ИМЕЮТ ЛИ ХЕДЖ-ФОНДЫ С ВЫСОКИМИ КОМИССИЯМИ ЛУЧШИЕ ПОКАЗАТЕЛИ?

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Аннотация: В данной исследовательской работе дается ответ на вопрос «Действительно ли хедж-фонды с высокой стимулирующей комиссией превосходят хедж-фонды с ниже среднего или низкой стимулирующей комиссией?» Исследование включает регрессионный анализ исторических данных и показателей, объясняющих сделанные выводы. Для дополнительного подтверждения результатов рассмотрены академические исследования других авторов. Помимо проверки того, действительно ли хедж-фонды с высокими комиссионными за стимулирование и управление превосходят хедж-фонды с низкими комиссионными за стимулирование и управление, автор также оценивает, будут ли они предлагать лучшие преимущества диверсификации в трудные времена, рассматривая корреляцию в кризисный период.

В статье анализируется, какова связь между структурой вознаграждения и абсолютными доходами, какова связь между структурой вознаграждения и доходностью с учетом риска, приводят ли более высокие комиссии к лучшим преимуществам диверсификации.

Тема актуальна из-за плохой производительности хедж-фондовой индустрии, что заставляет инвесторов задуматься о целесообразности инвестирования в хедж-фонды.

Ключевые слова: хедж-фонды, комиссии, эффективность, выгоды, диверсификация
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Do hedge funds with above average fees really outperform?

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Abstract: In this research paper the question ‘Do hedge funds with a high incentive fee really outperform hedge funds with a below average or low incentive fee?’ is answered by carrying out author’s own regression on historical data and the variables that may explain the outcomes in this question. The author also considers academic researches to support the findings and add additional explanations to the outcome. Aside from testing whether hedge funds with high incentive- and management fees really outperform the hedge funds with low incentive- and management fees, the author also assesses whether they will offer better diversification benefits in times of need by looking at the correlation during a crisis period.

In order to come to the article’s conclusion, the author answers the following questions: what relation does the fee-structure have to absolute returns, what relation does the fee-structure have to risk-adjusted returns, does paying higher fees mean better diversification benefits.

This topic is relevant since many investors started questioning the benefit of investing their money in hedge funds because of poor performance of the hedge fund industry.

Keywords: hedge funds, fees, performance, benefits, diversification
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Introduction
Many investors started questioning the benefit of investing their money in hedge funds after the poor performance of the hedge fund industry during 2016. According to eVestment the hedge fund industry has seen the biggest number of redemptions since 2009.

Since the hedge fund industry as a whole has underperformed many indices such as the S&P 500, it can be said that it would be a waste of money to pay high fees for a fund that doesn’t serve its purpose of generating uncorrelated returns and alpha.

Hedge funds are managed portfolios created to pool together the funds of multiple investors, manage the funds to generate significant returns and low correlation by active and more aggressive investment strategies. Some of the clients of hedge funds include retirement funds and wealthy individuals. Unlike mutual funds, which are also managed portfolios of pooled funds, hedge funds are less regulated by the SEC, and therefore have different perks and characteristics. For example, hedge funds are only accessible to accredited investors that have an income of $200k or more per year and are allowed to take (speculative) positions in derivatives and short sales. Hedge funds typically take on a high leverage to enhance their returns. Mutual funds generally only stick to stocks and bonds, while hedge funds can invest in any assets such as real estate, currencies or even make speculative positions on cattle, for example. Hedge funds are a fast-growing industry. The hedge fund industry is currently managing $3.2 trillion in assets under management (AUM) compared to $118 billion in 1997. Of this $3.2 trillion AUM roughly 71 % is managed by managers in the USA. Hedge fund managers typically receive their remunerations in the form of a fee structure. Hedge fund managers receive management fees similarly to mutual fund managers, which is a fixed percentage of the investor’s principal investment. This number is roughly 1.57 % by mean with 2 % being seen as standard. Hedge funds also receive a performance/incentive fee, which is a fixed percentage of the profits over a certain benchmark. The mean Incentive fee is 19.29 % with 20 % being seen as standard.

Two additions that can be seen to the fee structure of hedge funds are high-water marks and a hurdle rate. A high-water mark is the principal plus the highest gain that the investor has received on this amount. If the fund has never made a profit, the high-water mark will equal the principal. After the fund has exceeded the high-water mark, it can charge the investor the incentive fee. This measure makes sure that investors are only charged when the fund is generating profit. The hurdle rate is a relative benchmark that must be passed before the fund can collect any incentive remuneration. The hurdle rate can also be seen as an indication of how risky the investment is. A high hurdle rate indicates a riskier investment.

Hedge funds follow diverse strategies. Hedge fund managers have their own individual strategies to distinguish themselves from other managers. However, most hedge funds can be classified within a few broad strategies such as Equity hedge, CTA, relative value, and fund-of-funds. This paper will be focusing on the equity hedge strategy since this strategy can be easily compared to the overall stock market and they have the largest presence in the dataset available from Bloomberg. This allows to reduce the sampling error.

The equity hedge strategy, which is also known as the equity long/short strategy, buys stocks that it believes are undervalued, and short-sells stocks that it believes are overvalued. This first of all creates a high leverage since the proceeds from the short-sale can be used to purchase other stocks. And second of all, gives the manager the opportunity to diversify market risk by taking on a short-position which can turn a positive correlation into a negative correlation.

Literature review
The literature review is based on 22 papers about hedge fund and mutual fund fee structures. The reason for this is that hedge funds and mutual funds have similarities in terms of structure and there is a large amount of research available on this subject for mutual funds. The literature review is structured to cover the following questions:
1. What are the key components to set or change the fee structure? And what is the impact of this structure?
2. What are the theories that relate fees and performance?
3. Does the fee structure have different effects on mutual funds?

What are the key components to set or change the fee structure? And what is the impact of this structure?
In theory, skilled portfolio managers are attracted to funds with a high incentive fee in order to reward them for their performance. Allowing the fund to yield better returns for their investors. This is the main reason why the fee structure of a hedge fund is seen as a signal on how skilled the fund manager is.

Generally speaking, a 2 % management fee and a 20 % incentive fee are seen as the median fee structure of a hedge fund.

According to empirical research done by Deuskar et al. (2011) and Ramadorai and Streatchfield (2011) smaller hedge funds tend to charge lower management fees and higher incentive fees, while relatively large hedge funds charge higher management fees with lower incentive fees. Ramadorai and Streatchfield (2011) found in their research that funds with relatively high management fees at launch do not tend to outperform the funds with low fees, indicating that it is “Money for nothing”. On the contrary, funds with an above average incentive fee at launch are outperforming in terms of raw returns. Ramadorai and Streatchfield
Rich and Lajbcygier (2015) mentioned two theories about the fee structure by increasing the fees or allow the fund to grow by not changing the fee structure and get more profit from the fees on the higher AUM. According to Berk and Green (2004) and Dangl, Wu, and Zechner (2008), managers have no obvious preference between these two options if they can freely adjust the portfolio risk.

One negative effect of the fund to grow is the diseconomy of scale effect. This occurs when the positions of hedge funds grow so large that entering or exiting the position requires more effort and costs.

This illiquidity has a negative effect on the performance. At the same time, according to the empirical evidence of Yin (2015), managers will have increased compensation if they allow the fund to grow, even when diseconomies of scale exist.

However, according to Dangl, Wu, and Zechner (2008), there is also a positive relation between the management fee and the amount of risk taken. As mentioned earlier, larger fund size means larger liquidity risks. This indicates that if the fund size is large, the fund manager will have to invest in more liquid assets, and thus save the investments. If the management fee is higher, and the fund size decreases, the manager can invest a larger percentage in more illiquid assets and thus risky investments.

What are the theories that relate fees and performance? Rich and Lajbcygier (2015) mentioned two theories about
the relations between hedge fund and fee performance in their work: The efficient market theory and the Principal-Agent theory.

The efficient market theory states that it is impossible to "beat the market" because all publicly traded stocks automatically reflect their true value. Therefore, it is impossible to possess superior stock picking skills. This means that managers from high-fee funds theoretically should not be able to outperform the managers from low-fee funds. Rich and Lajbcygier explained the higher average returns for high-fee funds by concluding that it is not effect of superior stock picking, but simply by having a higher leverage and this taking more risk. The claim that funds with a higher incentive fee take more risk has been supported by the work of Kouwenberg and Ziemba (2007) mentioned earlier.

The Principal-Agent theory discussed by Jensen and Meckling (1976) and Ross (1973) states that the principal (investor) hires an agent (fund manager) to execute a certain objective (making profit). According to the agency law the agent should always handle in the best interest of the principal. However, Ackerman, McEnally and Ravenscraft (1999) acknowledged that due to information asymmetry this is not always the case. They identified four measures that could mitigate this Principal-Agent problem: incentive fees, joint ownership structures, market forces and government regulation. Since with hedge funds most emphasises is put on the first two, they are the ones we will discuss.

Incentive contracts are put in place to maximize both efficiency and effort to act in the best interest of the principal. By linking output and payment the agent will naturally deploy the skills to the maximum.

A joint ownership structure could also significantly mitigate this risk as mentioned by Kouwenberg and Ziemba (2007). However, Ackerman, McEnally and Ravenscraft (1999) claim that if the fund manager has his own capital invested in the fund, the behaviour of the manager might significantly increase effort, but make the fund manager more risk averse. A high stake in the fund might also make it harder to replace the manager in case of bad performance.

Does the fee structure have different effects on mutual funds?

In order to discuss the difference between hedge fund fee structures and mutual fee fund structures, we will first discuss the major differences between the two. Then, we will look at each of the determinants and effects of the fees. Elton, Gruber, and Blake (2003) mentioned some important differences in their work, the most important one is that mutual funds fall under SEC regulation, which requires them to disclose their audited returns and other data such as AUM and fee-structure to the SEC. They are also prevented from using more risky techniques such as short-selling or using derivatives for non-hedging purposes. An amendment from 1970 of the 1940 Investment Act requires mutual funds to operate by a so-called 'fulcrum fee'. The fulcrum fee requires by law the mutual fund to charge investors a symmetrical fee, which means that the mutual fund will receive a fee when the fund outperforms the chosen benchmark and has to pay a fee when the fund underperforms the benchmark. Because of this symmetrical requirement, incentive fees are less common in the US. Elton, Gruber, and Blake (2003) also mention that out of the 6,716 bond and stock mutual funds in 1999, only 108 charged incentive fees. Therefore, this paper will mainly focus on management fees, unless mentioned otherwise.

Just like with hedge funds, Golec (1988) names the signalling theory, mentioned earlier in the literature review, as a potential explanation for the determinants of the fee-structure. Warner and Wu (2011) had similar results in their work. In addition, Golec (1988) adds that funds from a larger family tend to charge this symmetric performance fee because they are well capable of bearing the loss if the returns turn negative. However, Drago, Lazzari, and Navone (2010) did not find such evidence in their work. One explanation for this contrast in results would be that Drago, Lazzari, and Navone (2010) conducted their work on Italian mutual funds, rather than American mutual funds. Khorana, Servaes, and Tufano (2008) found a significant correlation between the location and the fee-structure of mutual funds. They found that U.S. onshore-funds charge lower fees than offshore-based funds. This can be explained due to the smaller economies of scale in the offshore countries where the funds are domiciled, requiring the funds to charge higher costs to cover the overhead costs. They also found correlation between GDP, education level and fees: Funds domiciled in countries with a high per-capita GDP and a well-educated population charge lower management fees.

In terms of change in fees, Warner and Wu (2011) found a positive relation between the increase in management fees and positive performance. However, they didn't find a link between poor performance and a decrease in funds. They did find a link between growth and fee structure, as funds that grow will have an economy of scale and can therefore decide to lower their management fees while maintaining the same revenue in terms of fee income. Christoffersen (2001) found that half of the U.S. mutual fund managers voluntarily waived the fees that they could rightfully claim to improve their net performance.

Risk, performance, and fees also play an important role. Earlier in the literature review, Kouwenberg and Ziemba (2007) claimed that a higher incentive fee indeed leads to more risk in hedge funds. Ackerman, McEnally, and Ravenscraft (1999) claimed it would lead to less risk-taking. For mutual funds Elton, Gruber, and Blake (2003) found that mutual funds with incentive fees have positive risk adjusted returns, but are still outperformed by the market. The simple reason for this is that incentive-fee mutual funds have a market beta of less than 1. The efficient market theory by the market. The simple reason for this is that incen
However, they do have a positive stock-picking ability. Elton, Gruber, and Blake (2003) found that incentive-fee mutual funds tend to increase risk after a period of poor performance, and vice versa. Golec (1988) with his signalling theory mentions that the incentive-fee funds attracts fund managers with an aggressive approach, and therefore allow incentive-fee funds to have more risk.

Grinblatt and Titman (1989) on the other hand, mentioned the incentive for more risk-taking is increased only when the fee-contract is poorly constructed without caps and symmetry. Carpenter (2001) mentioned that some companies/funds “reset the strike prices of their compensatory options” to avoid this additional risk-taking.

Drago, Lazzari, and Navone (2010) did not find any proof of more risk-taking in their work.

According to Elton, Gruber, and Blake (2003), managers believe that having a (higher) incentive fee will lead to more cash inflows as this signals their superior ability (which bears more risk). They also mention that the average investor prefers to have more risk in their investment since the inflow into incentive-fee funds is far greater than those that do not have such a fee. Admati and Pfleiderer (1997), however, claim that incentive-fees don’t play a role on the fund’s cash inflows as investors are uncertain about the risk tolerance of the fund manager.

Berk and Green (2004) found a relation between the past performance of funds and the inflow of new funds, even though the past performance does not persist. Since Golec (1988) concluded in his work that funds with an incentive fee structure outperform those that don’t, we can conclude that these funds will also attract more cash inflows.

Data and methodology
Data has been gathered from the Bloomberg funds database. Bloomberg is known worldwide for its wide availability and easy access to the database for students, academics, and professionals. The Bloomberg funds database consists of hedge funds, both active and defunct. The author has restricted the analysis to United States Dollar denominated hedge funds and has filtered out non-equity hedge funds while also looking at the correlation between the MSCI world index. After applying these filters, 1170 funds remained in the list for the analysis. Hedge funds report on their results monthly by convention, and therefore all calculations are done with a monthly frequency.

For this analysis the author has split the data into a period of economic expansion and a period of recession. This was done to test the fees on their significance during crisis and (normal) expansion period. The data sample ranges between December 2001 and June 2009. The first period ranges from December 2001 to December 2007, as this was a period of an economic expansion according to the NBER. The economic expansion reached its peak in December 2007 and the recession period started in January 2008 and lasted until June 2009, which was the largest crisis in the U.S. since World War II. Another reason for the chosen timeframe is the amount of data available in the author’s data set during this period, giving the model more robustness against sampling errors.

From the Bloomberg Funds Database, the author has gathered the following data: (1) Fund’s monthly returns, (2) Fund’s incentive fees, (3) Fund’s management fees, (4) Fund’s Inception dates, (5) Fund’s high-water marks (1 if yes, 0 if no), (6) MSCI monthly returns and the (7) 1 Month T-bill returns.

Aside from the data mentioned above, the author has also created several extra variables that could explain the return movements: (8) monthly Sharpe ratio, (9) age of the fund, (10) MSCI correlation and (11) standard deviation of the fund.

The monthly Sharpe ratio was calculated using the following formula:

\[ \text{Sharpe}_x = \frac{(R_x - R_f)}{\sigma_x} \]

where:

- \( \text{Sharpe}_x \) = The Monthly corresponding sharpe ratio for fund x;
- \( R_x \) = The Monthly corresponding return for fund x;
- \( R_f \) = The annualised 1 month Treasury bill converted to monthly for the correg period;
- \( \sigma_x \) = Standard deviation of the fund returns of fund x.

The age of the fund was calculated using the following formula:

\[ \text{Age}_x = \text{Reporting date} - \text{inception date} \]

The MSCI world correlation was calculated using a VBA script, which can be found in the appendix. This VBA script matches the Excel correlation function of the returns of to the returns of the MSCI World for the correct time period. A problem that must be acknowledged when using the Sharpe ratio on hedge funds is that hedge funds have highly (positively) skewed returns due to the use of derivatives. Because of this, the Sortino-ratio, which focusses more on downside risk, would be a better option. However, in order to compare the results to those of other authors with similar returns, the author has chosen to use the Sharpe ratio.

It also has to be noted that the MSCI correlation is static and will not change over time in the sample. It is a mere indication of how correlated the funds are to the MSCI.

The standard deviation has also been calculated using the Excel standard deviation function of the returns of.

The hedge funds have been sorted from high to low on three criteria:
- An average of the management and performance fee,
- Performance fee,
- Management fee.

From that point onwards, the dataset can be divided into four quartiles. Since the 2/20 structure is the most common as mentioned in the introduction, the author has merged the two top quartiles into one quartile. The bottom two quartiles have also been merged into one quar-

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tile. Due to the large amount of funds, the data was put in a dated unbalanced panel format by using a self-written Visual Basic script, which can be found in the appendix.

After the data has been divided following the three criteria, each group is analyzed separately. To determine whether there is a relation between the fee-structure of a fund and the returns of the fund, the author created the following order to structure the work:
1. First, looking at the descriptive statistics of the data collected. Then creating one table for the pre-crisis period and one table for the crisis period.
2. Splitting the OLS regression in two parts:
   a. Part 1: The OLS regressions with the returns as the dependent variable during the pre-crisis and crisis period.
   b. Part 2: The OLS regressions with the Sharpe ratio as the dependent variable during the pre-crisis and crisis period to proxy the risk-adjusted returns.
3. Looking at the diversification benefits each quartile offers to make the assumption whether paying high fees result in better diversification benefits.
4. After these analyses we want to be able to tell:
   1. What relation does the fee-structure have to absolute returns?
   2. What relation does the fee-structure have to risk-adjusted returns?
   3. Does paying higher fees mean better diversification benefits?

For these three questions the author has created the following formulae that can be used in an OLS (Ordinary Least Squares) regression. Each formula (unless mentioned otherwise) will be used during crisis and pre-crisis period.

\[
return_t = \alpha + \beta_1 \text{MSCI}_\text{World} + \beta_2 \text{PerformanceFee} + \\
+ \beta_3 \text{ManagementFee} + \beta_4 \text{MSCI}_\text{COR} + \\
+ \beta_5 \text{HighWaterMark} + \beta_6 \text{Age} + \beta_7 \text{StDEV} + \epsilon_x
\]

\[
\text{Sharpe} = \alpha + \beta_1 \text{MSCI}_\text{World} + \beta_2 \text{PerformanceFee} + \\
+ \beta_3 \text{ManagementFee} + \beta_4 \text{MSCI}_\text{COR} + \\
+ \beta_5 \text{HighWaterMark} + \beta_6 \text{Age} + \beta_7 \text{StDEV} + \epsilon_x
\]

\[
\text{MSCI}_\text{COR}_t = \alpha + \beta_1 \text{MSCI}_\text{World} + \beta_2 \text{return} + \\
+ \beta_3 \text{ManagementFee} + \beta_4 \text{PerformanceFee} + \\
+ \beta_5 \text{HighWaterMark} + \beta_6 \text{Age} + \beta_7 \text{StDEV} + \epsilon_x
\]

Formulae 1 and 2 are similar to the models used by Rich and Lajbcygier (2015) and are constructed to find the variables that can explain the average returns and the risk-adjusted returns (Sharpe).

Formula 3 is also similar to the models used by Rich and Lajbcygier (2015) and has been constructed to detect a relation between the correlation of the fund and the management and performance fees.

The MSCI World index has been added as a variable since only equity hedge funds were picked for the research. The MSCI world index consists of 1652 stocks from 23 countries, and therefore serves as a good proxy of the global stock market. However, it must be noted that the MSCI world excludes emerging and frontier markets. Since the hedge funds can buy any stock from any country in the world, the author decided to use the MSCI World index.

The High-Water mark variable has been added to the variables to determine whether it truly is adding to the riskiness of the fund. Panageas and Westerfield (2009) claimed that it is not adding risk to the fund while Goetzmann, Ingersoll, and Ross (2001) claim it does add risk to the fund’s portfolio. Adding this variable also gives the opportunity to check whether it plays an important role in explaining the returns.

The Age variable has been added to find the possible correlation between the age of the fund and its performance. With this variable we can also look for an explanation to see whether the age of a fund determines the fee structure. Based on the signalling theory described earlier, the author expects the age variable to have significant impact on both the performance and the management fees.

The standard deviation variable has been added to see whether there is a relation between incentive fees and more risk-taking. Kouwenberg and Ziemba (2007) concluded from their research that this is indeed the case. However, they also noted that if the fund manager has 30% or more of his own capital in the fund, this risk-taking is significantly reduced.

Biases and problems
Since Hedge funds are not obliged to voluntarily report to the Bloomberg funds database, there may be biases present that can interfere with the results from the analysis. The following biases that can be present:
- Survivorship bias,
- Instant-history bias,
- Self-selection bias,
- Causality problem,
- Return smoothing problem.

The survivorship bias is the result of funds with consistently negative performance disappearing after they are closed. This happens because funds with positive performance are more likely to survive than those with negative performance. This particularly affects new funds since the Bloomberg fund database includes both inactive and live funds.

The instant-history bias, observed by Fung and Hsieh (2002), states that managers of new funds only want to reveal their returns if these have been meeting their expectations. If a new fund has been added to the database, the manager will add the prior returns to the database only if they are positive. The main reason to do this is to attract new investors for the fund. The Bloomberg database does not show when the returns are
added to the database, and therefore we are unable to see the extent of the instant-history bias.

The self-selection bias mentioned by Fung and Hsieh (2002), on the other hand, states that funds with excellent returns that are not looking for new investors may not wish to be included into the database. Since the funds have never been present in the database, there may be some “invisible” funds with a fee-structure relevant to this research.

The causality problem mentioned by Rich and Laljbcygier (2015) would affect our result as we are not certain whether funds with high fees get higher returns, or whether their fees are higher after negotiation due to good performance. Rich and Laljbcygier (2015) mention that Deuskar et al. (2011) found that only 2% of the funds in the TASS database renegotiated their fee-structure. It is not possible to observe this in the Bloomberg funds database.

The return-smoothing problem has been described in the work of Huang, Liechty, and Rossi (2009) and states that hedge funds often hold illiquid assets whose true values are hard to identify and are slowly reflected in the returns of the fund. Hedge funds can for this reason intentionally or unintentionally give the performance of the fund an upward bias. Huang, Liechty, and Rossi (2009) applied their model on a sample of U.S. equity funds and found that even for this relatively liquid strategy the funds show signs of return smoothing. Therefore, we can assume that return smoothing will also be present in funds within the dataset.

Results of the research

Descriptive data

After having gathered the data for the crisis and post-crisis period, the author has generated a descriptive statistics table for the periods included in the research. Table 1 represents the pre-crisis period and Table 2 represents the crisis period.

It is worth mentioning that the median values of the performance fees in both periods are 20%, which is the same as the data mentioned by Preqin in the Introduction. For the management fees this number is 1.5%, which is inconsistent with Preqin. However, these findings are similar to those made by Rich and Laljbcygier (2015).

The skewness and kurtosis test the normality of the data. If the skewness is greater than 1 or smaller than -1, the distribution is leptokurtic (fatter tails). A skewness between -0.5 and 0.5 indicates approximate symmetry. Kurtosis is better in measuring the peaks in a dataset. A kurtosis of exactly 3 means normal distribution while a kurtosis between -0.5 and 0.5 indicates approximate symmetry. A kurtosis greater than 3 indicates a leptokurtic dataset. Looking at the skewness and kurtosis of the management fee, we can see that they are symmetric, but leptokurtic. Indicating that the fees are roughly distributed around the mean but have some outliers. The performance fee is also non-normal and is more skewed to the left. Rich and Laljbcygier (2015) also found this in their work and were surprised since other academics found negative skewed returns in their empirical evidence. Rich and Laljbcygier (2015) mention that this can be explained since our sample occurs right after the dotcom bubble and at that moment the markets were recovering.

In terms of return, the mean fund return during normal market conditions were 1.3% (1% median) and during crisis this number was -0.6% (-0.1% median). This can easily be explained by the financial crisis during this period. The excessively high skewness and kurtosis numbers in the table indicate that the returns are highly not normal and leptokurtic. The skewness is positive during both periods, indicating a longer distribution on the right side of the curve. This right-skewed distribution is mitigated during the financial crisis, moving it to the left.

The high kurtosis values during pre-crisis and crisis period of 63 and 52.7 respectively indicates that there are massive outliers, and a risk-adjusted measurement would be more appropriate to mitigate this risk. This can be easily observed by the fact that the Sharpe-ratio has a lower value during the financial crisis.

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It was also noticed that the mean age (in days) of the funds before the crisis was 862 days (728 median) and during the financial crisis this number was 1232 (1095 median). This can easily be explained by the financial crisis during this period. The excessively high skewness and kurtosis numbers in the table indicate that the returns are highly not normal and leptokurtic. The skewness is positive during both periods, indicating a longer distribution on the right side of the curve. This right-skewed distribution is mitigated during the financial crisis, moving it to the left.

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would simply be that due to the lack of trust in the market, no new hedge fund managers have entered the industry.

The use of a high-water mark also seems to be very popular among hedge funds. With 96% of the funds having one in place before the crisis and 95% after. According to Goetzmann, Ingersoll, and Ross (2001), this would lead to more risk-taking since the high-water mark is similar to an option-contract.

Average fees, part 1: Return as dependent variable

Let’s discuss the OLS regression output of pre-crisis and crisis period for the bottom quartile funds that have been sorted by average total fees. After having used formula 1 in Eviews, the following results were calculated (Table 3, 4).

It is worth mentioning that before the crisis all variables were significant in explaining the returns of the hedge funds. For example, a 1% increase in performance fees would lead to a 0.022% increase in monthly returns if other parameters remain fixed. The management fee has a far greater effect on the performance. For every 1% increase in management fee, the monthly returns are expected to rise by 0.32%.

To assess why this could be the case, we will have to refer to some possible explanations given in the literature review. Gompers and Lerner (1999) explained in signalling model that fund managers first try to attract new cash flows to the fund by making it financially attractive. This means low fixed costs (management fees) and higher incentive-based fees. After the manager ‘has proven’ himself, he will become more risk averse and increase the management fee to cover more overhead costs. This can mean that the fund managers with more experience from the more established funds typically have higher management fees, and therefore the management fee is highly significant in explaining the returns. And vice versa, the less experienced fund managers have a lower management fee.

The significant management fee coefficient also contradicts Ramadorai and Streatfield, who claimed high management fees were ‘money for nothing’. It supports Warner and Wu (2011), who found a positive relationship between an increase in management fees and positive performance among mutual funds.

The high F-statistic value with 0% probability indicates that the values aren’t related to each other by chance. However, during the crisis only the MSCI correlation and the MSCI world index keep on playing a role in explaining the model.

The funds in the bottom quartiles have such a high correlation to the MSCI world that no matter the level of management fees, performance fees or any other variable present, they will follow the market. An explanation for the standard deviation that became insignificant could be that hedge funds typically have a more asymmetric return profile due to the use of derivatives for hedging, which caps the losses. The negative coefficient on the MSCI correlation also indicates that the higher your correlation is, the lower your returns will be (Table 5, 6).

The results for the top quartile are similar to those in the bottom quartile. However, the coefficients, high-water mark and the standard deviation (risk) are different during both periods. On top of that, fund’s age became significant for the crisis period.

The first thing to mention is that the coefficient for the performance fee is about 10x higher for the top quartile funds (Table 5) than for the lower quartile funds (Table 3) during the pre-crisis period. This shows that the effect of the performance fee is a lot stronger among the funds with above average fees than the ones with below average fees. A possible explanation for this would be the Principal-Agent theory discussed by Jensen and Meckling (1976) and
Ross (1973). It states that the more you pay the agent (fund manager), the more effort they will put in.

The signalling model from Gompers and Lerner (1999) could also play a role, indicating that better and more experienced fund managers are attracted to the funds with higher fees. The age variable, which is significant in both periods, could also support the theory from Gompers and Lerner (1999) that the fund managers with more experience from the more established funds typically have higher management fees.

The standard deviation and high-water mark variables that become insignificant are also worth mentioning. The insignificance of the standard deviation variable supports what Brown, Goetzmann, and Park (2001) found in their work: Higher hedge fund fees do not lead to more risk-taking. The high-water mark could be related to the standard deviation in our case, as it was already linked to more risk-taking due to the similarity of an option contract.

Average fees, part 2: Sharpe ratio as the dependent variable

Let’s discuss the OLS regression output of pre-crisis and crisis period for the bottom quartile funds that have been sorted by average total fees. This time the Sharpe ratio is used as the dependent variable to gauge risk-free returns. After having used formula 2 in Eviews, the following results were calculated (Table 7, 8).

The significance of the variables in Table 7 are similar to those in Table 3. However, the variable high-water mark is now insignificant. Since the dependent variable is now risk-adjusted, we can assume that the high-water mark was linked to the riskiness of the returns. This would support Goetzmann, Ingersoll, and Ross (2001) claiming that a high-water mark leads to more risk due to the similarity with an option contract.

Looking at the significances of the variables in Table 8 during crisis period, we can see that the results are similar to those in Table 4. There is, however, a significance at the 10 % level of the management fee during the crisis period. Which indicates higher risk-adjusted returns for the funds in the lowest quartile. This is consistent with what Rich and Lajbcygier (2015) found in their work.

With the top-quartile funds, variables give different results. The high-water mark using the Sharpe ratio (Table 9) became highly significant in the top quartile, while the high-water mark became insignificant in the top-quartile using the returns (Table 5) as the dependent variable. The negative, thus indicating that adding the high-water mark to the funds with high fees leads to lower risk adjusted returns. Since the high-water mark has previously been linked to the risk of a fund, we can conclude that funds with a high-water mark make riskier investments in terms of risk-adjusted returns.

Again, the coefficients of the top-quartile funds’ performance fees are significantly higher than those in the bottom quartile. This indicates that under normal market conditions higher performance fees result in significantly higher risk-adjusted returns.

Do funds with higher average fees offer better diversification?

In order to see whether funds with a high fee-structure at least offer better diversification benefits we will first look at the correlation between the MSCI World index and the returns of the hedge funds. Please note that the correlation in Table 11 is time-weighted and therefore different from the correlation in the descriptive statistics, which is weighted per fund. From this table we can see that both quartiles offer similar correlation during normal market conditions. However, during crisis period the funds in the top quartile offer significant diversification benefits. To assess these diversification benefits

### Table 7. OLS regression on Sharpe ratio pre-crisis. Bottom quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.0071</td>
<td>0.0030</td>
<td>2.34</td>
<td>0.02</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.0106</td>
<td>0.0044</td>
<td>2.29</td>
<td>0.02</td>
</tr>
<tr>
<td>PERFORMANCEFEES</td>
<td>0.00060</td>
<td>0.00010</td>
<td>6.00</td>
<td>0.00</td>
</tr>
<tr>
<td>BHANALYSE</td>
<td>0.00050</td>
<td>0.00010</td>
<td>5.00</td>
<td>0.00</td>
</tr>
<tr>
<td>NAVGROWTH</td>
<td>-0.00030</td>
<td>0.00010</td>
<td>-3.00</td>
<td>0.00</td>
</tr>
<tr>
<td>AGE</td>
<td>0.00020</td>
<td>0.00010</td>
<td>2.00</td>
<td>0.05</td>
</tr>
<tr>
<td>MSCI_CORR</td>
<td>0.00040</td>
<td>0.00020</td>
<td>2.00</td>
<td>0.05</td>
</tr>
</tbody>
</table>

### Table 8. OLS regression on Sharpe ratio during crisis. Bottom quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.0071</td>
<td>0.0030</td>
<td>2.34</td>
<td>0.02</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.0106</td>
<td>0.0044</td>
<td>2.29</td>
<td>0.02</td>
</tr>
<tr>
<td>PERFORMANCEFEES</td>
<td>0.00060</td>
<td>0.00010</td>
<td>6.00</td>
<td>0.00</td>
</tr>
<tr>
<td>BHANALYSE</td>
<td>0.00050</td>
<td>0.00010</td>
<td>5.00</td>
<td>0.00</td>
</tr>
<tr>
<td>NAVGROWTH</td>
<td>-0.00030</td>
<td>0.00010</td>
<td>-3.00</td>
<td>0.00</td>
</tr>
<tr>
<td>AGE</td>
<td>0.00020</td>
<td>0.00010</td>
<td>2.00</td>
<td>0.05</td>
</tr>
<tr>
<td>MSCI_CORR</td>
<td>0.00040</td>
<td>0.00020</td>
<td>2.00</td>
<td>0.05</td>
</tr>
</tbody>
</table>

### Table 9. OLS regression on Sharpe ratio during crisis. Bottom quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.0071</td>
<td>0.0030</td>
<td>2.34</td>
<td>0.02</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.0106</td>
<td>0.0044</td>
<td>2.29</td>
<td>0.02</td>
</tr>
<tr>
<td>PERFORMANCEFEES</td>
<td>0.00060</td>
<td>0.00010</td>
<td>6.00</td>
<td>0.00</td>
</tr>
<tr>
<td>BHANALYSE</td>
<td>0.00050</td>
<td>0.00010</td>
<td>5.00</td>
<td>0.00</td>
</tr>
<tr>
<td>NAVGROWTH</td>
<td>-0.00030</td>
<td>0.00010</td>
<td>-3.00</td>
<td>0.00</td>
</tr>
<tr>
<td>AGE</td>
<td>0.00020</td>
<td>0.00010</td>
<td>2.00</td>
<td>0.05</td>
</tr>
<tr>
<td>MSCI_CORR</td>
<td>0.00040</td>
<td>0.00020</td>
<td>2.00</td>
<td>0.05</td>
</tr>
</tbody>
</table>

### Table 10. OLS regression on Sharpe ratio during crisis. Bottom quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.0071</td>
<td>0.0030</td>
<td>2.34</td>
<td>0.02</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.0106</td>
<td>0.0044</td>
<td>2.29</td>
<td>0.02</td>
</tr>
<tr>
<td>PERFORMANCEFEES</td>
<td>0.00060</td>
<td>0.00010</td>
<td>6.00</td>
<td>0.00</td>
</tr>
<tr>
<td>BHANALYSE</td>
<td>0.00050</td>
<td>0.00010</td>
<td>5.00</td>
<td>0.00</td>
</tr>
<tr>
<td>NAVGROWTH</td>
<td>-0.00030</td>
<td>0.00010</td>
<td>-3.00</td>
<td>0.00</td>
</tr>
<tr>
<td>AGE</td>
<td>0.00020</td>
<td>0.00010</td>
<td>2.00</td>
<td>0.05</td>
</tr>
<tr>
<td>MSCI_CORR</td>
<td>0.00040</td>
<td>0.00020</td>
<td>2.00</td>
<td>0.05</td>
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</table>

### Table 11. Correlation between MSCI World index and hedge funds returns

<table>
<thead>
<tr>
<th>Correlation Coefficient</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSCI</td>
<td>0.00040</td>
</tr>
<tr>
<td>PERFORMANCEFEES</td>
<td>0.00060</td>
</tr>
<tr>
<td>BHANALYSE</td>
<td>0.00050</td>
</tr>
<tr>
<td>NAVGROWTH</td>
<td>0.00030</td>
</tr>
<tr>
<td>AGE</td>
<td>0.00020</td>
</tr>
<tr>
<td>MSCI_CORR</td>
<td>0.00040</td>
</tr>
</tbody>
</table>
we will use formula 3 to see how the correlation coefficients react to the fee structure of the fund.

In Tables 12 and 13, all variables were highly significant with a 0% probability in explaining the correlation of the MSCI to the fees of the funds. What is interesting to see is that the funds in the top quartile get better diversification for every increase in management fee. At the same time, in the bottom quartile the diversification gets worse. From these two tables we can conclude that funds with a higher fee structure offer better diversification benefits when needed during a crisis.

**Performance fees, part 1: Returns as the dependent variable**

Let's discuss the OLS regression output of pre-crisis and crisis period for the bottom quartile funds that have been sorted by their performance fees. After having used formula 1 in Eviews, the following results were calculated (Table 14, 15).

Looking at the bottom quartile hedge funds sorted by their performance fee, we can see that both the management fee and the performance fee has become insignificant. In this data sample all the other values are similar to those sorted by average fees in Tables 3 and 4. The Principal-Agent theory discussed by Jensen and Meckling (1976) and Ross (1973) could again be a driver in the sudden insignificance of these fees. Since they get a low pay, the investment could be more passive, rather than active, explaining the high MSCI correlation and MSCI insignificance. For the funds in the top quartile sorted by performance fees the results are presented in Tables 16 and 17.

These results are again similar to those sorted by average fees in Tables 5 and 6. However, the standard deviation and high-water mark are now significant. The standard deviation is now a key driver in explaining the returns. From this we can conclude that the funds with a high performance fee take on more risk. The high-water mark has a negative effect on the returns, however, which is probably related to the risk-taking, since we have seen this combination before. The crisis period in Table 17 has the same features as the crisis period in Table 6.

**Performance fees, part 2: Sharpe ratio as the dependent variable**

Let's look at the major discovery from the OLS regression output of pre-crisis and crisis period for the bottom quartile funds that have been sorted by performance fees. This time the Sharpe ratio is used as the dependent variable to gauge risk-free returns. After having used formula 2 in Eviews, the following results were calculated (Tables 18, 19).

The most important things worth noting in findings about the Sharpe ratio are the negative correlation between the management fee and the Sharpe ratio and the significance of the management fee during the financial crisis.

The negative correlation between the management fee and the Sharpe ratio is consistent with the conclusions from Deuskar et al. (2011), Dangl, Wu, and Zechnert (2008) mentioned in the literature review. Deuskar et al. (2011) found a positive correlation between higher management fees and capital inflow. From this we can conclude that funds with a higher management fee get less cash inflows because they are less attractive to new investors. Dangl, Wu, and Zechnert (2008) mentioned the combination of liquidity and economy of scale as one of the key drivers for fund managers to take risk. If the fund manager has a large amount of AUM, it will be very hard to enter and exit highly illiquid positions. Therefore, funds with a low cash inflow (high management fee) can invest in riskier assets. This could explain the drop in the Sharpe ratio for every increase in management fee. The reason why this is different from our earlier results in tables 2 to 5 is that the management fees are distributed in with small increments compared to the performance fee, and therefore have less influence in the sorting process.
Do funds with higher performance fees offer better diversification?

To see whether funds with a high performance offer better diversification benefits than those with a lower one, we started looking at the correlation of the MSCI world index and the returns again. The results are very similar to those in Table 11 and show that the correlation of funds with higher performance fees is indeed better. After using formula 3 in Eviews we obtained the coefficients of the funds that have been sorted by performance fee.

When we start looking at the coefficients, things are very different. Firstly, the coefficients show that an increase in both management and performance fees would still lead to better diversification. However, the bottom quartiles have a stronger relation to this increase in MSCI correlation. This is in line with the findings on the negative risk-adjusted coefficient in Table 20, connecting riskier investments with a higher management fee.

Management fees, part 1: Returns as the dependent variable

Let’s discuss the OLS regression output of pre-crisis and crisis period for the bottom quartile funds that have been sorted by their management fees. After having used formula 1 in Eviews, the following results were calculated (Tables 25, 26).

The observation of the management fee being significant at 10% with a positive coefficient and an insignificant performance fee is also remarkable. This is consistent with the findings of Rich and Lajbcygier (2015). It is surprising since it predicts the principal-agent theory of Jensen and Meckling (1976) and Ross (1973), which links effort to payout. This finding does support the signalling model from Gompers and Lerner (1999), which states that better fund managers, which are risk-averse, charge higher management fees. This finding is important since the hedge fund industry prefers performance fee over fixed fee (Rich and Lajbcygier, 2015).

### Table 16. OLS regression on returns pre-crisis. Top quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-0.03125</td>
<td>0.00278</td>
<td>-11.8389</td>
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</tr>
<tr>
<td>MSCI</td>
<td>0.03126</td>
<td>0.01541</td>
<td>2.0649</td>
<td>0.0600</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>0.1527</td>
<td>0.0002</td>
<td>8.4706</td>
<td>0.0000</td>
</tr>
<tr>
<td>WEALTH/INCOME</td>
<td>0.32846</td>
<td>0.01957</td>
<td>15.1465</td>
<td>0.0000</td>
</tr>
<tr>
<td>AGE</td>
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<td>6.1817</td>
<td>-0.3761</td>
<td>0.7090</td>
</tr>
<tr>
<td>RISK_COMM</td>
<td>0.24655</td>
<td>0.00431</td>
<td>5.6941</td>
<td>0.0000</td>
</tr>
<tr>
<td>R_DV</td>
<td>0.19085</td>
<td>0.13737</td>
<td>14.1770</td>
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</tr>
</tbody>
</table>

### Table 17. OLS regression on returns crisis period. Top quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
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<td>10.5284</td>
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</tr>
<tr>
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</tr>
<tr>
<td>WEALTH/INCOME</td>
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<td>0.01721</td>
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</tr>
<tr>
<td>AGE</td>
<td>0.22682</td>
<td>0.01672</td>
<td>13.6958</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### Table 18. OLS regression on Sharpe-ratio pre-crisis. Bottom quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
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<td>1.13309</td>
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</tr>
<tr>
<td>MSCI</td>
<td>0.16108</td>
<td>0.04190</td>
<td>38.6000</td>
<td>0.0000</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>0.291149</td>
<td>0.00472</td>
<td>62.5488</td>
<td>0.0000</td>
</tr>
<tr>
<td>SHARPE</td>
<td>0.37756</td>
<td>0.01162</td>
<td>32.5486</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### Table 19. OLS regression on Sharpe-ratio crisis period. Bottom quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
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<td>0.0000</td>
</tr>
<tr>
<td>PERFORMANCE</td>
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<td>0.00472</td>
<td>62.5488</td>
<td>0.0000</td>
</tr>
<tr>
<td>SHARPE</td>
<td>0.37756</td>
<td>0.01162</td>
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<td>0.0000</td>
</tr>
</tbody>
</table>

### Table 20. OLS regression on the Sharpe-ratio pre-crisis. Top quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2.30783</td>
<td>0.0197</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.16108</td>
<td>0.04190</td>
<td>38.6000</td>
<td>0.0000</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>0.291149</td>
<td>0.00472</td>
<td>62.5488</td>
<td>0.0000</td>
</tr>
<tr>
<td>SHARPE</td>
<td>0.37756</td>
<td>0.01162</td>
<td>32.5486</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### Table 21. OLS regression on Sharpe-ratio crisis period. Top quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
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<td>0.04248</td>
<td>2.30783</td>
<td>0.0197</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.16108</td>
<td>0.04190</td>
<td>38.6000</td>
<td>0.0000</td>
</tr>
<tr>
<td>PERFORMANCE</td>
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<td>0.00472</td>
<td>62.5488</td>
<td>0.0000</td>
</tr>
<tr>
<td>SHARPE</td>
<td>0.37756</td>
<td>0.01162</td>
<td>32.5486</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### Table 22. Correlation between the MSCI world and the returns (unbalanced panel)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
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</tr>
<tr>
<td>MSCI</td>
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<td>0.04190</td>
<td>38.6000</td>
<td>0.0000</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>0.291149</td>
<td>0.00472</td>
<td>62.5488</td>
<td>0.0000</td>
</tr>
<tr>
<td>SHARPE</td>
<td>0.37756</td>
<td>0.01162</td>
<td>32.5486</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### Table 23. MSCI correlation vs Performance & management fee. Top Quartile

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.39171</td>
<td>0.00217</td>
<td>18.5045</td>
<td>0.0000</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.16108</td>
<td>0.04190</td>
<td>38.6000</td>
<td>0.0000</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>0.291149</td>
<td>0.00472</td>
<td>62.5488</td>
<td>0.0000</td>
</tr>
<tr>
<td>SHARPE</td>
<td>0.37756</td>
<td>0.01162</td>
<td>32.5486</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### Table 24. MSCI correlation vs Performance & management fee. Top Quartile

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.39171</td>
<td>0.00217</td>
<td>18.5045</td>
<td>0.0000</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.16108</td>
<td>0.04190</td>
<td>38.6000</td>
<td>0.0000</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>0.291149</td>
<td>0.00472</td>
<td>62.5488</td>
<td>0.0000</td>
</tr>
<tr>
<td>SHARPE</td>
<td>0.37756</td>
<td>0.01162</td>
<td>32.5486</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### Table 25. MSCI correlation vs Performance & management fee. Bottom Quartile

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.39171</td>
<td>0.00217</td>
<td>18.5045</td>
<td>0.0000</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.16108</td>
<td>0.04190</td>
<td>38.6000</td>
<td>0.0000</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>0.291149</td>
<td>0.00472</td>
<td>62.5488</td>
<td>0.0000</td>
</tr>
<tr>
<td>SHARPE</td>
<td>0.37756</td>
<td>0.01162</td>
<td>32.5486</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
The first thing that is observed is the fact that all variables in Table 25 are considered significant, except for the management fee. Given the fact that these returns have been sorted by management fee, it can relate to the learning model of Gompers and Lerner (1999), which states that fund managers first set a low management fee with an incentive fee contract to prove themselves. After the fund manager has proven himself, we would expect the management fee to increase and become significant. This can explain why the management fee has no significance while the performance fee is highly significant. Another explanation would be the signalling theory: Fund managers want to reflect their skillset and are therefore scared to set the fees below average. This results in fee-herding as shown in Figure 1 where most of the fees concentrate around 1% and 1.5%. This fee herding could mean that the management does not properly reflect the fund manager's skill and makes it harder to explain variations in the return.

During the crisis period, none of the variables except for the MSCI world index and the correlation with the MSCI world index seem to explain the returns.

Regarding the returns for the top quartile, we can again conclude that there is no significance in the model. The probable cause for this is likely to be fee herding again as shown by Figure 2, most management fees are around 2%.

Management fees, part 2: Sharpe ratio as the dependent variable

With regards to the Sharpe ratio, the performance fee seems to be significant under normal market conditions. This indicates that the higher the performance fee corresponds to the higher the Sharpe ratio. This is consistent with the work of Ackerman, McNally and Ravenscraft (1999), claiming in their paper that an increase in fees would lead to less risk-taking as lower returns are required to generate the same amount of compensation.
Н.С. Филатов. Имеют ли хедж-фонды с высокими комиссиями лучшие показатели?

### Appendices

**Appendix 1: The Panel Format Script**

```vba
Sub PanelFormat()

Dim x As Integer
Dim J As Variant
Dim Column As String
Dim start As Integer
Dim last2 As String
Dim Rng As String
Dim rngDate As String
Dim rngName As String
Dim Fundname As String
Dim col As String
Dim col2 As String
Dim forJ As String

Sheets("panel output").Activate

' Start of loop
' insert number of funds as maximum
For x = 3 To 1300

' Selects the start and end point of the returns
start = Sheets("returns").Cells(2, x).End(xlDown).Row
Last = Sheets("returns").Cells(65536, x).End(xlUp).Row
amount = Last + 1 - start

' Column reference
col = Columns(x).Address
rngDate = ("A" & start & ":A" & Last)

' Pastes the date
Sheets("returns").Activate
Range(rngDate).Select
Selection.Copy
Sheets("panel output").Activate
Sheets("panel output").Cells(WorksheetFunction.CountA(Range("A:A")) + 1, 2).Select
ActiveSheet.Paste

' Pastes the fund number
Sheets("panel output").Activate
lrg = Range("A:A").Cells.CountLarge
last2 = Sheets("panel output").Cells(lrg, 1).End(xlUp).Row
forJ = (lrg + last2) - lrg

Sheets("panel output").Activate
For J = forJ To forJ + (amount - 1)
Cells(J + 1, 1) = x - 1
Next J

Next x

End Sub
```

**Appendix 2: The script that matches the fund correlation to the right MSCI periods**

```vba
Sub Correlation()

Dim start As String
Dim Last As String
Dim letter As String
Dim Rng As String
Dim MsciRng As String
Dim col As String

' Starts the loop. Enter the total number of funds here
For x = 2 To 1175

' Find the column reference. A table with all the columns and their corresponding letters has been created in the MSCI world tab
Sheets("MSCI WORLD").Activate
col = WorksheetFunction.VLookup(x, Sheets("MSCI World"), Range("D2:G1176"), 2, 0)

' Selects the start and end point of the returns
Sheets("returns").Activate
start = Sheets("returns").Cells(2, x).End(xlDown).Row
Last = Sheets("returns").Cells(65536, x).End(xlUp).Row
Rng = (col & start & ":B" & Last)
MsciRng = ("B" & start & ":B" & Last)

vll = WorksheetFunction.Correl(Sheets("MSCI World").Range(MsciRng), Sheets("returns").Range(Rng))

' Outputs the correlation date to the appropriate fund in the tab 'correlations'
Sheets("correlations").Cells(x, 2) = vll

Next x

Sheets("correlations").Activate
End Sub
```

### Table 31. OLS regression on the Sharpe-ratio pre-crisis. Top quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.31581</td>
<td>0.29819</td>
<td>1.06000</td>
<td>0.88000</td>
</tr>
<tr>
<td>MSCI</td>
<td>-0.00939</td>
<td>0.36930</td>
<td>-0.25000</td>
<td>0.76000</td>
</tr>
<tr>
<td>PERFORMANCFEE</td>
<td>-0.19557</td>
<td>0.43729</td>
<td>-0.45000</td>
<td>0.45000</td>
</tr>
<tr>
<td>NAGRODE</td>
<td>2.46725</td>
<td>2.49612</td>
<td>0.99000</td>
<td>0.31800</td>
</tr>
<tr>
<td>HOGDKIR</td>
<td>-0.04007</td>
<td>0.07330</td>
<td>-0.54000</td>
<td>0.58800</td>
</tr>
<tr>
<td>MSCI_CORR</td>
<td>0.09513</td>
<td>0.03732</td>
<td>2.60000</td>
<td>0.00800</td>
</tr>
</tbody>
</table>

**R-squared:** 0.976747
**Adjusted R-squared:** 0.969327
**S.E. of regression:** 0.090462
**Sum squared resid:** 4411.605
**Log likelihood:** -5960.547
**F-statistic:** 188.2615
**Prob(F-statistic):** 0.000000

### Table 32. OLS regression on the Sharpe-ratio during crisis. Top quartiles

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.53576</td>
<td>0.225972</td>
<td>2.36000</td>
<td>0.0173</td>
</tr>
<tr>
<td>MSCI</td>
<td>-0.04477</td>
<td>0.29777</td>
<td>-0.15000</td>
<td>0.88000</td>
</tr>
<tr>
<td>PERFORMANCFEE</td>
<td>-0.34546</td>
<td>0.050980</td>
<td>-6.79000</td>
<td>0.00000</td>
</tr>
<tr>
<td>NAGRODE</td>
<td>0.12802</td>
<td>0.100884</td>
<td>1.26000</td>
<td>0.21800</td>
</tr>
<tr>
<td>HOGDKIR</td>
<td>-0.00412</td>
<td>1.218296</td>
<td>-0.00000</td>
<td>0.99900</td>
</tr>
<tr>
<td>MSCI_CORR</td>
<td>-0.49515</td>
<td>0.040155</td>
<td>-12.39000</td>
<td>0.00000</td>
</tr>
</tbody>
</table>

**R-squared:** 0.194447
**Adjusted R-squared:** 0.150449
**S.E. of regression:** 1.610401
**Sum squared resid:** 2519.715
**Log likelihood:** -7586.146
**F-statistic:** 173.171
**Prob(F-statistic):** 0.000000

### Table 33. Correlation between the MSCI world and the returns (unbalanced panel)

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Top Quartile</th>
<th>Bottom quartile</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSCI</td>
<td>0.52</td>
<td>0.10</td>
</tr>
<tr>
<td>Crisis</td>
<td>0.27</td>
<td>0.20</td>
</tr>
</tbody>
</table>

### Table 34. MSCI correlation vs Performance & management fee. Top Quartile

| Performance fee coefficient | -2.526 | 1.464 |
| management fee coefficient | -9.453 | 18.289 |

### Table 35. MSCI correlation vs Performance & management fee. Bottom Quartile

| Performance fee coefficient | -1.690 | 1.391 |
| management fee coefficient | -20.023 | 8.965 |
References


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