

Are Commodity Hedge Funds interesting for institutional investors?

Gerhard Lechner¹ and Rupert Beinhauer¹

Abstract

This paper aims to analyze whether an attribution of Commodity Hedge Funds could be useful for an institutional investor (insurance company, pension fund). We analyze the out of sample and in-sample asset allocation effects for attributing Commodity Hedge Funds to a simple bond-equity portfolio. The data of these strategies of Funds go back until 2008 which indicates that these strategies are relatively new in comparison to other strategies. However, it is interesting to use the time since 2008, because the environment has changed significantly for institutional investors. Our contribution to the literature is to show the relative attractiveness of this new asset class for institutional investors. We found that Commodity Hedge Fund could improve the Sharpe Ratio of an investors portfolio, but the relative advantage against a Composite Hedge Fund index is limited.

JEL classification numbers: G11, G15, G23, C58

Keywords: Hedge fund performance, Hedge Fund Strategies, Commodity Hedge Funds, Asset allocation, Institutional Investors.

1 Introduction

The universe of hedge fund strategies has been increasing since the beginning of the new millennium. Many hedge funds used commodities as an asset class in their portfolio. Since 2008 Hedgefund Research (HFR) has used two indices which are measuring Commodity Hedge Funds. These hedge funds are specialized in trading commodities. There has already been done some research concerning

¹FH JOANNEUM University of Applied Sciences, Austria

the added value of commodities for multi-asset portfolios. For example, Bessler/Wolff (2015) investigated the out-of sample effects of adding commodities to bond-stock portfolios by analyzing various asset allocation strategies. They analyzed many commodity groups such as energy, precious metals, industrial metals and agricultural and livestock commodities. Additionally, they used aggregated commodity indices. For most asset allocation strategies aggregate commodity indices and industrial metals provided an added value in comparison to a simple stock bond portfolio, but they hardly found positive effects for agriculture and livestock. The advantage of their study was that the data go back to 1983. As mentioned our data set goes only back to 2008 and therefore significance is more limited.

The literature on the performance of hedge funds has grown considerably in the last ten years. There has been much research on the performance of the whole hedge fund market (Bali et al., 2014; Brown, 2012; Racicot/Theoret, 2016). The sources used non-linear performance attribution models in the form of an up-bottom approach and other studies used non-linear models with bottom-up performance attribution models (Agarwal/Naik, 2004; Fung/Hsieh, 2004). Stafylas et al. (2016) have recently made an overseable literature review about hedge fund returns. There is also a literature about special hedge fund strategies like Emerging Market hedge funds (Elling, 2010; Abugri/Dutta, 2009) or Fixed Income hedge funds (Duarte et al., 2007).

Hedge funds brought a significant outperformance compared to nearly all asset classes before the financial crisis (Elling, 2010). However, after the financial crisis the performance of hedge funds weakened considerably (Atilgan et al., 2013); Huang et al., (2017) investigated the performance of hedge funds between 1994 and 2008 and used the data of Lipper/TASS. They found that the performance considerably weakened from the beginning of the new millenium until 2008. Over the whole period Emerging Market hedge funds were the top performers of all strategies followed by Long/Short Equity. Furthermore, Huang et al. (2017) found that hedge funds returns are exposed to systematic risk factors and hedging does not always bring good results. Brown (2016) wrote a short comment about the weakness of the performance of hedge funds in comparison to the S&P 500. For him the large withdrawals of investors in July 2016 are attributable to the relative weakness of hedge funds performance.

Concerning the portfolio attribution of hedge funds to investors, Elling (2004) wrote an excellent paper about the added value of hedge funds for German insurance companies. He found that hedge funds deliver an added value on the performance and risk-adjusted performance of the insurers portfolios. However, he was skeptical about the liquidity aspect of hedge funds. Many hedge funds have lock-up periods of more than one year and are therefore a disadvantage for investors like insurance companies. Jackwerth/Slavutskaya (2016) made an interesting analysis of the effect of an attribution of hedge funds in pension funds portfolios. They used the data period of 1994 until 2012 and found that hedge funds produced significantly higher benefits for pension funds than other

alternative assets like commodities, real estates, mutual funds or foreign equities. The authors mentioned that pension funds increased their exposure of alternative assets after the financial crisis 2008 to around 10%. Another finding of this study was that the attribution of hedge funds to the portfolio of pension funds improved the total performance which is superior to the attribution of other alternative assets like commodities, real estate or mutual funds. Concerning the strategies, only Emerging Market Hedge Funds, Fixed Income Hedge Funds and Long/Short Equity Hedge Funds were not beneficial for pension funds portfolios. Commodity Hedge Funds are part of the Macro Funds and were not explicitly analyzed.

So far, there has been no research about the performance of the relatively new hedge funds strategy “Commodity Hedge Funds” and the attribution of these funds for multi-asset portfolios. We aim to investigate whether Commodity Hedge Funds could be useful for an investors portfolio. Our contribution to the literature has two important aspects. First, we want to show that using individual hedge funds strategies have advantages for investors, because it is not easy to track the whole universe of hedge funds. Secondly, commodity hedge funds are adding value at least to conservative asset allocation approaches. An advantage of our study is also that the period after 2008 brought a completely different environment for institutional investors and there have not been many asset allocation studies for the period of 2008 until now.

2 Methodology

We want to point to the goals of institutional investors like pension funds and insurance companies. The latter regard liquidity, return and safety as the most important goals. Especially, liquidity represents an important goal, because for example insurance companies have to consider asset-liability aspects. Hedge funds are not attractive from this point of view, because many funds have lock-up periods of twelve months or more. Some hedge funds make a difference between a hard lock-up period and a soft lock-up period. The latter approach delivers the opportunity to cancel from the investment, but on the condition of a payment of a fee (Kaiser 2009, p. 49). These conditions are a disadvantage for institutional investors. Another difficult thing to deal is to track a hedge funds index, because some indices consist of more than one hundred funds. Especially a composite index or a total index of a certain hedge fund strategy (for example: HFRI Emerging Market total index) are not really trackable for an investor. There are some alternatives like cloned, synthetic or investable hedge funds which do not have the liquidity risk, but on the other side these instruments are performing not as well as hedge funds. Therefore, we recommend to investors to track smaller hedge fund indices like the HFRI Macro Commodity index or the HFRI Sector - Energy/Basic Materials Index, because they do not consist of so many funds.

There are very different asset allocation models used in the literature, but there are only a few which are appropriate for investors like pension funds and insurance

companies, because they underlie a regulation. Insurance companies and pension funds are not allowed to hold more than 40% of their asset allocation in participations and equities in countries like Germany or Austria. Another regulatory restraint comes from Solvency II where insurance companies have to implement capital adequacy ratios which are very high for equities and hedge funds.

Table 1 shows our out-of-sample variants. We use a conservative and an aggressive portfolio. The conservative stock bonds portfolio consists of 80 % bonds and 20 % stocks. We compare that portfolio with a conservative portfolio where we added 5% Commodity Hedge Funds or Commodities. We reduced the stock share to 15%. For the aggressive variant we used 60% bonds and 40% stocks for the simple portfolio. We compared that portfolio with an attribution of 15% Commodity hedge funds or Commodities. On the other side, we reduced that stock bond share to 45%, because the aggressive variant should contain more risky assets.

Concerning the in-sample variant we examined the Sharpe for the relevant variables for each year. We compared the Sharpe Ratio of the several variables with the Sharpe Ratio of the S&P 500 and the US Government Bond index. When the Sharpe Ratio of the Hedge Fund was better than either the S&P 500 or the Bond Index we remain invested in Hedge Funds or we reinvested. If not, we took the hedge fund out of our asset allocation. The transactions costs were not considered and in the first year we invested in our variables. We chose to decide only once a year on the asset allocation, because typical institutional investors are not changing their asset allocation very often.

Finally, we used the Minimum Variance (MinVar) portfolio and the tangency portfolio which became more and more popular among investors like quantitative investment funds and exchange traded funds (Bessler/Wolff, 2015, p. 4). The MinVar portfolio has the objective to minimize the risk of a portfolio, which is measured through the variance. The formula for the minimization is:

$$\min \omega' \Sigma \omega \quad (1)$$

where ω is the vector of portfolio weights and Σ signifies the covariance matrix of asset returns (Bessler/Wolf, 2015). The MinVar approach has one important disadvantage for insurance companies and pension funds, namely, the regulation issue. The typical hedge funds risk-return profile delivers very high Sharpe Ratios in comparison to traditional asset classes like equities and bonds. That leads to very high weights of hedge funds in MinVar portfolios. However, the weights are limited due to regulatory restraints. Nevertheless, we want to add the results of the MinVar portfolio to get a comparison to our simple portfolios.

3 Data

We used monthly data and the hedge fund data are from Hedgefund Research (HFR). Abugri/Dutta (2009) and Aiken et al. (2016) also used this database. Many hedge fund performance studies used data of International Securities and Derivatives Markets (CISDM) (for example: Elling/Faust, 2010; Chen/Chen, 2009). Racicot/Theoret (2016) used data of Greenwich Alternative Investment. Thus, our categorization could be compared with Abugri/Dutta (2009) and Aiken et al. (2015). HFR was founded in 1994 and the data were re-calculated back to 1990 for some indices. The HFRI Fund Weighted Composite Index is a total index for all hedge funds, without the Fund of Fund component. The calculation of the returns of the total Composite index is based on geometrical average of all hedge funds. Each individual hedge fund has the same weight in the Composite Index. This means that this index is not volume based. The data are in USD (Kaiser, 2004, pp. 224-225). The data from S & P 500, CRB index² and the US total return government bond index are from Bloomberg. We used the US three month LIBOR as risk free yield. The commodity subindices Energy, Metals, industrial metals and Agriculture raw material are from the Federal Reserve Bank of St. Louis. The HFRI Macro Commodity index is part of the Macro total index and includes systematic and discretionary commodity strategies. Systematic commodity strategies are based on mathematical, algorithmic and technical models where the individual has no influence on positioning in the portfolio. Systematic commodity strategies have more than 35 percent of direct exposure in commodities. The rest of the exposure could be an indirect exposure in equities, fixed income and currencies. Discretionary commodity strategies are reliant on the fundamental evaluation of the market data by the hedge fund manager. This strategy also has more than 35 percent of direct exposure in commodities. Similar to the systematic strategy the rest of the portfolio could be an indirect exposure in equities, fixed income and currencies. The managers invest in Developed Markets and Emerging Markets (Hedgefundresearch, 2017). Macro Funds and Relative Value Funds typically use a high leverage in their portfolios (Barbarino, 2009). The papers of Schneeweis et al. (2005) and Tolonen (2014) showed a positive relationship between the level of the leverage and the performance of hedge funds. This should be a positive indicator for Macro Commodity Funds. The second hedge fund index which we use is the HFRI Sector - Energy/Basic Materials Index. This strategy tries to identify opportunities in commodity equities. The expertise of the hedge fund manager is higher than that of a market generalist. The direct exposure of commodity equities is normally above 50 percent of the total portfolio. This sub index is part of the Equity Market Neutral Index (Hedgefundresearch, 2017). Like other hedge fund data the HFR data suffer from the survivorship bias,

² The CRB (Commodity Research bureau) index is a benchmark index for commodities.

backfiling bias, selection bias and multiperiod sample bias. As other hedge fund performance studies the validity of the analysis has a limited character at least to some degree (Lhabitant, 2004, 87-95).

4 Main Results

The descriptive statistics in table 2 reports that the geometrical mean of the Macro Commodity Funds and HFRI Sector - Energy/Basic Materials Index is not as good as the HFRI Composite Index which means that Commodity Hedge Funds are relative underperformers in comparison to other Hedge Funds. However, the Macro Commodity Funds outperforms the CRB index which means that this hedgefunds index is a useful instrument when investors want some commodity exposure. The HFRI Sector Index was almost the weakest index in our sample. Concerning the median the picture is somewhat different. In this case the HFRI Sector Index performs much better than the Macro Commodity index. However, the median is not a useful indicator for measuring performance, because the sum (total performance) confirms the picture which we get from the geometrical average. The lowest standard deviation of all indices has the Macro Commodity Index which is again an argument for an investor to invest in this hedge fund subindex. The HFRI Sector index performs again not good when we look at the standard deviation, because it is as high as the volatile equity and commodity indices. The extreme values (maximum, minimum) and the Sharpe Ratio confirm the picture that the Macro Commodity Index is attractive for investors and the HFRI Sector Index is not attractive. Concerning the Sharpe Ratio, which could be seen as a very important performance measure for hedge funds, the HFRI Sector Index is the worst performer and the HFRI Commodity Index is only worse than the S & P 500 and the HFRI Composite Index.

Table 3 delivers an additional interesting aspect. From the perspective of the investor, the performance of a hedge fund should be positive at least year by year, because the major goal of an "Absolute Return Funds" is a positive performance in any kind of market situation (Lhabitant, 2004, 255). Interestingly, the Macro Commodity index performed positive in the crisis year 2008, which totally contradicts with the performance of the HFRI Sector index (it loses more than 41%). For an investor a positive performance in the crisis year 2008 could be regarded as a perfect portfolio hedge. In sum, yearly performance data attest the Macro Commodity index a good work. However, the years 2011-2013 were not successful if we take the Absolute Return philosophy. The performance data of the HFRI Sector index are not attractive for an institutional investor, because it brought four negative years and no positive performance over the whole period. We can conclude that the Macro Commodity Index reached at least partly the goal to be an "Absolute Return Fund".

We have to add one important point to our performance analysis. The performance was calculated from a Commodity Hedge Fund index. Of course there could be

individual hedge funds with completely different performance data. Therefore, an investor has to track the index completely to be diversified. If an investor chooses only one or a few Commodity Hedge Funds, the risk is much higher than with a diversified portfolio.

Table 4 shows relatively high correlations between the HFRI Sector Index and indices like CRB and S&P 500. On the other side, the correlations of the Macro Commodity Index are considerably lower in comparison to the mentioned indices. For investors it is interesting to have lower correlations between hedge funds and traditional asset classes, because lower correlations between different asset categories are optimizing their portfolio (Lhabitant 2004, 255). From this perspective the HFRI Commodity Index is even a better Hedge Fund portfolio than the HFRI Composite Index, because the correlations of this index with traditional indices are higher than the correlations of the HFRI Commodity index.

Table 5 demonstrates the performance of the conservative and aggressive portfolios. When we compare the mean of the stock bond portfolio with the portfolio where hedge funds and commodities are attributed, we find no outperformance of any variant. However, for an institutional investor the Sharpe Ratio is a better performance indicator. The attribution of the HFRI Macro index improves the Sharpe Ratio in the conservative variant. It is also noticeable that the CRB index and the HFRI Energy/Basic materials index have a lower Sharpe Ratio than the HFRI Macro index. As expected from the descriptive statistics the HFRI Energy Basic materials index does not represent an added value for an investor.

Concerning the aggressive portfolio no attribution of any indices makes sense. Generally, the Sharpe Ratio of the attributed indices is lower than that of the stock bond portfolio. The aggressive variante does not look attractive in any way, because of the strong performance of government bonds in this period.

The in-sample analysis shows much better results when attributing hedge funds and the CRB index. Again, especially the HFRI Macro Commodity Index is the best index. It shows an outperformance for all variants considered. The CRB and the HFRI Composite could outperform the benchmark Stock-bond portfolio with the conservative variant. Using the aggressive variant only the HFRI Macro index was succesfull in outperforming. The transaction costs were rather low, because the Asset Allocation was reconsidered only at the end of the year. The in-sample model brought an outperformance against the out-of-sample model at least for the conservative variant. The Sharpe Ratio and the returns of the portfolio where indices were attributed is higher for the conservative in-sample model. Concerning the aggressive variant only the HFRI Macro brought an improvement when using the in-sample model.

The results of the MinVar and Tangency portfolio confirms the results from our other portfolios. The HFRI Macro could be a positive attribution for investors who use these methods. The CRB index and the HFRI Energy/Materials indices are not relevant, because the weights were negative, which means that the portfolio manager was “short” in these asset classes. This is not a realistic situation and is

therefore not relevant.

4 Tables

Table 1: Out-of-sample asset allocation strategies Portfolios

Investor type	Stocks %	Bonds %	Hedge Funds %
Conservative	15 (20)	80 (80)	5 (0)
Aggressive	40 (40)	45 (60)	15 (0)

Notes: This table provides a conservative and an aggressive variant of a portfolio. In parenthesis are the weights of the simple stock bond portfolio. In the aggressive portfolio the stock share represents a maximum for institutional investors like insurance companies and pension funds.

Table 2: Descriptive Statistics

	Industrial	Energy	Metal	HF Energy	HF Macro	GBIndex	SP500	CRB	HF Comp
Mean	0,02	-0,18	-0,05	-0,17	0,22	0,32	0,52	0,10	0,28
Median	-0,74	0,69	-0,69	0,45	-0,01	0,21	1,17	0,21	0,41
Standard deviation	4,61	7,47	5,70	4,56	1,81	1,35	4,80	4,03	1,92
Skewness	-0,15	-0,98	-0,15	-0,99	1,01	0,50	-0,80	-1,26	-0,95
Kurtosis	0,90	1,63	0,93	2,51	2,80	2,05	1,34	6,82	2,52
Minimum	-15,03	-23,61	-19,88	-17,09	-3,61	-3,18	-16,94	-20,39	-6,84
Maximum	12,98	16,55	15,20	10,08	7,50	5,53	10,77	9,37	5,15
Sharpe Ratio	-0,01	-0,03	-0,02	-0,05	0,09	0,20	0,10	0,01	0,11

Table 3: Performance Commodity Hedgefunds

	HFRI EH: Sector - Energy/Basic Materials Index	HFRI Macro: Commodity Index
2008	-38,31%	6,42%
2009	41,83%	8,07%
2010	17,41%	10,62%
2011	-16,66%	-2,56%
2012	-5,63%	-2,57%
2013	0,91%	-5,84%
2014	-6,54%	3,54%

Table 4: Correlations

	HF Macro	HFEnergy	GBIndex	S & P 500	CRB	HF Comp
HF Macro	1					
HFEnergy	,549**	1				
GBIndex	-,044	-,312**	1			
S & P 500	,201	,725**	-,387**	1		
CRB	,489**	,755**	-,388**	,559**	1	
HF Comp	,466**	,922**	-,359**	,842**	,709**	1

Table 5: Out of sample performance of different Asset allocation strategies

Asset Allocation strategy	Performance measure	Stock bond	Stock plus	bond	HFRI Macro	CRB Index	HFRI Energy/Materials	HFRI Composite Index
Conservative	Mean	0,360	0,345	0,340	0,326	0,348		
	Median	0,385	0,360	0,395	0,310	0,345		
	Standard Deviation	1,134	1,053	1,057	1,104	1,066		
	Sharpe Ratio	0,267	0,272	0,267	0,243	0,272		
Agressive	Mean	0,399	0,384	0,367	0,326	0,392		
	Median	0,705	0,570	0,630	0,545	0,580		
	Standard Deviation	1,771	1,849	2,128	2,294	2,011		
	Sharpe Ratio	0,193	0,176	0,145	0,117	0,166		

Notes: This table reports the out-of-sample portfolio performance for stock-bond portfolios and portfolios complemented with the HFRI Macro Commodity index, the CRB index, the HFRI Equity Hedge: Sector - Energy/Basic Materials index and the HFRI Composite index during the time period from January 2008 to April 2015. The table presents the results for a conservative and aggressive investor. The basis portfolio consists only of US stocks and bonds while the extended portfolio additionally includes the indicated indices. Improvements in comparison to the stock-bond portfolio are in bold. Sharpe ratio represents the Sharpe ratio of the monthly returns.

Table 6: In-Sample performance of different Asset Allocation strategies

Asset Allocation strategy	Performance	Stock bond	Stock plus bond				
				HFRI Macro	CRB Index	HFRI Energy/Materials	HFRI Composite
Panel A: Conservative Investor	Return	0,36	0,38	0,37		0,33	0,37
	Sharpe	0,27	0,29	0,29		0,24	0,28
Panel B: Aggressive Investor	Return	0,40	0,42		0,35	0,29	0,38
	Sharpe	0,19	0,20		0,14	0,11	0,16

Notes: This table reports the portfolio performance of in-sample Asset Allocation models. The table shows the Return and the Sharpe Ratio of Stock-Bond-portfolio and the Stock-bond-portfolio plus the attributed variables. Return denotes the monthly return of the portfolios and the Sharpe Ratio denotes the monthly Sharpe Ratio of the several portfolios. The bold figures represent an outperformance against the Stock-bond-portfolio. The transaction costs are not considered.

Table 7: Contribution of Commodity Hedge Funds in MinVar portfolios

AA strategy	Performance	Stock bond	Stock plus bond			
MinVar portfolio			HFRI Macro	CRB Index	HFRI Energy/Materials	HFRI Composite
Tangency portfolio	Return	0,32	0,25	0,31*	0,30*	0,28
	Sharpe	0,24	0,27	0,26*	0,25*	0,29
Tangency portfolio	Return	0,33	0,32	0,43*	0,61*	0,32
	Sharpe	0,20	0,24	0,26*	0,31*	0,25

Notes: This table reports the return and the Sharpe Ratio of the MinVar and Tangency portfolio. Again there is a comparison between a Stock-Bond portfolio and portfolios where different variables are attributed. The bold figures represent an outperformance in comparison to the benchmark Bond-Stock portfolio.

* The CRB index and the HFRI Energy /Materials index brought “negative weights in the MinVar and tangency portfolios” which means that the investor is short these assets. This situation is not appropriate for an institutional investor and therefore the results of these portfolios are not useful.

5 Conclusion

Our aim was to analyze the advantage of using Commodity Hedge Funds in investors portfolios. We used simple out-of-sample and in-sample portfolio approaches to test the attribution of Commodity Hedge Funds. Despite the fact that these funds had to bear very weak market conditions from 2008 until 2015 the attribution of the HFRI Macro Commodity index increased the Sharpe Ratio of

our conservative portfolios. Furthermore, the hedge fund index is a better attribution than the CRB index. An aggressive portfolio approach made almost no sense in the considered time period, because of the strong development of government bonds. Therefore, the future prospects of government bonds are weaker due to a lower coupon and lower expected price gains. Therefore, in the future an aggressive portfolio could outperform a more conservative portfolio. We await that the trend of Commodity Hedge Funds will improve when commodity prices again have a clear upward trend. In any case we can recommend investors to attribute Commodity Hedge Funds to their portfolio. However, it is important to be diversified within that Commodity Hedge Funds portfolio.

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