

Estimating Risk Premiums of Individual Hedge Funds

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Recent research has shown that the returns generated by hedge funds are driven primarily by macrofactors, related to market and economic conditions, and microfactors, related to fund-specific characteristics (Schneeweis et al. [2001]). However, most of the published research of hedge funds is conducted using indices or portfolios to represent hedge fund returns. There appears to be little research investigating the variation of risk-return properties of individual hedge funds.¹ This research seeks to fill that gap by introducing a methodology for estimating the risk premiums earned by individual hedge funds for exposure to risk factors. The goal is to show the variation of risk exposures of individual funds both within and between various strategy styles. In addition, a simple performance measure is introduced for comparing risk-adjusted performance without the need for benchmarks.

Results indicate that the majority of funds earn average excess return greater than the expected excess return based on the estimated total average risk premium. Estimated average risk premiums of hedge fund styles are consistent with style expectations as to the type and degree of risk resulting from the underlying strategies. Although there is wide variation of the estimated risk premiums within each style, much of the variation is concentrated in the bottom and top-performing funds; analysis of this variation suggests that some styles exhibit a range of investment strate-

gies while others exhibit a dominant strategy. It appears that approximately 20% to 30% of the funds account for about 65% of the variation in total average risk premiums and about 80% of the variation in average performance values; the majority of funds (70% to 80%) account for the remainder of the variation (about 35% and 20%, respectively).

In the following section the methodology is described, followed by sections describing the data used and the empirical results.

METHODOLOGY

The average excess return of a fund or index is modeled based on the Arbitrage Pricing Theory (APT) relationship:

$$\bar{r}_i - \bar{r}_f = \sum_j \beta_{ij} \lambda_j \quad (1)$$

1. The β_{ij} values represent the exposure of fund i to factor j and the λ_j values represent the risk premium earned for exposure to factor j . The products $\beta_{ij} \lambda_j$ represent the components of the total average risk premium of fund i for exposure to each individual factor.

The factors used for this research are not traded assets so a Fama and Macbeth [1973] style two-pass regression is employed to estimate the risk premiums associated with the factors. The factors are primarily macrofactors intended to represent systematic risk common

to various hedge fund styles; one micro or fund-specific risk factor is also included. The factors are²

2. *Credit risk (CR)*: The monthly change in the yield spread between U.S. corporate BAA and AAA rated bonds.
3. *Term premium risk (TP)*: The monthly change in the yield spread between 20-year and 1-year Treasuries.
4. *Implied volatility risk (VIX)*: The monthly change in the average intramonth value of the CBOE Implied Volatility Index.
5. *Bond volatility risk (BVOL)*: The monthly change of the annualized intramonth volatility of the Lehman U.S. Government/Credit total return index.
6. *Market risk (Mkt)*: A measure of the residual risk inherent in U.S. large capitalization equities. Monthly observations of the market risk factor are represented by the residuals of the following regression:

$$S \& P_t = \hat{\alpha}_0 + \hat{\alpha}_1 CR_t + \hat{\alpha}_2 TP_t + \hat{\alpha}_3 VIX_t + \hat{\alpha}_4 BVOL_t + Mkt_t \quad (2)$$

In this equation, monthly total returns of the S&P500 are regressed against monthly values of the other four factors (CR, TP, VIX, and BVOL). The residuals of this regression, Mkt_t , yield a single aggregate factor representing residual equity risk.

7. *Historical volatility risk (HVOL)*. A measure of the volatility of an individual fund or index. The values are the standard deviations of monthly returns of individual funds or indices over the sample period. The first-pass consists of time series regressions to estimate the sensitivities (exposures) of the funds and indices to each risk factor:

$$r_{it} = \hat{\beta}_{i0} + \hat{\beta}_{i1} CR_t + \hat{\beta}_{i2} TP_t + \hat{\beta}_{i3} VIX_t + \hat{\beta}_{i4} BVOL_t + \hat{\beta}_{i5} Mkt_t + \varepsilon_{it}, \quad (3)$$

$i = 1, \dots, N$ there are k indices and $(N - k)$ funds.

Note that the HVOL risk factor is not included as it is assumed that the sensitivity to this factor is given directly by the value of the factor itself, that is, $\hat{\beta}_{i6}$ is the historical volatility of the monthly returns of the fund or index.

8. The second pass consists of a cross-sectional regression to estimate the risk premiums associated with each risk factor. In order to accomplish this, familiar

hedge fund style indices are used to represent the hedge fund market in the following regression³:

$$\bar{r}_i - \bar{r}_f = \hat{\lambda}_0 + \hat{\lambda}_1 \hat{\beta}_{i1} + \hat{\lambda}_2 \hat{\beta}_{i2} + \hat{\lambda}_3 \hat{\beta}_{i3} + \hat{\lambda}_4 \hat{\beta}_{i4} + \hat{\lambda}_5 \hat{\beta}_{i5} + \hat{\lambda}_6 \hat{\beta}_{i6} + u_i, \quad (4)$$

$i = 1, \dots, k$ indices

9. Estimates of the total average risk premium of individual funds are obtained by substituting the estimates obtained in Equations (3) and (4) into the APT relationship shown in Equation (1). For example, the product $\hat{\beta}_{i1} \hat{\lambda}_1$ represents the credit risk premium portion of the total average risk premium of fund i . Notice that the intercept $\hat{\lambda}_0$ that represents the average excess return for investing in hedge funds (or due to missing factors) is not included in the calculation of the total average risk premium of a fund; it is constant for all funds and is not associated with included risk factors so it is not useful for differentiating fund risk characteristics.
10. A simple performance measure is obtained by comparing the actual average excess return of a fund to the estimated total average risk premium. The performance measure is α^* (alpha-star) and is represented by the following equation:

$$\alpha^*_i = (\bar{r}_i - \bar{r}_f) - (\hat{\beta}_{i1} \hat{\lambda}_1 + \hat{\beta}_{i2} \hat{\lambda}_2 + \hat{\beta}_{i3} \hat{\lambda}_3 + \hat{\beta}_{i4} \hat{\lambda}_4 + \hat{\beta}_{i5} \hat{\lambda}_5 + \hat{\beta}_{i6} \hat{\lambda}_6). \quad (5)$$

DATA

The database is unique in that it combines databases of the major vendors of hedge fund and managed futures data existing at the time the database was donated.⁴ The constituent databases are MAR/CISDM, HFR, TASS, Tuna, and AltVest.⁵ The combined database is labeled the Alternative Investment Strategies (AIS) database in consideration of the classification system of Jaeger [2002] that was used to group the funds. The AIS database covers the time period from January 1990 through April 2002 and contains 4,691 funds of which 4,392 (94%) are classified as hedge funds and 299 (6%) are commodity trading advisor (CTA) funds or managed futures funds.

The later portion of the database contains the largest number of funds as well as markedly different periods of economic conditions. For these reasons a sample of funds was selected for the time period from January 1997 through December 2001. The sample includes a total of 1,767 funds of which 1,555 funds survived and 212 funds did not survive (12% attrition). Only the 1,555 surviving

funds were used to conduct the analyses because only these funds have a complete returns record.⁶

Standard survivorship bias estimates were conducted for the sample following the methods described in Ackerman et al. [1999] and Fung and Hsieh [2000]. The resulting survivorship bias estimate of approximately 2% annually is comparable with previously published estimates.

The diverse fund classifications of the constituent database vendors were organized by adapting the system proposed by Jaeger [2002]. In this system funds are classified according to three major style strategies with sub-strategies:

EXHIBIT 1 Distribution of Sample by Common Style

Style	No. Funds	% of Class	% of Total
Relative Value	24	11%	2%
Convertible Arbitrage	57	26%	4%
Fixed Income Arbitrage	60	27%	4%
Equity Market Neutral	82	37%	5%
All Relative Value	223	--	14%
Event Driven	145	83%	9%
Merger Arbitrage	7	4%	0%
Distressed Securities	17	10%	1%
Regulation D	5	3%	0%
All Event Driven	174	--	11%
Fund of Funds	314	--	20%
Opportunistic	7	1%	0%
Global Macro	101	15%	0%
Equity Hedge	372	56%	24%
Equity Non-Hedge	40	6%	3%
Emerging Markets	86	13%	6%
Sector Funds	32	5%	2%
Market Timers	9	1%	1%
Short Bias	17	3%	1%
All Opportunistic	664	--	43%
Managed Futures	121	90%	8%
Foreign Exchange	14	10%	1%
All Managed Futures	135	--	9%
Unknown	45	-	3%
Total Funds: 1555	1555	--	

1. *Relative value.* Convertible arbitrage, fixed income arbitrage, and equity market neutral.
2. *Event driven.* Merger arbitrage, distressed securities, and regulation D.
3. *Opportunistic.* Various systematic and/or discretionary directional strategies including global macro, emerging markets, equity market neutral, and short bias.

Fund of funds and managed futures are treated as separate classifications.

The distribution of the sample of funds by style classification is shown in Exhibit 1. For several strategies the database vendors did not supply sub-strategies, for example, the majority of funds (83%) within the event-driven strategy are classified only as "event driven." This is also the case for most of the managed futures funds and a few relative value and opportunistic funds.

AVERAGE STYLE RESULTS

Regression statistics and monthly values of estimated risk premiums associated with each risk factor resulting from the cross-sectional regression are shown in Exhibit 2. The

estimated average excess return for investing in hedge funds is about 0.30% per month or about 3.6% annually. The cross-sectional results show little evidence that the credit risk premium is different from zero; this is likely due to inadequacy of the credit risk measure chosen rather than that credit risk is not a significant source of risk. The most dominant factors are the term premium, implied volatility, and market risk factors, while bond volatility and historical volatility factors are less so.

Exhibit 3 shows the average estimated risk premiums earned by funds within each

EXHIBIT 2 Cross-Sectional Regression Results Using Indices

Risk Premium	Coefficient	s.e.	t-value	Pr> t	Rgr s.e.	R-sq	F-stat
λ_0 : Intercept	0.00305	0.00062	4.94	0.00	0.00279	0.62	23.84
λ_1 : CR	0.00005	0.00009	0.58	0.57			
λ_2 : TP	-0.00087	0.00020	-4.46	0.00			
λ_3 : VIX	0.00939	0.00237	3.96	0.00			
λ_4 : BVol	0.00391	0.00222	1.76	0.08			
λ_5 : Mkt	0.01128	0.00216	5.23	0.00			
λ_6 : HVol	0.02643	0.01548	1.71	0.09			

λ_1 : CR indicates the estimate of the monthly risk premium per unit of CR for hedge funds

EXHIBIT 3

Strategy Style Average Results (standard deviations shown below risk premium averages)

Style	N	Sharpe	$\alpha^* > 0$	α^*	ExRet	TotRpr	CR	TP	BVol	VIX	Mkt	HVol	Bond	Equity
Relative Value	24	0.8	88%	6.6%	6.5%	-0.1%	-0.1% 0.4%	-1.4% 2.7%	-0.3% 2.7%	-2.5% 4.1%	3.0% 5.1%	1.3% 0.9%	-1.9%	0.5%
Convertible Arbitrage	57	1.5	95%	6.0%	6.3%	0.4%	-0.1% 0.2%	0.1% 2.4%	0.0% 1.0%	-1.5% 2.6%	1.1% 3.1%	0.7% 0.6%	0.0%	-0.3%
Fixed Income Arbitrage	60	0.8	80%	3.4%	3.6%	0.2%	-0.1% 0.2%	0.2% 2.8%	-0.6% 1.9%	-0.6% 2.2%	0.5% 1.6%	0.8% 0.6%	-0.4%	-0.1%
Equity Market Neutral	82	0.6	57%	2.5%	5.2%	2.8%	0.0% 0.3%	1.2% 3.8%	-0.1% 1.9%	-0.9% 2.7%	1.6% 4.0%	1.0% 0.8%	1.1%	0.6%
Event Driven	145	1.1	92%	5.1%	5.8%	0.7%	-0.2% 0.3%	0.8% 3.0%	0.0% 1.4%	-2.7% 2.9%	1.9% 2.4%	0.9% 0.9%	0.5%	-0.8%
Merger Arbitrage	7	1.6	100%	4.5%	6.2%	1.7%	-0.1% 0.1%	1.4% 0.8%	0.1% 0.3%	-1.0% 0.4%	0.8% 0.5%	0.4% 0.1%	1.4%	-0.2%
Distressed Securities	17	0.7	88%	6.8%	4.8%	-2.1%	-0.2% 0.3%	-1.0% 1.8%	-0.5% 2.5%	-2.3% 3.1%	0.9% 1.8%	1.1% 0.8%	-1.7%	-1.5%
Regulation D	5	2.7	100%	7.5%	17.5%	10.0%	-0.1% 0.3%	6.5% 3.4%	2.1% 2.0%	-1.0% 0.7%	1.4% 0.9%	1.1% 0.7%	8.5%	0.4%
Fund of Funds	314	0.9	80%	3.4%	5.7%	2.3%	-0.2% 0.3%	1.5% 2.0%	-0.3% 1.2%	-1.8% 2.7%	2.3% 2.9%	0.9% 0.6%	0.9%	0.5%
Opportunistic	7	0.7	86%	5.6%	12.6%	7.0%	-0.3% 0.6%	2.5% 3.2%	0.9% 2.1%	-3.9% 3.6%	6.0% 3.9%	1.8% 0.5%	3.0%	2.1%
Global Macro	101	0.6	65%	0.6%	6.0%	5.3%	-0.2% 0.6%	1.9% 6.2%	0.3% 2.7%	-2.9% 4.4%	4.6% 6.6%	1.6% 1.3%	2.0%	1.7%
Equity Hedge	372	0.7	73%	5.9%	12.4%	6.5%	-0.3% 0.6%	2.2% 6.2%	0.6% 2.2%	-4.1% 4.6%	6.1% 6.0%	2.1% 1.1%	2.6%	1.9%
Equity Non-Hedge	40	0.2	60%	3.7%	10.5%	6.8%	-0.5% 0.8%	1.6% 6.9%	1.1% 4.9%	-7.8% 4.8%	10.0% 5.9%	2.4% 1.5%	2.2%	2.2%
Emerging Markets	86	0.2	64%	4.7%	4.0%	-0.7%	-0.5% 0.5%	-1.5% 3.6%	0.8% 2.4%	-10.6% 6.6%	8.3% 5.5%	2.8% 1.5%	-1.2%	-2.3%
Sector Funds (Total)	32	0.6	72%	2.6%	14.3%	11.7%	-0.5% 0.8%	5.2% 8.1%	1.9% 3.0%	-5.8% 3.7%	8.2% 4.9%	2.6% 1.2%	6.7%	2.3%
Market Timers	9	1.2	89%	8.8%	14.7%	5.9%	-0.3% 0.5%	2.9% 3.4%	0.3% 1.3%	-2.7% 2.2%	4.1% 2.9%	1.6% 1.5%	2.9%	1.4%
Short Bias	17	0.1	71%	1.9%	-0.4%	-2.3%	0.3% 0.5%	0.4% 5.0%	-2.3% 2.2%	8.4% 7.7%	-11.8% 9.9%	2.6% 1.5%	-1.6%	-3.3%
Managed Futures	121	0.3	60%	2.8%	6.7%	3.9%	0.0% 0.6%	0.9% 4.5%	-1.7% 3.7%	2.7% 4.5%	0.0% 4.8%	2.0% 1.3%	-0.8%	2.7%
Foreign Exchange	14	0.4	64%	1.1%	3.6%	2.4%	0.2% 0.3%	0.0% 2.6%	0.3% 0.7%	0.5% 1.1%	0.3% 1.3%	1.0% 0.6%	0.6%	0.8%
Total Funds**	1510													

**45 unclassified funds not shown

$\alpha^* > 0$ indicates % of funds with positive α^*

$\alpha^{**} = \text{ExRet} - \text{TotRpr}$

ExRet = Average Excess Return

TotRpr = Total Average Risk Premium

Bond = (CR + TP + BVol)

Equity = (VIX + Mkt)

strategy for exposure to the risk factors along with the standard deviation of the risk premium estimates.⁷ Note that the results for each strategy encompass a wide range of investment strategies, for example, fixed income may include funds focusing on spreads of the Treasury yield curve, Corporate/Treasury, Treasury/Eurodollar, Mortgage-Backed Securities/Treasury, etc. Notice that for all styles the standard deviations of the estimated risk premiums are generally greater than or equal in magnitude to the average risk premium values.⁸ Although this may be due in part to misclassification, it is also likely that this indicates a wide variation of within-style strategy, underlying markets traded, and objectives of the funds. However, it will be shown later that much of the variation from the mean values of the risk premiums occurs in the top and bottom 10–15% of funds when ranked on the performance measure α^* .

Based on the high percentage of funds with positive α^* , it appears that the majority of funds earn average excess return greater than the expected excess return based on the estimated total average risk premium. Generally, the average style Sharpe ratio varies directly with the percentage of funds with positive α^* .⁹ Results for each main strategy group are summarized in the following sections; note that results for funds only classified under a main strategy, that is, opportunistic and relative value are not discussed separately because of uncertainty of the mixture of strategies of the component funds.

Generally, the relative value investment styles appear to be essentially neutral with respect to the risk factors with the exception of equity market neutral that has results similar to equity hedge but with significantly smaller average equity risk premiums.

1. *Convertible arbitrage.* The total average risk premium indicates that the average fund was essentially neutral with respect to the risk factors. Bond market risk premiums are near zero while equity market risk premiums indicate slightly longer equity exposure; it is possible that this is due to rising stock prices during much of the sample period that causes convertibles to become more equity sensitive.
2. *Fixed income arbitrage.* Results indicate that the average fund was also neutral with respect to the risk factors. Average results are consistent with small net market exposure from long/short portfolios of high/low credit risk and high/low yields. There is little evidence of negative impact of long positions of higher-yield assets.

3. *Equity market neutral.* Results show evidence of a small average net long position in equities (negative implied volatility and positive residual market risk premiums) with positive exposure to term premium effects.

For the event-driven styles, the prime risk factor is related to “deal risk,” for example, for distressed securities the main risk factor is associated with favorable outcomes of asset distribution. None of the factors included in the model will directly capture these risks. Consequently, the risk premiums can only show the indirect effects of economic and market risks on “deal risk” as well as direct exposure funds may have to these factors.

1. *Merger arbitrage.* The large increase in merger activity, most of which was successful, appears to have resulted in the average fund showing relatively small direct equity risk factor premiums and negligible bond risk premiums except for the term premium risk that may reflect significant interest rate sensitivity.
2. *Distressed securities.* The total average risk premium is negative which is likely a result of returns strongly correlated with equity and bond markets from holding illiquid assets. This strategy has the highest overall combined negative equity and bond market risk premiums of the event-driven styles.
3. *Regulation D.* The total average risk premium is the highest of all the event-driven styles and it appears to result from high sensitivity to interest rates as indicated by the large term premium and bond volatility risk premiums.

The opportunistic styles are generally dominated by risk premiums associated with exposure to equity markets and term premium changes. The equity component of risk premium, on average, appears to vary directly with style expectations of net equity exposure.

1. *Equity-based funds.* Equity market risk premiums, due to exposure to the implied volatility and market risk factors, are largest for equity non-hedge followed by equity hedge and market timers while the term premium risk premiums are similar for these styles.
2. *Short bias.* Equity market risk premiums are similar to equity non-hedge but with an opposite sign; these funds also have a relatively large negative average bond volatility risk premium.
3. *Emerging markets.* Results for these funds are likely impacted by negative conditions in many emerging markets during the sample period. On average, the

dominant risk premiums are negative term premium and implied volatility and positive market risk premium. Combined risk premiums for equity and bond markets are negative on average.

4. *Global macro*. Results are similar but smaller in magnitude to those of equity hedge. Results are likely influenced by significant downsizing of funds in this style during the sample period, for example, loss of capital.
5. *Sector (total)*. These funds represent a mixture of very different market sectors, for example, energy, real estate, technology, so the results are not indicative of a particular traded market. The percentages of funds by sector style are 35% technology/micro cap, 13% healthcare/biotech, 9% real estate, 6% energy, and 37% unspecified.

The fund of funds group represents a portfolio of different strategy styles. However, it was not subclassified according to risk–return objectives such as that employed by HFR1: strategic, diversified, conservative, or market defensive. Consequently, results represent an average of the component substrategies. The average total average risk premium is about 2.3% annually with individual risk premiums approximately split between equity and bond market risk factors. The risk premiums are all the same sign and of an average magnitude of those of the main hedge fund styles. If managed futures managers comprise some of the managers in the Fund of Funds manager's portfolios, they are too few to change this overall average result.

The managed futures group average risk premiums are significantly different from those of most of the hedge fund styles. The primary differences between the managed futures funds and the hedge funds are due to 1) negligible market risk premium, 2) positive implied volatility risk premium, 3) negative bond market volatility risk premium, and 4) negligible credit risk premium and short-term premium risk premium. Although the total average risk premium is nearly as high as the opportunistic styles, it arises from different sources of risk. Previous researchers have found that managed futures and CTA funds primarily derive their returns from trend following styles based on technical trading rules rather than on fundamental economic information.¹⁰ On average, those funds specifically subclassified as foreign exchange show smaller risk premiums, total average risk premium, and α^* value than the main managed futures group.

Overall, it appears that the average estimated risk premiums of hedge fund styles are consistent with style

expectations as to the type and degree of risk resulting from the underlying strategies, for example, relative value styles have significantly lower average risk premiums than opportunistic styles.

WITHIN-STYLE RESULTS

As noted in the previous section, the standard deviations of the estimated risk premiums are generally equal to or higher in magnitude than the average risk premium values. However, much of the variation in the estimated values occurs in the bottom and top 10–15% of funds when ranked on the performance measure α^* . For each style with sufficient number of funds, the funds were ranked by α^* and the squared deviations from the mean were calculated. Exhibit 4 shows the percentage of total squared deviation from the mean for the bottom 10%, middle 80%, top 10%, and bottom and top combined 10% (20% total) of funds. Note that the fund of funds and equity hedge styles have in excess of 300 funds so 15% was used to delineate the groups for these styles. For example, for convertible arbitrage funds approximately 65% of the total variation from the mean value of the total average risk premium occurred in the bottom 10% of α^* -ranked funds and approximately 78% of the total variation from the mean value of the market risk premium occurred in the bottom and top 10% (20% total) of α^* -ranked funds.

Some of the strategies have a large proportion of the variation in estimated risk premiums occurring in the middle group for certain risk factors:

- Fixed income arbitrage: about 75% for credit risk, bond volatility, implied volatility, and market risk factors.
- Emerging markets: about 75% for all risk factors.
- Equity market neutral: about 65% for implied volatility and market risk factors.
- Equity hedge: about 50% for all risk factors.
- Fund of funds: about 50% for all risk factors.

Although these styles have a moderate proportion of variation of estimated risk premiums occurring in the bottom and top groups, the variation is sufficient to account for about 65% of the variation in the total average risk premium and about 75% of the variation in α^* .¹¹ For these styles the majority of funds show significant variation in estimated risk premiums that suggests a range of strategy styles rather than a dominant style. However, the

EXHIBIT 4

Variation of Risk Premium Estimates

Style	N	ExRet	α^*	TotRpr	CR	TP	BVol	VIX	Mkt	HVol
Convertible Arbitrage	6	53%	70%	65%	50%	24%	41%	23%	56%	42%
	45	22%	7%	18%	25%	22%	39%	28%	22%	20%
	6	25%	24%	18%	25%	54%	21%	49%	21%	38%
	12	78%	93%	82%	75%	78%	61%	72%	78%	80%
Fixed Income Arbitrage	6	20%	17%	32%	27%	8%	10%	17%	16%	11%
	48	53%	30%	27%	71%	27%	83%	64%	77%	50%
	6	28%	53%	42%	2%	65%	7%	19%	8%	39%
	12	47%	70%	73%	29%	73%	17%	36%	23%	50%
Equity Market Neutral	8	43%	53%	31%	58%	45%	34%	20%	14%	29%
	66	27%	15%	39%	32%	35%	40%	72%	62%	48%
	8	30%	32%	30%	10%	20%	26%	8%	23%	24%
	16	73%	85%	61%	68%	65%	60%	28%	38%	52%
Event Driven	15	67%	71%	27%	58%	24%	54%	36%	40%	50%
	115	16%	6%	30%	31%	36%	28%	32%	51%	26%
	15	16%	22%	43%	11%	40%	17%	31%	8%	25%
	30	84%	94%	70%	69%	64%	72%	68%	49%	74%
Fund of Funds**	31	29%	50%	28%	26%	24%	28%	33%	24%	22%
	252	43%	15%	54%	54%	49%	42%	43%	59%	54%
	31	28%	35%	18%	20%	27%	31%	24%	17%	24%
	62	57%	85%	46%	46%	51%	58%	57%	41%	46%
Global Macro	10	63%	76%	73%	30%	56%	57%	17%	64%	50%
	81	22%	8%	16%	56%	25%	27%	70%	31%	40%
	10	15%	15%	11%	14%	20%	17%	13%	5%	10%
	20	78%	92%	84%	44%	75%	73%	30%	69%	60%
Equity Hedge**	37	19%	41%	30%	14%	23%	22%	18%	25%	15%
	298	52%	17%	39%	52%	45%	53%	51%	55%	55%
	37	28%	36%	30%	35%	30%	23%	28%	20%	22%
	74	48%	77%	61%	48%	54%	46%	46%	45%	37%
Equity Non-Hedge	4	35%	40%	50%	12%	57%	45%	60%	38%	33%
	32	53%	29%	18%	81%	21%	9%	27%	55%	56%
	4	12%	31%	33%	7%	21%	46%	13%	7%	11%
	8	47%	71%	82%	19%	79%	91%	73%	45%	44%
Emerging Markets	9	26%	19%	15%	23%	12%	13%	2%	5%	2%
	68	27%	39%	74%	62%	74%	83%	80%	73%	69%
	9	47%	42%	10%	15%	14%	4%	18%	22%	30%
	18	73%	61%	26%	38%	26%	17%	20%	27%	31%
All Managed Futures	17	23%	42%	11%	17%	62%	36%	22%	44%	20%
	107	17%	12%	55%	44%	21%	34%	48%	40%	31%
	14	60%	46%	34%	39%	17%	30%	30%	15%	50%
	31	83%	88%	45%	56%	79%	66%	52%	60%	69%
Average Middle		33%	18%	37%	51%	36%	44%	52%	53%	45%
Average Bottom & Top		67%	82%	63%	49%	64%	56%	48%	47%	54%

Values shown are % of Total squared deviation from mean for Bottom 10%, Middle 80%, Top 10%, and Bottom and Top combined 10% (20% total) of α^* -ranked funds.

** 15% is used to delineate Bottom and Top performers for these styles.

Average Middle is the average of the middle group for all styles.

Average Bottom & Top is the average of the bottom & top groups for all styles.

effect on the variation of average performance (α^*) is relatively small when compared with the bottom and top groups (about 25% versus 75%).

For the remaining hedge fund styles, convertible arbitrage, event driven, global macro, equity non-hedge, and managed futures, the largest proportion of the variation in estimated risk premiums occurs in the bottom and top groups with the bottom group generally accounting for the largest proportion of variation. About 80% and 85% of the variation of the total average risk premium and average performance value occur in the bottom and top groups. The relatively low variation in estimated risk premiums, total average risk premiums, and average performance values for these funds suggest the presence of a dominant trading strategy followed by most funds. Funds following significantly different strategies, with different estimated risk premiums and average performance values, occur mainly in the bottom and top group of funds.

In summary it appears that for some styles there exists a relatively wide range of strategies while for others there is evidence of a dominant strategy. However, regardless of the range of strategies, it appears that there is relatively little variation in average performance in the middle-ranked group when compared with the bottom- and top-ranked groups. The average proportion of variation of performance is about 20% for the middle-ranked group. Consequently, it appears that approximately 70–80% of the funds in a given strategy account for about 20% of the variation in average performance while the remaining 20–30% of the funds account for about 80% of the variation.¹²

CONCLUSIONS

This research has demonstrated the value of the methodology for establishing differences of average risk premiums of individual funds within and between hedge fund styles. Although the results suffer from omission of important risk factors, as well as insufficient substrategy classification, this can be mitigated with more robust risk factor structures and quantitative classification techniques. Initial results indicate that the majority of funds earn average excess return greater than the expected excess return based on the estimated total average risk premium. Estimated average risk premiums of hedge fund styles are consistent with style expectations as to the type and degree of risk resulting from the underlying strategies. Although there is wide variation of the estimated risk premiums

within each style, much of the variation is concentrated in the bottom- and top-performing funds; analysis of this variation suggests that some styles exhibit a range of investment strategies while others exhibit a dominant strategy. Regardless of the variety of investment strategies in a given style, it appears that approximately 20–30% of the funds account for about 65% of the variation in total average risk premiums and about 80% of the variation in average performance values; the majority of funds (70–80%) accounts for the remainder of the variation (about 35% and 20%, respectively).

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ENDNOTES

¹Martin [2001] finds wide variation of individual hedge fund sensitivities to economic factors within investment strategies; however, the main goal of the article is to motivate the use of style-based hedge fund indices for investment purposes.

²Intramonth values are calculated based on daily values, for example, the intramonth volatility of the Lehman U.S. Government/Credit total return index is the standard deviation of daily returns of the index (annualized).

³A total of 96 major indices are used including the hedge fund indices of EACM, HFR, CFSB, Hennessee, and LJH and the CTA indices of MAR.

⁴The database was donated by Alternative Investment Analytics, formerly Schneeweis Partners.

⁵At the time the database was donated, all of the constituent databases were owned separately. For example, the current CISDM database was entirely owned and operated by MAR; this database is entirely the product of MAR and does not reflect any subsequent changes performed by CISDM.

⁶Mackey [2005] presents a comparison of estimated risk premiums for surviving funds versus non-surviving funds.

⁷For all results, monthly values of return and standard deviation were annualized by multiplying by a factor of 12 and $\sqrt{12}$, respectively.

⁸This is consistent with Martin's [2001] results for individual hedge funds.

⁹Sharpe ratios are calculated by dividing the annualized average excess return by the annualized standard deviation; the risk-free rate over the sample period was about 4.95% annually.

¹⁰See Fung and Hsieh [1997] and Schneeweis and Spurgin [1998].

¹¹Note that the fund of funds and emerging markets styles show only about 46% and 26% of the variation in the total average risk premium occurring in the bottom and top groups.

¹²Note that for the total average risk premium about 65% of the variation occurs in the bottom- and top-ranked groups and the remaining 35% occurs in the middle group.

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