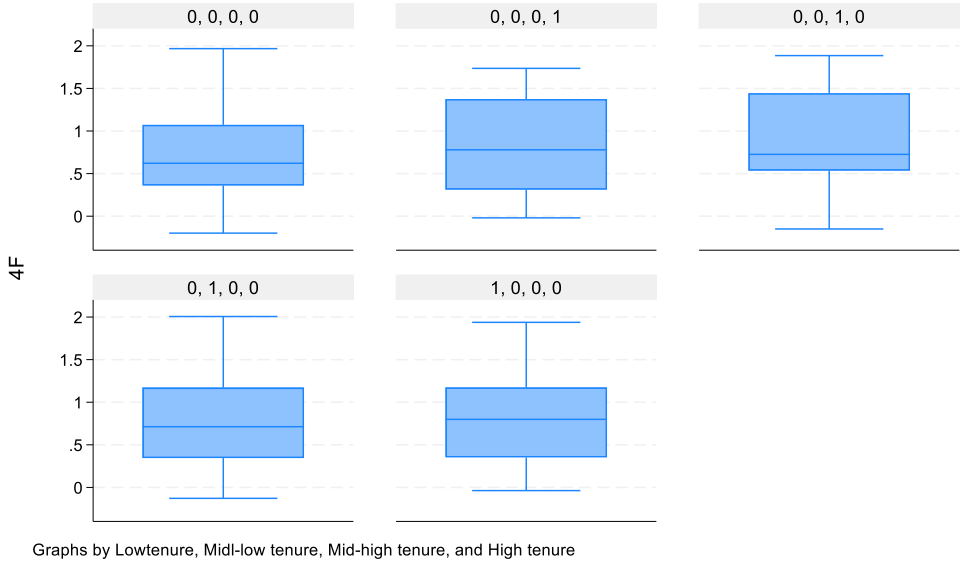
When looking at the distribution for the Three-Factor model in Figure 2, the distribution for the reference group seems to be more negatively skewed compared to the CAPM distribution. The median for the grouping variables seem to be similar to those of the CAPM. Furthermore, there do seem to be more outliers present, again indicated by the data points outside of the whiskers of the boxplot. This could indicate that this data sample for the Three-Factor model is less precise than for the CAPM. In general, the distribution for the different grouping variables seem to be quite similar where the median for all is close to -0.5.

Figure 2: Boxplots results for the Three-Factor model



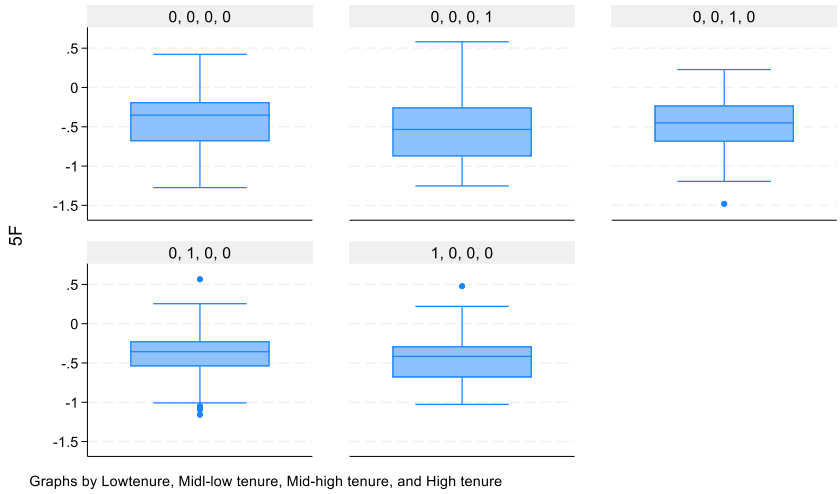
Different to the boxplots of the CAPM and the Three-Factor model, the boxplots of the Carhart show that the distribution of the data is primarily above zero. For the previous two models, the distribution was mainly below zero. Furthermore, the range of the box of the boxplots is larger relative to the other models, indicating that the data is more spread out. This can result in the data having larger variability and perhaps being less precise. The median of the data is negatively skewed, indicated by the line in the box being closer to the bottom. This might indicate that the data is more stretched towards the lower values of the data. For the Mid-high tenure variable, the top whisker seems to be relatively long. This could be explained by possible relatively high values which can cause the whisker to be stretched out. Lastly, there do not seem to be outliers in this data sample, as there are no data points outside of the whiskers present. This could suggest that the quality of the data seems to be relatively good and that there are seemingly no extreme values.

Figure 3: Boxplot results for Carhart Four-Factor model



Finally, the boxplots of the Five-Factor model are shown in Figure 4. The spread of the boxplots, similar to the boxplots of the CAPM and the Three-Factor model, is mainly below zero. The median for these boxplots again show that the distribution is relatively symmetric, where the High tenure does hint towards positive skewness. In contrast to the CAPM and Three-Factor model, these boxplots seem to have more outliers in the data, which especially holds for the Mid-High tenure. These extreme values could have a significant effect on the interpretation of the results. However, the boxes of the boxes seem to be rather small compared to the Carhart model boxplots, indicating that the data is more clustered around the median, which could be an indication that the data is more consistent.

Figure 4: Boxplots results for the Five-Factor model



Next to the quintile portfolios and the boxplots, the dummy manager tenure variables are regressed against the alphas of the performance models as done before. The dummy variables used in these regressions are similar to those used for the boxplots and are indicated as 'Low Tenure', 'MidLow Tenure', 'MidHigh Tenure' and 'High Tenure'.

Table 11 shows the results for the regression of these dummy variables and shows that the coefficients of the other variables are similar to the previous regressions and therefore confirms the estimated effect of those coefficients on the performance of the mutual funds. However, the p-value of the turnover variable has changed as to where it is significant in this regression. Consistent with previous results, the manager tenure variable is not significant and therefore we cannot derive conclusion from these results. But, the significance levels does seem to be the most favourable for the highest tenure dummy variable which was also found in the quintile portfolio results. Therefore hinting that higher manager tenure periods could have a larger impact on fund performance than those with lower tenure periods.

Table 11: Regression results for CAPM with dummy variables

*This table shows the results for the regression with the alphas of the CAPM as the dependent variable and where the dummy variables for the manager tenure variable have been added, relative to previous regressions. The different dummy variables are 'Lowtenure', 'Midlowtenure', 'Midhightenure' and 'Hightenure'. The length of tenure periods is the shortest for Lowtenure and increases with the variables where the periods are the highest for Hightenure. The other variables are the same variables as previous regressions. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Linear regression	Number of obs	=	199

F(8, 189)	=	.	
Prob > F	=	.	
R-squared	=	0.0793	
Root MSE	=	0.234	

CAPM	Coefficient	Robust std. err.	t	P>t	[95% conf.	interval]
Turnover	0.000*	0.000	-2.000	0.047	0.000	0.000
Expense	-0.060	0.051	-1.170	0.243	-0.160	0.041
FundSize	0.000**	0.000	2.850	0.005	0.000	0.000
FundAge	0.005*	0.002	2.310	0.022	0.001	0.010
Managementfee	-3.139	6.630	-0.470	0.636	-16.218	9.940
Lowtenure	-0.020	0.053	-0.380	0.705	-0.124	0.084
Midlowtenure	0.019	0.054	0.360	0.717	-0.086	0.125
Midhightenure	0.004	0.058	0.060	0.951	-0.110	0.117
Hightenure	-0.080	0.061	-1.320	0.189	-0.200	0.040
_cons	-0.177	0.094	-1.890	0.061	-0.362	0.008

Secondly, the same regression has been performed with the alphas of the Fama and French Three-Factor model as the dependent variable and are shown in Table 12. Similar to previous regression, the turnover coefficient has become significant for this regression, where it was insignificant before. The other coefficients show similar effects and significance levels. Following Table 11, the tenure dummy variables in Table 12 also do not have a significant effect and again the most favourable significance level is shown for the Hightenure coefficient. In both tables however, this variable a negative sign, hinting at a negative correlation between a longer tenure period for funds and their performance.

Table 12: Regression output for Three-Factor model with dummy variables

*This table shows the results for the regression with the alphas of the Three-Factor model as the dependent variable and where the dummy variables for the manager tenure variable have been added, relative to previous regressions. The different dummy variables are 'Lowtenure', 'Midlowtenure', 'Midhightenure' and 'Hightenure'. The length of tenure periods is the shortest for Lowtenure and increases with the variables where the periods are the highest for Hightenure. The other variables are the same variables as previous regressions. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Linear regression		Number of obs.	=	199
		F(8, 189)	=	.
		Prob > F	=	.
		R-squared	=	0.0658
		Root MSE	=	0.3713

ThreeFactor	Coefficient	Robust std. err.	t	P>t	[95% conf.	interval]
Turnover	0.000*	0.000	-2.450	0.015	0.000	0.000
Expense	-0.029	0.081	-0.350	0.723	-0.188	0.131
FundSize	0.000*	0.000	2.270	0.024	0.000	0.000
FundAge	0.010**	0.003	2.890	0.004	0.003	0.017
Managementfee	-0.177	10.859	-0.020	0.987	-21.598	21.244
Lowtenure	-0.042	0.088	-0.480	0.632	-0.216	0.132
Midlowtenure	0.019	0.094	0.210	0.837	-0.167	0.205
Midhightenure	-0.038	0.092	-0.420	0.677	-0.220	0.143
Hightenure	-0.129	0.100	-1.290	0.198	-0.325	0.068
_cons	-0.539***	0.152	-3.540	0.001	-0.840	-0.238

Thirdly, the results for the regressions for the Carhart model with dummy variables are shown in Table 13. This regression shows for all the coefficients, in contrast to the previous models, similar effects and significance levels, even for the turnover variable which showed different significance levels in the other two models. Additionally, the significance levels of the dummy variables are also not in line with the results of the CAPM and the Three-Factor model. In this regression, the LowTenure variable produces the most favourable significance level together with a coefficient with a positive sign, implying a positive relation. Corresponding with the earlier regressions, the Midlow- and MidhighTenure variables show the most unfavourable significance levels. This would then hint that these dummy variables have a less meaningful relation with fund performance than the shorter or longer tenure periods. However, one should be careful when interpreting these coefficients at all, as they are all not statistically significant from zero.

Table 13: Regression output Carhart with dummy variables

*This table shows the results for the regression with the alphas of the Carhart model as the dependent variable and where the dummy variables for the manager tenure variable have been added, relative to previous regressions. The different dummy variables are 'Lowtenure', 'Midlowtenure', 'Midhightenure' and 'Hightenure'. The length of tenure periods is the shortest for Lowtenure and increases with the variables where the periods are the highest for Hightenure. The other variables are the same variables as previous regressions. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Linear regression	Number of obs	=	199
	F(8, 189)	=	.
	Prob > F	=	.
	R-squared	=	0.2109
	Root MSE	=	0.49634

Carhart	Coefficient	Robust std. err.	t	P>t	[95% conf.	interval]
Turnover	0.000	0.000	-0.670	0.501	0.000	0.000
Expense	0.385***	0.099	3.900	0.000	0.190	0.580
FundSize	0.000	0.000	0.070	0.942	0.000	0.000
FundAge	0.011	0.006	1.860	0.064	-0.001	0.022
Managementfee	29.994*	13.035	2.300	0.022	4.282	55.706
Lowtenure	0.136	0.100	1.350	0.178	-0.062	0.334
Midlowtenure	-0.013	0.106	-0.120	0.906	-0.222	0.197
Midhightenure	0.071	0.122	0.580	0.564	-0.171	0.312
Hightenure	0.073	0.106	0.690	0.492	-0.136	0.283
_cons	-0.495*	0.197	-2.510	0.013	-0.884	-0.107

Lastly, Table 14 shows the results for the same regression but for the alphas of the Five-Factor model. The results show similar performance relative to the CAPM and the Three-Factor model, which can be expected as these models perform relatively similar throughout this paper and the different regressions. The turnover variable shows again a significant effect of near zero. The significance levels is again the most favourable for the HighTenure variable. Thus, the tenure variable seems to have the most significant impact where the tenure period among the firms is the longest. However, the sign of this variable seems to be negative for most models but as mentioned before, due to level of insignificance, not a firm conclusion can be drawn on the coefficient and its sign.

Table 14: Regression output for Five-Factor model with dummy variables

*This table shows the results for the regression with the alphas of the Five-Factor model as the dependent variable and where the dummy variables for the manager tenure variable have been added, relative to previous regressions. The different dummy variables are 'Lowtenure', 'Midlowtenure', 'Midhightenure' and 'Hightenure'. The length of tenure periods is the shortest for Lowtenure and increases with the variables where the periods are the highest for Hightenure. The other variables are the same variables as previous regressions. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Linear regression	Number of obs	=	199

F(8, 189)	=	.	
Prob > F	=	.	
R-squared	=	0.0702	
Root MSE	=	0.38109	

FiveFactor	Coefficient	Robust std. err.	t	P>t	[95% conf.	interval]
Turnover	0.000*	0.000	-2.550	0.012	0.000	0.000
Expense	-0.028	0.082	-0.350	0.730	-0.190	0.133
FundSize	0.000*	0.000	2.040	0.043	0.000	0.000
FundAge	0.011**	0.004	3.160	0.002	0.004	0.018
Managementfee	2.053	11.043	0.190	0.853	-19.731	23.837
Lowtenure	-0.040	0.090	-0.440	0.661	-0.218	0.138
Midlowtenure	0.010	0.096	0.110	0.915	-0.179	0.200
Midhightenure	-0.049	0.095	-0.520	0.602	-0.236	0.137
Hightenure	-0.127	0.102	-1.250	0.215	-0.328	0.074
_cons	-0.589***	0.156	-3.780	0.000	-0.897	-0.282

Discussion

The results of this research contribute to the ongoing discussion on mutual fund performance, for this paper specifically the funds in Europe, and highlights the effect of the average manager tenure of the funds on their performance. The conclusion that can be drawn from this study follows that mutual funds, in this data sample, tend to underperform and that in there is no clear relation between manager tenure and the performance of the funds.

This research made use of four different asset pricing models in order to examine the performance of mutual funds in Europe, these being the Capital Asset Pricing Model, the Fama and French Three-Factor Model, the Carhart Four-Factor Model and the Fama and French Five-Factor Model. With these models, the alphas have been computed and could be interpreted as the level of performance. After the computation of the alphas, these alphas are then used as dependent variable in order to measure the effect for the manager tenure and other control variables.

The underperformance of the funds based in Europe is in line with earlier existing literature based on other regions, for example the United States (Glode, 2011; Cuthbertson, Nitzsche and O'Sullivan, 2014; Kosowski, Timmerman, Wermers & White, 2006) . This implies that the challenges these funds are facing are not limited to their geographical location, but suggests

that these challenges exist throughout the industry itself. The underperformance could be a consequence of numerous reasons, for example higher management fees and limited investor knowledge.

Overall, the effect found of the manager tenure on fund performance is insignificant. However, when looking at the robustness tests, there does seem to be a stronger effect present, when looking at the significance levels, where the tenure periods are the longest. This is both seen in the quintile portfolios and the regressions with the dummy variables. This would imply that there might be a impact on fund performance present. But, the sign of the effect cannot be concluded based on these results as these are insignificant and there cannot conclude on a causation. Following this insignificant effect of the average manager tenure on fund performance, this might imply that the ability to generate excess returns by fund managers is rather due to luck than to actual skill of the managers. One could have expected that the more experienced managers would perform better as a result of a better understanding of the market. But the insignificant coefficients in this paper do not provide evidence for this reasoning.

So, the alternative hypothesis for the main research question was for the manager tenure coefficient to be positive and significant and for the second research question was expected the alphas to be negative and significant. The effect found in this paper is that there is no significant effect for the manager tenure variable and therefore fails to reject the null-hypothesis. For the second question, the null-hypothesis is rejected as the majority of the models found negative and significant alphas, indicating underperformance.

The implications of these results can be attributed to both individual investors and the management of mutual funds. According to these results, it is not necessary for individual investors to consider the manager tenure of funds when they are making their financial investment decisions. This factor does not provide a clear indication of the performance of the fund. However, as the results do indicate that the funds do underperform, these investors might consider gathering more experience and knowledge on the stock market and invest on their own behalf, as they might get better returns in the end.

Limitations and further research

An upside from the Morningstar database, that is used in this paper, is that the data is free from survivorship bias. Meaning that the data does not only contain firms which are still operative. This bias could skew the results towards an overperformance and the conclusion would therefore not be representative. However, there are some limitations with the data that has been used for this research. The data period used for this research consists of 10 years. Even though this period has seen some rapid economic and technological development, it could be useful to include earlier data periods as it would strengthen the results and the conclusions further. Moreover, the COVID-19 crisis happened during this period. Since this resulted in a global market crash followed by a relatively rapid recovery, it could have influenced the results of the regressions. Next to the time period, this data sample consists of 200 funds. If this sample would have consisted of more different funds, the data would have been more representative and more accurate. This especially holds for the robustness tests where both the quintiles and the dummy variables consisted of 40 observations.

Furthermore, this research is primarily focussed on the 'manager tenure' variable. However, when performing the different regression and retrieving the results, it is important to acknowledge the fact that there could be other factors present that could influence the correlation between the manager tenure and the performance of the mutual funds. Examples of these omitted variables could be market conditions, investment strategies and the level of risk-taking by managers. By including these omitted variables into the regression, it then could produce different and perhaps more accurate outcomes.

Next, there are some extensions which could be done in further research which could improve the validity of the results on this topic. First of all, this research conducted a quantitative analysis in order to retrieve the results, but it could be interesting if a qualitative analysis was performed and that the results would be compared. Interviews could be done with fund managers in order to get insights in the process of their decision making and managerial styles as well as their thoughts on the possible impact of the average manager tenure on fund performances.

Lastly, the performance measures used are traditional models based on risk-adjusted returns, widely used in the academic research. However, instead of using risk-adjusted returns, it could be interesting if the results would widely differ if the focus is more towards other performance

indicators, such as the volatility of investment decisions. Together with an alternative for performance measures, the models used are based on several assumptions which might not hold in society. These assumptions are for example, rational investor and manager behaviour, market efficiency and linearity. It could therefore be fascinating to use non-linear models and conclude if they provide different insights than the models used in this papers.

Conclusion

Concluding, the main purpose for this thesis was to provide insights into the effect of the average manager tenure of mutual funds on their performances, aiming specifically on those operative in Europe. The subsidiary aim was to investigate whether the funds show under- or overperformance relative to the US Treasury rate, which was chosen as the benchmark. By the use of four different and widely recognized capital asset pricing models, these being the Capital Asset Pricing Model, Fama and French Three-Factor model, Carhart Four-Factor model and Fama and French Five-Factor model, the alphas were generated. These alphas were then used as dependent variable and were regressed against different control variables, these being the turnover ratio, expense ratio, fund size, fund age, management fee and management tenure.

The first research question to answer is: *What is the effect of the average manager tenure on the performance of mutual funds in Europe?* The coefficient for the average manager tenure variable is close to zero and insignificant when controlling for various other variables, which is indicated by the coefficients (-0.002), (-0.005), (0.004) and (-0.005) for the four different models. This implies that the performance of mutual funds does not have a linear relation with the manager tenure. The implication for this is that, when making investment decisions, the individual investors do not have to consider the experience of managers with that specific fund where they are manager. As this result is consistent in all four models, it would imply that the effect of the variable is not dependent on a model. This result goes against the idea that the manager with a higher level of experience with the fund executes investment decisions which are more in line with the fund which could improve the performance. Instead, this result implies that the ability to generate excess returns is appointed to luck rather than skill of the manager. When looking at the robustness tests, there does seem a more significant correlation present among the longer tenure periods, however, the majority of the coefficients still remain insignificant. This relation is indicated by the p-values of these coefficients being the closest to 0.05. Because of the insignificance, a clear conclusion cannot be drawn from those results.

Concluding, the close to zero and insignificant relation results in failing to reject the null-hypothesis.

Other than the first hypothesis, the null-hypothesis for the second research question is rejected. The second research question of this paper questioned the performance of mutual funds and expected, based on existing literate, the mutual funds in Europe on average tend to underperform the benchmark. This result is indicated by the significant constant values of the regressions (-0.195), (-0.559), (-0.441) and (-0.608) for the four different models. Several reasons mentioned for this are information asymmetry and certain market anomalies, which could make if for the mutual fund managers more difficult to outperform the benchmark. The implication of this finding is that individual investors might be better of finding alternative investment opportunities, which can possibly generate higher returns. These investors might then prefer passive investing, for example index investing or investing in ETFs. The factors that do seem to have a significant impact on fund performance are the fund size and the fund age for the CAPM, Three-Factor model and the Five-Factor model. For the Carhart model it seems that the expense ratio and management fees are the most significant. Contrary to the majority of the alphas being negative, the Carhart model did find positive alphas, indicating overperformance of the funds. So, this shows that in this data sample, the momentum factor has a strong effect on the performance of the funds. Individual investors can act on this by investing in funds that invest more heavily towards momentum strategies.

Overall, this paper concludes on the findings that the average manager tenure has no significant effect on the performance of mutual fund and that these funds, on average, tend to underperform relative to the chosen benchmark. These findings might therefore be interesting to individual investors and be helpful in building and improving their investment strategies and portfolios in order to meet their financial goals.

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Appendix

Table 1: Summary statistics

This table shows the values of the different control variables for the funds. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund.

Firm	Turnover	Expense	Fund Size	Fund Age	Management fee	Tenure
1	57.96	1.84	1087593916	16	1.50%	8.46
2	62.85143	1.45	1622394540	13	1.25%	4.25
3	68.59857	1.503333	237802698	10	1.25%	1.25
4	49.88222	1.706667	201535576	18	1.35%	12.25
5	24.82556	1.843333	276455186	26	1.50%	2.95
6	56.77778	2.75	148531646	18	1.05%	11.79
7	97.947	1.95	30880978	12	1.70%	4.96
8	54.797	1.833333	7731650126	16	1.50%	1.11
9	46.52625	2.413333	615947338	6	1.83%	1.25
10	51.524	2.116667	56567008	20	1.63%	5.31
11	83.87	2.446667	1198426888	9	1.50%	8.28
12	83.87	2.446667	1198426888	19	1.15%	8.28
13	46.52625	1.836667	615947338	22	1.50%	6.00
14	-0.88889	2	23987477	17	1.05%	10.00
15	24.57889	1.846667	537067172	18	1.84%	10.44
16	108.77	1.236667	233157237	14	1.04%	5.94
17	83.87	1.906667	1198426888	19	1.60%	8.28
18	50.908	1.276667	27519864	19	1.63%	3.53
19	41.33625	1.295	35386912	11	1.50%	4.67
20	83.87	1.906667	1198426888	19	1.60%	9.42
21	87.845	1.786667	115707300	23	1.00%	1.17
22	65.696	1.71	597616187	8	0.90%	3.50
23	56.6	1.56	150935613	11	1.20%	6.53
24	36.499	1.413333	127557555	18	1.05%	6.17
25	38.77667	1.653333	503829896	22	1.30%	12.25
26	68.582	1.855	150913974	32	1.15%	5.31
27	60.88889	2.68	1651153908	18	1.05%	12.67
28	78.07111	2.73	380487509	16	2.25%	8.21
29	102	1.2	86070170	14	0.60%	10.31
30	18.76889	1.916667	116356647	12	1.85%	4.42
31	93.41	1.676667	481947198	11	1.50%	6.92
32	50.947	1.396667	2543447960	10	1.05%	12.25
33	103.7288	2.013333	15091175	34	2.00%	14.63
34	51.93	1.665	702345005	7	0.75%	5.31
35	179.002	1.566667	196161953	8	0.92%	1.83

36	88.76143	1.835	1346725220	16	1.50%	8.21
37	29.73889	1.686667	3928642748	24	1.35%	10.64
38	83.87	1.45	1198426888	19	1.15%	8.28
39	83.87	1.456667	1198426888	9	1.50%	8.28
40	50.947	1.096667	2543447960	13	1.09%	3.21
41	78.07111	1.985	380487509	16	0.75%	8.21
42	6.578	1.883333	2075985976	13	1.50%	2.42
43	91.341	1.25	1175076654	12	1.10%	20.50
44	38.62	1.6	63413285	18	1.50%	5.31
45	128.4444	1.65	29512979	14	0.90%	12.97
46	39.125	2.11	85510402	17	1.15%	6.94
47	23.80667	1.446667	50968934	16	1.05%	12.83
48	88.76143	1.015	1346725220	16	0.75%	13.25
49	152.91	1.94	87900560	13	1.50%	11.25
50	61.372	1.49	712365232	32	1.15%	4.50
51	45.09667	1.8	920218646	26	1.39%	2.67
52	29.73889	1.183333	3928642748	24	1.35%	1.88
53	54.761	1.115	1858600552	13	0.95%	12.08
54	44.793	1.85	595299460	23	1.50%	6.92
55	60.88889	1.925	1651153908	22	1.05%	11.79
56	9363.244	1.526667	334693933	13	1.20%	9.37
57	148.379	1.706667	57511063	4	1.30%	4.96
58	60.4925	1.676667	584400195	13	1.50%	13.50
59	45.62	1.396667	3588729643	17	1.05%	5.73
60	140.2057	1.93	37639620	12	1.50%	8.21
61	148.379	1.143333	57511063	11	1.60%	4.46
62	105.1722	1.35	455867014	16	1.25%	12.04
63	95.96667	1.25	9518155	13	0.95%	8.08
64	61.44444	1.52	2313835051	22	0.90%	11.61
65	48.57	2.233333	136003060	29	1.30%	4.86
66	29.66667	1.445	230344342	26	0.75%	6.21
67	104.6786	2.545	3707676750	21	1.50%	7.03
68	51.505	1.8	100920200	15	1.50%	11.25
69	38.33333	1.1	126860866	11	0.85%	6.58
70	27.62333	1.07	190133028	13	2.00%	1.83
71	62.22222	1.6	9349883	23	1.05%	14.33
72	265	1.3	600408421	13	1.00%	11.92
73	54.996	2.795	604654412	9	1.50%	6.17
74	137.295	1.3	380421072	23	0.70%	3.42
75	67.227	1.826667	117274024	11	0.70%	9.17
76	45.856	2.013333	129651574	9	1.44%	5.31
77	29.926	1.46	919738177	11	1.12%	13.63
78	73.90222	1.35	503599528	17	1.10%	11.50
79	95.30167	1.6	27913659	11	1.20%	5.42
80	41.67111	2.65	13746440283	26	1.45%	9.67
81	20.6	1.746667	1885328154	17	1.50%	14.29
82	84.8025	2.8	303167525	23	1.50%	10.63
83	62.9325	1.22	30070226	18	0.91%	3.14

84	35.22889	1.523333	951131949	22	1.20%	10.64
85	34.72	1.976667	747201862	24	1.65%	17.75
86	62.6775	1.48	676239533	17	1.25%	1.81
87	14.11889	1.88	91132978	5	1.50%	5.75
88	8.90875	2.173333	22011152	23	1.00%	12.40
89	126.866	1.98	581555587	15	1.54%	2.92
90	49.665	1.71	1167830820	22	0.00%	13.42
91	17.33778	1.49	2376354482	11	1.25%	8.58
92	30.44667	2.46	386801101	18	2.10%	5.33
93	104.6786	1.75	3707676750	42	1.50%	5.71
94	118.5775	1.8	2891726457	11	1.50%	3.61
95	-3.34286	1.706667	4309765237	25	1.50%	10.23
96	-42.2222	1.9	4199002290	18	1.05%	5.67
97	197.7778	2.23	377757571	18	0.60%	8.58
98	36.57857	1.74	1794105393	12	1.35%	7.25
99	41.33625	1.363333	35386912	11	2.00%	20.33
100	65.29143	1.335	1582274659	9	1.00%	1.42
101	40.708	1.895	1554916283	13	1.77%	4.36
102	29.35125	1.86	1301722036	11	1.65%	4.58
103	77.59222	1.8	3477591573	17	1.50%	12.86
104	77.25111	2.993333	641773914	31	1.70%	4.08
105	76.96	1.955	155528849	27	1.31%	9.92
106	64.59222	1.496667	1006907065	15	1.25%	12.42
107	45.86778	2.01	20754621943	17	0.55%	7.33
108	148.9722	2.175	116716313	9	0.90%	7.75
109	-29.4444	1.99	349575887	15	1.50%	12.58
110	45.86778	1.863333	20754621943	11	1.65%	5.42
111	42.94333	1.32	541830552	13	1.01%	3.83
112	360.3933	1.375	106011657	38	1.00%	4.25
113	45.86778	1.766667	20754621943	29	1.55%	7.33
114	31.11111	2.035	479027315	24	1.15%	11.04
115	65.43	1.745	20482676114	11	1.25%	5.92
116	50.61667	1.316667	543744238	22	1.01%	3.19
117	106.4	1.506667	183128700	14	1.06%	5.31
118	14.626	1.79	1967513917	9	1.50%	3.44
119	276.5467	1.45	650701374	18	1.25%	5.92
120	8.555556	2.195	173167560	18	0.50%	7.17
121	51.66	1.866667	64695239	31	1.44%	2.92
122	18.2525	1.86	288743840	28	1.44%	7.28
123	34.72	1.273333	747201862	13	0.95%	12.04
124	37.418	2.356667	3166733488	23	2.15%	4.08
125	68.53	1.163333	65078475	30	0.86%	5.31
126	115.9556	1.223333	788512852	11	1.00%	5.62
127	74.77333	1.193333	261987368	20	0.91%	7.14
128	42.375	1.416667	47360921	23	1.05%	7.08
129	36.774	1.125	94511935	31	0.86%	5.31
130	-1.80333	1.85	63940047	13	1.65%	23.25
131	69.25778	1.996667	333064061	6	0.80%	1.92

132	65.43	1.395	20482676114	11	1.25%	7.67
133	172.342	1.563333	785819260	19	1.63%	5.97
134	45.86778	1.316667	20754621943	25	1.10%	7.33
135	141.484	1.716667	69874311	8	1.28%	9.97
136	55.50625	1.433333	3498482	14	0.75%	1.17
137	-8.99	1.9	533784721	13	1.00%	3.50
138	276.5467	1.9	650701374	18	1.92%	5.71
139	105.3333	1.2	787016984	18	0.55%	7.92
140	72.54667	1.4	5708811446	14	0.80%	3.36
141	-8.17556	1.48	1184607743	17	1.00%	1.17
142	71.722	1.623333	80135453	20	1.00%	6.92
143	139.5133	1.07	5132485313	15	0.85%	7.67
144	12.66778	1.743333	553102171	25	1.50%	11.83
145	45.12875	1.455	5436558084	26	1.60%	9.42
146	71.722	1.173333	80135453	11	1.00%	3.61
147	15.12143	2.356667	6876977	17	0.80%	2.58
148	42.3	1.713333	3781398007	3	0.85%	3.50
149	-5.375	1.825	5035439041	13	1.50%	4.33
150	7.797778	1.226667	411049440	12	0.80%	2.75
151	163.42	1.34	991394321	11	1.10%	10.50
152	34.5475	1.745	414419431	39	1.50%	11.67
153	15.25	1.886667	1324626332	16	1.50%	8.72
154	196.73	2.646667	63078578	15	2.25%	6.56
155	40.616	2.11	627984569	17	1.63%	3.17
156	-7.02111	1.563333	939878814	11	1.25%	3.36
157	60.84833	1.99	124865026	16	1.70%	10.00
158	38.38778	1.703333	633738901	12	1.50%	2.83
159	36.13	1.98	3225334546	28	1.80%	10.58
160	18.77778	1.96	3820564	16	1.05%	10.33
161	19.90125	1.5	604826507	11	1.00%	4.25
162	33.49	1.84	113977419	13	1.25%	4.25
163	71.505	1.87	79028197	13	1.25%	2.92
164	196.73	1.906667	63078578	18	1.50%	1.88
165	45.12875	1.745	5436558084	26	1.50%	9.42
166	95.30167	2.05	27913659	11	1.65%	9.42
167	90.52875	1.545	382997106	9	1.00%	7.97
168	53.70444	1.335	1246401448	13	1.10%	6.53
169	73.7375	1.5	129548412	19	1.10%	10.98
170	35.488	2.175	54747525	11	1.75%	10.14
171	3.172222	1.783333	349609531	13	1.25%	10.13
172	36.681	2.613333	247016273	15	2.10%	5.73
173	30.811	1.896667	24624712	12	1.25%	5.15
174	-14.28	1.15	583172256	16	0.90%	12.75
175	-17.834	2.483333	418421564	16	2.10%	12.83
176	87.49	1.91	1574858511	23	1.60%	20.33
177	89.715	1.1	148567312	26	0.90%	4.33
178	131.053	2.653333	59882802	15	2.00%	6.54
179	-1.875	1.955	1278244712	16	1.50%	8.43

180	154.31	1.833333	309950364	12	2.00%	6.21
181	72.009	1.9	9985031	10	1.25%	5.25
182	153.6443	3.04	540450847	4	1.00%	4.83
183	65.72333	1.693333	5311530261	11	1.50%	5.08
184	97.82889	1.78	219914834	19	1.60%	16.67
185	72.31	1.986667	172078284	11	1.54%	5.08
186	-36.2222	2.755	3308644096	15	1.15%	10.36
187	15.816	2.1	519181855	27	1.63%	2.08
188	91.127	1.5	402414144			12.89
189	289.6425	2.443333	3022489254	11	2.25%	6.42
190	47.58333	1.893333	4542397780	19	1.44%	5.81
191	98.74	1.2	1231472609	15	1.00%	7.42
192	79.1275	2.2	6817994947	21	1.50%	10.79
193	45.12875	2.735	5436558084	26	1.60%	7.33
194	55.37714	2.193333	126102153	14	1.75%	7.13
195	68.55875	1.723333	734590577	18	1.50%	11.75
196	289.6425	1.99	3022489254	12	1.80%	11.75
197	76.20857	1.69	3120267346	16	1.50%	10.54
198	68.55875	1.25	734590577	23	1.05%	5.08
199	50.576	2.096667	274236293	11	1.00%	8.67

Table 2: Alphas for every fund individually via the four different models and their significance levels.

*This table shows the alphas for the regression of the four different models used and their p-values. The regression for the CAPM only used the beta factor. The Three-Factor model added the size and value factors. Carhart (Four-Factor) model added the momentum factor and the Five-Factor model added profitability and investment factors to their Three-Factor model. These results are based on monthly return from January 1st 2013 until January 1st 2023. For the calculation of the excess return, the US Treasury rate is used as all the returns of the funds are based on the US Dollar. The alpha (α) shows the performance of the funds adjusted for the risk and can be interpreted as the skill by the manager to obtain abnormal returns. A positive alpha indicates superior performance and a negative alpha underperformance of the manager. The beta (β) can be explained as the volatility of the investment relative to the market. The size factor (SMB) represents the difference in excess return of smaller companies relative to larger companies. The value factor (HML) represents the difference in excess return of value stocks relative to growth stocks. The profitability factor (RMW) can be seen as the difference between funds with robust profitability and funds with weaker profitability. The investment factor (CMA) shows the difference between funds with conservative investment styles and aggressive investment styles. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Fund	CAPM	P-value	3-factor	P-value	4-Factor	P-Value	5-Factor	P-Value
1	-0.331**	0.008	-0.487**	0.002	0.579	0.072	-0.495***	0.001
2	-0.331**	0.008	-0.487**	0.002	0.581	0.071	-0.494***	0.001
3	-0.413***	0.001	-0.570***	0.000	0.494	0.123	-0.577***	0.000
4	-0.415***	0.001	-0.571***	0.000	0.498	0.120	-0.579***	0.000
5	-0.369**	0.003	-0.525***	0.001	0.542	0.091	-0.533***	0.001
6	-0.369**	0.003	-0.524***	0.001	0.542	0.091	-0.532***	0.001
7	0.218	0.154	0.136	0.284	1.836***	0.001	0.100	0.391
8	0.266	0.083	0.184	0.148	1.885***	0.001	0.148	0.204
9	0.134	0.379	0.052	0.680	1.750***	0.001	0.016	0.892
10	-0.102	0.454	-0.284	0.095	0.423	0.058	-0.297	0.081
11	-0.163	0.235	-0.347*	0.042	0.367	0.101	-0.360*	0.035
12	-0.142	0.299	-0.327	0.056	0.388	0.084	-0.339*	0.047
13	-0.151	0.273	-0.337*	0.050	0.374	0.095	-0.350*	0.041
14	-0.144	0.377	-0.476*	0.017	0.217	0.366	-0.506*	0.012
15	-0.089	0.538	-0.193	0.288	0.045	0.837	-0.212	0.249
16	-0.197	0.692	-0.736	0.236	0.748	0.260	-0.684	0.276
17	-0.312***	0.001	-0.468***	0.000	0.773*	0.024	-0.492***	0.000
18	-0.566	0.062	-1.050**	0.005	-0.091	0.843	-1.096**	0.004
19	-0.520	0.087	-1.002**	0.007	-0.048	0.917	-1.049**	0.006
20	-0.392	0.092	-0.695*	0.016	0.496	0.196	-0.716*	0.015
21	-0.625	0.071	-0.906*	0.037	0.889	0.149	-0.881*	0.045
22	-0.522	0.059	-0.835*	0.012	1.242*	0.045	-0.843*	0.013
23	-0.030	0.802	-0.155	0.296	0.495*	0.021	-0.165	0.258
24	-0.310	0.054	-0.474*	0.017	0.558	0.075	-0.460*	0.020
25	-0.051	0.639	-0.164	0.210	0.211	0.187	-0.188	0.145
26	-0.209	0.687	0.221	0.731	1.746*	0.031	0.259	0.689
27	0.283	0.196	0.287	0.255	1.498**	0.002	0.228	0.345
28	0.006	0.960	-0.093	0.519	1.340**	0.002	-0.154	0.275
29	-0.008	0.966	-0.019	0.935	0.413	0.147	0.003	0.988

30	-0.016	0.933	0.067	0.771	0.403	0.146	0.091	0.686
31	0.027	0.741	-0.009	0.910	1.702***	0.001	-0.043	0.606
32	-0.011	0.891	-0.047	0.567	1.662***	0.001	-0.081	0.331
33	-0.136	0.154	-0.248*	0.036	0.458**	0.026	-0.248*	0.037
34	-0.218	0.234	-0.373	0.075	1.535**	0.008	-0.384	0.061
35	0.422*	0.049	0.576*	0.024	1.536**	0.003	0.582*	0.024
36	-0.518	0.080	-1.036**	0.004	-0.002	0.997	-1.074**	0.004
37	-0.568*	0.033	-1.010**	0.002	0.327	0.449	-1.013**	0.002
38	-0.568*	0.047	-0.977**	0.006	0.530	0.254	-0.976**	0.007
39	0.220***	0.001	0.220**	0.010	0.448***	0.000	0.221*	0.011
40	-0.626	0.061	-1.035*	0.013	0.750	0.196	-1.036*	0.015
41	-0.278	0.191	-0.609*	0.020	0.471	0.170	-0.633*	0.017
42	-0.094	0.403	-0.214	0.125	0.612**	0.013	-0.197	0.158
43	-0.421	0.130	-0.588	0.090	1.173*	0.036	-0.679*	0.048
44	-0.086	0.685	-0.224	0.378	1.452**	0.008	-0.229	0.356
45	-0.144	0.250	-0.203	0.090	1.735**	0.002	-0.229	0.055
46	0.303	0.524	0.414	0.421	1.389	0.090	0.559	0.263
47	-0.129	0.178	-0.253*	0.033	0.683**	0.007	-0.233*	0.049
48	-0.328*	0.020	-0.587***	0.001	0.688*	0.026	-0.575***	0.001
49	-0.380	0.065	-0.442***	0.001	1.617*	0.017	-0.417**	0.002
50	0.098	0.688	0.201	0.509	1.781**	0.002	0.202	0.509
51	-0.137	0.249	-0.246	0.098	0.337	0.083	-0.248	0.094
52	-0.304	0.173	-0.384	0.172	0.804	0.053	-0.417	0.135
53	-0.198*	0.027	-0.368***	0.001	0.586*	0.025	-0.377***	0.001
54	-0.256*	0.028	-0.334*	0.021	1.459**	0.007	-0.317*	0.031
55	-0.420	0.075	-0.815**	0.005	0.650	0.079	-0.830**	0.005
56	0.003	0.987	-0.202	0.231	1.001*	0.013	-0.153	0.358
57	-0.572***	0.000	-0.763***	0.000	0.672	0.098	-0.738***	0.000
58	-0.243	0.100	-0.472**	0.008	0.170	0.425	-0.497**	0.006
59	-0.026	0.827	-0.162	0.263	0.307	0.089	-0.175	0.226
60	-0.198	0.144	-0.395*	0.019	0.529	0.062	-0.374*	0.027
61	-0.235	0.062	-0.436**	0.002	0.753*	0.032	-0.447***	0.001
62	-0.195	0.121	-0.396**	0.004	0.797*	0.024	-0.407**	0.004
63	-0.240	0.430	-0.412	0.282	1.072*	0.036	-0.428	0.271
64	-0.300	0.325	-0.471	0.218	1.008*	0.047	-0.487	0.210
65	0.038	0.916	0.322	0.461	1.230*	0.037	0.382	0.382
66	-0.670*	0.036	-1.041**	0.004	0.983	0.135	-1.054**	0.005
67	-0.438*	0.036	-0.710***	0.000	1.170*	0.035	-0.699***	0.001
68	-0.363*	0.029	-0.559***	0.000	1.405**	0.010	-0.549***	0.000
69	-0.198	0.065	-0.359**	0.008	0.298	0.141	-0.353**	0.009
70	-0.069	0.464	-0.195	0.074	0.048	0.678	-0.211	0.055
71	-0.130	0.171	-0.256*	0.020	-0.012	0.919	-0.271*	0.015
72	-0.057	0.613	-0.079	0.566	0.399*	0.041	-0.059	0.661
73	-0.927	0.112	-1.102*	0.044	0.837	0.409	-0.996	0.058
74	-0.075	0.630	-0.243	0.185	1.219**	0.010	-0.328	0.061
75	-0.151	0.721	-0.375	0.474	1.822*	0.032	-0.251	0.631
76	-0.599	0.067	-1.054**	0.010	0.776	0.212	-1.057*	0.010
77	-0.431	0.146	-0.751*	0.043	0.834	0.144	-0.723	0.054

78	-0.977**	0.010	-1.198**	0.009	0.767	0.240	-1.253**	0.007
79	-0.270	0.372	-0.466	0.216	1.270*	0.029	-0.488	0.201
80	-0.110	0.509	-0.366	0.078	0.437	0.083	-0.371	0.077
81	-0.245	0.168	-0.553*	0.012	0.375	0.188	-0.566*	0.011
82	-0.332	0.191	-0.565	0.064	1.385*	0.020	-0.595	0.056
83	-0.214	0.137	-0.425*	0.013	0.198	0.326	-0.458**	0.008
84	-0.094	0.412	-0.149	0.298	0.657*	0.011	-0.115	0.417
85	-0.072	0.583	-0.241	0.124	0.340	0.092	-0.259	0.098
86	-0.106	0.468	-0.371*	0.030	1.351**	0.007	-0.407*	0.018
87	-0.222	0.173	-0.417*	0.037	1.607**	0.006	-0.420*	0.039
88	-0.080	0.508	-0.221	0.138	0.616*	0.016	-0.205	0.172
89	-0.111	0.316	-0.230	0.091	0.766**	0.007	-0.234	0.090
90	-0.140	0.206	-0.259	0.057	0.737**	0.009	-0.264	0.057
91	0.270*	0.033	0.280	0.069	0.353*	0.037	0.292	0.060
92	0.232	0.066	0.242	0.114	0.315	0.062	0.254	0.100
93	-0.153	0.256	-0.362*	0.026	1.593**	0.005	-0.373*	0.023
94	-0.217	0.108	-0.426**	0.009	1.528**	0.007	-0.437**	0.008
95	-0.025	0.675	-0.152*	0.034	0.233*	0.032	-0.146*	0.041
96	-0.200	0.219	-0.438*	0.018	1.421*	0.013	-0.449*	0.016
97	0.012	0.801	-0.029	0.640	0.119	0.141	-0.020	0.752
98	0.011	0.926	-0.108	0.433	0.252	0.134	-0.128	0.355
99	-0.041	0.737	-0.061	0.674	1.743**	0.002	-0.060	0.679
100	0.029	0.832	0.018	0.910	1.813**	0.002	0.021	0.901
101	-0.272	0.381	-0.315	0.213	1.483	0.061	-0.142	0.534
102	0.139*	0.003	0.184***	0.001	0.276***	0.000	0.188***	0.001
103	-0.229	0.374	-0.481	0.134	0.627	0.120	-0.448	0.161
104	-0.192	0.455	-0.445	0.166	0.664	0.100	-0.412	0.197
105	-0.319	0.258	-0.387	0.268	1.008*	0.042	-0.391	0.270
106	0.094	0.836	-0.377	0.505	0.878	0.139	-0.379	0.508
107	-0.062	0.914	-0.772	0.278	0.799	0.304	-0.742	0.304
108	0.352	0.497	0.031	0.960	1.457*	0.047	0.086	0.891
109	0.088	0.854	0.530	0.369	2.006**	0.006	0.565	0.340
110	-0.225	0.528	-0.452	0.314	1.279*	0.020	-0.450	0.323
111	-0.359	0.316	-0.775	0.084	0.947	0.090	-0.795	0.081
112	-0.355	0.147	-0.758**	0.010	1.138*	0.039	-0.817**	0.006
113	-0.535	0.064	-1.063**	0.003	0.005	0.992	-1.099**	0.002
114	-0.272	0.149	-0.607**	0.009	0.413	0.180	-0.624**	0.008
115	-0.705*	0.040	-1.269**	0.003	0.554	0.349	-1.274**	0.003
116	-0.185	0.421	-0.593**	0.032	1.311*	0.012	-0.662*	0.017
117	-0.334	0.054	-0.682***	0.001	0.313	0.246	-0.719***	0.001
118	-0.180	0.143	-0.394**	0.009	0.513*	0.046	-0.385*	0.011
119	-0.320*	0.008	-0.576***	0.000	1.142*	0.021	-0.587***	0.000
120	-0.180	0.131	-0.398**	0.005	0.856**	0.010	-0.437**	0.002
121	-0.245*	0.041	-0.463***	0.001	0.791*	0.017	-0.502***	0.000
122	-0.206	0.137	-0.298	0.071	0.106	0.593	-0.346*	0.034
123	-0.266	0.361	-0.414	0.256	0.987	0.060	-0.387	0.293
124	0.057	0.692	-0.094	0.560	0.644**	0.008	-0.133	0.409
125	-0.653**	0.006	-1.014***	0.000	0.740	0.186	-1.058***	0.000

126	0.057	0.653	-0.243	0.057	1.586**	0.003	-0.280*	0.030
127	-0.123	0.269	-0.259*	0.033	-0.044	0.753	-0.283*	0.019
128	-0.063	0.597	-0.220	0.117	0.264	0.118	-0.237	0.090
129	0.090	0.843	0.386	0.493	1.967**	0.007	0.423	0.456
130	0.011	0.953	-0.247	0.292	0.377	0.083	-0.250	0.293
131	-0.439	0.055	-0.832**	0.003	0.205	0.577	-0.857**	0.003
132	-0.132	0.516	-0.533*	0.033	0.400	0.181	-0.537	0.034
133	-0.418	0.084	-0.809**	0.007	0.556	0.151	-0.833**	0.006
134	-0.602*	0.037	-1.099**	0.002	-0.087	0.844	-1.134**	0.002
135	-0.664*	0.022	-1.159***	0.001	-0.150	0.734	-1.194***	0.001
136	-0.590*	0.038	-1.099**	0.002	-0.094	0.828	-1.134***	0.001
137	-0.517	0.069	-1.027**	0.003	-0.020	0.964	-1.062**	0.003
138	-0.199	0.334	-0.416	0.100	0.532	0.118	-0.410	0.108
139	-0.110	0.150	-0.184	0.054	-0.128	0.221	-0.194*	0.044
140	-0.215**	0.003	-0.366***	0.000	0.738*	0.018	-0.366***	0.000
141	-0.328**	0.002	-0.538***	0.000	0.833*	0.036	-0.541***	0.000
142	-0.293	0.268	-0.477	0.141	1.361**	0.009	-0.451	0.168
143	-0.105	0.547	-0.181	0.242	1.938**	0.002	-0.160	0.294
144	-0.070	0.897	-0.404	0.541	1.237	0.093	-0.348	0.604
145	-0.509	0.167	-1.063*	0.018	1.060	0.092	-1.064*	0.019
146	-0.121	0.583	-0.420*	0.030	1.430*	0.015	-0.405*	0.036
147	-0.501	0.153	-0.887*	0.041	1.011	0.101	-0.899*	0.041
148	-0.444	0.094	-0.727*	0.024	0.711	0.142	-0.751*	0.022
149	-0.139	0.378	-0.236	0.202	1.097**	0.009	-0.327	0.062
150	-0.119	0.533	-0.316	0.183	1.610**	0.005	-0.381	0.100
151	-0.545	0.581	-1.286	0.300	0.372	0.785	-1.480	0.233
152	-0.273	0.083	-0.633***	0.001	0.083	0.687	-0.648***	0.001
153	-0.516	0.241	-1.214*	0.026	0.677	0.326	-1.158*	0.035
154	-0.532	0.053	-1.083***	0.001	0.380	0.392	-1.082**	0.002
155	-0.328	0.297	-0.325	0.408	1.512*	0.011	-0.325	0.407
156	-0.475	0.051	-0.883**	0.002	0.277	0.418	-0.856**	0.003
157	-0.692	0.061	-1.010*	0.021	1.394	0.061	-1.008*	0.020
158	-0.499	0.097	-0.347	0.339	0.902	0.097	-0.298	0.414
159	-0.593**	0.005	-0.870***	0.000	1.255*	0.023	-0.847***	0.001
160	-0.382*	0.031	-0.677***	0.001	0.984*	0.021	-0.668***	0.001
161	-0.557*	0.014	-0.833**	0.003	0.215	0.477	-0.844**	0.003
162	-0.236	0.134	-0.519**	0.006	0.167	0.451	-0.513**	0.007
163	-0.641**	0.003	-0.918***	0.000	1.204*	0.029	-0.896***	0.000
164	-0.526*	0.014	-0.727**	0.002	1.123*	0.038	-0.701**	0.004
165	-0.542***	0.001	-0.785***	0.000	0.685	0.084	-0.757***	0.000
166	-0.377*	0.048	-0.723***	0.001	0.255	0.342	-0.708**	0.002
167	-0.354	0.063	-0.699**	0.002	0.280	0.296	-0.684**	0.002
168	-0.552**	0.004	-0.839***	0.000	1.115*	0.033	-0.835***	0.000
169	-0.245	0.470	-1.004*	0.016	0.199	0.580	-1.010*	0.017
170	-0.036	0.780	-0.073	0.629	0.871**	0.009	-0.011	0.936
171	-0.121	0.445	-0.335	0.081	0.352	0.147	-0.358	0.062
172	-0.127	0.305	-0.298	0.054	0.603*	0.020	-0.286	0.067
173	-0.549*	0.019	-0.964***	0.001	0.160	0.671	-1.001***	0.001

174	-0.386*	0.021	-0.688***	0.001	-0.037	0.886	-0.701***	0.001
175	0.138	0.787	0.325	0.562	1.163	0.174	0.478	0.381
176	-0.222	0.066	-0.427**	0.004	1.431**	0.010	-0.433**	0.004
177	-0.171	0.353	-0.347	0.074	1.667*	0.013	-0.283	0.134
178	-0.371	0.199	-0.422	0.073	1.655*	0.031	-0.293	0.181
179	-0.201	0.093	-0.246	0.097	1.801**	0.003	-0.244	0.079
180	-0.111	0.714	-0.226	0.549	1.443**	0.009	-0.240	0.532
181	-0.546	0.115	-0.991*	0.022	0.734	0.230	-0.966*	0.027
182	-0.201	0.100	-0.297*	0.040	1.842**	0.003	-0.270	0.056
183	-0.209	0.565	-0.547	0.228	1.220*	0.037	-0.535	0.246
184	-0.277**	0.010	-0.455***	0.001	0.791*	0.021	-0.455***	0.001
185	-0.377*	0.014	-0.687***	0.000	1.454*	0.014	-0.667***	0.000
186	-0.228**	0.007	-0.333**	0.002	0.778*	0.015	-0.339***	0.001
187	-0.069	0.429	-0.180	0.087	0.179	0.172	-0.196	0.059
188	-0.254**	0.005	-0.362**	0.001	0.990*	0.013	-0.363***	0.001
189	-0.198*	0.019	-0.306**	0.003	0.565*	0.023	-0.316***	0.002
190	-0.115	0.302	-0.253	0.063	0.608*	0.013	-0.284*	0.037
191	-0.076	0.388	-0.188	0.077	0.171	0.196	-0.204	0.052
192	-0.147	0.059	-0.237*	0.015	0.532*	0.012	-0.245*	0.013
193	-0.171*	0.028	-0.252**	0.009	0.744**	0.007	-0.255**	0.010
194	-0.520	0.162	-0.988*	0.034	0.794	0.199	-0.959*	0.042
195	-0.138	0.306	-0.377*	0.018	0.236	0.230	-0.391*	0.014
196	-0.635*	0.026	-1.158***	0.001	-0.199	0.647	-1.195***	0.001
197	-0.046	0.526	-0.169	0.060	0.352*	0.014	-0.168	0.064
198	-0.593*	0.021	-0.977**	0.002	0.980	0.085	-1.027***	0.001
199	-0.079	0.597	-0.259	0.095	1.136**	0.008	-0.318*	0.036

Table 3: Regression output CAPM

*This table shows the regression output with the alphas of the CAPM as the dependent variable. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Regression Statistics	
Multiple R	0.244072
R Square	0.059571
Adjusted R Square	0.030183
Robust Standard Error	0.234192
Observations	199

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	0.667049	0.111175	2.027037	0.063907
Residual	192	10.53043	0.054846		
Total	198	11.19748			

	Coefficients	*Robust Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.195*	0.090	-2.168	0.031	-0.373	-0.018	-0.373	-0.018
Turnover	0.000	0.000	-0.476	0.635	0.000	0.000	0.000	0.000
Expense	-0.052	0.044	-1.176	0.241	-0.138	0.035	-0.138	0.035
Fund Size	0.000*	0.000	2.095	0.038	0.000	0.000	0.000	0.000
Fund Age	0.005*	0.002	2.031	0.044	0.000	0.010	0.000	0.010
Management fee	-2.836	4.941	-0.574	0.567	-12.580	6.909	-12.580	6.909
Tenure	-0.002	0.004	-0.492	0.623	-0.010	0.006	-0.010	0.006

Table 4: Regression output Fama and French Three-Factor model

*This table shows the regression output with the alphas of the Fama and French Three-Factor model as the dependent variable. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Regression Statistics	
Multiple R	0.230532
R Square	0.053145
Adjusted R Square	0.023556
Robust Standard Error	0.371405
Observations	199

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.486544	0.247757	1.7961	0.101787
Residual	192	26.48483	0.137942		
Total	198	27.97138			

	Coefficients	*Robust Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.559***	0.143	-3.911	0.000	-0.840	-0.277	-0.840	-0.277
Turnover	0.000	0.000	-0.628	0.530	0.000	0.000	0.000	0.000
Expense	-0.022	0.069	-0.316	0.753	-0.159	0.115	-0.159	0.115
Fund Size	0.000	0.000	1.717	0.088	0.000	0.000	0.000	0.000
Fund Age	0.010*	0.004	2.475	0.014	0.002	0.018	0.002	0.018
Management fee	0.321	7.835	0.041	0.967	-15.133	15.775	-15.133	15.775
Tenure	-0.005	0.007	-0.756	0.450	-0.018	0.008	-0.018	0.008

Table 5: Regression output Carhart Four-Factor model

*This table shows the regression output with the alphas of the Carhart Four-Factor model as the dependent variable. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Regression Statistics	
Multiple R	0.449509
R Square	0.202058
Adjusted R Square	0.177122
Robust Standard Error	0.495206
Observations	199

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	11.92281	1.987135	8.103167	8.17E-08
Residual	192	47.08406	0.245229		
Total	198	59.00687			

	Coefficients	*Robust Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.441*	0.190	-2.317	0.022	-0.817	-0.066	-0.817	-0.066
Turnover	0.000	0.000	-0.204	0.839	0.000	0.000	0.000	0.000
Expense	0.381***	0.093	4.117	0.000	0.199	0.564	0.199	0.564
Fund Size	0.000	0.000	-0.124	0.901	0.000	0.000	0.000	0.000
Fund Age	0.010	0.005	1.942	0.054	0.000	0.021	0.000	0.021
Management fee	28.974**	10.447	2.773	0.006	8.368	49.579	8.368	49.579
Tenure	0.004	0.009	0.418	0.677	-0.014	0.021	-0.014	0.021

Table 6: Regression output Fama and French Five-Factor model

*This table shows the regression output with the alphas of the Fama and French Five-Factor model as the dependent variable. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Regression Statistics	
Multiple R	0.239012
R Square	0.057127
Adjusted R Square	0.027662
Robust Standard Error	0.380743
Observations	199

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1.686358	0.28106	1.938811	0.076482
Residual	192	27.83328	0.144965		
Total	198	29.51964			

	Coefficients	*Robust Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.608***	0.146	-4.151	0.000	-0.896	-0.319	-0.896	-0.319
Turnover	0.000	0.000	-0.649	0.517	0.000	0.000	0.000	0.000
Expense	-0.023	0.071	-0.330	0.742	-0.164	0.117	-0.164	0.117
Fund Size	0.000	0.000	1.537	0.126	0.000	0.000	0.000	0.000
Fund Age	0.011**	0.004	2.743	0.007	0.003	0.019	0.003	0.019
Management fee	2.419	8.032	0.301	0.764	-13.424	18.261	-13.424	18.261
Tenure	-0.005	0.007	-0.713	0.477	-0.018	0.008	-0.018	0.008

Table 7: Regression output quintile portfolio CAPM

*This table shows the regression output for the quintile portfolios with the alphas of the CAPM as the dependent variable and ranked based on their manager tenure period. The first quintile are the funds with the lowest manager tenure, with a cutoff of 4.08 years. The second quintile ranges then to a period of 5.75 years, the third quintile to 8.21 years, the fourth until 11.04 and the fifth quintile are the funds with the highest manager tenure values, which ranges until 23.25 years. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Variables	1st	2nd	3rd	4th	5th
Intercept	0.193	-0.078	-0.132	-0.516	-1.061***
	(0.291)	*(0.817)*	*(0.761)*	*(0.343)*	*(0.001)*
Turnover	-0.001	0.001	0.002*	0.000	0.001
	(0.071)	*(0.097)*	*(0.012)*	*(0.673)*	*(0.141)*
Expense	-0.251**	0.117	-0.100	-0.056	0.093
	(0.004)	*(0.195)*	*(0.304)*	*(0.640)*	*(0.431)*
Fund size	0.000	0.000	0.000	0.000	0.000
	(0.466)	*(0.103)*	*(0.102)*	*(0.325)*	*(0.184)*
Fund age	0.003	0.002	0.007	0.013	0.011
	(0.483)	*(0.485)*	*(0.340)*	*(0.180)*	*(0.132)*
Management fee	1.031	31.058**	0.030	-11.397	18.416
	(0.915)	*(0.004)*	*(0.998)*	*(0.419)*	*(0.120)*
Tenure	0.001	-0.005	-0.031	0.028	0.039*
	(0.968)	*(0.932)*	*(0.565)*	*(0.562)*	*(0.015)*

Table 8: Regression output quintile portfolio Three-Factor model

*This table shows the regression output for the quintile portfolios with the alphas of the Fama and French Three-Factor model as the dependent variable and ranked based on their manager tenure period. The first quintile are the funds with the lowest manager tenure, with a cutoff of 4.08 years. The second quintile ranges then to a period of 5.75 years, the third quintile to 8.21 years, the fourth until 11.04 and the fifth quintile are the funds with the highest manager tenure values, which ranges until 23.25 years. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Variables	1st	2nd	3rd	4th	5th
Intercept	0.165	-0.326	-0.012	-0.335	-1.733**
	(0.546)	*(0.586)*	*(0.988)*	*(0.619)*	*(0.002)*
Turnover	-0.002*	0.001	0.003*	0.000	0.001
	(0.031)	*(0.180)*	*(0.034)*	*(0.439)*	*(0.302)*
Expense	-0.296*	0.293	-0.096	-0.076	0.228
	(0.019)	*(0.071)*	*(0.578)*	*(0.622)*	*(0.243)*
Fund size	0.000	0.000	0.000	0.000	0.000
	(0.471)	*(0.250)*	*(0.140)*	*(0.272)*	*(0.612)*
Fund age	0.010	0.006	0.007	0.021	0.017
	(0.150)	*(0.360)*	*(0.580)*	*(0.085)*	*(0.153)*
Management fee	-3.126	-53.351**	5.115	-6.184	-9.803
	(0.830)	*(0.005)*	*(0.807)*	*(0.747)*	*(0.609)*
Tenure	-0.041	-0.009	-0.104	-0.031	0.039
	(0.427)	*(0.929)*	*(0.279)*	*(0.602)*	*(0.134)*

Table 9: Regression output quintile portfolio Carhart model

*This table shows the regression output for the quintile portfolios with the alphas of the Carhart Four-Factor model as the dependent variable and ranked based on their manager tenure period. The first quintile are the funds with the lowest manager tenure, with a cutoff of 4.08 years. The second quintile ranges then to a period of 5.75 years, the third quintile to 8.21 years, the fourth until 11.04 and the fifth quintile are the funds with the highest manager tenure values, which ranges until 23.25 years. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Variables	1st	2nd	3rd	4th	5th
Intercept	-0.283	-0.563	-0.423	-0.938	-1.420*
	(0.483)	*(0.472)*	*(0.617)*	*(0.431)*	*(0.018)*
Turnover	0.000	-0.002*	0.000	0.000	0.000
	(0.770)	*(0.022)*	*(0.776)*	*(0.787)*	*(0.757)*
Expense	0.479*	0.804***	0.246***	-0.220	0.511*
	(0.019)	*(0.000)*	*(0.000)*	*(0.389)*	*(0.026)*
Fund size	0.000	0.000	0.000	0.000	0.000
	(0.505)	*(0.784)*	*(0.656)*	*(0.740)*	*(0.217)*
Fund age	-0.007	0.006	0.015	0.016	0.034*
	(0.550)	*(0.421)*	*(0.253)*	*(0.183)*	*(0.016)*
Management fee	30.280	-17.599	71.089**	18.121	17.002
	(0.184)	*(0.448)*	*(0.003)*	*(0.549)*	*(0.441)*
Tenure	0.011	0.045	-0.052	0.157	0.034
	(0.891)	*(0.744)*	*(0.610)*	*(0.151)*	*(0.235)*

Table 10: Regression output quintile portfolio Five-Factor model

*This table shows the regression output for the quintile portfolios with the alphas of the Fama and French Five-Factor model as the dependent variable and ranked based on their manager tenure period. The first quintile are the funds with the lowest manager tenure, with a cutoff of 4.08 years. The second quintile ranges then to a period of 5.75 years, the third quintile to 8.21 years, the fourth until 11.04 and the fifth quintile are the funds with the highest manager tenure values, which ranges until 23.25 years. The independent variables are the turnover ratio, expense ratio, fund size, fund age, management fee and manager tenure. The turnover ratio is stated as a measure for trading activity of the fund. The expense ratio variable indicates the ratio of the assets of the fund that are used to pay for the operating expenses, together with management fees, of the fund. Fund size is seen as the total sum of the money that is managed by the fund across the share classes. Fund age correlated to the amount of years the fund is operating relative to the year of launch. Management fee is the compensation for the management of the investments and equals to the maximum annual charge of that fund. The manager tenure is the average amount of years a manager has managed that specific fund. Significance levels: * P-value < 0.05, ** P-value < 0.01, *** P-value< 0.001.*

Variables	1st	2nd	3rd	4th	5th
Intercept	0.087	-0.338	-0.668	-0.954	-1.947***
	(0.758)	*(0.586)*	*(0.434)*	*(0.198)*	*(0.000)*
Turnover	-0.002*	0.001	0.002	0.000	0.001
	(0.023)	*(0.185)*	*(0.101)*	*(0.397)*	*(0.371)*
Expense	-0.295*	0.302	-0.119	-0.142	0.198
	(0.024)	*(0.067)*	*(0.488)*	*(0.370)*	*(0.307)*
Fund size	0.000	0.000	0.000	0.000	0.000
	(0.432)	*(0.372)*	*(0.217)*	*(0.223)*	*(0.395)*
Fund age	0.013	0.006	0.007	0.016	0.024*
	(0.083)	*(0.356)*	*(0.606)*	*(0.222)*	*(0.049)*
Management fee	1.510	-51.306**	25.567	-15.046	-9.943
	(0.920)	*(0.008)*	*(0.260)*	*(0.421)*	*(0.603)*
Tenure	-0.042	-0.018	-0.025	0.067	0.049
	(0.423)	*(0.870)*	*(0.805)*	*(0.314)*	*(0.056)*