

Alpha and Beta of Long/Short Equity Hedge Funds: A Study of Swedish and International Funds

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Abstract

As shown in the literature, delivering alpha over time and in different market environments is very difficult and relatively few managers have the ability to do so. Empirical analysis has shown that the main drivers of return for Long/Short Equity hedge funds are a stock market factor and the spread between small- and large capitalization stocks. We find that Swedish Long/Short Equity hedge funds outperformed their international peers during the financial crisis in June 2007 – December 2008 but underperformed during the previous equity bull market April 2003 – May 2007. The reason for this is found to be a lower beta to the broad equity market for Swedish funds. Funds started during 2004 – 2005 operated with a higher beta to the Swedish stock market during the equity bear market compared to funds started before April 2003. Our regression model can explain 65% of the returns of the funds during the bear market period and the stock market is the only statistically significant factor. The capability to generate alpha is found to be limited and concentrated to the equity bull market.

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1. Introduction

The financial crisis that started to effect most financial markets during the summer of 2007 has proved to be a difficult period for many hedge funds. Although generally outperforming long-only equity funds by a wide margin hedge funds active in equity based strategies reported weak returns for June 2007 – December 2008 as the equity market plummeted and liquidity dried up. At an aggregated level Long/Short Equity hedge funds had difficulties in this environment but the dispersion of returns were also wide with some managers capable of delivering strong results even during this period, while other had to close down as a result of severe negative returns.

The difficulties for Long/Short Equity hedge funds should not come as a total surprise as a around 70-80% of the returns come from exposure to the broad equity market and the spread between small- and large capitalization stocks, as demonstrated in numerous studies, for example Agarwal and Naik (2004), Fung and Hsieh (2004a, 2006), Haglund (2006, 2008) and Jaeger and Wagner (2005). Due to the exposure to these two factors Long/Short Equity funds should generally be seen as a substitute to an active long-only mandate and not as a risk-reduction tool in portfolio construction. The diversification effects of using Long/Short Equity funds to reduce tail-risk in an equity portfolio are limited as shown by Haglund (2009). It is normally very difficult for a manager to be able to deliver stable alpha over time and it has been shown in Fung and Hsieh (2004b, 2006) that around 20% of hedge funds can deliver a persistent alpha when beta and alternative beta exposures are accounted for.

In this paper we follow up on the study by Haglund (2008) where alpha and beta exposures of Swedish Long/Short Equity hedge funds domiciled in and managed from Sweden and with a focus on the Swedish stock market were studied for the period November 2002 – December 2007. Here we use the same index construction process of an index of Swedish Long/Short Equity funds and examine how they have fared with the bull- and bear market periods between 2003 - 2008 in terms of delivering alpha and adjusting the beta exposures. We then compare our results to international Long/Short Equity funds before conducting an analysis of the alpha and betas of individual Swedish Long/Short Equity funds during the recent bull and bear market periods.

The rest of this paper is structured as follows; in section 2 we describe the factor analysis process, section 3 deals with the data used in the study, in section 4 we present the results and the paper ends in section 5 with some concluding remarks.

2. Structure of factor model

In order to assess the beta exposures and the resulting alpha of the funds we use a factor based regression process where the model is structured as follows:

$$R_i = \alpha_i + \beta_M X_{M,t} + \beta_{SL} X_{SL,t} + \beta_{VG} X_{VG,t} + \varepsilon_i$$

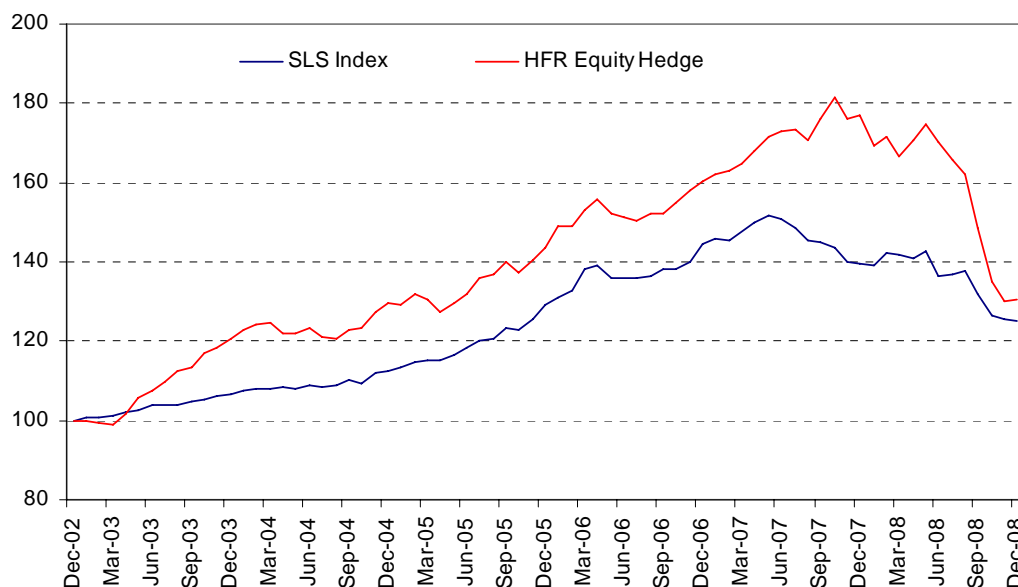
where R_i is the return on fund i , $X_{M,t}$, $X_{SL,t}$ and $X_{VG,t}$ are the values of the stock market factor, the small- large cap factor and the value – growth factor respectively, β_M , β_{SL} and β_{VG} are the corresponding sensitivities and ε_i is a zero mean random variable.

We conduct static regressions for the period January 2003 – December 2008, a 12-month rolling window regression with a jump of one month at a time in order to assess the beta exposures over time and finally, regressions for bull- and bear stock market periods.

3. Data

As no appropriate index is available for Long/Short Equity hedge funds domiciled in and managed from Sweden with a focus on the Swedish stock market, and in order to avoid some of the pitfalls with public hedge fund indexes, we construct an own index named Swedish Long/Short Index (SLS Index), based upon the same construction process as in Haglund (2008). As reported by Bacmann et al (2008) a mis-specified model or a model where certain factors are omitted can result in flawed results where the explanatory power is significantly reduced. We therefore apply a strict policy for the inclusion of funds in the SLS Index to assure that the factors are representative for the included funds. The market factors we use are MSCI Sweden including dividends net of tax minus the one-month SSVX rate (named MSCI Swe-rf), MSCI Sweden Small capitalization index minus MSCI Sweden (named MSCI Swe SL) and the return on MSCI Sweden Value index minus MSCI Sweden Growth index (named MSCI Swe VG). The HFR Equity Hedge Index is utilized to proxy the return of international Long/Short Equity hedge funds and for these funds we use the three corresponding factors from Fama and French (1992); a stock market factor minus the risk free rate (named Rm-rf), a small minus large cap stocks factor (named SMB) and a value minus growth stocks factor (named HML) in the regression process. The Rm-rf factor is the value-weighted return on all NYSE, AMEX, and NASDAQ stocks minus the one-month U.S. Treasury bill rate and the SMB and HML factors include NYSE, AMEX, and NASDAQ stocks.

Figure 1 Rebased return of SLS Index and HFR Equity Hedge



For most investors it is possible to invest in funds domiciled in Sweden as well as funds domiciled outside Sweden and as shown in Figure 1, the SLS Index underperformed their international peers in the HFR Equity Index during the equity bull market in April 2003 – May 2007 but managed to outperform during the bear market in June 2007 – December 2008. From June 2007 – December 2008 international funds lost 28% while the Swedish funds lost 18.5%.

4. Empirical results

4.1 Regression of Long/Short Equity Indexes

SLS Index

The results of the regression analysis covering the whole period from January 2003 – December 2008 are displayed in Table 1 and Figure 2-3. The Swedish funds have a beta of 0.21 to the Swedish equity market and a beta of 0.15 to the spread between Swedish small and large cap stocks. No significant exposure is found to the value – growth spread. The gross exposure can according to McGuire and Tsatsaronis (2008) be estimated by summing the absolute values of the beta coefficients and that gives an approximate gross exposure of 36% for the SLS Index, a very low figure. Interestingly, a trend towards an increasing beta to both the Swedish stock market and to the SL spread can be seen from August 2004 – October 2007. Most managers apparently saw the hefty fall in the stock market during June 2007 as a temporary dip and accordingly increased their beta exposures again in the following two months. The small positive alpha generated for the period is only significant at the 10% level.

Table 1 Regression of SLS Index for period January 2003 – December 2008

<i>Regression Statistics</i>		<i>Durbin-Watson test</i>				
Multiple R	0.826	1.82				
R ²	0.683					
Adjusted R ²	0.669					
Standard Error	0.00856851					
Observations	72					

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	0.01074526	0.003581752	48.78475	6.16227E-17
Residual	68	0.00499253	7.34195E-05		
Total	71	0.01573778			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Critical t value</i>
Intercept	0.00200852	0.00102559	1.9584	0.0000	0.0040	1.99547
MSCI Swe-rf	0.21219468	0.01836997	11.5512	0.1762	0.2482	
MSCI Swe SL	0.15177093	0.0317995	4.7727	0.0894	0.2141	
MSCI Swe VG	-0.01081598	0.03045914	-0.3551	-0.0705	0.0489	

Figure 2 12-month rolling window regression of SLS Index against MSCI Swe-*rf* (Beta 1), MSCI Swe SL (Beta 2) and MSCI Swe VG (Beta 3), January 2003 – December 2008

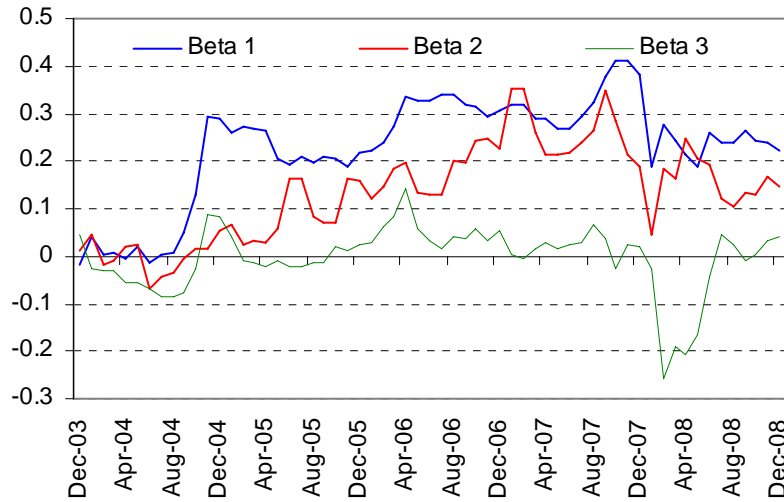
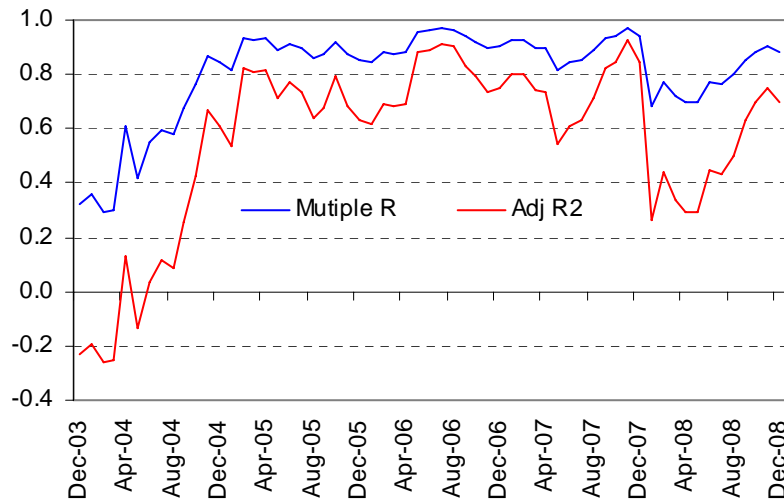


Figure 3 Correlation and Adjusted R^2 of 12-month rolling window regression of SLS Index, January 2003 – December 2008



We now turn to analyse the bull market for equities during April 2003 – May 2007. As shown in Table 2, the model can explain 51% of the return of the SLS Index. The beta to the stock market and the spread between small- and large cap stocks are both around 0.19, resulting in an estimated gross exposure of around 39%. No significant exposure is found to the value – growth spread. A significant alpha of 0.28% per month was generated during the bull market as a result of security selection.

Table 2 Regression of SLS Index for period April 2003 – May 2007

<i>Regression Statistics</i>		<i>Durbin-Watson test</i>			
Multiple R	0.735	1.75			
R ²	0.540				
Adjusted R ²	0.510				
Standard Error	0.00723452				
Observations	50				

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	0.00283145	0.000943818	18.03302	7.04241E-08
Residual	46	0.00240756	5.23383E-05		
Total	49	0.00523902			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Critical t value</i>
Intercept	0.00281881	0.0013368	2.1086	0.0002	0.0054	2.0129
MSCI Swe-rf	0.19456021	0.02744127	7.0901	0.1408	0.2483	
MSCI Swe SL	0.19003045	0.04497324	4.2254	0.1019	0.2782	
MSCI Swe VG	-0.03494659	0.03142134	-1.1122	-0.0965	0.0266	

In Table 3 we find the same analysis covering the bear market period June 2007 – December 2008. No significant alpha is generated during this period while the beta to the broad stock market is 0.22, i.e. at around the same levels as during the previous bull market. The model can now explain 65% of the return of the SLS Index. The gross exposure is estimated to 32%, somewhat lower than during the bull market period.

Table 3 Regression of SLS Index for period June 2007 – December 2008

<i>Regression Statistics</i>		<i>Durbin-Watson test</i>			
Multiple R	0.843	1.61			
R ²	0.710				
Adjusted R ²	0.652				
Standard Error	0.01072408				
Observations	19				

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	0.00422555	0.001408515	12.24731	0.000259062
Residual	15	0.00172509	0.000115006		
Total	18	0.00595064			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Critical t value</i>
Intercept	-0.00058454	0.00292581	-0.1998	-0.0063	0.0052	2.1314
MSCI Swe-rf	0.22530644	0.0381937	5.8990	0.1504	0.3002	
MSCI Swe SL	0.10157061	0.05894856	1.7230	-0.0140	0.2171	
MSCI Swe VG	0.01205036	0.08766825	0.1375	-0.1598	0.1839	

HFR Equity

As shown in Table 4, the HFR Equity Index had a beta of 0.57 against the equity market and a beta of -0.20 against the value – growth spread during January 2003 – December 2008 and there was no significant exposure to the small – large cap spread.

A statistically significant alpha of 0.32% per month was generated and the model shows a high explanatory power with an adjusted R^2 of 0.77. In Figure 4 we see a trend towards a higher beta against the stock market during 2005 – 2006 and a decrease in beta to the small – large factor and to the value- growth factor from December 2006 and onwards. The explanatory power is generally at a high level, Figure 5.

Table 4 Regression of HFR Equity Index for period January 2003 – December 2008

Regression Statistics		Durbin-Watson test			
Multiple R	0.888	1.63			
R ²	0.788				
Adjusted R ²	0.779				
Standard Error	0.01156388				
Observations	72				

ANOVA					
	df	SS	MS	F	Significance F
Regression	3	0.03377482	0.011258272	84.19071	7.5276E-23
Residual	68	0.00909319	0.000133723		
Total	71	0.04286801			

	Coefficients	Standard Error	t Stat	Lower 95%	Upper 95%	Critical t value
Intercept	0.00320483	0.00137571	2.3296	0.0005	0.0059	1.99547
Rm-rf	0.57320182	0.04279719	13.3934	0.4893	0.6571	
SMB	0.06754753	0.07049805	0.9581	-0.0706	0.2057	
HML	-0.20643074	0.05188589	-3.9786	-0.3081	-0.1047	

Figure 4 12-month rolling window regression of HFR Equity Index against market factor Rm (Beta 1), small –big factor SMB (Beta 2) and value – growth factor HML (Beta 3), January 2003 – December 2008

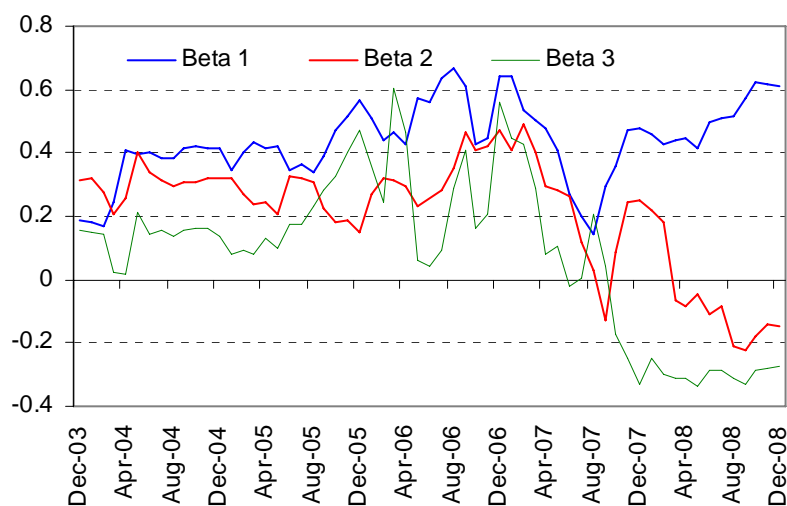
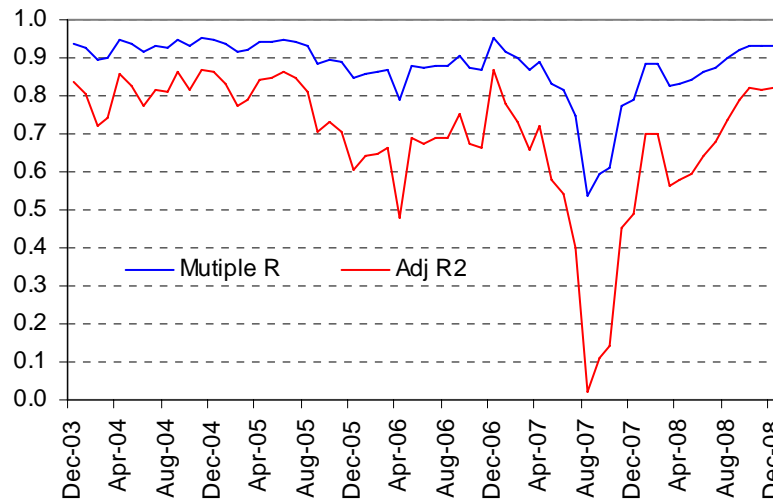


Figure 5 Correlation and Adjusted R^2 of 12-month rolling window regression of HFR Equity Index, January 2003 – December 2008



We now turn to analyse the HFR Equity Index during the bull market period April 2003 – May 2007. The results are seen in Table 5 and the model has a high explanatory power of 0.75. The beta to the stock market is 0.35 and the beta to the small – large spread is 0.27, while the exposure to the value – growth spread is statistically non-significant. The estimated gross exposure measured as the sum of the absolute beta values is 63%. A statistically significant alpha of 0.57% per month was generated for the period.

Table 5 Regression of HFR Equity Index for period April 2003 – May 2007

Regression Statistics		Durbin-Watson test			
Multiple R	0.876	1.72			
R ²	0.768				
Adjusted R ²	0.753				
Standard Error	0.00778873				
Observations	50				

ANOVA					
	df	SS	MS	F	Significance F
Regression	3	0.00922848	0.003076161	50.70785	1.25759E-14
Residual	46	0.00279056	6.06644E-05		
Total	49	0.01201904			

	Coefficients	Standard Error	t Stat	Lower 95%	Upper 95%	Critical t value
Intercept	0.00575648	0.00134785	4.2709	0.0031	0.0084	2.01290
Rm-rf	0.35180954	0.05533603	6.3577	0.2434	0.4603	
SMB	0.27642895	0.06198467	4.4596	0.1549	0.3979	
HML	-0.03736847	0.07442908	-0.5021	-0.1832	0.1085	

In Table 6 we show the result from the analysis of HFR Equity Index for the bear market period June 2007 – December 2008. The explanatory power is now even higher at 0.82 and the beta to the stock market is 0.62, a much higher value than the 0.35 seen during the bull market. The beta to small- large cap spread is now

statistically non-significant, while a beta of -0.30 is seen to the value- growth spread. The estimated gross exposure is now 92%. No statistically significant alpha was produced for this period.

Table 6 Regression of HFR Equity Index for period June 2007 – December 2008

<i>Regression Statistics</i>		<i>Durbin-Watson test</i>				
Multiple R	0.922	1.88				
R ²	0.851					
Adjusted R ²	0.821					
Standard Error	0.01483123					
Observations	19					

<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	3	0.01882794	0.006275981	28.53165	1.91203E-06	
Residual	15	0.00329948	0.000219966			
Total	18	0.02212743				

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Critical t value</i>
Intercept	-0.00290322	0.00402139	-0.7219	-0.0108	0.0050	2.13145
Rm-rf	0.62095385	0.07249178	8.5659	0.4789	0.7630	
SMB	-0.13718326	0.18193447	-0.7540	-0.4938	0.2194	
HML	-0.30363485	0.08573928	-3.5414	-0.4717	-0.1356	

4.2 Comparison of results from regression analysis of HFR Equity and SLS Index

When comparing the results from the regression analysis of the two indexes in bear- and bull markets some interesting observations can be made. Firstly, during the bull market period both the HFR Equity Index and the SLS Index have statistically significant exposures to the stock market (0.35 and 0.19 respectively) and the small – large cap spread (0.27 and 0.19 respectively). Neither index has a significant exposure to the value – growth spread. Both indexes generated a statistically significant alpha during the bull market with a value of 0.28% per month for the SLS Index and 0.57% per month for the HFR Equity Index.

Secondly, during the bear market period the beta to the stock market is much higher for the HFR Equity Index than for the SLS Index (0.62 and 0.22 respectively). For the same period we also see a significant negative exposure to the value – growth spread for the HFR Equity Index (beta -0.30). The funds in the HFR Equity index thereby shifted their exposure from being long small cap stocks hedged with large caps to being long growth stocks and short value stocks. No significant exposure to the value – growth spread is found for the SLS Index and the small positive beta of 0.10 to the small – large cap spread for the same index is not significant (t-stat 1.72). No alpha was generated by either index during the bear market period.

4.3 Alpha and beta of individual Swedish Long/Short Equity funds

In this part we conduct an analysis at the individual fund level in order to assess the beta and the alpha generating capabilities of the managers and to study if we can see any patterns regarding the persistency of alpha. Since we did not identify any significant exposure to the value – growth spread for the SLS Index in the analysis of

the bull- or bear market period in section 4.1 we here use a regression model with two factors; the market factor and the small – large cap spread factor. For funds active as of April 2003 (named Group 2003) we first conduct a regression analysis covering the bull market period April 2003 – May 2007 and then the same analysis for the bear market period June 2007 – December 2008. As a number of funds started during the 2004 – 2005 period we also conduct a separate analysis for this group of funds (named Group 2006) with a start date set at January 2006 and for this group we define the bull market period as January 2006 – May 2007. Group 2003 contains 13 funds and Group 2006 8 funds. No funds were closed down during the bull market period while two funds from Group 2003 and one fund from Group 2006 were closed down during the bear market period. None of the closed funds had produced a statistically significant alpha during the bull market period.

The summary of the results are shown in Table 7 and in Group 2003 31% of the funds produced a significant alpha measured as the intercept in the two-factor regression analysis during the bull market period, while 8% of the funds in this group produced alpha during the bear market. For Group 2006 the figures are 25% and 0% respectively.

Table 7 Summary statistics of alpha of individual funds during bull and bear market periods

		Bull period	Bear period
Group 2003	Significant alpha	31%	8%
	No significant alpha	69%	92%
Group 2006	Significant alpha	25%	0%
	No significant alpha	75%	100%

In Table 8 we display the median beta exposures to the Swedish stock market and to the Swedish small – large cap spread for the two groups of funds during the bear market period. The median market beta of the funds in Group 2006 is considerable higher than for the funds in Group 2003, while the beta to the small – large cap spread is about the same.

Table 8 Median beta exposures for funds during the bear market period June 2007 – December 2008

		Beta
Group 2003	Median market beta	0.08
	Median beta to small – large spread	0.06
Group 2006	Median market beta	0.50
	Median beta to small – large spread	0.11

To put the beta values we identified in Table 8 in relation to the funds' returns during the bear market period we display the median return of the two groups in Table 9. The markedly higher market beta of Group 2006 resulted in a much worse return of -29.11% versus a return of -10.28% for Group 2003.

Table 9 Median return during bear market period June 2007 – December 2008

	Median return for bear market period
Group 2003	-10.28%
Group 2006	-29.11%

Footnote: Funds that closed down during 2007-2008 are included up until their last reported return in the calculation of the median returns.

5. Conclusions

After studying Swedish Long/Short Equity funds managed from Sweden and with an investment focus on the Swedish stock market we find that Swedish Long/Short Equity hedge funds outperformed their international peers during the bear market in June 2007 – December 2008 and underperformed during the equity bull market in April 2003 – May 2007. The outperformance during the bear market can be explained by a lower beta to the equity market and lower gross exposure measured as the sum of the absolute beta coefficients in the regression analysis compared to international funds.

Furthermore, the international funds switched from a long exposure to the small- large cap spread during the bull market period to be long growth stocks and short value stocks during the bear market period. The same shift in exposure is not identified among the Swedish funds but a decrease in the exposure to small cap stocks is seen for the bear market period. Interestingly, the international funds operated with a substantially higher beta to the equity market and a higher gross exposure during June 2007 – December 2008 compared to the period April 2003 – May 2007.

The main drivers of the return of Swedish Long/Short Equity funds during the bull market period April 2003 – May 2007 are the broad stock market and the exposure to the spread between small- and large cap stocks. During the bear market June 2007 – December 2008 the stock market was the main driver. Less than a third of the Swedish funds generated a statistically significant alpha during the bull market period and the capabilities of alpha creation during the following bear market period were very limited. We also find that a higher percentage of older funds generated alpha for the bull market period and that these funds also operated with a lower beta to the Swedish stock market during June 2007 – December 2008 and thereby outperformed the younger funds by 18%.

As shown in this study, creating alpha during a period with a beneficial market environment is much more common than during a period with adverse market conditions. In the case of Long/Short Equity hedge funds it is easier to find managers that are experienced and have strong track records in managing the long book of the portfolio compared to the short book. It is also a question of the mindset of the portfolio managers; do they see longer bear markets as a period where the aim is to limit the losses and preserve capital or a period where substantial gains can be made on the short side? The latter is interesting in terms of our analysis of younger and older Swedish funds. Many funds set up during 2004 – 2005 were started by former stock brokers or long-only fund managers and the higher betas of these funds during the equity bear market can be a result of their background and the limited experience in shorting stocks.

We have shown that managing the beta and alternative betas (the various spread factors) are the most important parameters for the manager to focus on during adverse market conditions and for managers that do not possess the skill and internal

processes to do so we expect the consolidation- and closure process started during 2007- 2008 to continue in 2009.

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