ECONOMIC AND STATISTICAL RISK FACTORS AFFECTING THE RETURNS OF THREE GLOBAL MACRO HEDGE FUND CATEGORIES

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Abstract: This paper examines three types of Global Macro Hedge Fund return and risk factors. The Discretionary Thematic Category is sensitive to credit spreads, industrial production, drawdown ratios related to magnitude and the duration of drawdown in that category. The Multi-Strategy Global Macro strategy returns are driven by the S&P 500, Run Up (momentum) and a ratio related to the magnitude of drawdown. The Global Macro Systematic Diversified category returns are driven by Run Up factors (momentum), 10 Year Treasury Rates, Standard Deviation of category returns and a ratio related to maximum drawdown. This evidence points to investors using prior statistics in a category over common risk statistics typically used in finance such as Beta or a Sharpe ratio. Run Up and Drawdown information is used by investors in Global Macro Hedge Funds to analyze risk and returns in these hedge fund categories.

Keywords: Hedge funds, Drawdown ratios, Run Up ratios, Global Macro, Investments, Economic Factors, Statistical Factors

I. INTRODUCTION

As more and more capital is deployed in typical hedge fund categories, competition will cause pension funds and large institutions to obtain average levels of returns in many hedge fund categories; therefore it is important for these investors to understand the factors that drive the average returns and risk types and risk level in each hedge fund category. This paper is not an exercise in trying to pick the top 20% of hedge funds in a category; it is an explanation of the risk factors that affect each strategy of Global Macrohedge funds What types of risk and what levels of risk do investors inherit, on average, when they invest in a Systematic Diversified Macro fund or a Discretionary Thematic hedge fund? These questions are studied in detail for threestrategies in theHFRX Macrocategory.

This paper includes four types of models generated for each of 3Macro hedge fund strategies. The first model is a recreation of Fung and Hsieh (2004) seven-factor model using the variables and data available in their database[1]. The second model is called Statistical model (STAT).The third model is called Economic model (ECON). The fourth model is called COMBO model and uses the combination of statistical and economic independent variables to generate a hybrid model that benefits from both historical statistical and macroeconomic characteristics. We have used a pool of 20 *macroeconomic* and *financial* indicators in this paper such as the Commodity Research Bureau (CRB) index return, West Texas Intermediate (WTI) crude oil return, Gold index return, Copper index return, U.S. total balance of trades (BOT), U.S. Dollar index (DXY), U.S. ten-year Treasury bond total return, U.S. industrial production (INDPRO), U.S. personal consumption expenditure (PCE), Case/Shiller U.S. national housing price index, etc.

Family of Statistical Factors	Family Description	Family Member Factors
D family	Downside Risk Factors	D_1 ratio, D_2 ratio, D_3 ratio, *DD*%, *DDV*
L family	Liquidity Risk Factors	*L* ratio, *DDM*
R family	Momentum Risk Factors	R_1 ratio, R_2 ratio, R_3 ratio, *RU*%, *RUM*, *RUV*

Figure1 - Three families of novel statistical risk factors for hedge funds

1. Empirical results

The Discretionary Thematic strategy COMBO model shows the best performance among the four models with five significant variables including economic variables such as CRB index return, short-term Credit Spread, and U.S. industrial production rate, and statistical factors such as D_1 and D_2 ratios (as downside risk factors). As a

[1] The Fung & Hsieh factors data can be reached at: http://faculty.fuqua.duke.edu/~dah7/DataLibrary/TF-FAC.xls

result this strategy's performance is mainly driven by commodity, production activities in country, the effect of short term credibility of businesses, and downside risk related factors.

The Macro Multi-Strategy indexresults similar STAT and COMBO models with three significant variablesincluding the S&P 500 return as a CAPM variable, and statistical variables such as D_1 ratio (a downside risk factor) and maximum Run-up percentage (a momentum factor). It can be observed that this strategy is dominated by market benchmark movements and historical statisticalfactors.

The Systematic Diversified strategy COMBOmodel, as the best performing model in this category, is dominated by statistical variables. The significant variables include the U.S. ten-year T-bond total return as an economic variable, and D_3 ratio (a downside risk factor), R_1 and R_3 ratios (as momentum factors), and standard deviation as the statistical variable.

Table 1

MACRO: DISCRETIONARY THEMATIC

FH 7-FACTOR MODEL		STATISTICAL MODEL		ECONOMIC MODEL		COMBO MODEL	
Variable	**Coefficient**	**Variable**	**Coefficient**	**Variable**	**Coefficient**	**Variable**	**Coefficient**
Intercept	0.0053	*Intercept*	0.0044*	*Intercept*	0.0042*	*Intercept*	−0.0064**
	(0.0124)		(0.0013)		(0.0012)		(0.0028)
S&P 500	**0.1823***	*CRB*	**0.1606***	*CRB*	**0.1347***	*CRB*	**0.1452***
	(0.0547)		(0.0207)		(0.0272)		(0.0278)
SML	0.0539			*CRSPRD_S*	**18.6058***	*D_1 ratio*	**0.0010***
	(0.0844)				(6.2068)		(0.0002)
T10Y	1.2325					*CRSPRD_S*	**−23.6581***
	(2.7016)						(7.3051)
CRSPRD_L	2.1888					*D_2 ratio*	**0.0018***
	(3.1529)						(0.0005)
Bd. Opt.	−0.0079					*INDPRO*	**−0.3865****
	(0.0155)						(0.1651)
FX Opt.	−0.0027						
	(0.0118)						
Com. Opt.	0.0138						
	(0.0135)						
Adj. R^2	11.35%		30.33%		32.69%		49.22%
AIC	−4.743		−5.264		−5.316		−5.469
SIC	−4.569		−5.155		−5.184		−5.271
Est. Method	OLS		GARCII		GARCII		GARCII
Serial Correl.	No		No		No		No
Cond. Hetero.	Yes		No		No		No
Period	Jan. 2005 – Dec. 2015						
Significance Level: *** 10% ** 5% * 1%							

Table 2

MACRO: MULTI-STRATEGY

FH 7-FACTOR MODEL		STATISTICAL MODEL		ECONOMIC MODEL		COMBO MODEL	
Variable	**Coefficient**	**Variable**	**Coefficient**	**Variable**	**Coefficient**	**Variable**	**Coefficient**
Intercept	−0.0140***	*Intercept*	0.0083*	*Intercept*	0.0025**	*Intercept*	0.0083*
	(0.0079)		(0.0023)		(0.0011)		(0.0023)
S&P 500	**0.1961***	*S&P 500*	**0.1616***	*S&P 500*	**0.1790***	*S&P 500*	**0.1616***
	(0.0349)		(0.0229)		(0.0257)		(0.0229)
SML	0.0158	*RU%*	**−0.0210***	*URATE*	**1.6868***	*RU%*	**−0.0210***
	(0.0539)		(0.0052)		(0.6304)		(0.0052)
T10Y	**3.1975*****	*D_1 ratio*	**0.0011***			*D_1 ratio*	**0.0011***
	(1.7240)		(0.0003)				(0.0003)
CRSPRD_L	**3.8241*****						
	(2.0120)						
Bd. Opt.	−0.0145						
	(0.0099)						
FX Opt.	**0.0248***						
	(0.0075)						
Com. Opt.	0.0117						
	(0.0086)						
Adj. R^2	26.32%		24.00%		18.19%		24.00%
AIC	−5.642		−5.694		−5.667		−5.694
SIC	−5.467		−5.541		−5.535		−5.541
Est. Method	OLS		GARCH		GARCH		GARCH
Serial Correl.	No		No		No		No
Cond. Hetero.	Yes		No		No		No
Period	Jan. 2005 – Dec. 2015						
Significance Level: *** 10% ** 5% * 1%							

Table 3

MACRO: SYSTEMATIC DIVERSIFIED							
FH 7-FACTOR MODEL		STATISTICAL MODEL		ECONOMIC MODEL		COMBO MODEL	
Variable	**Coefficient**	**Variable**	**Coefficient**	**Variable**	**Coefficient**	**Variable**	**Coefficient**
Intercept	−0.0103	*Intercept*	0.0023	*Intercept*	0.0022	*Intercept*	0.0450*
	(0.0143)		(0.0021)		(0.0019)		(0.0146)
S&P 500	−0.0171	*S&P 500*	**−0.1155***	*CRSPRD_L*	**39.5040***	R_1 *ratio*	**7.1697***
	(0.0630)		(0.0394)		(12.6784)		(1.5387)
SML	−0.0308			*XAU*	**0.0986****	*T10YTR*	**0.3585***
	(0.0973)				(0.0441)		(0.1077)
T10Y	**5.4218*****					R_3 *ratio*	**1.8095***
	(3.1131)						(0.4488)
CRSPRD_L	0.7020					*SD*	**−2.4148***
	(3.6331)						(0.5826)
Bd. Opt.	**0.0495***					D_3 *ratio*	**2.7637****
	(0.0179)						(1.1309)
FX Opt.	0.0174						
	(0.0136)						
Com. Opt.	**0.0309****						
	(0.0156)						
Adj. R^2	16.99%		3.36%		11.54%		19.29%
AIC	4.460		4.410		4.517		4.603
SIC	−4.285		−4.322		−4.385		−4.405
Est. Method	OLS		GARCH		GARCH		GARCH
Serial Correl.	No		No		No		No
Cond. Hetero.	Yes		No		No		No
Period	Jan. 2005 Dec. 2015						
Significance Level: *** 10% ** 5% * 1%							

CONCLUSION

This paper examines 3 hedge fund strategies in the HFRX Macro category that have never been presented in the previous hedge fund literature. The obtained models are controlled for CAPM and Fama-French variables and usually consist of four or fewer significant factors with only two of the COMBO models having six significant variables. The models presented in this paper outperform the Fung and Hsieh (2004) seven-factor models.

This paper introducesthree new families of statisticalfactors (*D* family, *R* family, and *L* family) representing Downside Risk factors, Momentum Risk factors, and Liquidity Risk factors respectively, and are better at measuring risk for these hedge fund strategies than traditional variables currently being used.

Using a pool of 20 macroeconomic variables, this study provides evidence that researchers should expand their use of other macroeconomic factors in their analyses of hedge fund returns.

Therefore, this paper has shown that depending on the characteristic of a hedge fund strategy, using a combination of statistical based on historical data and macroeconomic/financial variables can result in an improved factor model as opposed to using only one group of the variables.

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