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Performance of alternative mutual funds: The average investor's hedge fund

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Abstract

Alternative Mutual Funds (AMFs) provide the individual investor with the opportunity to invest in funds that follow strategies similar to those of hedge funds and seek returns uncorrelated with the market. Financial planners, advisors, and investors need to be aware of how well AMFs deliver absolute or positive returns regardless of market conditions and their relatively high expense ratios. In this article we analyze the performance of AMFs for the period January 1998 through December 2011 using the Carhart four-factor model and the Fung-Hsieh seven-factor model. Our results indicate that most AMFs have not been able to create any value for their investors over the period of our study. Furthermore, the performance of these funds was even worse during the recent financial crisis. © 2014 Academy of Financial Services. All rights reserved.

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1. Introduction

Alternative mutual funds (AMFs) are relatively new entrants into the mutual fund industry. As characterized by Morningstar, they are also known as hedged mutual funds or non-traditional mutual funds. It is important for financial planners, advisors, and investors to be knowledgeable of the performance and costs of these funds when making investment recommendations or decisions. These funds follow investment strategies similar to those of hedge funds and are attractive to individual investors who are often unable to invest in hedge

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funds because of high initial investment requirements and longer lock-up periods. AMFs normally have a goal of providing individual investors with access to investment strategies that offer non-correlated returns and diversification benefits. This goal of AMFs is in contrast with traditional or long only funds that try to beat a benchmark such as S&P 500 or Russell 1000.

AMFs have grown rapidly in the last few years. The growth in assets under management (AUM) has been significant. According to Goldman Sachs Asset Management (2012), inflows into these funds were $29.7 billion in 2005 (11% of the total mutual fund inflows). By 2009, these funds experienced inflows of $121 billion (25% of total mutual fund flows). Further, by December 2011, total assets under management for all the surviving funds were $132.82 billion.

AMFs have more flexibility than long only funds. They can buy underpriced securities and short overpriced ones. These funds can also use leverage, derivatives, options, and swaps (like hedge funds) to seek higher returns (see Appendix A1 for an explanation of nine different types of AMFs). Even though AMFs have more flexibility than traditional mutual funds, they have more constraints than hedge funds. Some of the regulations with which AMFs must comply include daily liquidity, covering short positions, borrowing less than one-third of total assets, limiting investments in illiquid assets to less than 15% of assets under management.[1]

AMFs' active management strategy of buying undervalued securities and shorting overvalued ones could increase returns manifold, if managers make good investments; it can also increase risk, if managers make poor choices. Therefore, the investment manager's skill in buying and shorting securities is extremely important. AMFs are more actively managed than traditional long-only mutual funds.[2] Studies by Brooks and Porter (2012) find that the returns from actively managed funds dominate the returns from passively managed funds and Dowell and Mann (2004) reached a similar conclusion in regards to fixed income funds. However, previous research by Carhart (1997), Elton, et al. (1995), and others does not support the existence of skilled or informed mutual fund managers.[3]

Although AMFs funds are relatively new, there has been some research in this field. Koski and Pontiff (1999) and Deli and Varma (2002) find that the flexibility to use derivatives, sell securities short, and borrow money to create leverage help managers to control expenses, risk, and manage cash flows more efficiently that makes the AMFs appear to be an attractive alternative to standard mutual funds and subject to analysis. Agarwal, et al. (2009) look at the performance of 52 hedged mutual funds over the period 1994–2004. They find that these hedged mutual funds outperform traditional mutual funds, but underperform similar hedge funds. Broussard and Neely (2011) study a similar sample of 36 long/short and market-neutral funds and find that managers of these funds do not create any alpha.

Our article adds to the literature by analyzing the performance of AMFs during the recent financial crisis that began in 2007. We also utilize the Fabozzi and Francis (1979) model to test the monthly performance of these funds in both up and down markets. This analysis is important as many of these funds are sold to individual investors with the promise of absolute returns regardless of market conditions. In addition, our data include a wider variety of AMFs (nine different categories), and also a much larger sample (318 funds) of which about 180 were created in the last five years.

2. Hypotheses

In our article we are interested in determining whether or not AMFs can provide benefits to individual investor through their promise of delivering returns that are uncorrelated with the market. Do they provide absolute returns and positive alphas regardless of market conditions? To examine these issues we test the following hypotheses:

Hypothesis 1: Alternative mutual funds have more flexibility than long-only mutual funds. They can take long (short) positions in undervalued (overvalued) securities. Additionally, they can use derivatives (including forwards, options, and swaps) to seek absolute returns. Therefore, they should have a positive alpha.
Hypothesis 2: Alternative mutual funds (like hedge funds) seek returns uncorrelated with the market. Lipper defines them as seeking "positive returns in all market conditions" without measuring themselves against investable indexes. Therefore, during bear markets and major financial crisis, they should have a positive alpha.

3. Data and descriptive statistics

Elton, et al. (1996) find that previous mutual fund studies suffered from survivorship bias as funds that merge or die have worse performance than funds that do not and failing to account for survivorship bias will lead to higher risk-adjusted returns for mutual funds. Brown, et al. (1992) also find that survivorship bias can give a false impression about persistence in mutual fund performance. To avoid this problem, we include in our analysis all alternative mutual funds that ever existed as found in the Morningstar Direct data. By including all the dead AMFs in the analysis, we control for survivorship bias problem.

3.1. Summary statistics

Table 1a contains some descriptive statistics on alternative mutual funds. The last column contains all the funds that ceased operations before December 2011. There were 256 surviving funds and 62 dead funds at the end of December 2011. All these funds are included in the analysis. The total assets under management for all surviving funds at the end of December 2011 were $132.82 billion.

A further description of the funds is found in Table 1b that includes information on management fees, net expense ratio, and turnover for different categories of alternative mutual funds. Most of these funds have annual expense ratios close to or over 2%. This ratio is much higher than expense ratios for long only equity or bond mutual funds.[4] According to Morningstar Direct, average annual expense ratios for various classifications of funds were as follows: Large Growth (1.43%), Large Value (1.43%), Mid Growth (1.55%), Mid Value (1.37%%), Small Growth (1.61%), Small Value (1.43%), Long Term Bond (1.09%), and Multisector Bond (1.22%).

Table 1a Descriptive statistics

Alternative	No. of living funds	AUM (December 2011)	Average (AUM)	Standard deviation (AUM)	Median (AUM)	Dead funds
Long/short	76	29,667.70	390.36	1,124.08	44.70	33
Multialternative	51	10,694.80	205.67	365.17	65.30	2
Market Neutral	29	23,152.10	798.35	1,181.30	94.40	18
Currency	19	9,730.90	512.15	1,319.90	58.80	3
Managed Futures	13	6,438.50	495.27	474.33	378.50	0
Inverse Debt	7	515.80	73.69	105.04	29.50	0
Inverse Commodities	3	11.30	3.77	2.17	3.40	0
Bear Market	30	3,777.8	118.05	321.07	13.60	6
Non-Traditional Bond	28	48,831.50	1,743.98	3,468.09	271.45	0
All	256	132,820.40				62

Notes. AUM = assets under management.
All figures in millions of dollars (December 2011).
The last column contains number of funds that died before December 2011.

Table 1b Expenses and turnover (*Source:* Morningstar Direct)

Comparison		Mean	Standard deviation	Median
Long/short	Management fee	1.18	0.43	1.20
	Annual net expense ratio	2.14	0.96	1.98
	Turnover (%)	423.80	1,238.68	193.25
Multialternative	Management fee	0.93	0.48	0.98
	Annual net expense ratio	1.60	0.73	1.56
	Turnover (%)	264.90	545.68	112.00
Market Neutral	Management fee	1.29	0.33	1.25
	Annual net expense ratio	1.95	0.73	1.89
	Turnover (%)	336.78	944.34	216.00
Currency	Management fee	0.80	0.19	0.85
	Annual net expense ratio	1.44	0.48	1.30
	Turnover (%)	129.47	326.99	28.00
Managed Futures	Management fee	1.24	0.37	1.06
	Annual net expense ratio	2.67	1.43	1.95
	Turnover (%)	312.90	619.88	70.00
Inverse Debt	Management fee	0.78	0.06	0.75
	Annual net expense ratio	1.88	0.41	1.81
	Turnover (%)	974.26	424.29	1,107.00
Inverse Commodities	Management fee	0.88	0.14	0.84
	Annual net expense ratio	1.65	0.68	1.51
	Turnover (%)	103.75	38.42	83.00
Bear Market	Management fee	0.85	0.15	0.90
	Annual net expense ratio	1.95	0.54	1.90
	Turnover (%)	506.96	507.97	473.00
Non-Traditional Bond	Management fee	0.71	0.35	0.60
	Annual net expense ratio	1.23	0.50	1.10
	Turnover (%)	276.53	314.06	141.00

3.2. Data

Our selection of the beginning period for our analysis was based on regulatory changes. Before September 1997, mutual funds managers were limited in their ability to use investment strategies that involved timing the market because of the "short–short" rule that requires that mutual funds not earn more than 30% of their gross income from sales of securities held for less than three months.[5] Failure to comply with this rule would result in a tax of 35% on the entire gain. In September 1997, the "short–short" rule was eliminated. This change led to a proliferation of AMFs who could now use short-term hedging and trading strategies irrespective of the 30% of gross earnings limitation. Our analysis of AMFs begins after this rule change and extends from January 1998 through December 2011.

We begin our data collection first by developing a comprehensive list of all alternative mutual funds (surviving as well as dead) from the Morningstar Direct data. This list then was used in conjunction with data from the Center for Research in Security Prices (CRSP) survivorship bias free mutual fund database to gather monthly returns, net asset value (NAV), and assets. Following Bauer, et al. (2005, 2006, 2007), among surviving funds all funds with at least 12 months of return data are included in the analysis.[6] The monthly Fama-French three factors, the momentum factor (for Carhart analysis), and the monthly risk-free rate were all taken from the Wharton Research Data Services (WRDS) database. Information on expense ratios, 12b-1 fees, turnover, inception data (for calculating fund age), and load fees were obtained from Morningstar Direct.

4. Methodology

To evaluate the performance of the AMFs we compute the α using a mutual fund model and also a hedge fund model.[7] The models are as follows:

4.1. Carhart four-factor model

According to Elton, Gruber, and Blake (2011), the most frequently used multifactor model for measuring portfolio performance is the three factor model developed by Fama and French (1993). The three-factor model is used as Fama and French provide evidence that the three factors (excess market return, size factor, and value vs. growth factor) explain about 90% of diversified portfolio returns (as they are associated with risk). According to Davis (2001), if the three factors do measure risk, then the fund manager should be able to earn returns to compensate for this risk. Furthermore, the premiums associated with factors can be earned by a passive strategy of buying a diversified portfolio of stocks with sensitivity similar to the factors. Therefore, if active fund management has any economic value, it should be able to outperform these passive strategies.

Carhart's (1997) four-factor model is used as a performance benchmark. Carhart four-factor model is similar to Fama-French three factor model, but it includes an additional factor for momentum (MOM), which is the return difference between a portfolio of past 12-month

winners and a portfolio of past 12-month losers. The four-factor model is consistent with a model of market equilibrium with four risk factors.

The model is as follows:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i (R_{m,t} - R_{f,t}) + \beta_s \, SMB_t + \beta_v \, HML_t + \beta_m \, MOM + \varepsilon_{i,t} \quad (1)$$

Where:

$R_{i,t}$ = the percentage return to fund i in month t.
$R_{f,t}$ = US T-bill rate for month t.
$R_{m,t}$ = return on CRSP value-weighted index for month t.
SMB_t = realization on capitalization factor (small-cap return minus large-cap return) for month t.
HML_t = realization on value factor (value return minus growth return) for month t.
MOM = the momentum factor
$\varepsilon_{i,t}$ = an error term.

Small company stocks will have a positive loading on SMB (positive slope, β_s), whereas big-company stocks tend to have a negative loading. Similarly, a positive estimate on β_v indicates sensitivity to value factor and a negative estimate indicates sensitivity to growth factor. A positive loading on β_m would show sensitivity to momentum effects. Finally, a positive intercept (α) would indicate superior performance; whereas a negative intercept would indicate underperformance, compared with the four-factor model.

4.2. Fung-Hsieh seven-factor model

All the previous models were mutual fund models. Because these funds follow strategies similar to hedge funds, mutual fund models may not give an accurate description of performance. Therefore, the widely used Fung-Hsieh seven factor hedge fund model (Fung and Hsieh, 2001, 2004) is also used to determine performance. Returns for bond, currency, and commodity lookback straddles have been obtained from Dr. David A. Hsieh's Web site.[8] The seven factors are as follows:

I. Equity Market Factor – S&P 500 Index monthly returns.
II. Size Factor – Russell 2000 monthly index returns – S&P 500 monthly index returns.
III. Bond Market Factor – The monthly change in the 10-year treasury constant maturity yield.
IV. Credit Spread Factor – The monthly change in the Moody's BAA yield less 10-year treasury constant maturity yield.
V. Bond Trend-Following Factor – Return of PTFS Bond Lookback Straddle.
VI. Currency Trend-Following Factor – Return of PTFS Currency Lookback Straddle.
VII. Commodity Trend-Following Factor – Return of PTFS Commodity Lookback Straddle.

$$R_{i,t} - R_{f,t} = \alpha_1 + \beta_1 \text{ Equity} + \beta_2 \text{ Size Spread} + \beta_3 \text{ Bond Market} + \beta_4 \text{ Credit Spread} + \beta_5 \text{ Bond Trend} + \beta_6 \text{ Currency Trend} + \beta_7 \text{ Commodity Trend} + \varepsilon_{i,t} \quad (2)$$

5. Empirical results

The results from the mutual fund model indicate that most AMFs have a significantly negative alpha (all alphas have been annualized) as shown in Table 2a. Non-Traditional Bond, Currency and Managed-Futures mutual funds also had positive alphas, but the results were not significant.

The Carhart four-factor model indicates that the returns of most of these funds were driven by value stocks and past winners. There were some exceptions like Multialternative and Non-Traditional Bond funds which either had significant exposure to growth stocks and/or followed contrarian strategies (not buying past winners). Multialternative and Managed-Futures funds also had significant exposure to large cap stocks.

Inverse Debt, Inverse Commodities, and Bear Market funds had the worst performance (highly negative and statistically significant alphas) among all the categories. "All funds" is an equally weighted portfolio of all AMFs within all investment styles. Carhart four-factor model finds that All Funds had significantly (at 1%) negative alphas. Annualized All Funds alphas are −3.07%.

5.1. Fung-Hsieh model

The seven-factor model confirms the results of the mutual fund models that most of the fund categories have significantly negative alphas as shown in Table 2b. The only major differences are performance of Managed-Futures funds. Fung-Hsieh model shows that Managed Futures funds have a significantly positive alpha of 4.64% (alpha was insignificant with Carhart four-factor model). Non-Traditional Bond mutual funds again have a positive alpha, but the results are not significant. Inverse-Debt, Inverse Commodities, and Bear Market funds again show the worst performance among all categories. All funds have an annualized alpha of −3.101% (statistically significant at 1%). Both the models show that that All funds have very low R^2 that is what we expect from a well diversified portfolio.

6. Gross performance of alternative funds

Until now only net performance of mutual funds has been considered. This means that expenses have already been deducted from fund's return. Previous literature (Jensen, 1968; Malkiel, 1995; Gruber, 1996; Detzler, 1999) indicates that mutual fund performance net of expenses has not been generated excess returns. However, using gross returns, superior performance can be identified (Blake, Elton, and Gruber, 1993; Detzler, 1999) with alpha insignificantly different from zero. This finding is consistent with Grossman and Stiglitz (1980) theory of informationally efficient markets, where informed investors are compensated for their information gathering.

To test this hypothesis, fund's monthly gross return is calculated by adding 1/12 of fund's annual expense ratio to monthly net returns the results of which are seen in Table 3. Some of these funds are able to follow the market with alphas insignificantly different than zero. There were exceptions, like Non-Traditional Bond and Managed Futures funds that have

Table 2a This table reports the results for Carhart four-factor model for the period January 1998 through December 2011

Carhart	Annualized Alpha (×100)	Alpha	SMB	HML	K	MOM	R^2	Number of funds
Long/short	[−1.86%]	[−0.0015778]***	[0.0088723]	[0.1026465]***	[0.5477669]***	[0.0156107]	0.4665	109
Multialternative	[−1.32%]	[−0.001107]***	[−0.0959005]***	[−0.0836065]***	[0.3875449]***	[−0.0399093]***	0.5115	53
Market-Neutral	[−2.02%]	[−0.0017057]***	[0.0568486]**	[0.0013326]	[0.2506415]***	[0.0512367]***	0.1265	47
Currency	[0.076%]	[0.0000629]	[−0.0130323]	[0.0202419]	[0.1068979]***	[0.0171163]	0.0321	22
Managed-Futures	[1.43%]	[0.0011856]	[−0.2911973]***	[0.227495]***	[0.1531407]***	[0.0960893]	0.0862	13
Inverse Debt	[−10.33%]	[−0.0090418]***	[0.0558854]	[−0.1039062]	[0.0142187]	[−0.0433405]	0.0099	7
Inverse Commodities	[−12.27%]	[−0.0108537]	[0.4688384]	[0.4164045]	[−1.03057]***	[−0.2433481]	0.2974	3
Bear Market	[−9.219%]	[−0.0080274]***	[−0.070593]	[0.3221259]***	[−1.394972]***	[0.0966994]***	0.6162	36
Non-Traditional Bond	[1.019%]	[0.0008454]	[0.0331409]	[−0.0756949]***	[0.1551144]***	[−0.0742364]***	0.3378	28
All Funds	[−3.07%]	[−0.0025953]***	[0.0060725]	[0.1354929]***	[0.0161597]	[0.0399217]***	0.05322	318

Notes. Reported are the OLS estimates for equally weighted portfolios per investment style. All alphas have been annualized. All Funds is an equally weighted portfolio of all alternative mutual funds within specific investment style. Standard errors are heteroskedasticity consistent.

***Significant at 1%, **significant at 5%.

Table 2b This table reports the results for Fung-Hsieh seven-factor model for the period January 1998 through December 2011

Fung-Hsieh	Annualized Alpha (×100)	Alpha	Equity	Size Spread	Bond Market	Credit Spread	Bond Trend	Currency Trend	Commodity Trend	R^{2}‘	Number of funds
Long/short	[−2.557%]	[−0.0021559]***	[0.524]***	[0.105]***	[−0.375]	[−1.118]***	[−0.002]	[0.005]	[0.0004]	0.432	109
Multialternative	[−1.373%]	[−0.0011512]***	[0.388]***	[−0.047]**	[−0.482]	[−1.159]***	[0.007]**	[0.004]	[0.003]	0.4953	53
Market-Neutral	[−2.168%]	[−0.0018251]***	[0.203]***	[0.112]***	[−0.480]	[−0.818]	[−0.003]	[0.007]	[−0.0006]	0.1033	47
Currency	[−0.395%]	[−0.0003299]	[0.0958]***	[0.022]	[−0.668]	[−0.456]	[−0.005]	[0.009]	[0.0031]	0.0317	22
Managed Futures	[4.64%]	[0.003788]**	[0.128]**	[−0.168]**	[5.323]***	[0.971]	[0.021]**	[0.0124]	[0.056]***	0.2228	13
Inverse Debt	[−9.25%]	[−0.00806]***	[−0.044]	[0.009]	[5.175]***	[0.138]	[−0.028]	[0.0044]	[−0.0009]	0.1202	7
Inverse Commodities	[−14.74%]	[−0.0132051]**	[−0.912]***	[0.092]	[−0.502]	[1.802]	[−0.130]**	[0.0034]	[−0.039]	0.2598	3
Non-Traditional Bond	[0.7074%]	[0.0005876]	[0.130]***	[0.009]	[−1.682]***	[−2.541]***	[−0.008]**	[0.003]	[−0.013]***	0.3767	36
Bear Market	[−7.1%]	[−0.006118]***	[−1.526]***	[−0.313]***	[−1.181]	[−2.727]***	[−0.041]***	[0.006]	[0.011]	0.6048	28
All Funds	[−3.101%]	[−0.0026217]***	[−0.026]	[0.014]	[−0.288]	[−1.336]***	[−0.015]***	[0.006]**	[0.0028]	0.05327	318

Notes. Reported are the OLS estimates for equally weighted portfolios per investment style. All alphas have been annualized. “All Funds” is an equally weighted portfolio of all alternative mutual funds within specific investment style. Standard errors are heteroskedasticity consistent.

***Significant at 1%, **significant at 5%.

Table 3 This table shows the Carhart four-factor and Fung-Hsieh seven-factor net and gross alphas for the period January 1998 through December 2011

Carhart	Annualized Net Alpha (×100)	Net Alpha	Annualized Gross Alpha (×100)	Gross Alpha	Number of funds
Long/short	[−1.86%]	[−0.0015778]***	[0.2355%]	[0.0001955]	109
Multialternative	[−1.32%]	[−0.001107]***	[0.367%]	[0.0003054]	53
Market-Neutral	[−2.02%]	[−0.0017057]***	[−0.235%]	[−0.0001958]	47
Currency	[0.076%]	[0.0000629]	[1.577%]	[0.0013045]	22
Managed-Futures	[1.43%]	[0.0011856]	[5.41%]	[0.0044015]**	13
Inverse Debt	[−10.33%]	[−0.0090418]***	[−8.56%]	[−0.007428]***	7
Inverse Commodities	[−12.27%]	[−0.0108537]	[−11.289%]	[−0.0099325]	3
Bear Market	[−9.219%]	[−0.0080274]***	[−5.867%]	[−0.0050259]***	36
Non-Traditional Bond	[1.019%]	[0.0008454]**	[2.29%]	[0.0018846]***	28
All Funds	[−3.07%]	[−0.0025953]***	[−0.7725]	[−0.0006461]	318

Fung-Hsieh	Annualized Net Alpha (×100)	Net Alpha	Annualized Gross Alpha (×100)	Gross Alpha	Number of funds
Long/short	[−2.557%]	[−0.0021559]***	[−0.35%]	[−0.0002922]	109
Multialternative	[−1.373%]	[−0.0011512]***	[0.31%]	[0.0002588]	53
Market-Neutral	[−2.168%]	[0.0018251]***	[−0.42%]	[−0.0003481]	47
Currency	[−0.395%]	[−0.0003299]	[1.10%]	[0.0009127]	22
Managed Futures	[4.64%]	[0.003788]**	[8.7%]	[0.0069782]***	13
Inverse Debt	[−9.25%]	[−0.00806]***	[−7.46%]	[−0.0064437]***	7
Inverse Commodities	[−14.74%]	[−0.0132051]**	[−13.78%]	[−0.0122837]	3
Bear Market	[0.7074%]	[0.0005876]	[−3.657%]	[−0.0030994]***	28
Non-Traditional Bond	[−7.1%]	[0.006118]***	[1.97%]	[0.0016267]***	36
All Funds	[−3.101%]	[−0.0026217]***	[−0.752]	[−0.0006288]	318

Notes. Reported are the OLS estimates for equally weighted portfolios per investment style. All alphas have been annualized. "All Funds" is an equally weighted portfolio of all alternative mutual funds within specific investment style. Standard errors are heteroskedasticity consistent.

***Significant at 1%, **significant at 5%.

significantly positive alphas, whereas Inverse Debt funds, Inverse Commodities funds, and Bear Market funds still underperform (significantly). Overall, results from the mutual fund model indicate that All Funds gross alpha is negative, but not statistically significant.

6.1. Fung-Hsieh model

The Fung-Hsieh model has similar results. Managed Futures and Non-Traditional Bond mutual funds have significantly positive alphas whereas Inverse Debt and Bear Market funds have significantly negative alphas (similar to mutual fund models). Therefore, the underperformance of these funds is not because of expenses. All Funds has insignificantly negative alpha of −0.752%. These results indicate that AMFs are able to follow the indices, but that the fund expenses are too high to be able to keep pace with or outperform the market.

7. Performance of alternative funds during bull and bear markets

Because one of the alleged advantages of AMFs is their ability to provide performance uncorrelated with the market, we test to see if performance varies depending on whether or not there is a bull or bear market. We use Fabozzi and Francis's (1979) modification of the Jensen model. The Jensen's alpha was modified to allow alphas and betas to vary during different market conditions. The modified model is as follows:

$$R_{i,t} - R_{f,t} = \alpha_1 + \alpha_2 (D_t) + \beta_1 (R_{m,t} - R_{f,t}) + \beta_2 (D_t) (R_{m,t} - R_{f,t}) + \varepsilon_{i,t} \quad (3)$$

Where:

D_t = 1 if the period is bull market and zero otherwise.
α_1 = Bear market alpha (αbear).
α_2 = Difference between bull and bear market alphas (αbull – αbear).
$\alpha_1 + \alpha_2$ = Bull market alpha (αbull).[9]

Similarly, β_1 is the bear market beta. β_2 is the difference between bull and bear market beta and $\beta_1 + \beta_2$ is bull market beta. Only the alpha specification from the article is used to determine whether alternative funds are outperforming in bull or bear markets.

Following Fabozzi and Francis (1979), the mutual fund and hedge fund models are modified to determine the performance of these funds during different market conditions.

$$R_{i,t} - R_{f,t} = \alpha_1 + \alpha_2 (D_t) + \beta_i (R_{m,t} - R_{f,t}) + \beta_s SMB_t + \beta_v HML_t + \beta_m MOM + \varepsilon_{i,t}$$

(Modified Carhart) (4)

Where:

D_t = 1 if $(R_{m,t} - R_{f,t}) > 0$ and zero otherwise.
α_1 = Bear market alpha (αbear).
α_2 = Difference between bull and bear market alphas (αbull – αbear).
$\alpha_1 + \alpha_2$ = Bull market alpha (αbull).

Similarly, the modified Fung-Hsieh model is given by:

$$R_{i,t} - R_{f,t} = \alpha_1 + \alpha_2 (D_t) + \beta_1 \text{Equity} + \beta_2 \text{Size Spread} + \beta_3 \text{Bond Market} + \beta_4 \text{Credit Spread} + \beta_5 \text{Bond Trend} + \beta_6 \text{Currency Trend} + \beta_7 \text{Commodity Trend} + \varepsilon_{i,t} \quad (5)$$

Where:

D_t = 1 if S&P 500 monthly return >0 and zero otherwise. α_1 = Bear market alpha (α_{Bear}).
α_2 = Difference between bull and bear market alphas (αbull – αbear)
$\alpha_1 + \alpha_2$ = Bull market alpha (αbull).

Table 4 This table shows the Fabozzi and Francis (1979) modified Carhart four-factor and Fung-Hsieh seven-factor bull and bear market alphas

Carhart	α_1 positive	α_1 significant	α_2 positive	α_2 significant	α_{Bull} positive	Number of funds
Long/short	35	24	58	18	46	109
Multialternative	13	7	38	7	27	53
Market-Neutral	20	6	26	6	21	47
Currency	11	6	8	3	8	22
Managed-Futures	1	0	12	0	12	13
Inverse Debt	0	5	5	0	0	7
Inverse Commodities	1	1	1	0	1	3
Bear Market	8	5	6	2	5	36
Non-Traditional Bond	15	5	16	4	16	28
Fung-Hsieh	α_1 positive	α_1 significant	α_2 positive	α_2 significant	α_{Bull} positive	Number of funds
Long/short	34	22	61	19	44	109
Multialternative	18	8	38	5	31	53
Market-Neutral	15	11	28	4	23	47
Currency	12	4	8	5	9	22
Managed-Futures	2	0	10	0	11	13
Inverse Debt	0	5	5	0	0	7
Inverse Commodities	1	0	0	0	0	3
Bear Market	13	7	5	7	6	36
Non-Traditional Bond	15	3	17	4	23	28

Notes.

$R_{i,t} - R_{f,t} = \alpha_1 + \alpha_2 (D_t) + \beta_i (R_{m,t} - R_{f,t}) + \beta_s SMB_t + \beta_v HML_t + \beta_m MOM + \epsilon_{i,t}$ (modified Carhart)

Where $D_t = 1$ if $(R_{m,t} - R_{f,t}) > 0$ and zero otherwise.

$R_{i,t} - R_{f,t} = \alpha_1 + \alpha_2 (D_t) + \beta_1$ Equity $+ \beta_2$ Size Spread $+ \beta_3$ Bond Market $+ \beta_4$ Credit Spread $+ \beta_5$ Bond Trend $+ \beta_6$ Currency Trend $+ \beta_7$ Commodity Trend $+ \epsilon_{i,t}$ (modified Fung-Hsieh model).

Where $D_t = 1$ if S&P 500 monthly return > 0 and zero otherwise.

α_1 = Bear market alpha (α_{Bear}).

α_2 = Difference between bull and bear market alphas ($\alpha_{Bull} - \alpha_{Bear}$).

$\alpha_1 + \alpha_2$ = Bull market alpha (α_{Bull}) is the sum of α_1 and α_2 (se Bhardwaj and Brooks, 1993).

A *t*-test is used to test for the significance of coefficient. Following Fabozzi and Francis (1979), a two tail *t*-test (where $-1.96 < t\text{-stat} < 1.96$) is used since the alternative hypothesis is that the tested coefficient is not equal to zero.

Results from Table 4 indicate that most of the AMFs do not outperform during down markets. Most of the down market alphas (α_1) are negative for all alternative fund categories. This result is true even for Bear Market funds that are supposed to outperform during down markets. These results are consistent with Fabozzi and Francis (1979) who find no evidence of mutual funds outperformance during bear markets. Results also show that during a bull market, only half (or less than half) of the funds of all categories (with the exception of Managed-Futures funds) have positive alphas. Most of the Managed-Futures funds (11 out of 13) had positive alphas during bull markets. Fung-Hsieh seven-factor model shows that 23 out of 28 Non-Traditional Bond mutual funds have positive bull market alphas.

8. Performance during the 2007 financial crisis

These AMFs strive to maintain a low correlation with the overall market. Therefore, these funds should have had decent performance during the financial crisis. To test this hypothesis the performance of AMFs is tested during the 2007 financial crisis.

According to the Wall Street Journal, the U.S. bear market (2007–2009) was declared in June 2008 when DJIA fell 20% from its October 11, 2007 high. The DJIA peaked at 14,198.10 on October 11, 2007 before starting its decline. The bear market reversed course by the end of March, 2009. This analysis is for the period of October, 2007 through March, 2009.

The results indicate that these funds have even worse performance (significantly negatively) during the recent financial crisis as shown in Table 5a. The only exception was Currency funds that had positive alpha, but the results were not significant. The biggest surprise again was performance of Bear-Market funds. Bear Market funds lost significant value during the crisis period. Carhart four-factor model shows that Bear Market funds had negative annualized alphas of over −18% (significant at 1%). All Funds had significantly negative (significant at 1%) alphas of −7.51% (Carhart).

8.1. Fung-Hsieh model

The hedge fund model shows that most of these categories had negative returns but the results were not statistically significant as seen in Table 5b. Bear Market funds have an alpha of −21.43% (significant at 1%) during the crisis. Inverse Debt funds have an alpha of −10.125%, whereas the three Inverse Commodities funds lost over half their value during the financial crisis (annualized alpha of −52.78% significant at 1%). All Funds had a significantly negative alpha of −6.97% (significant at 1%) during the crisis. These results clearly demonstrate that these funds are not able to deliver absolute returns (returns uncorrelated to the market) during financial crisis.

9. Robustness checks

9.1. Conditional factor models

All the models previously used were unconditional factor models. The assumption is that investors and managers use no information about the state of the economy to form expectations. However, if managers trade on publicly available information, and use dynamic strategies, unconditional models may produce inferior results. To address these concerns, Chen and Knez (1996) and Ferson and Schadt (1996) advocate using conditional models. This adjustment is made by using time-varying conditional expected returns and betas instead of unconditional betas. The instruments used are commonly available and proven to be useful for determining stock returns. The instruments are: (1) 1 month T-bill rate; (2) dividend yield on market index; (3); Slope of the term structure (Treasury Constant Maturity 10-year rate – Treasury Constant Maturity 3-month rate); (4) Quality spread in the corporate

Table 5a This table reports the results for Carhart four-factor model for the period October 2007 through March 2009

Carhart	Annualized Alpha (×100)	Alpha	SMB	HML	K	MOM	R^2	Number of funds
Long/short	[−3.068%]	[−0.0025937]**	[0.0786324]	[−0.0494474]	[0.637765]***	[0.0422494]	0.5508	109
Multialternative	[−2.20%]	[−0.0018537]	[−0.0363936]	[−0.1110572]***	[0.4209263]***	[0.0356293]	0.5574	53
Market-Neutral	[−5.6%]	[−0.0047909]**	[0.109206]	[−0.1264681]	[0.3289842]***	[0.0710199]	0.188	47
Currency	[0.62%]	[0.0005197]	[0.0323449]	[0.0026877]	[0.0864039]	[0.0232104]	0.0192	22
Managed-Futures	[0.82%]	[0.0006882]	[−0.6051944]	[0.1440316]	[−0.1432934]	[0.2009702]	0.5589	13
Inverse Debt	[−13.91%]	[−0.0124022]**	[0.168463]	[−0.3043749]	[−0.0821791]	[−0.1194316]	0.0403	7
Inverse Commodities	[−36.54%]	[−0.0371955]**	[1.192139]	[0.834445]**	[−1.255457]***	[−0.3327845]	0.3446	3
Non-Traditional Bond	[−3.19%]	[−0.0026986]**	[0.1459912]**	[−0.274778]***	[0.2091656]***	[−0.0837113]***	0.4676	28
Bear Market	[−18.106%]	[−0.0165074]***	[−0.1734499]	[0.2572829]***	[−1.375152]***	[0.0371385]	0.6064	36
All Funds	[−7.51%]	[−0.0064841]***	[0.0736936]	[−0.0021545]	[0.0479261]	[0.0197205]	0.06972	318

Notes. Reported are the OLS estimates for equally weighted portfolios per investment style. All alphas have been annualized. 'All Funds' is an equally weighted portfolio of all alternative mutual funds within specific investment style. Standard errors are heteroskedasticity consistent.

***Significant at 1%, **significant at 5%.

Table 5b This table reports the results for Fung-Hsieh seven-factor model for the period October 2007 through March 2009.

Fung-Hsieh	Annualized Alpha (×100)	Alpha	Equity	Size Spread	Bond Market	Credit Spread	Bond Trend	Currency Trend	Commodity Trend	R^2
Long/short	[−2.097%]	[−0.0017641]	[0.6034645]***	[0.0403136]	[−0.5453617]	[−0.2099296]	[−0.022963]*	[−0.0206572]***	[0.0245881]**	0.515
Multialternative	[−0.07449%]	[−0.0000621]	[0.3784509]***	[−0.1255398]**	[−0.78077758]*	[−1.223122]***	[−0.0000842]	[−0.0163319]**	[0.0228487]**	0.5385
Multi-Neutral	[−3.139%]	[−0.0026539]	[0.2726933]***	[0.0179493]	[0.5183695]	[−0.6198575]	[0.0049955]	[−0.0045664]	[0.0207093]	0.1432
Currency	[−1.115%]	[−0.0009337]	[0.0488554]	[0.0511936]	[−1.084883]	[0.0877479]	[−0.0185468]	[−0.0065784]	[0.0019404]	0.0239
Managed Futures	[−0.837%]	[−0.0006998]	[−0.0775635]	[−0.3892783]	[3.55139]	[2.551328]	[0.0032133]	[−0.0425914]	[0.1408849]***	0.6989
Inverse Debt	[−10.125%]	[−0.008856]	[−0.1855874]*	[−0.0077328]	[0.0458092]	[−2.455614]	[−0.1485848]**	[0.0401842]	[−0.0430363]	0.2128
Inverse Commodities	[−52.78%]	[−0.06063]***	[−1.129233]***	[1.813746]**	[−1.868392]	[5.983555]	[−0.4091808]**	[0.2739249]***	[−0.2995754]**	0.5013
Non-Traditional Bond	[−0.749%]	[−0.0006263]	[0.1256811]***	[−0.1286473]**	[−3.704702]***	[−2.542829]***	[−0.0529448]***	[0.0016379]	[−0.0091885]	0.5122
Bear Market	[−21.43%]	[−0.0199009]***	[−1.505699]***	[−0.038693]	[−1.265379]	[−3.784502]***	[−0.0802635]**	[0.0416814]***	[0.0047357]	0.5755
All Funds	[−6.97%]	[−0.0059987]***	[0.0083969]	[0.007002]	[−0.9877032]*	[−1.137654]**	[−0.0392152]**	[0.0034754]	[0.0091344]	0.06948

Notes. Reported are the OLS estimates for equally weighted portfolios per investment style. All alphas have been annualized. "All Funds" is an equally weighted portfolio of all alternative mutual funds within specific investment style. Standard errors are heteroskedasticity consistent.

***Significant at 1%, **significant at 5%.

bond market (Moody's BAA rated corporate bond yield – Moody's AAA rated corporate bond yield). All the instruments are lagged by one month. For the Carhart four-factor model, market beta, SMB, HML, and MOM are allowed to vary over time.

9.2. Conditional Carhart four-factor model

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i (R_{m,t} - R_{f,t}) + \beta_s \, SMB_t + \beta_v \, HML_t + \beta_m \, MOM + \delta_1\{z_{t-1}*(R_{m,t} - R_{f,t})\} + \delta_2\{z_{t-2}* \, SMB_t\} + \delta_3\{z_{t-3}* \, HML_t\} + \delta_4\{z_{t-4}*MOM\} + \varepsilon_{i,t} \quad (6)$$

For the Fung-Hsieh seven-factor model, all the seven factors are allowed to vary over time.

9.3. Conditional Fung-Hsieh seven-factor model

$$R_{i,t} - R_{f,t} = \alpha_1 + \beta_1 \, \text{Equity} + \beta_2 \, \text{Size Spread} + \beta_3 \, \text{Bond Market} + \beta_4 \, \text{Credit Spread} + \beta_5 \, \text{Bond Trend} + \beta_6 \, \text{Currency Trend} + \beta_7 \, \text{Commodity Trend} + \delta_1\{z_{t-1}* \, \text{Equity}\} + \delta_2\{z_{t-2}* \, \text{Size Spread}\} + \delta_3\{z_{t-3}* \, \text{Bond Market}\} + \delta_4\{z_{t-4}* \, \text{Credit Spread}\} + \delta_5\{z_{t-5}* \, \text{Bond Trend}\} + \delta_6\{z_{t-6}* \, \text{Currency Trend}\} + \delta_7\{z_{t-7}* \, \text{Commodity Trend}\} + \varepsilon_{i,t} \quad (7)$$

9.4. Results of conditional models tests

The results are robust with conditional Carhart model as shown in Table 6. The conditional Fung-Hsieh model produces similar results with two exceptions. Inverse Commodity funds have a positive alpha of 3% but the results were not significant (unconditional model shows an alpha of −14.74% significant at 1%) whereas Bear Market funds have a conditional alpha of −3.75% (significant at 1%) compared with an unconditional alpha of −7.1% (also significant at 1%). The conditional alpha of All Funds is −2.627% (significant at 1%) versus an unconditional alpha of −3.1% (also significant at 1%).

9.5. Mutual fund market-timing and selectivity

Previous literature (Treynor and Mazuy, 1966; Kon and Jen, 1978; Henriksson and Merton, 1981, Lee and Rahman, 1990) studies mutual fund market timing and selectivity. They find that mutual fund managers have limited success in market timing and selectivity. However, AMFs use hedge fund strategies. Research (Chen, 2007; Chen and Liang, 2007) on hedge funds indicates that hedge fund managers have some success in market timing. Many of these AMFs are run by a manager with some hedge fund experience. This experience factor is confirmed by Agarwal, et al. (2009) who find that managers of at least half the hedged mutual funds have prior hedge fund experience. The following two models are used to test for mutual funds market timing and selectivity.

Table 6 This table shows the Conditional vs. Unconditional alpha for Carhart four-factor models and Fung-Hsieh seven-factor models for the period January 1998 through December 2011

Carhart	Unconditional Annualized Alpha (×100)	Unconditional Alpha (α)	R^2	Conditional Annualized Alpha (×100)	Conditional Alpha (α)	R^2	Number of funds
Long/short	[−1.86%]	[−0.0015778]***	0.4665	[−2.12%]	[−0.0017865]***	0.4735	109
Multialternative	[−1.32%]	[−0.001107]***	0.5115	[−1.743]***	[−0.0014644]***	0.5304	53
Market-Neutral	[−2.02%]	[−0.0017057]***	0.1265	[−2.31%]	[−0.001945]***	0.1403	47
Currency	[0.076%]	[0.0000629]	0.0321	[0.32%]	[0.0002699]	0.0442	22
Managed-Futures	[1.43%]	[0.0011856]	0.0862	[−2.72%]	[−0.0022979]	0.3015	13
Inverse Debt	[−10.33%]	[−0.0090418]***	0.0099	[−9.768%]	[−0.0085294]***	0.0884	7
Inverse Commodities	[−12.27%]	[−0.0108537]	0.2974	[−6.22%]	[−0.0053394]	0.4632	3
Bear Market	[−9.219%]	[−0.0080274]***	0.6162	[−7.66%]	[−0.0066148]***	0.6249	36
Non-Traditional Bond	[1.019%]	[0.0008454]	0.3378	[0.876%]	[0.0007272]	0.4137	28
All Funds	[−3.07%]	[−0.0025953]***	0.05322	[−3.338%]	[−0.0028259]***	0.05303	318

Fung-Hsieh	Unconditional Annualized Alpha (×100)	Unconditional Alpha (α)	R^2	Conditional Annualized Alpha (×100)	Conditional Alpha (α)	R^2	Number of funds
Long/short	[−2.557%]	[−0.0021559]***	0.432	[−2.757%]	[−0.0023267]***	0.4379	109
Multialternative	[−1.373%]	[−0.0011512]***	0.4953	[−1.2%]	[−0.0010031]	0.5165	53
Market-Neutral	[−2.168%]	[−0.0018251]***	0.1033	[−1.951%]	[−0.0016402]**	0.1132	47
Currency	[−0.395%]	[−0.0003299]	0.0317	[−0.56%]	[−0.0004678]	0.0484	22
Managed Futures	[4.64%]	[0.003788]**	0.2228	[5.75%]	[0.0046744]**	0.4084	13
Inverse Debt	[−9.25%]	[−0.00806]***	0.1202	[−10.175%]	[−0.0089024]***	0.1821	7
Inverse Commodities	[−14.74%]	[−0.0132051]**	0.2598	[3.0036%]	[0.0024692]	0.4709	3
Non-Traditional Bond	[0.7074%]	[0.0005876]	0.3767	[0.842%]	[0.0006987]	0.4484	36
Bear Market	[−7.1%]	[−0.006118]***	0.6048	[−3.75%]	[−0.0031838]***	0.6222	28
All Funds	[−3.101%]	[−0.0026217]***	0.05327	[−2.627%]	[−0.002216]***	0.05307	318

Notes. Reported are the OLS estimates for equally weighted portfolios per investment style. All alphas have been annualized. "All Funds" is an equally weighted portfolio of all alternative mutual funds within specific investment style. Standard errors are heteroskedasticity consistent.

***Significant at 1%, **significant at 5%.

The first model was developed by Treynor and Mazuy (1966). This model adds a quadratic term to CAPM or the market model to capture market timing and selectivity. The equation is as follows:

$$R_{i,t} - R_{f,t} = \alpha_s + \beta_1 (R_{m,t} - R_{f,t}) + \beta_2 (R_{m,t} - R_{f,t})^2 + e_{i,t} \quad (8)$$

A positive and significant $\beta 2$ indicates superior market timing ability. However, a negative and significant $\beta 2$ indicates inferior market timing. If $\beta 2$ is not different than 0, then the manager has no market timing ability. Similarly, αs measures selectivity.

The second model, which was developed by Henriksson and Merton (1981), replaces the quadratic term with a variable Max (0, Rm). The equation is as follows:

$$R_{i,t} - R_{f,t} = \alpha_s + \beta_1 (R_{m,t} - R_{f,t}) + \gamma[D_t(R_{m,t} - R_{f,t})] + e_{i,t} \quad (9)$$

Where:

$D_t = 0$ if $R_{m,t} > R_{f,t}$ (-1 otherwise).

Here, γ measures market-timing ability, whereas αs measures selectivity.

These results, shown in Table 7a, confirm previous mutual fund literature that mangers of these funds in general do not have success in market-timing or stock selection. Only Non-Traditional Bond mutual fund managers seem to have success in selectivity, but no market-timing ability. Some of the other categories do have positive $\beta 2$ and γ (market-timing ability), but the results are not significant. All categories with the exception of Non-Traditional Bond mutual funds had negative (some of them statistically significant) or insignificantly positive αs. Both the models find that All Funds (that is an equally weighted portfolio of all AMFs within specific investment style) do have any success in market-timing or selectivity.

Following Ferson and Schadt (1996), the conditional market timing and selectivity of these funds is given by:

Conditional Treynor and Mazuy

$$R_{i,t} - R_{f,t} = \alpha_s + \beta_1 (R_{m,t} - R_{f,t}) + \delta 1\{zt\text{-}1^*(R_{m,t} - R_{f,t})\} + \beta_2 (R_{m,t} - R_{f,t})2 + e_{i,t} \quad (10)$$

Conditional Henriksson and Merton

$$R_{i,t} - R_{f,t} = \alpha_s + \beta_1 (R_{m,t} - R_{f,t}) + \delta 1\{zt\text{-}1^*(R_{m,t} - R_{f,t})\} + \gamma[D_t(R_{m,t} - R_{f,t})] + e_{i,t} \quad (11)$$

Where:

$D_t = 0$ if $R_{m,t} > R_{f,t}$ (-1 otherwise).

The results remain same. Only Non-Traditional Bond mutual funds have some selectivity, but no market-timing ability. Other AMFs have no market-timing or selectivity.

Table 7a Reported are the results from Treynor and Mazuy (1966) and Henriksson and Merton (1984) models

Treynor and Mazuy	α_s	β_2	R^2	Number of funds
Long/short	[−0.0010545]**	[−0.1481033]	0.4613	109
Multialternative	[−0.0002566]	[−0.2660947]	0.4979	53
Market-Neutral	[−0.0004345]	[−0.3265041]	0.1168	47
Currency	[−0.0003485]	[0.1284035]	0.0313	22
Managed-Futures	[0.0009739]	[−0.2675342]	0.0285	13
Inverse Debt	[−0.0091004]***	[0.0422014]	0.0017	7
Inverse Commodities	[−0.0125913]	[0.5599629]	0.2335	3
Non-Traditional Funds	[0.0026413]***	[−0.5331332]***	0.3057	28
Bear Market	[−0.0034579]***	[−1.550607]***	0.6073	36
All Funds	[−0.0018099]***	[−0.2233747]	0.05329	318
Henriksson and Merton	α_s	γ	R^2	Number of funds
Long/short	[−0.0015555]**	[−0.0002089]	0.461	109
Multialternative	[−0.0008719]	[0.0004863]	0.496	53
Market-Neutral	[−0.0003722]	[0.0021221]	0.1158	47
Currency	[−0.000494]	[−0.0011674]	0.0311	22
Managed-Futures	[−0.0230618]***	[0.0445176]	0.5666	13
Inverse Debt	[−0.0068348]**	[0.0048976]	0.0032	7
Inverse Commodities	[−0.016618]	[−0.012518]	0.2349	3
Non-Traditional Funds	[−0.00004059]	[−0.0024351]	0.3021	28
Bear Market	[−0.0100744]***	[−0.0058585]	0.6026	36
All Funds	[−0.0037009]***	[−0.0027284]**	0.05339	318

Notes. For the Treynor and Mazuy (1996) model, α_s measures selectivity whereas β_2 measures market-timing. Similarly, for the Henriksson and Merton (1984) model, α_s measures selectivity whereas γ measures market-timing. "All Funds" is an equally weighted portfolio of all alternative mutual funds within specific investment style. Standard errors are heteroskedasticity consistent.

***Significant at 1%, **significant at 5%.

9.6. Persistence

Grinblatt and Titman (1992), Brown, et al. (1992), Hendricks, et al. (1993), Brown and Goetzmann (1995), Goetzmann and Ibbotson (1994), Kahn and Rudd (1995), Malkiel (1995), Elton, et al. (1996), and Carhart (1997) have tested the persistence of mutual fund total returns in time. Grinblatt and Titman (1992) find evidence that differences in performances between funds persists over time and this persistence is consistent with the ability of fund managers to earn abnormal returns. Hendricks, et al. (1993) find that relative performance no-load growth funds persist in the near term, with the strongest evidence for a one-year horizon. Goetzmann and Ibbotson (1994) find strong evidence that past mutual fund performance predicts future mutual fund performance. Their data suggests that winner and losers are likely to repeat, even when performance is adjusted for relative risk. Kahn and Rudd (1995) investigate performance persistence for fixed income and equity mutual funds and found performance persistence only for fixed income funds. However, this persistence edge cannot overcome the average underperformance of fixed-income funds resulting from fees and expenses. Elton, et al. (1996) find that risk-adjusted performances of mutual funds persist, that is, funds that did well in the past continue to do well in the future. Deztel and

Table 7b Reported are the results from conditional Treynor and Mazuy and Henriksson and Merton models

Conditional Treynor and Mazuy	α_s	β_2	R^2	Number of funds
Long/short	[−0.0010298]**	[−0.1524436]	0.4639	109
Multialternative	[−0.0011016]**	[0.2324004]	0.5105	53
Market-Neutral	[−0.0004432]	[−0.3883459]	0.1202	47
Currency	[−0.0003479]	[−0.0222527]	0.0371	22
Managed-Futures	[−0.0007113]	[0.5235891]	0.1667	13
Inverse Debt	[−0.0100143]***	[0.3859164]	0.0197	7
Inverse Commodities	[−0.0146829]	[2.237837]	0.2678	3
Non-Traditional Funds	[0.0018968]***	[−0.3312209]	0.3643	28
Bear Market	[−0.0034545]***	[−1.630376]***	0.6101	36
All Funds	[−0.0016509]***	[−0.5044269]***	0.05317	318
Conditional Henriksson and Merton	α_s	γ	R^2	Number of funds
Long/short	[−0.0009166]	[0.0011572]	0.4638	109
Multialternative	[−0.0005413]	[−0.0001244]	0.5095	53
Market-Neutral	[−0.0002004]	[0.0027451]	0.1189	47
Currency	[−0.0007876]	[−0.0008534]	0.0372	22
Managed-Futures	[0.0052106]	[0.0098067]	0.1722	13
Inverse Debt	[−0.0082083]***	[0.002002]	0.0186	7
Inverse Commodities	[−0.0114461]	[−0.0042874]	0.2586	3
Non-Traditional Funds	[−0.0006605]	[−0.0036931]**	0.3624	28
Bear Market	[−0.0085499]***	[−0.0019516]	0.6049	36
All Funds	[−0.0030748]***	[−0.0002986]	0.0532	318

Notes. For the conditional Treynor and Mazuy model, α_s measures selectivity whereas β_2 measures market-timing. Similarly, for the conditional Henriksson and Merton model, α_s measures selectivity whereas γ measures market-timing. "All Funds" is an equally weighted portfolio of all alternative mutual funds within specific investment style. Standard errors are heteroskedasticity consistent.

***Significant at 1%, **significant at 5%.

Weigand (1998) find that adjusting fund returns for the size of the stocks in which funds invest and financial ratios intended to capture fund manager investment styles explains all the persistence in mutual fund returns from 1976 to 1985, the period in which persistence is most prevalent. Philpot (2000) looks at the performance persistence of non-conventional bond funds (high-yield bonds, global issues, and convertible bonds) and finds that short-term performance persistence is present, but limited to the high-yield bond subsample.

Survivorship bias plays a very important role in performance persistence. This impact is because of truncation of the data set because of disappearance of poorly performing funds from the sample. Studying only surviving funds will overstate performance. Brown, et al. (1992) show that early studies exaggerate the extent of persistence by relying on survivorship-biased data sets. Because survivorship bias has been controlled, there will be no such problems.

Carhart (1997) finds that in his survivorship bias free sample of U.S. equity funds, persistence disappears after accounting for momentum in stock returns. However, recent studies argue that after properly considering fund styles, there is persistence in U.S. equity funds (Ibbotson and Patel, 2002; Wermers, 2000).

Following Kahn and Rudd (1995), the following model is used test whether alternative mutual funds have any performance persistence.

Table 8 Reported are the results of Kahn and Rudd (1995) performance persistence model

	a	b
Long/short	.0207159**	−0.0410406
	[2.23]	[−0.66]
Multialternative	.0211119**	−0.239867***
	[2.33]	[−3.25]
Market-Neutral	0.0081719	0.0770294
	[0.77]	{0.89}
Currency	.0204124***	−0.1299019}
	[2.68]	[−1.05]
Managed-Futures	−0.0283912	−0.1391153
	[−1.06]	[−0.33]
Inverse Debt	−0.1000085***	−0.2209817
	[−5.32]	[−1.26]
Inverse Commodities	−0.2029987***	−0.2472212
	[−3.85]	[−0.75]
Non-Traditional Bond	.0424145***	−0.2435717
	[2.65]	[−1.59]
Bear Market	−0.1160574***	−0.0197846
	[−4.39]	[−0.26]
All Funds	−0.0148607**	0.0346342
	[−2.47]	[0.72]

Notes. "All Funds" is an equally weighted portfolio of all alternative mutual funds within specific investment style. Standard errors are heteroskedasticity consistent. *t*-stats are in brackets. Period 2 performance is regressed against Period 1 performance.

Performance (2) = a + b X Performance (1).

Where 'Performance' is annual returns. Positive estimates of coefficient b with significant *t*-statistics are evidence of persistence: Period 1 performance contains useful information about Period 2 performance.

***Significant at 1%, **significant at 5%.

Period 2 performance is regressed against Period 1 performance.

$$\text{Performance (2)} = a + b \text{ X performance (1)} \tag{12}$$

where "Performance" is annual returns. Positive estimates of coefficient b with significant *t*-statistics are evidence of persistence: Period 1 performance contains useful information about Period 2 performance. The results from Table 8 indicate that none of the mutual fund categories display any performance persistence.

9.7. Factors affecting performance of AMF

Following Otten and Bams (2002) and Bauer, et al. (2007), the following regression is performed to estimate the marginal effect of expense ratios and other variables on performance of All Funds. The results of this analysis are presented in Table 9.

$$\alpha_i = c_0 + c_1 \text{ LN (Assets}_i) + c_2 \text{ (Turnover}_i) + c_3 \text{ Expense ratio}_i + c_4 \text{ Ln(Age}_i) + \varepsilon_i \tag{13}$$

Table 9 The influence of fund characteristics on risk adjusted performance.

Model	Constant	Ln (Assets)	Turnover	Expense	Ln (Age)
Carhart	−0.0032062**	0.0010181***	−0.0000709	−0.0646934	−0.0005993
	[−1.99]	[5.37]	[−1.40]	[−1.36]	[−1.73]
Fung-Hsieh	−0.0012341***	0.0005377***	−0.0000136	−0.0227598	−0.0004795**
	[−3.19]	[3.75]	−0.26	[−0.71]	[−2.03]

Notes. Following Otten and Bams (2002) and Bauer, et al. (2007), the following regression is performed to estimate the marginal effect of expense ratios and other variables on performance of "All Funds." Standard errors are heteroskedasticity consistent. *t*-Stats are in brackets.

$\alpha_i = c_0 + c_1$ LN (Assets$_i$) + c_2 (Turnover$_i$) + c_3 (Expense ratio$_i$) + c_4 Ln(Age$_i$) + ϵ_i

Where α_I = Alpha for fund i from both the models (Carhart and Fung-Hsieh).

LN (Assets$_i$) = Ln of total assets for fund i at end of 2011. Ln is used instead of total assets as this variable may be non-linearly related to performance.

Turnover$_i$ = Turnover for fund i at end of 2011.

Expense ratio$_i$ = Expense ratio for fund i at end of 2011.

Ln (Age$_i$) = Ln of total fund's age at end of 2011. Ln is used instead of total age as this variable may be non-linearly related to performance.

***Significant at 1%, **significant at 5%.

Where:

α_i = Alpha for fund i from both the models (Carhart and Fung-Hsieh).
LN (Assets$_i$) = Ln of total assets for fund i at end of 2011. Ln is used instead of total assets as this variable may be non-linearly related to performance.
Turnover$_i$ = Turnover for fund i at end of 2011.
Expense ratio$_i$ = Expense ratio for fund i at end of 2011.
Ln (Age$_i$) = Ln of total fund's age at end of 2011. Ln is used instead of total age as this variable may be non-linearly related to performance.

Ln (Assets) is significantly positive in both cases indicating economies of scale for larger funds (similar to Otten and Bams, 2002). Turnover and expenses are negative in both cases, but the results are not statistically significant. These results, however, are consistent with previous literature that turnover and expenses are negatively related to performance (Blake, et al., 1993; Malkiel, 1993; Carhart, 1997; Dellva and Olson, 1998). Finally, the influence of fund age is considered. Results indicate that that there is significantly negative relationship between fund age and performance (significantly in the case of Fung-Hsieh model). These results are consistent with Webster (2002) who finds a strong negative relationship between fund age and market adjusted returns. This analysis is only for surviving funds at the end of 2011. We also ran a robustness check (not reported in the article) where we included all the dead funds (based on the final value in their year of death). This did not change the nature of the cross-sectional results.

10. Index funds versus alternative mutual funds

Would investors have been better off with index mutual funds? Index funds tracking the S&P 500 are passively managed and have lower expense ratios and management fees. Only

Table 10a Expenses and turnover for index funds tracking S&P 500 and equity AMFs

Comparison	Number		Mean	Standard deviation
Index Mutual Funds	62	Management fee	0.20	0.16
		Annual net expense ratio	0.65	0.47
		Turnover(%)	9.89	24.602
Long/short	109	Management fee	1.18	0.43
		Annual net expense ratio	2.14	0.96
		Turnover(%)	423.80	1,238.68
Multialternative	53	Management fee	0.93	0.48
		Annual net expense ratio	1.60	0.73
		Turnover(%)	264.90	545.68
Market Neutral	47	Management fee	1.29	0.33
		Annual net expense ratio	1.95	0.73
		Turnover(%)	336.78	944.34
Bear Market	36	Management fee	0.85	0.15
		Annual net expense ratio	1.95	0.54
		Turnover(%)	506.96	507.97

equity AMFs are compared to index funds for this apples to apples comparison. Therefore, only AMFs which have significant equity exposure are included in this analysis.

The performance of all index funds tracking the S&P 500 (living as well as dead) from January 1998 through December 2011 is computed. There are a total of 62 index funds tracking the S&P 500 during this period. Table 10a shows the differences in expense ratios and management fees between index funds and alternative funds. Index funds have average expense ratio of only 0.65% compared with 2.14% for long/short, 1.60% for Multialternative funds, 1.95% for Market Neutral, and 1.95% for Bear Market. The performance comparison is made using the Carhart four-factor model. Fung-Hsieh seven-factor model is not used for computing alpha of index funds (tracking S&P 500) as S&P 500 returns (equity factor) is one of the seven factors for Fung-Hsieh model.

Table 10b clearly shows that performance of index funds is better than any of the equity AMFs over the entire sample period. The annualized alpha of index funds with the Carhart

Table 10b This table shows difference in performance between passively managed index mutual funds tracking S&P 500 and equity alternative mutual funds using alpha from the Carhart four-factor model for the period January 1998 through December 2011

Carhart	Annualized Alpha (×100)	Alpha	R^2	No.
Index Funds tracking S&P 500	[−0.5598%]	[−0.0004677]***	0.9746	62
Long/short	[−1.86%]	[−0.0015778]***	0.4665	109
Multialternative	[−1.32%]	[−0.001107]***	0.5115	53
Market-Neutral	[−2.02%]	[−0.0017057]***	0.1265	47
Bear Market	[−9.219%]	[−0.0080274]***	0.6162	36

Notes. Reported are the OLS estimates for equally weighted portfolios per investment style. All alphas have been annualized. Standard errors are heteroskedasticity consistent. Fung-Hsieh seven-factor model is not used for computing alpha of index funds (tracking S&P 500) as S&P 500 returns (equity factor) is one of the seven-factors for the Fung-Hsieh model.

***Significant at 1%, **significant at 5%.

Table 10c This table shows difference in performance between passively managed index mutual funds tracking S&P 500 and equity alternative mutual funds using alpha from the Carhart four-factor model for the period October 2007 through March 2009 (2007 financial crisis)

Carhart	Annualized Alpha (×100)	Alpha	R^2	No.
Index Funds tracking S&P 500	[−1.556%]	[−0.0013062]***	0.9908	62
Long/short	[−3.068%]	[−0.0025937]**	0.5508	109
Multialternative	[−2.20%]	[−0.0018537]	0.5574	53
Market-Neutral	[−5.6%]	[−0.0047909]**	0.188	47
Bear Market	[−18.106%]	[−0.0165074]***	0.6064	36

Notes. Reported are the OLS estimates for equally weighted portfolios per investment style. All alphas have been annualized. Standard errors are heteroskedasticity consistent. Fung-Hsieh seven-factor model is not used for computing alpha of index funds (tracking S&P 500) as S&P 500 returns (equity factor) is one of the seven-factors for the Fung-Hsieh model.

***Significant at 1%, **significant at 5%.

four-factor model is −0.56% (significant at 1%). This result is much better than any of the equity AMFs. Even during the 2007 crisis (Table 10c), the S&P 500 index funds lost much less value than equity AMFs.

11. Conclusion

Our results indicate that most alternative funds have not delivered on their promise to provide absolute returns regardless of market conditions and have not created any value for investors. Using the mutual fund model, we do find that Non-Traditional Bond mutual funds have positive alphas while the Fung-Hsieh seven-factor model shows similar results for Managed-Futures funds. However, the conditional Carhart model finds that alpha of Non-Traditional Bond mutual funds is positive, but not significant.

The performance of AMFs was even worse during the 2007 financial crisis that shows that these funds do not deliver absolute returns. On a gross return basis, some of the categories are able to follow the market with alphas insignificantly different than zero. There are again exceptions like Inverse-Debt, Inverse-Commodities and Bear Market Funds which still underperform on a gross basis. The managers of these funds do not have any success in market timing or selectivity and none of the fund categories display any performance persistence.

Based on our findings, investors should be wary of having unrealistic expectations of performance and diversification benefits of these alternative mutual funds. Our analysis does not support the hypotheses that AMFs will have positive alphas and that they will provide superior performance in bear markets.

Notes

1 See, for example, Agarwal, et al. (2009).
2 See Table 1b for turnover ratios for AMFs and Appendix A-3 for the turnover ratios for traditional long-only funds.

3 Additional studies on fund performance show mixed results. According to Sewell (2011) for every article that supports market efficiency (most of these articles were published before 1990), there are three articles that reject the efficient markets hypothesis. For example, Jensen (1968), Ippolito (1989), Droms and Walker (1996), Davis (2001), Baras, et al. (2010) find no superior performance of mutual fund managers, whereas Grinblatt and Titman (1992), Hendricks, et al. (1993), Goetzman and Ibbotson (1994), Elton (1996), Gruber(1996), Wermers (2000), Haslem, et al. (2008), and Budiono and Martens (2010) find evidence of superior performance Studies on international funds tend to reject market efficiency. See, for example, Otten and Bams (2002), Huij and Post (2011).
4 *t*-test confirm these results (see also Appendix A2 and A3 for summary statistics of these comparison mutual fund categories).
5 Internal Revenue Service Code Section 851 (b)(3).
6 Table 1a shows number of dead and surviving funds for each category. Some of the categories such as Managed Futures, Inverse Debt, and Inverse Commodities have 13, 7, and 3 funds, respectively. We have monthly data for these funds for the last six to seven years. We compute alpha for these categories for the available time period. The same approach has been used by Bauer, et al. (2005, 2006, 2007) and Otten and Bams (2002). They compute alpha for mutual fund categories with 1–15 funds.
7 The authors also used the Capital Asset Pricing Model and the Fama-French three-factor model to evaluate the performance of AMFs. Although the results are not reported in this article, they are consistent with the Carhart four-factor model.
8 https://faculty.fuqua.duke.edu/~dah7/HFRFData.htm.
9 The Bull market alpha ($\alpha 1 + \alpha 2$) for a mutual fund is simply the sum of bear market alpha ($\alpha 1$) and difference between bull and bear market alpha ($\alpha 2$) for that fund and as such there is no significance level for this alpha (see Bhardwaj and Brooks, 1993).

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Appendix A1

Definitions (source-Morningstar):

Multialternative: These funds offer investors exposure to a combination of strategies like long-short equity and debt, managed futures, global macro, and convertible arbitrage, among others. These strategies may change in response to market conditions. Short exposure is usually greater than 20%.
Managed Futures: These funds typically take long and short positions in futures or other derivative contracts according to a trend-following or momentum strategy.
Currency Mutual Funds: These funds invest in United States and foreign currencies using

short term money market instruments, derivatives (including forwards, options, swaps), and cash deposits.

Long/Short Mutual Funds: These funds take long (short) positions in undervalued (overvalued) assets. Long/short structure varies from 120/20 to 150/50 with 130/30 being the most popular. Because of Regulation T, short selling is limited to 50%.

Market Neutral: These funds try to earn income by maintaining low correlation with the market. These funds usually have 50% of net assets in long positions whereas holding 50% of net assets in short positions. Their goal is to deliver positive returns regardless of fluctuations in market.

Inverse Debt: These funds seek to generate returns equal to an inverse fixed multiple of short-term returns of a fixed-income index.

Inverse Commodities: These funds seek to generate returns equal to an inverse multiple of short-term returns of a commodity index.

Non-Traditional Bonds: Many funds in this group describe themselves as "absolute return" portfolios, which seek to avoid losses and produce returns uncorrelated with the overall bond market; they use a variety of methods to achieve those aims.

Bear Market Funds: Bear-market portfolios invest in short positions and derivatives to profit from stocks that drop in price. Because these portfolios often have extensive holdings in shorts or puts, their returns generally move in the opposite direction of the benchmark index

Appendix A2

Total number of funds (including dead funds) and total assets under management (AUM) for comparison mutual fund categories at the end of December 2011

Category	Total funds	Living funds	Dead funds	AUM (December 2011)
Large Value	620	352	268	$540.40
Large Growth	846	430	416	$780.80
Mid Value	209	115	94	$ 84.10
Mid Growth	483	235	248	$198.60
Small Value	202	104	98	$ 57.00
Small Growth	470	231	239	$120.90
Multisector Bond	104	59	45	$136.20
Long Term Bond	59	15	44	$ 14.70

Note. AUM in billions of dollars.

Appendix A3

Expenses and Turnover for comparison mutual fund categories

Category		Mean	Standard deviation	Median
Large Value	Management fee	0.71	0.71	0.21
	Annual net expense ratio	1.43	1.30	1.00
	Turnover (%)	103.83	68.00	310.11
Large Growth	Management fee	0.71	0.71	0.21
	Annual net expense ratio	1.43	1.30	1.00
	Turnover (%)	103.83	68.00	310.11
Mid Value	Management fee	0.74	0.70	0.18
	Annual net expense ratio	1.37	1.25	0.55
	Turnover (%)	61.03	52.00	41.33
Mid Growth	Management fee	0.77	0.75	0.20
	Annual net expense ratio	1.55	1.43	0.66
	Turnover (%)	122.35	108.00	103.17
Small Value	Management fee	0.84	0.85	0.19
	Annual net expense ratio	1.43	1.35	0.44
	Turnover (%)	71.36	51.00	88.35
Small Growth	Management fee	0.86	0.85	0.23
	Annual net expense ratio	1.61	1.48	0.67
	Turnover (%)	127.75	100.00	129.63
Multisector Bond	Management fee	0.61	0.60	0.23
	Annual net expense ratio	1.22	1.15	0.51
	Turnover (%)	100.44	50.21	105.65
Long Term Bond	Management fee	0.50	0.50	0.18
	Annual net expense ratio	1.09	1.00	0.51
	Turnover (%)	71.51	30.00	109.08

No.	Model	Number of factors
1	Unconditional Carhart	4
2	Unconditional Fung-Hsieh	7
3	Conditional Carhart	20
4	Conditional Fung-Hsieh	35

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