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Master Degree Project in Finance

Swedish Hedge Fund and Mutual Fund Performance during the Financial Crisis of 2008

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Abstract

The purpose of the thesis is to study the respective performance of Swedish hedge and mutual funds during the financial crisis of 2008 to see which type of funds have the best performance during a crisis of this sort. A conditional four-factor model developed by Fink, Raatz and Weigert (2014) is used for the estimation of performance. The empirical results demonstrate that both hedge funds and mutual funds underperformed during the crisis but hedge funds performed less badly than mutual funds.

Keywords: hedge funds, mutual Funds, financial crisis of 2008, conditional four-factor model, fund's performance.

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1.Introduction

The thesis studies the respective performance of Swedish hedge and mutual funds during the financial crisis of 2008 to see which type of funds have the best performance during a crisis of this sort. A conditional four-factor model developed by Fink, Raatz and Weigert (2014) serves as the study method.

The financial crisis of 2008 was the worst crisis since the Great Depression of the 1930s. It came about because of the burst of a US housing bubble and the ensuing wide scale defaults on subprime loans. The crisis had large and negative impact on the stock market in Sweden, causing the OMX to fall 55 percent between July 2007 and November 2008 (Lybeck 2009).

Earlier literature shows that a conditional four-factor model is suitable for measuring fund performance during a recession and the results in earlier literature show that hedge funds generally perform better in a recession than mutual funds. The differences between the present thesis and previous studies are the estimation of both unconditional and conditional performance for Swedish hedge funds and the examination of Swedish hedge and mutual funds' performance during the financial crisis of 2008 as well as a comparison of the performance of each fund.

There are several reasons why investors should invest in hedge funds, like higher expected returns, the diversification of assets, and a reduction in risk. McCrary (2002) states that hedge funds have higher returns both in absolute terms and relative to the aggregate returns on stocks and bonds. Due to diversification, hedge funds have a low correlation to stock and bond indices and therefore also carry lower risk than traditional assets (McCrary 2002). During a recession hedge funds should perform better than mutual funds because they can take both long and short positions in the market. Unlike most mutual funds, hedge funds can use derivative securities to protect their portfolio during the recession. All hedge funds are under active management and when a recession occurs, this confers the advantage of being able to react faster than mutual funds that have a passive management strategy.

1.1 Research Question

The first research question is how Swedish hedge funds and mutual funds perform, respectively, without fees in the time period 2005-2015, and especially during the financial crisis of 2008. Next, a comparative analysis establishes which funds have the better performance. Finally, the thesis then investigates if during a crisis investors should invest in hedge funds or in mutual funds.

1.2 Contribution

This thesis compares the respective risk adjusted performances of Swedish hedge funds and mutual funds during the financial crisis of 2008, by applying the conditional four factor model of Fink, Ratz and Weigert (2014). The thesis also estimates unconditional risk adjusted performance by using Carhart's (1997) four-factor model on data from the time period 2005-2015. Finally, based on these performance estimates, the thesis formulates advice for investors about how they should best act during crisis periods.

1.3 Outline

The next chapter of the thesis provides a literature review of previous studies about measuring the performance of hedge funds and mutual funds. Chapter three contains the theoretical framework and the explanation of the applied models. An explanation of how data is selected forms the fourth. Results, robustness checks, and conclusions from the thesis are presented, respectively, in the final three chapters.

2. Literature Review

There are three parts to the literature review in the thesis. The first set of literature concerns the estimation of performance of mutual funds in different countries. Fink, Raatz and Weigert (2014) study the performance of mutual funds during recessions in 16 countries between 1980 and 2010. They use a conditional four-factor model to evaluate fund performance. This study shows that Swedish mutual funds have a negative performance of around 1.21 percent per month during the recession. Flam and Vestman (2014) investigate the performance of Swedish actively managed and index funds between 1999 and 2009. They apply three- and four-factor models to measure the performance and create their own risk factors based on the Swedish data. Their results show that the actively managed Swedish funds have positive risk adjusted return of 0.9 percent per year before expenses and -0.5 percent after expenses. Ferreira et al. (2011) study determinants of the performance of open-end, actively managed equity mutual funds in 27 countries. They have time series data for the period between 1980 and 2007 and apply an unconditional four-factor model to estimate the performance. They conclude that passive funds outperform actively managed funds in general. Kosowski (2006) examines the risk-adjusted performance of US mutual funds during periods of growth and recession, respectively. He applies a conditional four-factor model to measure the risk-adjusted performance and find that US mutual funds underperform during periods of growth but do not in recessions.

The second set of literature addresses the estimation of performance of hedge funds. Huang and Wang (2010) examine the performance of hedge fund-like products such as 130/30, market neutral and long/short funds during the financial crisis of 2008. Performance evaluations are based on information ratios as well as on an unconditional and a conditional four-factor model. Results based on information ratios show that all market neutral funds and the top 75 percent of long/short equity funds have higher risk-adjusted returns than the Vanguard S&P 500 Index Funds. Based on the unconditional and conditional four-factor model, Huang and Wang (2010) find that the former fund types do not generate positive return in the pre-crisis or crisis period.

The third set of literature compares the performance between hedge fund and mutual funds. Liang (1998) investigates the performance and risks of hedge funds during the period of January 1994 to December 1996, and then compares this with that of mutual funds. He uses the Sharpe ratio and an asset class factor model to evaluate performance using data from 921

hedge funds. His conclusion is that hedge funds have higher Sharpe ratios and also better performance than traditional mutual funds. Kapoor (2012) studies the respective performances of Canadian hedge and mutual funds between January 2001 and May 2009. In this study he uses a three- and four -factor model and other risk adjusted measures such as the Sharpe ratio, Treynor ratio, and Information ratios. His results show that hedge funds have higher risk adjusted returns than do mutual funds. Furthermore, during recessions, hedge funds perform better than mutual funds. In this thesis I investigate whether a similar relationship holds in the case of Sweden.

3. Theoretical Framework

3.1 Hedge Funds and Mutual funds

3.1.1 Definition of Hedge Fund

Hedge funds are defined as a limited liability investment pool run by a separate manager. The investment manager is hired by the fund to service it and is responsible for marketing it. Hedge funds take long and short positions and employ leverage. They have freedom to change the nature of the investment in a narrow class of assets. A combination of management fee and incentive fee provides the source of income for hedge funds. Periodic valuations of the investments provide the basis for the calculation of these fees. Many hedge funds do not value the assets on a daily basis because that may reveal information to outsiders (McCrary 2002).

Hedge Fund Strategies in Sweden

Hedge fund managers follow different types of strategies to produce attractive returns for investors. Dividing hedge funds into broad categories of strategy allows investors to understand the risks that apply to a particular fund so that they can identify funds which are the most appropriate for them (McCrary 2002). Common hedge fund strategies in Sweden are CTA/Managed Futures (Commodity Trading Advisors), Equity Hedge, Event Driven, Fixed Income Directional, Macro, and Multi-Strategy. Figure 1 shows the proportions of these strategies in the Swedish hedge fund market (Bloomberg Terminal 2015).

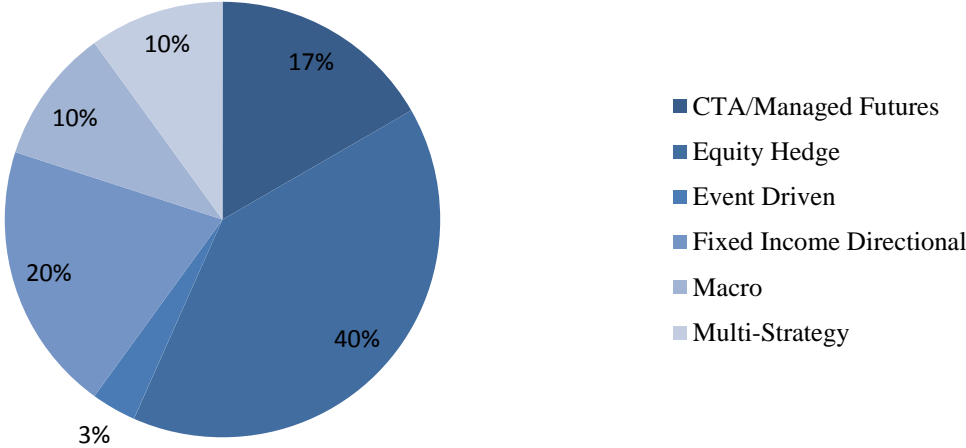


Figure 1 Hedge Fund Strategies distribution in the Swedish hedge fund market. Source: Bloomberg Terminal (2015)

Equity Hedge is the dominant strategy in Sweden at 40 percent of the market, whereas Event Driven funds have the smallest market share at 3 percent. Each of these strategies is described in the following sections.

CTA/Managed Futures

CTA funds use futures as the investment objective and the fund manager runs different trading strategies by using futures contracts, options on futures contracts, and FX forwards. Most of the CTA funds are systematic traders or trend followers, who have the ability to take long and short positions and use leverage (Morningstar 2012).

Equity Hedge

Funds of this type invest mainly in stocks and may take long or short positions. Managers of equity hedge funds use options to leverage their position or to hedge. Equity hedge funds that carry varied degrees of short positions have different risk parameters, beta exposure, and return streams than do traditional long-only funds or indexes. Instead the latter types of funds usually have either net long or net short market exposure to equities (Morningstar 2012).

Event Driven

Event driven funds seek profits from price changes related to a variety of corporate actions that include bankruptcy, emergence from bankruptcy, divestiture, stock buyback, dividend issuance, major shifts in corporate strategy, and other atypical events (Morningstar 2012).

Fixed Income Directional

These funds mostly take directional positions in global debt. Long and short positions are independent of each other. Most funds have debt instruments as an investment objective but managers may invest in other instruments such as emerging markets debt, U.S. debt, and global debt, along with credit default swaps. These funds expose at least 75 percent in fixed income investment and short exposure is greater than 20 percent (Morningstar 2012).

Macro

Macro funds ground their investment decision on valuation of the broad macroeconomic environment. They seek investment opportunities by studying factors such as the global economy, government policies, interest rates, inflation, and market trends. These funds may invest in global equities, bonds, currencies, derivatives, and commodities but the main

investment is through derivatives markets. The funds expose at least 60 percent in derivatives (Morningstar 2012).

Multi-Strategy

These funds follow several different hedge fund strategies and the assets may be divided between multiple portfolio managers, each of whom focuses on a different strategy. Market movements may cause slight change in the exposure to different strategies with time (Morningstar 2012).

3.1.2 Definition of Mutual Fund

Mutual funds pool money from many investors and invest it in stocks, bonds, money-market instruments or other securities. Investors cannot purchase shares in the mutual fund from secondary markets such as the New York Stock Exchange or the Nasdaq Stock Market, only from a broker for the fund or from banks. Mutual fund share prices are based on net asset value per share and some funds may add a sales fee to the price. Mutual funds buy back shares every time investors want to sell them (U.S. Securities and Exchange Commission 2010).

Mutual Fund Style

Mutual fund managers also follow different types of strategies to generate attractive returns for investors. The most common mutual fund strategies in Sweden are Aggregate, Aggressive Allocation, Blend, Dynamic Allocation, Target Date, Value, Growth and Global Allocation. The Blend strategy is the largest fraction of Swedish mutual fund strategies (Bloomberg Terminal 2015).

Aggregate

This strategy seeks to reproduce a broad bond index by holding many securities across a range of maturities. The Lehman Aggregate Bond Index is the common index used as a benchmark. This index captures Treasury bonds, corporate bonds, municipal bonds and high-grade mortgage-backed securities (Investopedia 2015).

Aggressive Allocation

Aggressive allocation funds maximize their return by taking a higher degree of risk. Therefore this strategy has an asset allocation with large weight in stocks and a smaller weight in fixed income and cash (Investopedia 2015).

Dynamic Allocation

Dynamic allocation strategy includes frequent rebalancing of the portfolio to bring the asset mix back to a long term target. Such as rebalancing would be to decrease the positions in the best performing assets and increase positions in the underperforming assets. The dynamic allocation strategy has the ability to reduce market risk and provide returns that exceed the benchmark index (Investopedia 2015).

Target Date

Target date funds automatically reset the asset mix of stocks, bonds and cash equivalents according to selected time frame. These funds are similar to life-cycle funds and structured to address some date in the future, such as retirement (Investopedia 2015).

Value

The Value strategy involves that investors trade stocks that are lower than their intrinsic values. The investors seek for undervalued stocks in the market and select the stocks with lower price-to-book ratio and price-to-earnings ratio than average (Investopedia 2015).

Growth

This type of funds of stocks has capital appreciation as primary goal with little or no dividend payouts. The investors select companies if they reinvest their earnings into expansion, acquisitions, and research and development (Investopedia 2015).

Blend

Blend Funds have portfolios that contain a mix of value and growth stocks (Investopedia 2015).

Global Allocation

Global Allocation funds can invest in stocks anywhere in the world even in investors' own country. These funds create more global opportunities for diversification and have ability to protect against inflation and currency risk (Investopedia 2015).

3.2 Comparison of Mutual Funds and Hedge Funds

There are some similarities between mutual funds and hedge funds. Both are investment pools, both invest large amounts of the money in publicly listed common stocks and the calculation of net asset value is the same for both types of funds (McCrary 2002).

However, the differences between mutual funds and hedge funds are fairly large. Mutual funds have a smaller asset range than hedge funds and the types of assets do not vary much over time. Mutual funds calculate and publish the net asset value on a daily basis but hedge funds do not, calculating the net asset value only monthly or quarterly, and unlike mutual funds, some hedge funds may not even publish the values in public. Mutual funds allow investors to enter and exit the fund on any business day, whereas hedge funds allow such transactions just on a monthly or on a quarterly basis. Management fees of mutual funds and hedge funds are very similar, since hedge fund management fees have decreased with time from two percent to one percent. Most mutual funds do not have performance-based incentive fees and for funds that do, it is almost always smaller than those of hedge funds (McCrary 2002).

3.3 Unconditional Four-Factor Model

In this section I introduce the econometric models used for measuring fund performance. Carhart (1997) develops the original four-factor model based on Fama and French's (1993) three-factor model, by adding one more risk factor, the momentum. According to Carhart (2007), his model improves on the average pricing errors of the CAPM and Fama and French's (1993) the three-factor model. The Regression Model (3.3.1) estimates the unconditional risk adjusted performance.

$$r_{it} = \alpha_i + \beta_{1i}RMRf_t + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}MOM_t \quad (3.3.1)$$

3.4 Risk Factors

Risks factors used in the regression are the market risk factor (RMRf), the size risk factor (SMB), the value risk factor (HMB) and the momentum risk factor (MOM). The capital asset pricing model can capture only market risk and does not consider the other three risk factors. A four-factor model therefore is more complete than the capital asset pricing model. The size risk factor, the value risk factor and the momentum risk factor are develop for the US market but Fama and French (2012) find that they apply to global data as well. However, it is important to use a version of these factors that is relevant for the studied geographical area. Therefore, in this thesis I use risk factors that are constructed from Swedish or European data. Banz (1981) is the first to introduce the size risk factor and he discovers that low market capitalization stocks tend to have higher average returns. The SMB factor is the difference between the monthly average return of three small and three big portfolios:

$$SMB = (Small\ Value + Small\ Neutral + Small\ Growth - Big\ Value - Big\ Neutral - Big\ Growth)/3 \quad (3.4.1)$$

According to Fama and French (2012), there is evidence that stocks with high book-to-market ratios (value stocks) have higher returns than low book-to-market ratio stocks. The HML factor captures the risk associated with value investing, that is, buying value stocks and selling growth stocks. The HML factor is calculated as the monthly average return on two high book-to-market portfolios minus the average on two low book-to-market portfolios:

$$HML = (Small\ Value + Big\ Value - Small\ Growth - Big\ Growth)/2 \quad (3.4.2)$$

Jegadeesh and Titman (1993) create the momentum risk factor. They develop strategies that buy stocks that have performed well in the past and sell stocks that have performed poorly. They show that such a strategy generates significant positive returns over holding period of three to twelve months. The MOM factor captures the risk associated with this strategy and is constructed as the monthly average return on two winner portfolios minus the average return on two loser portfolios.

$$MOM = (Small\ High + Big\ High - Small\ Low - Big\ low)/2 \quad (3.4.3)$$

3.5 Conditional Four-Factor Model

This thesis also applies the conditional four-factor model of Fink, Raatz and Weigert (2014), that considers the business cycle variable in estimating fund performance during the financial crisis. In the Regression Model (3.5.1), r_{it} is the monthly return of the portfolio in excess of the risk free rate. This model includes the dummy crisis variable IC_t coded as one in times of financial crisis and as zero outside the crisis. Risk factors interact with the financial crisis dummy variable IC_t in the Regression Model (3.5.2). By using the interaction terms, it is possible to see how investment styles change in the crisis. For example, if the coefficient on $SMB_t \times IC_t$ is statistically significant and negative, then the fund sells small stock and/or buys big stocks during the crisis. Ferson and Harvey (1999) state that it is possible to take control of time-varying beta when risk factors interact with conditional factors such as the prevailing economic conditions.

$$r_{it} = \alpha_i + \gamma_i IC_t + \beta_{1i} RMRf_t + \beta_{2i} SMB_t + \beta_{3i} HML_t + \beta_{4i} MOM_t \quad (3.5.1)$$

$$r_{it} = \alpha_i + \gamma_i IC_t + \beta_{1i} RMRf_t + \beta_{2i} SMB_t + \beta_{3i} HML_t + \beta_{4i} MOM_t + \beta_{5i} RMRf_t \times IC_t + \beta_{6i} SMB_t \times IC_t + \beta_{7i} HML_t \times IC_t + \beta_{8i} MOM_t \times IC_t \quad (3.5.2)$$

The constant term, α_i , can be interpreted as the average risk adjusted return outside the crisis. The average risk adjusted return inside the crisis is $\alpha_i + \gamma_i$. $RMRf_t$ is the market risk factor, SMB_t is the size risk factor, HML_t is the value risk factor and MOM_t is the momentum risk factor.

4. Data

4.1 Data

Monthly return data is collected from the Bloomberg database for both hedge funds and mutual funds in the time period between 2005 and 2015. Observations are day to day total returns and the gross dividends are used. Monthly data on risk factors for the same time period comes from Kenneth French Data Library¹ for Europe. The number of months is 121.

4.2 Fund Selection and Construction of Dummy Variables

There are 24 Swedish hedge funds in the Bloomberg database but, because of missing data, thirteen of these had to be omitted. In terms of total assets, the remaining eleven hedge funds comprise 83percent of the Swedish hedge fund market. These eleven funds have total asset of 62.7 billion SEK while the whole market is 75.3 billion SEK. To make a fair comparison with the performance of hedge funds, this thesis uses the eleven largest Swedish mutual funds determined by total assets. In terms of total assets, these eleven mutual funds comprise 17 percent of the Swedish mutual fund market with total assets of 333.1 billion SEK. The total asset of the Swedish mutual funds market is 1955.4 billion SEK. Appendix 1 presents all the funds' names, strategies and total assets. The financial crisis dummy variable *IC* relates to the period from June 2007 to November 2008. Figure 2 provides a line graph of the price of the Stockholm all-share index OMXSPI from 2007 to 2009. As can be seen, from June 2007 to November 2008 the price dropped by 56 percent.

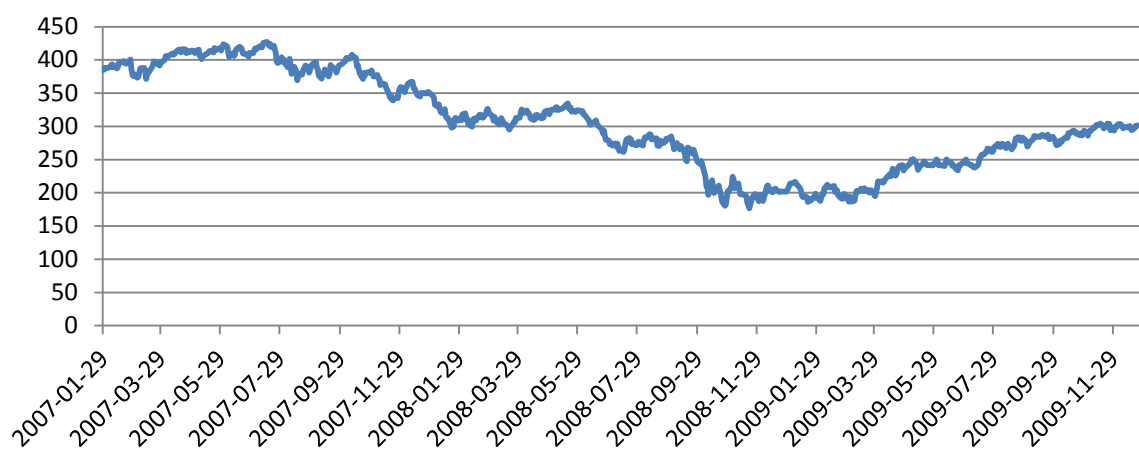


Figure 2 OMXSPI price line chart in SEK from January 2007

¹ http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

4.3 Fund Estimation

The first part of the analysis estimates the unconditional and conditional models using the average return of hedge funds and mutual funds. That is, the average return across all hedge funds and mutual funds, respectively, is used during the estimation of performance. In the main analysis, an equal-weighted average is used. In the robustness section, it is also investigated how the results change if a value-weighted average is used instead. The second part estimates the respective conditional performance for individual hedge funds and mutual funds by using the Regression Model (3.5.1) and Regression Model (3.5.2). Table 1 presents the summary statistics for all variables used during the estimation.

VARIABLES	Obs.	Mean	Std.D	Min	Max
Hedge Funds	121	0.00499	0.0117	-0.0628	0.0437
Mutual Funds	121	0.00639	0.0331	-0.107	0.147
Hedge Fund 1	121	0.00716	0.0201	-0.0496	0.0839
Hedge Fund 2	121	0.00412	0.0207	-0.0585	0.0606
Hedge Fund 3	121	0.00335	0.00981	-0.0315	0.0258
Hedge Fund 4	121	0.00316	0.0113	-0.0384	0.0600
Hedge Fund 5	121	0.00557	0.0291	-0.111	0.183
Hedge Fund 6	121	0.00861	0.0414	-0.0912	0.148
Hedge Fund 7	121	0.000980	0.00816	-0.0249	0.0244
Hedge Fund 8	121	0.00243	0.0147	-0.0648	0.0453
Hedge Fund 9	121	0.0102	0.0497	-0.252	0.146
Hedge Fund 10	121	0.00214	0.0118	-0.0483	0.0484
Hedge Fund 11	121	0.00720	0.0437	-0.162	0.132
Mutual Fund 1	121	0.00724	0.0448	-0.153	0.187
Mutual Fund 2	121	0.00573	0.0277	-0.0839	0.120
Mutual Fund 3	121	0.00763	0.0405	-0.135	0.167
Mutual Fund 4	121	0.0123	0.0594	-0.143	0.332
Mutual Fund 5	121	0.00538	0.0314	-0.111	0.123
Mutual Fund 6	121	0.00203	0.00694	-0.0159	0.0180
Mutual Fund 7	121	0.00569	0.0351	-0.122	0.141
Mutual Fund 8	121	0.00837	0.0428	-0.145	0.172
Mutual Fund 9	121	0.0108	0.0527	-0.177	0.235
Mutual Fund 10	121	0.00553	0.0357	-0.125	0.126
Mutual Fund 11	121	-0.000306	0.00456	-0.0350	0.00453
RmRf	121	0.00568	0.0582	-0.221	0.138
SMB	121	0.000277	0.0188	-0.0465	0.0485
HML	121	-0.000389	0.0226	-0.0460	0.0745
MOM	121	0.00795	0.0401	-0.260	0.0987

Table 1 Summary statistic for all variables

The summary statistics in Table 1 show that mutual Funds (0.639 percent) have higher average returns than hedge Funds (0.499 percent) but the volatility (standard deviation) is also higher. Of the individual hedge funds, Hedge Fund 9 performs the best with 1.02 percent average return, and the worst performer is Hedge Fund 7 with 0.103 percent. The best performing mutual fund is Mutual Fund 4 with an average return of 1.23 percent, whilst Mutual Fund 11 is the worst performer, with an average return of -0.003 percent.

5. Results

5.1 Unconditional Performance

Table 2 presents the results of the Regression Model (3.3.1) for hedge funds and mutual funds. These show that hedge funds have an unconditional risk adjusted performance of 0.461 percent per month and this is statistically significant at one percent level. Hedge fund returns have a positive relationship with *SMB* but negative ones with *HML* and *MOM*. Mutual funds have an unconditional risk adjusted performance of 0.456 percent per month that is statistically significant at the ten percent level. There is a positive relationship between mutual funds returns and *SMB*, but negative ones in the cases of *HML* and *MOM*. Mutual funds have higher coefficient for the market risk factor *RmRf* than hedge funds and this can be explained by the fact that mutual funds are only allowed to take long position in stocks, and therefore they cannot reduce the market risk as much as hedge funds, and have high correlation with the market. Hedge funds are allowed to take both short and long positions in stocks, so they have lower correlation with the market. Table 2 also shows that hedge funds have better unconditional risk adjusted performance than mutual funds, but the difference is very small.

VARIABLES	(1) Hedge Funds	(2) Mutual Funds
RmRf	0.112*** (0.0360)	0.435*** (0.0483)
SMB	0.118** (0.0589)	0.129 (0.0997)
HML	-0.0699 (0.0658)	-0.206 (0.138)
MOM	-0.0404 (0.0299)	-0.0954 (0.123)
Constant	0.00461*** (0.00100)	0.00456* (0.00247)
Observations	121	121
R-squared	0.348	0.561
Number of Funds	11	11

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2 Regression results base on Regression Model (3.3.1)

5.2 Conditional Performance

Table 3 presents the result of the Regression Model (3.5.1), which includes the financial crisis dummy variable *IC*. In the case of hedge funds, the coefficient on the *IC* variable is -0.722 percent and it is statistically significant at five percent level. In other words, during the financial crisis hedge funds underperform by -0.722 percent per month, compared to normal times. Outside the crisis, the average monthly risk adjusted performance is 0.577 percent which is statistically significant. Risk adjusted performance inside the crisis is -0.145 percent per month and is not statistically significant. Mutual funds also have a negative coefficient on *IC* -1.64 percent that it is statistically significant at five percent level. Mutual funds also underperform during the financial crisis at -1.64 percent per month. The average risk adjusted performance of mutual funds outside and inside the crisis respectively is 0.718 percent and -0.922 percent per month. The average risk adjusted performance outside is statistically significant. Both hedge funds and mutual funds underperform during the crisis but as seen in Table 3, hedge funds perform less badly than mutual funds.

VARIABLES	(1) Hedge Funds	(2) Mutual Funds
RmRf	0.0955*** (0.0337)	0.399*** (0.0448)
SMB	0.0852 (0.0562)	0.0539 (0.105)
HML	-0.0528 (0.0621)	-0.168 (0.130)
MOM	-0.0367 (0.0308)	-0.0870 (0.129)
IC	-0.00722** (0.00311)	-0.0164** (0.00633)
Constant	0.00577*** (0.000926)	0.00718*** (0.00251)
Alpha inside the crisis	-0.00145 (0.6429)	-0.00922 (0.149)
Observations	121	121
R-squared	0.389	0.587
Number of Funds	11	11

Robust standard errors in parentheses, P-value in parentheses for Alpha inside the crisis

*** p<0.01, ** p<0.05, * p<0.1

Table 3 Regression results base on Regression Model (3.5.1)

Table 4 presents the estimation of Regression Model (3.5.2), where the financial crisis dummy variable *IC* interacts with the risk factors. Hedge funds still underperform during the financial crisis by -0.751 percent per month, and this is statistically significant at the ten percent level. The average risk adjusted performance outside and inside the crisis, respectively, are 0.597 percent and -0.154 percent per month. The underperformance remains unchanged for mutual funds as well with -1.04 percent per month, statistically significant at the ten percent level. Mutual funds have an average risk adjusted performance of 0.73 percent per month outside the crisis and -0.31 percent per month inside the crisis. Once again risk adjusted performance outside the crisis is statistically significant but not the performance inside the crisis. Both fund types have statistically significant negative coefficients on *HMLxIC* which means both funds sell the high book-to-market ratio stocks during the crisis. Comparing the two, while both funds types underperform in the crisis, mutual funds do worse than hedge funds.

VARIABLES	(1) Hedge Funds	(2) Mutual Funds
RmRf	0.0832*** (0.0186)	0.361*** (0.0577)
SMB	0.0653 (0.0463)	0.0685 (0.130)
HML	-0.0150 (0.0409)	-0.0600 (0.145)
MOM	-0.0385 (0.0316)	-0.0334 (0.160)
RmRfxIC	0.0156 (0.0786)	0.0663 (0.101)
SMBxIC	0.140 (0.164)	-0.113 (0.249)
HMLxIC	-0.562* (0.321)	-0.820*** (0.265)
MOMxIC	-0.0362 (0.109)	-0.486** (0.204)
IC	-0.00751* (0.00384)	-0.0104* (0.00565)
Constant	0.00597*** (0.000855)	0.00730*** (0.00263)
Alpha inside the crisis	-0.00154 (0.6446)	-0.0031 (0.1452)
Observations	121	121
R-squared	0.437	0.620
Number of Funds	11	11

Robust standard errors in parentheses, P-value in parentheses for Alpha inside the crisis

*** p<0.01, ** p<0.05, * p<0.1

Table 4 Regression results base on Regression Model (3.5.2)

5.3 Individual Hedge Fund Estimation

Table 6 presents the estimation of Regression Model (3.5.1) for the individual hedge funds. Just four hedge funds have statistically significant coefficient on the financial crisis dummy variable *IC*, namely Hedge Fund 3, Hedge Fund 8, Hedge Fund 9, and Hedge Fund 11. All funds display underperformance during the financial crisis and Hedge Fund 9 is the worst with -3.33 percent per month, which is statistically significant at the ten percent level. Hedge Fund 8 has an underperformance of -1.24 percent per month, Hedge Fund 11 has -2.62 percent, and that of Hedge Fund 3 is -0.333 percent per month. All three are statistically significant at the one and ten percent levels, respectively. Outside of the crisis, the respective risk adjusted performance of Hedge Fund 9, Hedge Fund 8, Hedge Fund 3, and Hedge Funds 11 is 1.55, 0.32, 0.32, and 1.01 percent per month.

Table 7 presents the estimation for the individual hedge funds base on Regression Model (3.5.2). Hedge Fund 8, Hedge Fund 9 and Hedge Fund 11 are the only funds that have a statistically significant coefficient for the financial crisis dummy variable *IC*. All three funds underperform during the financial crisis by -0.825, -4.50 and -2.26 percent per month, respectively. Outside the crisis, the average risk adjusted performances of Hedge Fund 8, Hedge Fund 9 and Hedge Funds 11 are 0.33, 1.57 and 1.08 percent per month, respectively. Hedge Fund 8 has a statistically significant negative coefficient for *HMLxIC* and *MOMxIC*, which means that during the crisis it sells high book-to-market ratio stocks and stocks that have performed well in the past.

5.4 Individual Mutual Fund Estimation

The estimation of Regression Model (3.5.1) for individual mutual fund is presented in Table 8. All funds except Mutual Fund 11 underperform during the financial crisis, having a statistically significant coefficient on the financial crisis dummy variable *IC*. The funds with the largest drop performance are Mutual Fund 4 (-2.07 percent per month, statistically significant at five percent level), Mutual Fund 9 (-2.05 percent, statistically significant at five percent level) and Mutual Fund 7 (-1.99 percent per month statistically significant at one percent level). Outside of the crisis, the average risk adjusted performance for Mutual Fund 4, Hedge Fund 9 and Hedge Fund 7 is 1.36, 1.08 and 1.08 percent per month, respectively.

Table 9 presents the estimation of Regression Model (3.5.2) for individual mutual funds. In this estimation just five mutual funds have statistically significant coefficient on the *IC* variable. Mutual Fund 4, Mutual Fund 2 and Mutual Fund 7 have the largest negative relative

performance during the financial crisis. Mutual Fund 4, Mutual Fund 2 and Mutual Fund 7 underperform by -1.92, -1.29 and -1.21 percent per month, respectively, all statistically significant at the five percent level. The average risk adjusted performance outside the crisis for Mutual Funds 4, Mutual Funds 2 and Mutual Funds 7 is 1.2, 0.79 and 0.73 percent per month, respectively. All three funds have a statistically significant negative coefficient on *MOMxIC*, suggesting that these funds sell stocks that have performed well in the past during the crisis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
VARIABLES	Hedge fund 1	Hedge fund 2	Hedge fund 3	Hedge fund 4	Hedge fund 5	Hedge fund 6	Hedge fund 7	Hedge fund 8	Hedge fund 9	Hedge fund 10	Hedge fund 11
Rm-Rf	0.109*** (0.0395)	0.179*** (0.0302)	0.103*** (0.0148)	-0.0580 (0.0369)	0.267*** (0.0425)	-0.0466 (0.103)	-0.00169 (0.0216)	0.0984*** (0.0273)	-0.0277 (0.183)	0.0996*** (0.0234)	0.329*** (0.0824)
SMB	0.0372 (0.111)	0.323*** (0.0959)	0.159*** (0.0372)	-0.0485 (0.0719)	0.311*** (0.0895)	-0.253 (0.227)	-0.0115 (0.0397)	0.00226 (0.0610)	0.125 (0.265)	0.0752 (0.0656)	0.213 (0.197)
HML	-0.256*** (0.0864)	0.0382 (0.0821)	-0.00322 (0.0365)	-0.0205 (0.0577)	-0.180* (0.104)	-0.0753 (0.228)	0.0592 (0.0494)	-0.0229 (0.0654)	0.0424 (0.308)	-0.0898* (0.0536)	-0.0709 (0.210)
MOM	-0.171*** (0.0554)	0.0984 (0.0742)	0.0125 (0.0225)	-0.0596** (0.0286)	-0.309*** (0.109)	0.171* (0.0876)	0.0221 (0.0197)	0.0624 (0.0401)	-0.0202 (0.138)	-0.0865** (0.0331)	-0.124 (0.0956)
IC	0.00497 (0.00696)	-0.00457 (0.00452)	-0.00375* (0.00213)	0.000252 (0.00376)	-0.00682 (0.00563)	0.00685 (0.0120)	-0.000702 (0.00273)	-0.0124*** (0.00462)	-0.0333* (0.0197)	-0.00398 (0.00341)	-0.0261*** (0.00881)
Constant	0.00705*** (0.00192)	0.00293 (0.00187)	0.00319*** (0.000799)	0.00393*** (0.00112)	0.00736*** (0.00205)	0.00654 (0.00411)	0.000945 (0.000804)	0.00321** (0.00142)	0.0155*** (0.00460)	0.00280*** (0.000926)	0.0101** (0.00395)
Observations	121	121	121	121	121	121	121	121	121	121	121
R-squared	0.177	0.349	0.524	0.094	0.635	0.079	0.022	0.259	0.063	0.420	0.354

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 Regression results base on Regression Model (3.5.1) for individual hedge fund

VARIABLES	(1) Hedge fund 1	(2) Hedge fund 2	(3) Hedge fund 3	(4) Hedge fund 4	(5) Hedge fund 5	(6) Hedge fund 6	(7) Hedge fund 7	(8) Hedge fund 8	(9) Hedge fund 9	(10) Hedge fund 10	(11) Hedge fund 11
Rm-Rf	0.0675* (0.0344)	0.154*** (0.0400)	0.0977*** (0.0169)	-0.0300 (0.0194)	0.207*** (0.0375)	0.0106 (0.116)	-0.00370 (0.0219)	0.0702** (0.0316)	-0.0360 (0.0914)	0.0888*** (0.0251)	0.291*** (0.0904)
SMB	-0.00969 (0.112)	0.294** (0.114)	0.168*** (0.0433)	0.0199 (0.0622)	0.183* (0.0970)	-0.332 (0.240)	0.00828 (0.0415)	0.00775 (0.0591)	0.207 (0.196)	0.0433 (0.0683)	0.123 (0.223)
HML	-0.172** (0.0759)	0.109 (0.0890)	0.0114 (0.0358)	-0.0182 (0.0412)	-0.0826 (0.101)	-0.151 (0.261)	0.0918* (0.0512)	0.0557 (0.0537)	0.0705 (0.168)	-0.0772 (0.0498)	-0.00144 (0.209)
MOM	-0.173*** (0.0584)	0.114 (0.0789)	0.0263 (0.0278)	-0.0624** (0.0240)	-0.300** (0.132)	0.0931 (0.0722)	0.0298 (0.0203)	0.0982*** (0.0302)	-0.0774 (0.102)	-0.0535 (0.0444)	-0.118 (0.110)
RmRfxIC	0.0990 (0.132)	0.0311 (0.0486)	0.00773 (0.0303)	-0.0814 (0.0809)	0.112 (0.0907)	-0.209 (0.179)	-0.00659 (0.0596)	0.0505 (0.0742)	0.117 (0.476)	-0.00530 (0.0417)	0.0568 (0.173)
SMBxIC	0.202 (0.378)	0.178 (0.210)	-0.0609 (0.0821)	-0.157 (0.196)	0.552** (0.229)	0.785 (0.505)	-0.0365 (0.129)	-0.0542 (0.194)	-0.397 (0.805)	0.0997 (0.135)	0.431 (0.434)
HMLxIC	-0.800** (0.319)	-0.819*** (0.220)	-0.0484 (0.133)	-0.725** (0.330)	-0.678* (0.380)	-0.896 (0.689)	-0.558*** (0.181)	-0.618* (0.316)	-0.615 (2.015)	0.219 (0.166)	-0.646 (1.011)
MOMxIC	-0.0402 (0.252)	-0.196 (0.119)	-0.112** (0.0454)	-0.0428 (0.134)	-0.140 (0.226)	0.465 (0.322)	-0.107 (0.0761)	-0.330** (0.126)	0.481 (0.690)	-0.264*** (0.0815)	-0.113 (0.314)
IC	0.00581 (0.00878)	-0.00242 (0.00476)	-0.00220 (0.00214)	-0.00445 (0.00404)	-0.00101 (0.00588)	-0.00355 (0.0131)	-0.00133 (0.00260)	-0.00825* (0.00477)	-0.0450* (0.0247)	0.00227 (0.00313)	-0.0226** (0.0104)
Constant	0.00768*** (0.00196)	0.00321* (0.00190)	0.00315*** (0.000853)	0.00343*** (0.00104)	0.00836*** (0.00210)	0.00643 (0.00418)	0.000873 (0.000801)	0.00334** (0.00150)	0.0157*** (0.00401)	0.00283*** (0.000958)	0.0108** (0.00413)
Observations	121	121	121	121	121	121	121	121	121	121	121
R-squared	0.217	0.380	0.545	0.252	0.670	0.163	0.112	0.339	0.088	0.537	0.363

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 Regression results base on Regression Model (3.5.2) for individual hedge fund

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Mutual fund 1	Mutual fund 2	Mutual fund 3	Mutual fund 4	Mutual fund 5	Mutual fund 6	Mutual fund 7	Mutual fund 8	Mutual fund 9	Mutual fund 10	Mutual fund 11
Rm-Rf	0.560*** (0.0613)	0.277*** (0.0404)	0.485*** (0.0565)	0.652*** (0.0976)	0.362*** (0.0427)	0.0407*** (0.0117)	0.417*** (0.0467)	0.533*** (0.0595)	0.669*** (0.0697)	0.406*** (0.0587)	-0.0139** (0.00585)
SMB	0.0987 (0.148)	-0.0235 (0.0948)	0.0226 (0.136)	0.237 (0.208)	-0.0408 (0.104)	-0.0478 (0.0347)	-0.0647 (0.112)	0.128 (0.134)	0.210 (0.162)	0.0676 (0.121)	0.00142 (0.0164)
HML	-0.230 (0.174)	-0.143 (0.119)	-0.201 (0.162)	-0.183 (0.258)	-0.129 (0.115)	-0.0623* (0.0352)	-0.139 (0.130)	-0.234 (0.169)	-0.276 (0.203)	-0.229 (0.149)	-0.0170 (0.0132)
MOM	-0.104 (0.159)	-0.0849 (0.112)	-0.0848 (0.151)	-0.264 (0.280)	-0.0750 (0.107)	-0.0160 (0.0231)	-0.0803 (0.123)	-0.0611 (0.157)	-0.119 (0.199)	-0.0553 (0.123)	-0.0131** (0.00637)
IC	-0.0190** (0.00837)	-0.0196*** (0.00615)	-0.0194** (0.00819)	-0.0207** (0.00987)	-0.0190*** (0.00642)	-0.00371** (0.00173)	-0.0199*** (0.00697)	-0.0187** (0.00858)	-0.0205** (0.00962)	-0.0197** (0.00871)	-0.000222 (0.000543)
Constant	0.00759** (0.00330)	0.00769*** (0.00229)	0.00836*** (0.00313)	0.0136*** (0.00487)	0.00671*** (0.00231)	0.00247*** (0.000726)	0.00688*** (0.00257)	0.00849*** (0.00323)	0.0108*** (0.00381)	0.00648** (0.00277)	-9.72e-05 (0.000428)
Observations	121	121	121	121	121	121	121	121	121	121	121
R-squared	0.596	0.492	0.558	0.558	0.577	0.169	0.595	0.570	0.609	0.499	0.041

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 Regression results base on Regression Model (3.5.1) for individual mutual fund

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Mutual fund	Mutual fund	Mutual fund	Mutual fund	Mutual fund	Mutual fund	Mutual fund	Mutual fund	Mutual fund	Mutual fund	Mutual fund
	1	2	3	4	5	6	7	8	9	10	11
Rm-Rf	0.511*** (0.0793)	0.230*** (0.0472)	0.427*** (0.0701)	0.726*** (0.138)	0.302*** (0.0480)	0.0342** (0.0144)	0.357*** (0.0540)	0.477*** (0.0739)	0.636*** (0.0922)	0.286*** (0.0558)	-0.0122 (0.00803)
SMB	0.112 (0.183)	-0.0132 (0.116)	0.0242 (0.167)	0.372 (0.261)	-0.0550 (0.122)	-0.0588 (0.0427)	-0.0755 (0.134)	0.150 (0.164)	0.228 (0.197)	0.0615 (0.136)	0.00286 (0.0199)
HML	-0.0974 (0.196)	-0.0267 (0.126)	-0.0585 (0.178)	-0.212 (0.329)	0.0109 (0.118)	-0.0318 (0.0350)	0.00326 (0.137)	-0.0854 (0.183)	-0.156 (0.230)	0.0142 (0.142)	-0.0182 (0.0140)
MOM	-0.0390 (0.198)	-0.0304 (0.142)	-0.0230 (0.189)	-0.198 (0.328)	-0.0191 (0.137)	-0.00326 (0.0283)	-0.0220 (0.156)	0.0127 (0.197)	-0.0367 (0.249)	0.00459 (0.154)	-0.0137* (0.00694)
RmRfxIC	0.0895 (0.137)	0.0983 (0.0960)	0.121 (0.133)	-0.275 (0.181)	0.127 (0.0973)	-0.00985 (0.0179)	0.124 (0.110)	0.111 (0.139)	0.0195 (0.150)	0.329** (0.127)	-0.00548 (0.00903)
SMBxIC	-0.129 (0.334)	-0.135 (0.246)	-0.105 (0.330)	-0.343 (0.389)	-0.0354 (0.254)	0.0947 (0.0580)	-0.0446 (0.280)	-0.198 (0.330)	-0.0931 (0.376)	-0.247 (0.315)	0.00236 (0.0258)
HMLxIC	-0.961*** (0.361)	-0.752*** (0.260)	-0.951** (0.385)	-0.655 (0.502)	-0.906*** (0.275)	-0.425*** (0.107)	-0.957*** (0.315)	-1.014*** (0.358)	-0.981** (0.456)	-1.398*** (0.502)	-0.0244 (0.0231)
MOMxIC	-0.587** (0.258)	-0.479** (0.187)	-0.551** (0.253)	-0.641* (0.385)	-0.503*** (0.179)	-0.149*** (0.0363)	-0.527** (0.201)	-0.652** (0.264)	-0.745** (0.314)	-0.511** (0.249)	0.00141 (0.0134)
IC	-0.0113 (0.00730)	-0.0129** (0.00561)	-0.0116 (0.00736)	-0.0192** (0.00953)	-0.0113** (0.00520)	-0.00221* (0.00131)	-0.0121** (0.00578)	-0.0102 (0.00786)	-0.0112 (0.00886)	-0.0115 (0.00801)	-0.000430 (0.000584)
Constant	0.00779** (0.00346)	0.00793*** (0.00243)	0.00872*** (0.00330)	0.0120** (0.00483)	0.00718*** (0.00245)	0.00250*** (0.000769)	0.00732*** (0.00272)	0.00871** (0.00340)	0.0107*** (0.00393)	0.00765*** (0.00292)	-0.000119 (0.000422)
Observations	121	121	121	121	121	121	121	121	121	121	121
R-squared	0.623	0.543	0.591	0.578	0.624	0.255	0.636	0.608	0.635	0.582	0.043

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9 Regression results base on Regression Model (3.5.2) for individual mutual fund

6. Robustness Check

Running different robustness checks is important to confirm the stability of the main results. Accordingly, I estimate again the conditional performance in the form of Regression Model (3.5.1) using (1) value-weighted portfolios, (2) different definitions for *IC*, the crisis dummy variable, and (3) different sources for the risk factors.

Table 10 in Appendix 2a shows the result of the estimation of performance based on value-weighted portfolios. Within the crisis, hedge funds have a higher return than outside the crisis by 0.0319 percent per month, which is not statistically significant. The reason for this result is that the largest hedge fund in the portfolio is three times bigger than the next largest fund and so it has a considerable impact on the value-weighted portfolio. As shown by Table 6, Hedge fund 1, the largest fund, has a positive coefficient and thus the value-weighted portfolio has the same result. In the case of mutual funds, the result is similar to main result presented in Table 3. The coefficient on variable *IC* is -1.70 percent and this is statistically significant at the five percent level. The average risk adjusted performance outside of the crisis is 0.739 percent per month and the performance is statistically significant at one percent level.

Table 11 in Appendix 2b presents the estimation of performance using two different time periods as the definition for the financial crisis. The first time period runs from May 2007 to March 2009 and is based on the largest drop in MSCI World index of 40 percent. This recessionary trend is evident in the S&P 500 index and Euro Stoxx indexes. The results using this time period are similar to the main results from Table 3, and the coefficient on *IC* for hedge funds is -0.473 percent, which is statistically significant at the ten percent level. Outside of the crisis, the average risk adjusted performance is 0.553 percent per month which is statistically significant at the one percent level. In the case of mutual funds, the coefficient for *IC* is -1.18 percent and is statistically significant at five percent level. Outside the crisis, the average risk adjusted performance is 0.684 percent per month which is statistically significant at one percent level. The second financial crisis period runs from December 2007 to June 2009. This period corresponds to the recession period defined by the NBER for the USA. Results of this estimation have both fund types showing negative coefficients for *IC* but the results are not statistically significant.

The final robustness check uses two different risk factor sources. These results are presented in Table 12 in Appendix 2c. The first estimation is based on Andrea Frazzini's Swedish data² and the second on Kenneth French's Global data. Results using the Swedish data closely match the main results from Table 3. The coefficients on *IC* for both hedge funds and mutual funds are negative at -0.779 percent and -1.48 percent, both of which are statistically significant. The respective average risk adjusted performances outside the crisis for hedge funds and mutual funds are 0.554 and 0.590 percent per month, both are statistically significant. The results based on the Global data also match the main result from Table 3. Both hedge funds and mutual funds have negative *IC* coefficients of -0.772 percent and -1.40 percent, which are statistically significant at the five percent level. Outside the crisis, the average risk adjusted performances of the funds are 0.571 percent per month and 0.595 percent per month, respectively, again both are statistically significant.

² http://www.econ.yale.edu/~af227/data_library.htm

7. Conclusion

Using Fink, Raatz and Weigert's (2014) conditional four-factor model, this study examines the equal weighted performance of Swedish hedge funds and mutual funds during the financial crisis of 2008. Following the estimation of performance, the thesis also establishes which funds have performed best during the crisis.

There is evidence that both hedge funds and mutual funds underperform during the financial crisis. Based on Regression Model (3.5.1), the respective and statistically significant underperformance of hedge funds and mutual funds during the crisis was -0.722 percent and -1.64 percent per month. Adjusted for risk, the average underperformance of hedge funds during the crisis was -0.145 percent per month and that of mutual funds was -0.922. Based on the Regression Model (3.5.2) with crisis interaction terms, both hedge and mutual funds underperform during recession. During the crisis, the statistically significant relative performance of hedge funds is -0.751 percent per month and that of mutual funds is -1.04 percent per month. Adjusted for risk, the respective underperformance of hedge and mutual funds is -0.154 and -0.31 percent per month during the crisis.

Estimations of performance provided by this study demonstrate that both hedge funds and mutual funds underperformed in the recessionary crisis. Confronted by such conditions, hedge funds however, performed less badly than did mutual funds during the crisis and this was true too for the average risk adjusted performance inside the crisis. A conclusion of this thesis is that when recessionary conditions arise, large investors in Sweden should invest preferentially in hedge funds to restrict the losses suffered by their portfolios.

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Appendix

1

Hedge Funds	Name	Strategy	Total Asset MSEK
Hedge Fund 1	BRUMMER & PARTNERS NEKTAR FD	Equity Hedge	27939
Hedge Fund 2	BRUMMER & PARTNERS ZENIT	Equity Hedge	11426
Hedge Fund 3	CATELLA-HEDGEFOND	Multi-Strategy	7403
Hedge Fund 4	EXCALIBUR	Fixed Income Directional	5867
Hedge Fund 5	RAM ONE-A	Equity Hedge	3893
Hedge Fund 6	LYNX	CTA/Managed Futures	3353
Hedge Fund 7	SEB HEDGE FIXED INCOME	Fixed Income Directional	790
Hedge Fund 8	ADRIGO HEDGE	Equity Hedge	708
Hedge Fund 9	GLADIATOR	Equity Hedge	623
Hedge Fund 10	PRIOR NILSSON YIELD	Equity Hedge	535
Hedge Fund 11	ATLANT FONDER-EDGE-A	Macro	200

Mutual Funds	Name	Strategy	Total Asset MSEK
Mutual Fund 1	ALLEMANSFOND KOMPLETT	Blend	57685
Mutual Fund 2	SEB VARLDENFOND	Aggressive Allocation	35727
Mutual Fund 3	AKTIEFOND PENSION	Blend	35064
Mutual Fund 4	DIDNER & GERGE AKTIEFOND	Blend	30967
Mutual Fund 5	SWEDBANK ROBUR KAPITALINVEST	Blend	27761
Mutual Fund 6	NORDEA STRATEGA 10	Dynamic Allocation	27261
Mutual Fund 7	SWEDBANK ROBUR TRANSFER 80	Dynamic Allocation	26217
Mutual Fund 8	AMF AKTIEFOND VARLDEN	Value	25602
Mutual Fund 9	AMF AKTIEFOND SVERIGE	Value	24524
Mutual Fund 10	HANDELSBANKEN KORTRANTEFOND	Aggregate	22799
Mutual Fund 11	SPP GENERATION 50-TAL	Target 2021-2025	19518

2a

VARIABLES	(1) Hedge Fund Value Weight	(2) Mutual Fund Value Weight
RmRf	0.105*** (0.0247)	0.417*** (0.0468)
SMB	0.0983 (0.0629)	0.0552 (0.111)
HML	-0.125** (0.0539)	-0.173 (0.136)
MOM	-0.0728*** (0.0276)	-0.0915 (0.134)
IC	0.000319 (0.00390)	-0.0170** (0.00657)
Constant	0.00547*** (0.00106)	0.00739*** (0.00262)
Observations	121	121
R-squared	0.295	0.588
Number of Funds	11	11

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10 Robustness check for value weighted.

2b

VARIABLES	MSCI May 2007- Mars 2009		NBER December 2007 - June 2009	
	Hedge Fund	Mutual Fund	Hedge Fund	Mutual Fund
RmRf	0.0998*** (0.0341)	0.406*** (0.0460)	0.106*** (0.0323)	0.420*** (0.0493)
SMB	0.104* (0.0584)	0.0938 (0.104)	0.118* (0.0597)	0.128 (0.101)
HML	-0.0611 (0.0637)	-0.184 (0.133)	-0.0684 (0.0640)	-0.202 (0.133)
MOM	-0.0380 (0.0305)	-0.0895 (0.127)	-0.0458 (0.0325)	-0.111 (0.122)
IC	-0.00473* (0.00268)	-0.0118** (0.00563)	-0.00235 (0.00337)	-0.00680 (0.00748)
Constant	0.00553*** (0.000945)	0.00684*** (0.00254)	0.00506*** (0.000892)	0.00584** (0.00241)
Observations	121	121	121	121
R-squared	0.369	0.577	0.353	0.566
Number of Funds	11	11	11	11

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 11 Robustness check for value different definition for *IC*.

2c

VARIABLES	Frazzini's Swedish Data		French's Global Data	
	Hedge Fund	Mutual Fund	Hedge Fund	Mutual Fund
RmRf	0.0871*** (0.0206)	0.338*** (0.0283)	0.104*** (0.0373)	0.501*** (0.0448)
SMB	0.0464** (0.0228)	-0.0519 (0.0468)	0.0895 (0.0592)	0.0794 (0.126)
HML	-0.00451 (0.0312)	0.0925 (0.0745)	-0.0269 (0.0805)	-0.142 (0.135)
MOM	-0.00905 (0.0239)	-0.0558 (0.0749)	-0.0353 (0.0348)	-0.0828 (0.134)
IC	-0.00779** (0.00308)	-0.0148*** (0.00531)	-0.00772** (0.00352)	-0.0140** (0.00586)
Constant	0.00554*** (0.000872)	0.00590*** (0.00221)	0.00571*** (0.000887)	0.00595*** (0.00221)
Observations	121	121	121	121
R-squared	0.442	0.701	0.369	0.634
Number of Funds	11	11	11	11

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table 12 Robustness check for different source for the risk factors.