

## Supplementary Tables to “Hedge Fund Risk Dynamics: Implications for Performance Appraisal”\*

The analyses performed in the paper originally used the CISDM database of hedge funds. At the suggestion of the referee, we obtained the Lipper TASS database of hedge funds and re-did our analyses. The key results using the TASS database are reported in the paper. This supplement includes all tables summarizing the TASS results but not reported in the paper. The table numbers correspond to the table numbers used in the text. Table IA.I in this supplement, for example, contains the summary statistics for the monthly returns of the hedge funds included in the TASS database, while Table I in the paper contains the summary statistics for the monthly returns of the hedge funds included in the CISDM database.

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\*Citation format: Bollen, Nicolas P.B., and Robert E. Whaley, 2009, Internet Appendix to “Hedge Fund Risk Dynamics: Implications for Performance Appraisal,” *Journal of Finance* 64, 987-1037, <http://www.afa.jof.org/IA/2009.asp>. Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.

**Table IA.I**  
**Summary Statistics of Reported Monthly Returns of TASS Funds**

See Appendix Table A1 for definitions of fund types. The summary statistics are the number of funds and the equally weighted averages of the mean monthly return,  $\mu$ ; the standard deviation of monthly returns,  $\sigma$ ; the Sharpe ratio,  $SR$ ; the skewness,  $Skew$ ; the excess kurtosis,  $Kurt$ ; the autocorrelation coefficient,  $AR(1)$ ; the percentage of funds with an  $AR(1)$  coefficient significantly positive at the 5% probability level,  $\%>>0$ ; and the percentage of funds with an  $AR(1)$  coefficient significantly negative at the 5% probability level,  $\%<<0$ . Data are from January 1994 through December 2005.

Type	No. of funds	$\mu$	$\sigma$	$SR$	$Skew$	$Kurt$	$AR(1)$	$\%>>0$	$\%<<0$
Panel A. Live Funds									
HF	1,652	0.0111	0.0320	0.3656	0.1478	3.2676	0.1472	29.7%	1.3%
FOF	796	0.0070	0.0171	0.3414	-0.1934	2.4272	0.2028	36.8%	1.0%
CTA/MF	303	0.0103	0.0537	0.1350	0.3538	1.7509	0.0014	6.3%	3.0%
	2,751								
Panel B. Dead Funds									
Type	No. of funds	$\mu$	$\sigma$	$SR$	$Skew$	$Kurt$	$AR(1)$	$\%>>0$	$\%<<0$
HF	2,077	0.0081	0.0429	0.2019	0.0214	3.4227	0.1339	23.5%	1.4%
FOF	525	0.0048	0.0256	0.1751	-0.2191	3.0817	0.1830	32.6%	1.1%
CTA/MF	902	0.0064	0.0601	0.0350	0.2761	2.4183	0.0032	5.1%	4.4%
	3,504								
Panel C. All Funds									
Type	No. of funds	$\mu$	$\sigma$	$SR$	$Skew$	$Kurt$	$AR(1)$	$\%>>0$	$\%<<0$
HF	3,729	0.0094	0.0381	0.2744	0.0774	3.3540	0.1398	26.3%	1.3%
FOF	1,321	0.0061	0.0205	0.2753	-0.2036	2.6873	0.1949	35.1%	1.1%
CTA/MF	1,205	0.0074	0.0585	0.0601	0.2956	2.2505	0.0028	5.4%	4.1%
	6,255								

Table IA.II

Distribution of Length of Reported Monthly Return Series of TASS Funds

See Appendix Table A1 for definitions of fund types. Listed are the 25<sup>th</sup>, 50<sup>th</sup>, and 75<sup>th</sup> percentiles of the distributions of history lengths, in months, of different fund types. Data are from January 1994 through December 2005.

Type	No. of funds	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>
Panel A. Live Funds				
HF	1,652	39	60	96
FOF	796	35	50	83
CTA/MF	303	54	93	141
	2,751			
Panel B. Dead Funds				
Type	No. of funds	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>
HF	2,077	36	52	78
FOF	525	36	50	76
CTA/MF	902	35	54	80
	3,504			
Panel C. All Funds				
Type	No. of funds	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>
HF	3,729	37	55	84
FOF	1,321	35	50	79
CTA/MF	1,205	36	60	93
	6,255			

Table IA.V  
Summary Statistics of Factor Models Estimated Using Reported Monthly Returns  
of 2,751 Live TASS Funds

See Appendix Table A1 for definitions of fund types and factors. Listed are summary statistics of factor models estimated by OLS. For each fund, an optimal subset of factors is selected using the Bayesian Information Criterion. Listed in Panel A are the number of funds of each type; the average adjusted- $R^2$ ; alpha,  $\alpha$ ; total volatility,  $\sigma$ ; residual volatility,  $\sigma_\varepsilon$ ; and the number of factors used in each regression. Listed in Panels B and C are the percentage of funds for which a factor is included in the optimal subset and the exposure to each factor averaged across funds for which the factor is included in the optimal subset, respectively. Data are from January 1994 through December 2005.

Panel A. Regression Statistics				
Statistic	All	HF	FOF	CTA/MF
No. of funds	2,751	1,652	796	303
Adjusted- $R^2$	29.9%	28.5%	36.8%	19.3%
$\alpha$	0.53%	0.61%	0.26%	0.78%
$\sigma$	3.01%	3.20%	1.70%	5.36%
$\sigma_\varepsilon$	2.45%	2.58%	1.30%	4.74%
No. of factors	2.2	2.1	2.6	1.9
Panel B. Percent of Funds with Factor Exposure				
Factor	All	HF	FOF	CTA/MF
<i>MKTXS</i>	56.5%	55.4%	72.4%	20.1%
<i>SMB</i>	19.2%	23.1%	16.7%	5.0%
<i>HML</i>	21.5%	22.5%	26.5%	3.3%
<i>SMBSQ</i>	15.2%	18.6%	12.1%	4.6%
<i>HMLSQ</i>	9.5%	11.4%	7.5%	4.0%
<i>D10YR</i>	22.5%	17.7%	34.3%	17.8%
<i>DSPRD</i>	26.2%	24.4%	37.8%	5.6%
<i>PTFSBD</i>	10.2%	8.6%	6.5%	28.7%
<i>PTFSFX</i>	16.4%	7.2%	24.1%	45.9%
<i>PTFSCOM</i>	9.6%	8.6%	6.2%	23.8%
<i>PTFSIR</i>	5.0%	6.1%	2.3%	6.6%
<i>PTFSSTK</i>	10.8%	9.7%	8.7%	22.1%
Panel C. Average Factor Exposure				
Factor	All	HF	FOF	CTA/MF
<i>MKTXS</i>	0.3531	0.4232	0.2346	0.4179
<i>SMB</i>	0.2829	0.3269	0.1675	0.1890
<i>HML</i>	0.2227	0.2379	0.2014	0.1055
<i>SMBSQ</i>	0.1735	0.1317	0.0669	1.8248
<i>HMLSQ</i>	0.0664	0.0089	0.1000	0.8001
<i>D10YR</i>	-0.1882	-0.1865	-0.1609	-0.3351
<i>DSPRD</i>	-0.1718	-0.1819	-0.1722	0.0725
<i>PTFSBD</i>	0.1086	0.0134	0.0051	0.3260
<i>PTFSFX</i>	0.2515	0.2061	0.1471	0.4345
<i>PTFSCOM</i>	0.2174	0.1719	0.1273	0.3686
<i>PTFSIR</i>	-0.0827	-0.1095	-0.0218	-0.0036
<i>PTFSSTK</i>	0.1244	0.0678	0.1105	0.2741

Table IA.VI  
 Summary Statistics of Factor Models Estimated Using Reported Monthly Returns  
 of 2,179 Live TASS Funds

See Appendix Table A1 for definitions of fund types. Listed are summary statistics of factor models estimated by OLS using the futures contract factors listed in Appendix Table A1. For each fund, an optimal subset of factors is selected using the Bayesian Information Criterion. Listed are the number of funds of each type; the average adjusted- $R^2$ ; alpha,  $\alpha$ ; total volatility,  $\sigma$ ; residual volatility,  $\sigma_\varepsilon$ ; and the number of factors used in each regression. Data are from January 1994 through December 2005.

Statistic	All	HF	FOF	CTA/MF
No. of funds	2,179	1,325	590	264
Adjusted- $R^2$	21.0%	20.5%	23.1%	18.5%
$\alpha$	0.62%	0.87%	0.46%	-0.22%
$\sigma$	3.15%	3.37%	1.67%	5.39%
$\sigma_\varepsilon$	2.74%	2.91%	1.43%	4.79%
No. of factors	1.3	1.3	1.4	1.5

Table IA.XI

Significant Parameter Changes in Factor Models Estimated Using Reported  
Monthly Returns of 1,071 Live TASS Funds and 1,374 Dead TASS Funds

See Appendix Table A1 for definitions of factors. Listed are summary statistics of factor exposures of funds for which a constant-beta model can be rejected in favor of the following switching-beta model at the 10% probability level:

$$R_t = \alpha_0 + \beta_0^T F_t + \varepsilon_t \quad \text{for } t = 1, \dots, T\pi$$

$$R_t = \alpha_0 + \alpha_1 + (\beta_0^T + \beta_1^T) F_t + \varepsilon_t \quad \text{for } t = T\pi + 1, \dots, T,$$

where  $T\pi$  is the switch date. Listed for each factor are the number of funds for which the factor is selected, the average factor loading prior to the switch in factor loadings, and the 25<sup>th</sup>, 50<sup>th</sup>, and 75<sup>th</sup> percentiles of the distributions of switch magnitudes. Data are from January 1994 through December 2005.

Factor	No. of funds	$\beta_1$			
		$\beta_0$	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>
Panel A. Live Funds					
<i>MKTXS</i>	707	0.3443	-0.2678	0.0388	0.3061
<i>SMB</i>	209	0.2983	-0.3704	-0.1018	0.1299
<i>HML</i>	258	0.1608	-0.0390	0.1580	0.3406
<i>SMBSQ</i>	195	0.3925	-0.7017	-0.3452	0.0119
<i>HMLSQ</i>	134	0.0118	-0.5009	-0.1627	0.2105
<i>D10YR</i>	170	-0.1247	-0.1195	-0.0355	0.0542
<i>DSPRD</i>	307	-0.2353	-0.0906	0.0190	0.2795
<i>PTFSBD</i>	114	0.0441	-0.2843	0.0420	0.1805
<i>PTFSFX</i>	124	0.2871	-0.2386	-0.0314	0.1647
<i>PTFSCOM</i>	72	0.5429	-0.6796	-0.1542	0.0623
<i>PTFSIR</i>	60	-0.0282	-0.2465	0.0000	0.2194
<i>PTFSSTK</i>	110	0.0728	-0.1158	0.0054	0.2069
Panel B. Dead Funds					
<i>MKTXS</i>	672	0.4316	-0.3229	0.0145	0.3203
<i>SMB</i>	260	0.3096	-0.3342	-0.0960	0.1664
<i>HML</i>	251	-0.0501	-0.1277	0.1184	0.3871
<i>SMBSQ</i>	276	0.1408	-0.7529	-0.3201	0.1817
<i>HMLSQ</i>	179	-0.0511	-0.7068	-0.1403	0.2457
<i>D10YR</i>	160	-0.0489	-0.2674	-0.0307	0.1288
<i>DSPRD</i>	290	-0.2616	-0.2086	0.0132	0.3414
<i>PTFSBD</i>	214	0.0536	-0.3299	0.0384	0.3115
<i>PTFSFX</i>	165	0.3436	-0.4187	-0.0521	0.2631
<i>PTFSCOM</i>	140	0.4188	-0.6630	-0.2820	0.1065
<i>PTFSIR</i>	86	-0.1032	-0.3151	-0.0334	0.3746
<i>PTFSSTK</i>	171	0.0820	-0.2906	-0.0094	0.1926