Finance, Markets and Valuation

Relationship between mutual funds and hedge funds performance in different periods

Relación entre la performance de los fondos de inversión y los hegde funds en diferentes periodos

Gerhard Lechner [1], **Benjamin Fauster**[2]

[1]*Faculty of Economics and FH Joanneum Graz, University of Applied Sciences. Austria Email: gerhard.lechner@fh-joanneum.at*
[2]*Joanneum Graz, University of Applied Sciences. Austria*

Abstract

The hedge fund literature has already shown that hedge funds and mutual funds follow a different strategy. One result of the literature was that mutual funds herd into or out of stocks following the herd of hedge funds one quarter later. The aim of this paper is to find out whether herding behavior of mutual funds have changed after the financial crisis. Our paper compares mutual funds and equity hedge funds in general (not only large hedge funds). The hypothesis is that mutual funds are not herding to equity hedge funds as strong as before the crisis. We use OLS regressions and correlation analysis to test the aforementioned hypothesis. We found that the monthly returns of hedge funds and mutual funds have synchronized in developed markets after the financial crisis. Therefore, the argument that mutual funds herd hedge funds is at least not as strong as before. The improving effectiveness and price informativeness could be an explanation for this changing environment.

Keywords: Equity Hedge; Hedge fund performance; Mutual fund performance; Equity Indices; Herd behavior.

Resumen

La literatura dedicada a los hedge fund ya ha demostrado que éstos y los fondos de inversión siguen estrategias diferentes. Así, se ha demostrado que los fondos de inversión en su conjunto compran o venden las mismas acciones que los hedge funds pero con un retraso de un trimestre. El objetivo del presente trabajo es comprobar si este comportamiento gregario de los fondos de inversión se ha modificado tras la crisis financiera. Con esta intención se comparan los fondos de inversión y los hedge funds en general (no solo los hegde funds de gran tamaño). La hipótesis es que los fondos de inversión ya no siguen en tropel a los hedge funds con la misma intensidad que en los tiempos previos a la crisis. Para comprobar si se verifica esta hipótesis empleamos regresiones OLS y análisis de correlación. Como resultado, encontramos que las rentabilidades mensuales de los hedge funds y los fondos de inversión se han sincronizado en los mercados desarrollados tras la crisis. Por lo tanto, el argumento de que los fondos de inversión siguen la

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estela de los hedge funds ya no es igual de válido que en el pasado. Este cambio podría explicarse como consecuencia de una mayor eficiencia y mayor información de los precios.

Keywords: Equity Hedge; Hedge fund; Fondo de inversión; Índice bursátil; Comportamiento gregario.

1 Introduction

Hedge funds were the top performers in the investment universe in the 1990s and at the beginning of the new millennium. However, after the financial crisis hedge funds lose some momentum in comparison to other asset classes and many institutional investors sold their hedge funds exposure. Brown (2016) even spoke of a crisis in the hedge funds industry, because investors significantly reduced their exposure in July 2016. The author also made clear that the reason for the weakness is not hard to find, because the S&P 500 had an annualized return of 14.5% from January 2009 through March 2016 and the HFRI Asset Weighted Composite Index and the Dow Jones Credit Suisse Hedge Fund Index recorded an annualized return (after fees) of only 6.1% in the same period. There are still not many papers in literature which discuss the weakness of the hedge funds industry after the financial crisis. Lechner y Beinhauer (2017) found that the Dodd Frank Act was definitely a moment from where hedge funds have lost momentum. The authors found a relatively high correlation of hedge funds to the CRB commodity index and to the MSCI Emerging market equity index. It was also interesting that the correlations of most hedge funds strategies increased with the S&P 500. Caglayan y Ulutas (2013) already found a strong link between Emerging Market equities, Emerging Market currencies and the future return of global macro hedge funds. However, the weakness on commodity markets and Emerging Market equities was just one explanation or cause according to the study. There is also an increasing general market efficiency and hedge funds were one of the largest profiteers of weaker market efficiency.

Field-specific literature reveals many studies about the performance of hedge funds and mutual funds. For example, Liang (1999) examined the performance of hedge funds and mutual funds. His results demonstrated the relatively good performance of hedge funds. The risk-return profile and the Sharpe Ratio of hedge funds were better than those of mutual funds. However, his study was about the 1990s where hedge funds had golden times. There have already been done some studies about the relationship of hedge funds and equity mutual funds. For example, Eling y Faust (2010) compared the performance of hedge funds and mutual funds in emerging markets. The reason for their study was the limited possibility of Emerging Market hedge funds to be short of certain instruments like Emerging Market equities or Emerging Market bonds (Government and Corporate bonds). The question was what could be the added value of hedge funds if their ability to be short in the markets was limited. The authors used five different performance measurement models to show whether Emerging Market hedge funds could generate an alpha in comparison to Emerging Market mutual funds. The results showed that Emerging Market hedge funds were able to generate alpha, but Emerging Market mutual funds could not outperform the benchmark. According to the study the reason for the outperformance of Emerging Market hedge funds was that these funds were more active in changing their asset allocation than mutual funds. However, the data period from February 1995 until 2008 did not consider after crisis development. Another reason why Emerging Market hedge funds outperformed mutual funds could be that hedge funds are able to mix their portfolio with bonds and equities. Mutual funds are often either specialized on equities or bonds.

A study of Jiao y Ye (2014) examined whether there is a relationship in the equity trading

strategy of mutual funds and large hedge funds. They found that mutual funds and large hedge funds herd after each other. According to the study mutual funds herding measure is positively related to last quarters hedge fund herding. That means hedge funds buy or sell equities in quarter i followed by mutual funds in the quarter i+1. The study used a sample period from 2000:Q1-2007:Q2. Another result of the study was that when mutual funds followed hedge funds a significant price impact was the consequence, whereas hedge funds herding did not destabilize prices. The top 30% of mutual funds following hedge funds does so persistently and this group was also responsible for price reversals in equity markets. The limitation of this study was that the authors only used long equity investment of hedge funds. Jiao (2012) has already examined the relationship between hedge funds activities in the equity markets and equity prices. In the expansion period from 2000 until 2009 hedge fund trading in equities predicted increasing stock returns one quarter ahead and return reversals in the second year.

The aim of this paper is to analyze the relationship between hedge funds and mutual funds returns in different periods starting from 2000 to April 2017. We want to analyze three different periods, namely, from January 2000 to December 2006, from January 2007 to December 2008 and from January 2009 to April 2017. The target is to show that hedge fund performance weakened in relation to mutual fund performance after the financial crisis. A weaker performance of hedge funds in relation to mutual funds would be furthermore an indication that herding behavior in the form which was described by Jiao y Ye (2014) has weakened. However, we await that the month on month correlation between hedge funds and equity mutual funds have increased after 2009, because of improved price informativeness (Bai, Philippon, y Savov, 2016) and regulations (Dodd Frank Act, Solvency II) which hit hedge funds (Lechner y Beinhauer, 2017). The latter argument is our main contribution to the literature, because the influential times of hedge funds for the market development are likely to be over. At least when we take the time period after the financial crisis the influence of hedge funds on market trends have diminished. However, one argument should not be underestimated. The performance of Emerging Market equities was very weak after the financial crisis and hedge funds probably increased their exposure in this illiquid asset class. Aiken, Kilic, y Reid (2016) demonstrated that hedge funds are not able to find the right timing for Emerging Market equities and conversely Caglayan y Ulutas (2013) found a positive relation between hedge funds future returns and their exposure to Emerging Market equities and Emerging Market currencies. Caglayan y Ulutas emphasized that only directional hedge fund strategies have the right timing ability in investing in Emerging Market equities.

2   Methodology and data

Contrarily to Eling y Faust (2010) our focus will be on the comparison of the performance of worldwide hedge funds and equity mutual funds. We differentiate between three different periods. The first period is from January 2000 until December 2006 which displays the period before the financial crisis. This period was very favorable for hedge funds according to many studies in the literature. The second period we use is the time immediately before and at the financial crisis from January 2007 to December 2008 and the third period consists of the time after the financial crisis from January 2009 till April 2017 which became a more and more difficult time for hedge funds. For all data we used monthly return data. All data are net returns which means that fees are already extracted. For hedge funds we used the data of CISDM which are open for the public. Therefore, our study can be compared for example with Capocci y Hübner (2004); Chen y Chen (2009); Ding y Shawky (2007); Eling y Faust (2010); Kouwenberg (2003).

The study of Jiao y Ye (2014), which is very relevant for our paper used data from Thomson Financials CDA/Spectrum 13 F and the study of Lechner y Beinhauer (2017) used Hedgefund Research (HFR) data. Furthermore, Jiao y Ye (2014) used quarterly returns instead of monthly returns and they focused on large hedge funds. Additionally, as mentioned this study used only long equity investments of hedge funds. Therefore, our study is not directly comparable with this study. The data for mutual funds, equity indices, three month EURIBOR and three month US LIBOR are from Bloomberg. As a first step we filtered out funds which do not exist for the whole period from January 2000 to April 2017. Furthermore, we only used retail tranches of equity mutual funds. Finally, we selected 458 European, 414 North American and 146 Emerging Market equity funds. For the classification of the region we used management focus of the funds and not the place of residence. We calculated equal weighted indices for each region with monthly returns of the funds. Concerning the performance data of hedge funds there are some biases which are already very well known in literature. For example, D. G. Kaiser (2009) and Lhabitant (2009) discussed the survivorship bias, the backfilling bias, the selection bias and multi-period sample bias.

We want to use a very simple model to test whether mutual funds are following the trend of hedge funds. A simple OLS regression with the following equation will be tested:

$$Y_t = \beta_{\text{Long Short Equity}} X_{1t} + \beta_{\text{Equity Market Neutral}} X_{2t} + \beta_{\text{Merger Arbitrage}} X_{3t} + \beta_{\text{Distressed}} X_{4t} + Const. + \epsilon$$

(1)

For Y_t we use different mutual fund indices. The hypothesis is now that the R square of the third period is higher than the R square of the first period. If this hypothesis is correct, we can conclude that hedge funds explain the performance better than before the crisis. This indicates a higher relationship between mutual funds and hedge funds after the crisis. Therefore, the result that mutual funds follow hedge funds strategy one quarter later has weakened in the third period. We only use the equity related hedge funds strategies like Long/Short Equity, Equity Market Neutral, Merger Arbitrage and Distressed Securities because the collinearity statistics displayed a collinearity effect when we included the Equal Weighted Composite Index. However, as mentioned, the limitation of our model is that we do not use the data of large hedge funds as Jiao y Ye (2014). That means if our hypothesis is right the trading strategy of hedge funds and mutual funds is not as different. Furthermore, we could simply check the correlation between hedge funds and equity mutual funds. If they increased in the period after the financial crisis, then, the thesis of the herd behavior of mutual funds has weakened.

3 Results

This chapter is organized as follows. First, we want to present the descriptive statistics for our three periods where we get a first overview about the performance of hedge funds and mutual funds. Second, we present the correlations of the different periods and finally, we show the results of the regressions of the first and the third period.

3.1 Descriptive Statistics

First we want to demonstrate the different results of the descriptive statistics for the three different periods which we used.

	Min (%)	Max (%)	Mean (%)	St. dev. (%)	Skew.	Kurt.	Max. DD (%)	Sharpe Ratio
Euro Stoxx 50	-18.64	14.27	-0.06	5.47	-0.46	1.65	-61.60	-0.29
MSCI Emerging Markets	-15.69	13.55	0.93	6.01	-0.47	-0.28	-49.66	0.28
S&P 500	-11.00	9.67	0.04	4.12	-0.26	0.34	-46.28	-0.27
FONDS EUROPE	-13.35	10.63	0.37	4.57	-0.66	0.76	-53.57	-0.02
FONDS EM	-14.08	10.79	0.94	5.27	-0.59	-0.23	-41.62	0.38
FONDS NA	-10.33	8.04	-0.03	4.15	-0.44	-0.01	-47.11	-0.33
CISDM Equal Weighted	-3.14	7.89	0.77	1.78	0.38	2.10	-5.81	0.98
CISDM Long/Short Equity	-3.38	6.50	0.61	1.77	0.19	0.83	-6.96	0.64
CISDM Equity Market	-1.33	2.76	0.59	0.56	0.40	3.61	-1.46	2.01
CISDM Merger Arbitrage	-2.00	2.41	0.57	0.76	-0.41	1.60	-2.34	1.38
CISDM Distressed Securities	-1.52	4.18	0.98	1.12	0.15	0.29	-2.56	2.28

Table 1. Descriptives 01/2000-12/2006

Note: This table provides the descriptive statistics of our sample for the first period from January 2000 until December 2006. Mean denotes the average monthly return of the indices and funds while St. Dev. denotes the monthly standard deviation of the sample. "Skew," and "Kurt." represent the third and fourth moment of the return distribution. The Sharpe Ratio shows the annualized Sharpe Ratio, whereby we used the 3 month EURIBOR for Eurostoxx 500 and for FONDS EUROPE as the risk free rate. For all other variables we used the 3 month LIBOR as risk free rate. "Max.DD" represents the maximal drawdown and Min and Max represent the minimum and maximum monthly return which we can observe in the data sample.

In Table 1 the descriptive statistics of the first period shows that concerning the mean Emerging Market equities outperformed European and US stocks. If we take the S&P 500 as a benchmark for North American mutual funds, we read out of the figures that mutual funds were not able to outperform the benchmark.

The performance of the European stocks was mitigated in this period, because of the breakdown of the IT bubble 2001/02. The CISDM Distressed Securities index even outperformed the MSCI Emerging Market which was the strongest performer in the equity universe. Hedge funds performance was generally very strong in this period. The relatively low standard deviation of hedge funds leads to a very high Sharpe Ratio which made an investment in hedge funds more and more attractive. Even Emerging Market mutual funds were not able to keep pace with hedge funds concerning the risk-return profile. The higher volatility of equity indices and equity mutual funds in comparison to hedge funds is mirrored in the maximum and minimum returns.

Table 2 represents the data period of the financial crisis. The crisis on the financial markets started approximately in summer 2007 and ended at the end of 2008. Concerning the monthly return all hedge fund indices outperformed mutual funds and equity indices. However, the survivorship bias has to be considered in this context.

Many hedge funds went bankrupt during the financial crisis and this had no impact on the performance of hedge fund indices. The expectation would be that the performance was overestimated. D. Kaiser y Haberfelner (2011) found that the survivorship and backfilling bias has increased since the financial crisis. The liquidation bias also increased strongly in the aftermath of the crisis and it can account for an overestimate of performance of over 10 percent p.a. The study also confirmed the already known fact that funds of hedge funds should be less prone of data bias effects. The study of D. Kaiser y Haberfelner (2011) used the database TASS, which is very often used for an analysis of hedge fund performance. On the contrary to this Xu, Liu, y Loviscek (2010) used CISDM data which are comparable with our data as well as a different sample period than D. Kaiser y Haberfelner (2011) and they found that the survivorship bias was lower in 2008 compared with previous years.

The standard deviation of hedge funds is still lower than that of mutual funds and equity indices, but almost no strategies were able to outperform the risk free rate. The mean of mutual funds underperformed their benchmarks with the exception of North American mutual funds.

Most interesting about the results of the data period after the financial crisis, which are represented in Table 3, is the fact that the mean of hedge funds performed relatively weak against equity indices and completely underperformed against mutual funds. This fact is different to the period until 2007. However, when we look at the risk-return profile (Sharpe Ratio) the performance of hedge funds is still better than that of mutual funds. These results confirm the comment of Brown (2016) who argued against the statement that the hedge fund industry is in a state of crisis.

3.2 Correlations

Table 4 displays the correlations between equity indices, equity mutual funds and hedge funds. The correlations of European and North American mutual funds to hedge funds are very similar to each other.

	Min (%)	Max (%)	Mean (%)	St. dev. (%)	Skew.	Kurt.	Max. DD (%)	Sharpe Ratio
Euro Stoxx 50	-14.69	5.43	-1.99	5.47	-1.11	0.60	-46.14	-1.54
MSCI Emerging Markets	-27.50	11.00	-1.50	9.37	-1.00	1.14	-60.60	-1.25
S&P 500	-16.94	4.75	-1.73	5.07	-1.31	2.14	-42.15	-1.74
FONDS EUROPE	-16.20	4.79	-2.10	5.55	-1.18	0.78	-48.29	-1.99
FONDS EM	-22.01	8.84	-1.55	7.91	-0.99	0.64	-55.24	-1.54
FONDS NA	-13.40	5.78	-1.56	4.79	-0.78	0.19	-38.21	-1.86
CISDM Equal Weighted	-7.90	3.03	-0.43	2.76	-1.25	1.43	-21.12	-1.68
CISDM Long/Short Equity	-5.40	2.42	-0.29	2.22	-0.77	-0.29	-17.04	-1.41
CISDM Equity Market	-2.10	1.70	0.29	0.77	-1.24	3.01	-2.79	-0.25
CISDM Merger Arbitrage	-2.63	2.13	0.17	1.45	-0.48	-1.00	-5.65	-1.25
CISDM Distressed Securities	-10.59	1.58	-0.66	2.57	-2.78	9.67	-21.22	-2.67

Table 2. Descriptives 01/2007-12/2008

Note: This table provides the descriptive statistics of our sample for the second period from January 2007 until December 2008. Mean denotes the average monthly return of the indices and funds while St. Dev. denotes the monthly standard deviation of the sample. "Skew," and "Kurt." represent the third and fourth moment of the return distribution. The Sharpe Ratio shows the annualized Sharpe Ratio, whereby we used the 3 month EURIBOR for Eurostoxx 500 and for FONDS EUROPE as the risk free rate. For all other variables we used the 3 month LIBOR as risk free rate. "Max.DD" represents the maximal drawdown and Min and Max represent the minimum and maximum monthly return which we can observe in the data sample.

	Min (%)	Max (%)	Mean (%)	St. dev. (%)	Skew.	Kurt.	Max. DD (%)	Sharpe Ratio
Euro Stoxx 50	-13.79	14.69	0.51	5.11	-0.21	0.05	-29.68	0.23
MSCI Emerging Markets	-14.78	16.66	0.71	5.82	0.37	0.62	-38.51	0.31
S&P 500	-10.99	10.77	1.05	4.01	-0.33	0.54	-18.62	0.86
FONDS EUROPE	-11.23	14.74	0.92	4.06	-0.10	0.93	-22.89	0.72
FONDS EM	-11.60	14.90	0.87	4.63	0.17	0.81	-23.29	0.57
FONDS NA	-8.68	9.82	1.11	3.47	-0.30	0.43	-14.61	1.08
CISDM Equal Weighted	-4.59	6.23	0.59	1.63	-0.02	1.74	-9.26	1.18
CISDM Long/Short Equity	-4.00	4.30	0.57	1.58	-0.60	1.02	-9.39	1.18
CISDM Equity Market	-1.37	2.79	0.41	0.61	0.46	2.19	-2.29	2.18
CISDM Merger Arbitrage	-1.03	1.44	0.44	0.50	-0.27	-0.21	-1.07	2.85
CISDM Distressed Securities	-2.40	4.91	0.69	1.30	-0.11	0.64	-9.03	1.79

Table 3. Descriptives 01/2009-03/2017

Note: This table provides the descriptive statistics of our sample for the third period from January 2009 until April 2017. Mean denotes the average monthly return of the indices and funds while St. Dev. denotes the monthly standard deviation of the sample. "Skew." and "Kurt." represent the third and fourth moment of the return distribution. The Sharpe Ratio shows the annualized Sharpe Ratio, whereby we used the 3 month EURIBOR for Eurostoxx.500 and for FONDS EUROPE as the risk free rate. For all other variables, we used the 3 month LIBOR as risk free rate. "Max.DD" represents the maximal drawdown and Min and Max represent the minimum and maximum monthly return which we can observe in the data sample.

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	Euro Stoxx 50	MSCI EM	S&P 500	Mutual Funds Europe	Mutual Funds EM	Mutual Funds NA	Equal Weighted	Equity Long/ Short	Equity Market Neutral	Merger Arbitrage	Distressed Securities
Euro Stoxx 50	1.00										
MSCI EM	0.68	1.00									
S&P 500	0.82	0.75	1.00								
Mutual Funds Europe	0.94	0.78	0.80	1.00							
Mutual Funds EM	0.70	0.96	0.75	0.83	1.00						
Mutual Funds NA	0.84	0.75	0.94	0.88	0.82	1.00					
Equal Weighted	0.62	0.79	0.65	0.75	0.79	0.72	1.00				
Equity Long/Short	0.65	0.77	0.69	0.77	0.78	0.75	0.96	1.00			
Equity Market Neutral	0.38	0.40	0.33	0.43	0.40	0.38	0.67	0.69	1.00		
Merger Arbitrage	0.50	0.55	0.47	0.60	0.54	0.55	0.68	0.70	0.63	1.00	
Distressed Securities	0.43	0.65	0.49	0.55	0.61	0.49	0.78	0.76	0.51	0.55	1.00

Table 4. Correlations 01/2000-12/2006

Note: This table indicates the correlations of equity indices, equity mutual indices and hedge fund indices in the period from January 2000 to December 2006.

	Euro Stoxx 50	MSCI EM	S&P 500	Mutual Funds Europe	Mutual Funds EM	Mutual Funds NA	Equal Weighted	Equity Long/Short	Equity Market Neutral	Merger Arbitrage	Distressed Securities
Euro Stoxx 50	1.00										
MSCI EM	0.83	1.00									
S&P 500	0.92	0.82	1.00								
Mutual Funds Europe	0.96	0.86	0.92	1.00							
Mutual Funds EM	0.85	0.98	0.84	0.90	1.00						
Mutual Funds NA	0.93	0.79	0.96	0.95	0.84	1.00					
Equal Weighted	0.80	0.95	0.82	0.89	0.97	0.82	1.00				
Equity Long/Short	0.80	0.89	0.75	0.88	0.93	0.80	0.95	1.00			
Equity Market Neutral	0.54	0.70	0.46	0.62	0.74	0.50	0.76	0.85	1.00		
Merger Arbitrage	0.76	0.66	0.76	0.83	0.70	0.80	0.73	0.79	0.62	1.00	
Distressed Securities	0.75	0.81	0.83	0.82	0.82	0.78	0.88	0.74	0.47	0.66	1.00

Table 5. Correlations 01/2007-12/2008

Note: This table indicates the correlations of equity indices, equity mutual indices and hedge fund indices in the period from January 2007 to December 2008. In bold are the correlations, which have increased in comparison to the period from 2000 to 2006.

The correlations between mutual funds and Equity Market Neutral and Merger Arbitrage are relatively low in comparison to other hedge fund strategies. Nevertheless, the data do not confirm results of Jiao y Ye (2014). However, Jiao y Ye (2014) only considered large hedge funds, which are probably also part of CISDM indices. We also tested the correlations of the bear market from 2001 to 2002 and found that the correlations are much higher in this period. Capocci, Corhay, y Hübner (2005) investigated the performance of hedge funds in bull and bear markets. Their results show that almost all hedge funds follow the market more closely in the bearish period from 2001 to 2002. However, this study used completely different hedge funds strategies and a different database (TASS).

The findings of Capocci y cols. (2005) are confirmed in table 5 where the crisis period is shown. The correlations between mutual funds and hedge funds increased, whereby especially for Distressed Securities and Merger Arbitrage the correlations to mutual funds have increased significantly. The correlation between mutual funds and Equity Market Neutral have also increased, but remained relatively low in comparison to other strategies.

Table 6 displays that correlations between mutual funds and hedge funds increased in the after crisis period. There are only few exceptions. The correlation between mutual funds and Merger Arbitrage decreased in comparison to the period before 2007. The strongest increase in the correlation to mutual funds recorded the Equal weighted hedge fund index. An increase in correlations show that herd behavior between hedge funds and mutual funds is on the rise, but hedge funds are not a forerunner. It is logical that the correlation between hedge funds and equity indices has also increased in most cases. Especially the correlations to the MSCI Emerging Market have increased considerably which supports the papers of Caglayan y Ulutas (2013) and Lechner y Beinhauer (2017) who stressed the relationship between hedge fund performance and Emerging Market equity performance. The hedge funds which we selected for our data analysis are probably very active in Emerging Markets equities.

3.3   Regressions

In this section we depict the results of our regression model of equation 1. The hypothesis is that the R square should have risen after the financial crisis. This means that mutual funds and hedge funds are related more closely than before the crisis with the consequence that the forerunner role of hedge funds has decreased after the financial crisis.

The results show that the R square was rising for Mutual Funds Europe and Mutual Funds North America. For Emerging Markets mutual funds we did not find an increase of the R square. However, the model also shows that after the financial crisis we only have one significant variable for Europe (Long/Short Equity) instead of three before the crisis. In North America the situation is similar.

Our hypotheses that the explanation value of our model increased after the crisis have been confirmed for Mutual Funds in Europe and North America. For us this shows that the forerunner role of hedge funds has decreased. In the descriptive statistics in tables 1-3 we could already show that mutual funds performed better than hedge funds. This together with the fact that correlations were rising confirms that hedge funds do not have the forerunner role in comparison to mutual funds. Only from a risk adjusted basis we still found that hedge funds are the best performers. Concerning Emerging Markets hedge funds could still be a forerunner to mutual funds because the results of our model show a decreasing explanation of the performance of hedge funds through mutual funds.

	Euro Stoxx 50	MSCI EM	S&P 500	Mutual Funds Europe	Mutual Funds EM	Mutual Funds NA	Equal Weighted	Equity Long/ Short	Equity Market Neutral	Merger Arbitrage	Distressed Securities
Euro Stoxx 50	1.00										
MSCI EM	0.65	1.00									
S&P 500	0.79	0.77	1.00								
Mutual Funds Europe	0.95	0.71	0.81	1.00							
Mutual Funds EM	0.69	0.97	0.76	0.77	1.00						
Mutual Funds NA	0.78	0.66	0.93	0.82	0.74	1.00					
Equal Weighted	0.72	0.86	0.81	0.81	0.72	0.77	1.00				
Equity Long/Short	0.76	0.77	0.85	0.85	0.88	0.84	0.93	1.00			
Equity Market Neutral	0.50	0.38	0.43	0.53	0.79	0.45	0.55	0.57	1.00		
Merger Arbitrage	0.56	0.47	0.56	0.57	0.42	0.52	0.53	0.59	0.34	1.00	
Distressed Securities	0.54	0.67	0.61	0.65	0.46	0.60	0.82	0.79	0.40	0.40	1.00

Table 6. Correlations 01/2009-03/2017

Note: This table indicates the correlations of equity indices, equity mutual indices and hedge fund indices in the period from January 2009 to April 2017. In bold are the correlations which increased in comparison to the period from 2000 to 2006.

	January 2000 - December 2006		January 2009 - April 2017	
Regressors	MF Europe	MF North America	MF Europe	MF North America
Long/Short Equity	0.91***	1,03***	0.81***	1.01***
	(7.08)	(8.06)	7.48	(9.18)
Equity Market Neutral	-0.25**	-0.32***	0.05	-0.06
	(-2.59)	(-3.23)	(0.78)	(-0.95)
Merger Arbitrage	0.21**	0.18*	0.10	0.03
	(2.08)	(1.75)	(1.53)	(0.38)
Distressed	-0.14	-0.25**	-0.05	-0.19**
	(-1.34)	(-2.30)	(-0.60)	(-2.09)
Descriptive statistics				
Adjusted R square	0.62	0.62	0.73	0.72
Durbin Watson	2.04	1.79	2.04	1.89
n	84	84	84	84

Table 7. OLS estimations with Mutual Funds as dependent variables

Note: * indicates significance at 10% level, ** indicates significance at 5% level, *** indicates significance at 1% level. The dependent variables are Mutual Funds Europe (MF Europe) and Mutual Funds North America (MF North America). In the first line we depict the standardized beta of hedge funds strategies which are the independent variables. The t-statistics are displayed in parenthesis and n is the number of observations. We also tested the collinearity of the data and did not find any significant collinearity.

Maybe, for Emerging Markets the price informativeness is still not as effective as in the developed markets. Therefore, hedge funds still could be a forerunner of the whole market.

4   Conclusions

The basis for our study were the results of Jiao y Ye (2014) who found that mutual funds and hedge funds herd after each other with a lag of one quarter. However, the thesis of their paper is only valid for large hedge funds. The target of our paper was to check the relationship of mutual funds and hedge funds before and after the crisis. The main difference of our paper in comparison to Jiao y Ye (2014) is that we do not limit hedge funds to "large hedge funds". Furthermore, we only addressed hedge fund strategies with a focus on equity investment. Another difference to the study of Jiao y Ye (2014) is that we used monthly data for our analysis. Our findings demonstrate that herding behavior of mutual funds to hedge funds has decreased after the financial crisis. First, the performance of hedge funds was significantly weaker after the crisis. Second, correlations between mutual funds and hedge funds increased after the crisis. Finally, our model displays a higher explanation value of mutual funds through hedge fund performance, which indicates that herding behavior has decreased. A weaker performance together with a higher correlation to mutual funds proves that hedge funds have lost their forerunner role at least in the developed markets. The reason for the loss of the forerunner role could be that the market effectiveness has increased. For Emerging Markets our model shows that the explanation of the hedge fund performance through Emerging Market mutual funds decreased. That indicates still weaker market effectiveness in Emerging Markets. Hedge Funds are more likely frontrunner in such markets. Nevertheless, the analysis does not show that hedge funds are no longer interesting for investors, because the Sharpe Ratios of hedge funds are still higher than those of mutual funds.

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