

Internet Appendix for:

**Only Winners in Tough Times Repeat:
Hedge Fund Performance Persistence over Different Market Conditions**

Zheng Sun
University of California at Irvine

Ashley W. Wang
Federal Reserve Board

Lu Zheng
University of California at Irvine
CAFR

Appendix 1: Correlations between Main Variables

Appendix 1 reports the time-series average of the pair-wise correlation between the main variables used in the paper.

	RET_DOWN	RET_UP	Net Fee Ret.	Alpha	AR	SR	VOL	Redemption Notice	Lockup	Personal Cap. Dummy	High Water Mark Dummy	Management Fee	Incentive Fee	Age	AUM	Past 1Y Flow	Min. Investment	Leverage dummy
RET_UP(% per month)	-0.27																	
Net Fee Ret. (% per month)	0.41	0.49																
Alpha(t)	0.48	0.29	0.56															
AR	0.34	-0.03	0.21	0.49														
SR	0.40	0.12	0.38	0.45	0.75													
VOL(% per month)	-0.10	0.47	0.39	0.10	-0.23	-0.21												
Redemption Notice Period(Days)	0.07	-0.01	0.04	0.05	0.18	0.19	-0.14											
Lockup(months)	0.02	0.07	0.07	0.05	0.06	0.08	0.02	0.24										
Personal Cap. dummy	-0.02	0.07	0.04	0.02	-0.01	0.01	0.07	0.04	0.05									
High Water Mark dummy	0.05	0.04	0.08	0.07	0.05	0.07	0.03	0.17	0.20	0.04								
Management Fee(%)	0.00	0.01	0.01	0.01	-0.04	-0.05	0.07	-0.12	-0.07	-0.02	-0.03							
Incentive Fee(%)	0.03	0.08	0.10	0.08	0.01	0.04	0.18	-0.02	0.14	0.15	0.38	0.11						
Age(Yr)	-0.04	0.02	-0.03	-0.04	-0.04	-0.04	0.01	-0.06	-0.05	0.15	-0.14	0.02	-0.05					
AUM(M\$)	0.04	0.00	0.06	0.05	0.10	0.13	-0.08	0.08	0.02	-0.01	0.01	0.03	-0.02	0.13				
Past 1Y Flow(% per annum)	0.12	0.05	0.13	0.13	0.12	0.18	-0.02	0.02	0.01	0.01	0.05	0.01	0.04	-0.08	0.05			
Min. Investment(M\$)	0.03	-0.03	0.01	0.01	0.05	0.05	-0.05	0.06	0.03	0.00	0.04	-0.06	-0.01	0.03	0.19	0.01		
Leverage dummy	-0.01	0.04	0.03	0.02	-0.03	0.00	0.09	-0.06	-0.01	0.19	0.08	0.10	0.24	0.04	0.01	0.02	-0.04	
Derivative dummy	-0.01	0.02	0.02	0.01	-0.05	-0.03	0.08	-0.11	-0.05	0.19	0.01	0.06	0.17	0.07	-0.02	0.01	-0.04	0.63

Appendix 2: Robustness for Alternative Backfill Bias Control (1998–2014)

Appendix 2 summarizes the results when the backfill bias is controlled for by filtering out data prior to a fund entering the TASS database. Panel A reports the time-series averages and t -statistics of the post-formation FH 7-factor alphas, FH 7-factor-based appraisal ratios (AR), and the smoothing-adjusted Sharpe ratios (SR) for quintile portfolios sorted on RET_DOWN and RET_UP , respectively. The performance measures are based on the equal-weighted buy-and-hold portfolios sorted every 3 months and held for 1 quarter. Panel B (Panel C) reports the panel regression and Fama–MacBeth regression results for hedge fund performance on RET_DOWN (RET_UP) and other fund characteristics at quarterly frequency as the following:

$$AbnormalPerformance_{i,t} = c_{0i} + c_{1i}RET_DOWN(RET_UP)_{i,t-1} + c_{2i}Control_{i,t-1} + e_{i,t}.$$

Control variables are the same as in Table 3. Panel regression is adjusted for fund-clustering effect and time- and style-fixed effects. The Fama–MacBeth regression controls for style dummies. For brevity, only the estimation results for the RET_DOWN (RET_UP) are reported here. The t -statistics reported in italicized font are adjusted for heteroscedasticity and autocorrelation. * and ** indicate significance at the 5% and 1% levels, respectively.

Panel A: Equal-weighted Portfolio Performance Sorted on RET_DOWN and RET_UP

		Alpha (FH 7- factor, % per month)	AR	SR			Alpha (FH 7- factor, % per month)	AR	SR
Low RET_DOWN	Port	-0.10	0.01	0.26	Low RET_UP	Port	0.36	0.73	0.59
<i>t-stat</i>		-0.53	0.11	2.99	<i>t-stat</i>		4.45	9.89	11.69
Port2		0.31	0.24	0.44	Port2		0.38	0.68	0.59
		2.33	2.99	4.21			5.21	8.36	7.38
Port3		0.38	0.49	0.49	Port3		0.37	0.51	0.52
		3.29	6.21	5.74			3.60	6.41	6.20
Port4		0.45	0.71	0.56	Port4		0.44	0.36	0.39
		4.70	9.23	7.77			3.11	4.96	4.90
Hi RET_DOWN	Port	0.54	0.65	0.50	Hi RET_UP	Port	0.26	0.18	0.32
		4.67	10.04	10.60			1.22	2.65	4.22
High-Low		0.64**	0.64**	0.24**	High - Low		-0.10	-0.55**	-0.26**
		3.27	8.12	3.18			-0.42	-5.95	-3.35

Panel B: Regression Analysis using RET_DOWN

Panel Regression				Fama-MacBeth Regression			
	Alpha (FH 7-factor, % per annum)	AR	SR		Alpha (FH 7-factor, % per annum)	AR	SR
RET_DOWN	2.03**	0.14**	0.05**		2.56**	0.14**	0.06**
<i>t-stat</i>	17.71	27.84	8.63		3.55	8.58	4.04
R2(%)	9.53	10.53	15.74		9.70	5.35	4.64
#FundsQtrObs	194,057	191,678	130,347				

Panel C: Regression Analysis using RET_UP

Panel Regression				Fama-MacBeth Regression			
	Alpha (FH 7-factor, % per annum)	AR	SR		Alpha (FH 7-factor, % per annum)	AR	SR
RET_UP	-0.72**	-0.08**	-0.05**		-1.11	-0.12**	-0.06***
<i>t-stat</i>	-8.41	-20.15	-9.70		-1.66	-7.57	-5.39
R2(%)	9.09	10.17	15.68		9.42	5.96	5.92
#FundsQtrObs	193,231	190,775	129,468				

Appendix 3: Robustness for Survivorship Bias Control

Our analysis may be subject to a typical survivorship bias problem. Although we include both live and graveyard funds in the portfolio analysis, there is no return data available after funds voluntarily stop reporting and drop out of the data set. If the dropped-out funds continue to operate and the unreported performance of these funds is substantially lower than the performance of existing funds, the observed portfolio return based on existing funds would be biased upward; and the lower the survival rate, the more severe the bias. This potential bias raises a concern that the observed performance difference across the RET_DOWN(RET_UP) quintiles might be due to the difference in the survival rate rather than true performance. To assess such a possibility, we analyze the dropout property of quintile portfolios sorted on past conditional performance and gauge the impact of the potential bias on our findings via some back-of-the-envelope calculations.

Table A3 reports the survival rates for portfolios sorted on RET_DOWN and RET_UP, respectively, which correspond to the portfolios reported in Panels A and B of Table 2. In general, funds with higher past conditional performance, RET_DOWN or RET_UP, have a higher survival rate than funds with lower past conditional performance. For example, about 84%(85%) of the funds in the highest RET_DOWN(RET_UP) quintile remain in the data set one year after portfolio formation, while the corresponding figure for the lowest RET_DOWN(RET_UP) quintile is 78% (74%).

The dropout analysis suggests that, after correcting for a potential survivalship bias, funds in the high RET_DOWN portfolio would outperform those in the low RET_DOWN portfolio even more, while funds in high RET_UP portfolios may no longer underperform those in the low RET_UP portfolio. Take the RET_UP -sorted portfolios as an example, for each quintile, the true risk-adjusted return can be denoted as:

$$\alpha^{True} = w^{Surviving} \alpha^{Surviving} + w^{Dropout} \alpha^{Dropout} \quad . \quad (A4)$$

The difference in the true performance between the high- and low-RET_UP portfolios is then given by:

$$\alpha_{Hi}^{True} - \alpha_{Low}^{True} = w_{Hi}^{surviving} \alpha_{Hi}^{Surviving} + w_{Hi}^{Dropout} \alpha_{Hi}^{Dropout} - w_{Low}^{surviving} \alpha_{Low}^{Surviving} - w_{Low}^{Dropout} \alpha_{Low}^{Dropout} \quad (A5)$$

Assume $\alpha_{Low}^{Dropout} = \alpha_{Hi}^{Dropout} = \alpha^{Dropout}$. Take the equally-weighted one-year post-formation case as an example: from Table 2B, $\alpha_{Hi}^{True} - \alpha_{Low}^{True} = 0.85 \times 0.23\% - 0.74 \times 0.31\% + (0.15 - 0.26) \alpha^{Dropout}$. While there is no direct way to measure the performance of funds after they leave the database, the existing literature suggests that the annual performance for such funds range from -0.7% to 0.14% per year.¹ Back-of-envelope calculations imply that using a reasonable estimate for $\alpha^{Dropout}$, the highest RET_UP quintile continues to underperform the lowest one by 0.03 to 0.3% per month, similar to the baseline results in Table 2B.

¹ See Ackerman, McNally, and Ravenscraft (1999), Fung and Hsieh (2000) and Sun, Wang and Zheng, (2012) for details.

Overall, the analysis above suggests that the potential survivorship bias does not drive the outperformance of the high RET_DOWN portfolios, nor does it contribute significantly to the lack of performance predictability of RET_UP.

A3: Survival Rates of RET_DOWN - and RET_UP -Sorted Quintile Portfolios

Table A3 reports the time-series averages of the survival rate for quintile portfolios constructed in Panels A and B of

Table 2 in the paper.

1. Quintile Portfolios Sorted on RET_DOWN					
	3m	6m	1y	2y	3y
Low RET_DOWN Port	0.94	0.88	0.78	0.62	0.50
Port 2	0.95	0.90	0.81	0.66	0.54
Port 3	0.95	0.91	0.83	0.68	0.56
Port 4	0.96	0.92	0.84	0.69	0.58
Hi RET_DOWN Port	0.96	0.92	0.84	0.69	0.57
High –Low	0.02	0.04	0.06	0.07	0.07
2. Quintile Portfolios Sorted on RET_UP					
	3m	6m	1y	2y	3y
Low RET_UP Port	0.92	0.86	0.74	0.57	0.44
Port 2	0.95	0.91	0.82	0.68	0.56
Port 4	0.96	0.92	0.84	0.70	0.58
Port 5	0.96	0.92	0.84	0.70	0.58
Hi RET_UP Port	0.96	0.92	0.85	0.71	0.59
High-Low	0.04	0.06	0.10	0.14	0.15

Appendix 4: Smoothing-adjusted Sharpe Ratio

We use the smoothing-adjusted Sharpe ratio rather than the regular Sharpe ratio. Lo (2002) points out that hedge fund returns are subject to high serial correlations that can bias the *annualized* Sharpe ratio when measured using monthly returns if autocorrelation in returns is not taken into account. Moreover, Getmansky, Lo, and Makarov (2004) show that due to illiquidity and smoothing, the unobserved true economic returns differ from the observed smoothed returns. Therefore, even the *monthly* Sharpe ratio, which itself is based on the observed returns, will be biased. Getmansky et al. (2004) further propose an econometric model of return smoothing, as well as an estimator for the smoothing-adjusted Sharpe ratio. In particular, the true return of a hedge fund R_t is determined by a linear factor model, as described below:

$$R_t = \mu + \beta\Lambda_t + \varepsilon_t, \quad \varepsilon_t, \Lambda_t \sim IID \quad (A1)$$

The true return, R_t , is not observable. Instead, we observed the smoothed returns, R_t^o , as follows:

$$R_t^o = \theta_0 R_t + \theta_1 R_{t-1} + \dots + \theta_k R_{t-k} \quad (A2)$$

$$\theta_j \in [0,1], j = 0, \dots, k \quad \text{and} \quad \theta_0 + \theta_1 + \dots + \theta_k = 1$$

Getmansky et al.'s paper shows that the Sharpe ratio of the true unobserved return can be obtained by multiplying the regular Sharpe ratio based on the smoothed return by $\sqrt{\theta_0^2 + \theta_1^2 + \dots + \theta_k^2}$. The coefficients $(\theta_0, \theta_1, \dots, \theta_k)$ in Equation (A2) can be estimated using the maximum likelihood method. We assume that the observed returns depend on lagged true returns up to time $(t - 2)$. Thus, the smoothing-adjusted Sharpe ratio is:

$$SR = \sqrt{\theta_0^2 + \theta_1^2 + \theta_2^2} SR^o \quad (A3)$$

where SR^o is the regular Sharpe ratio calculated using observed monthly hedge fund returns.

Appendix 5

Robustness: Value-weighted Portfolio Performance Sorted on RET_DOWN and RET_UP (1998–2014)

Panel A reports the time-series averages and t -statistics of the post-formation FH 7-factor alphas, FH 7-factor-based Appraisal Ratios, and the smoothing-adjusted Sharpe Ratios for the value-weighted quintile portfolios sorted on RET_DOWN, and Panel B for portfolios sorted on RET_UP. The performance measures are based on buy-and-hold portfolios sorted every three months and held for 3 months to 3 years. The t -statistics reported in italicized font are adjusted for heteroscedasticity and autocorrelation. * and ** indicate significance at the 5% and 1% levels, respectively.

<i>Panel A: Quintile Portfolios Sorted on RET_DOWN</i>															
	Alpha (FH 7-factor) (% per month)					Appraisal Ratio					Sharpe Ratio (smoothing adjusted)				
	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y
Low RET_DOWN Port	-0.04	0.00	0.03	0.09	0.10	0.03	0.01	0.02	0.04	0.05	0.26	0.16	0.12	0.10	0.09
<i>t-stat</i>	<i>-0.21</i>	<i>0.00</i>	<i>0.17</i>	<i>0.88</i>	<i>0.89</i>	<i>0.40</i>	<i>0.30</i>	<i>0.58</i>	<i>1.08</i>	<i>1.57</i>	<i>3.09</i>	<i>2.87</i>	<i>2.73</i>	<i>3.35</i>	<i>4.21</i>
Port 2	0.25	0.23	0.23	0.27	0.27	0.19	0.13	0.12	0.13	0.14	0.43	0.22	0.17	0.14	0.13
<i>t-stat</i>	<i>1.87</i>	<i>1.94</i>	<i>1.85</i>	<i>2.49</i>	<i>2.90</i>	<i>2.52</i>	<i>2.43</i>	<i>2.28</i>	<i>2.54</i>	<i>2.50</i>	<i>4.20</i>	<i>3.39</i>	<i>3.26</i>	<i>3.76</i>	<i>3.80</i>
Port 3	0.39	0.38	0.36	0.37	0.34	0.47	0.31	0.27	0.24	0.22	0.49	0.29	0.23	0.20	0.17
<i>t-stat</i>	<i>3.34</i>	<i>3.72</i>	<i>3.56</i>	<i>3.61</i>	<i>3.89</i>	<i>5.80</i>	<i>4.71</i>	<i>4.15</i>	<i>3.40</i>	<i>2.84</i>	<i>5.77</i>	<i>4.74</i>	<i>4.35</i>	<i>4.19</i>	<i>3.61</i>
Port 4	0.46	0.41	0.40	0.39	0.37	0.73	0.48	0.41	0.36	0.32	0.58	0.35	0.28	0.24	0.21
<i>t-stat</i>	<i>4.70</i>	<i>4.73</i>	<i>4.44</i>	<i>4.51</i>	<i>4.43</i>	<i>8.70</i>	<i>6.26</i>	<i>5.21</i>	<i>4.39</i>	<i>3.73</i>	<i>7.94</i>	<i>6.64</i>	<i>5.80</i>	<i>5.27</i>	<i>4.34</i>
Hi RET_DOWN Port	0.55	0.55	0.52	0.45	0.38	0.74	0.46	0.38	0.32	0.28	0.51	0.31	0.25	0.20	0.18
<i>t-stat</i>	<i>4.64</i>	<i>4.98</i>	<i>5.21</i>	<i>4.83</i>	<i>4.59</i>	<i>10.26</i>	<i>7.48</i>	<i>6.34</i>	<i>5.41</i>	<i>5.39</i>	<i>10.31</i>	<i>8.75</i>	<i>8.38</i>	<i>6.71</i>	<i>5.90</i>
High – Low	0.59**	0.55**	0.49**	0.36**	0.28*	0.71**	0.45**	0.36**	0.28**	0.23**	0.25**	0.15**	0.12**	0.10**	0.08**
<i>t-stat</i>	<i>3.06</i>	<i>3.93</i>	<i>3.90</i>	<i>3.51</i>	<i>2.52</i>	<i>8.01</i>	<i>8.54</i>	<i>8.25</i>	<i>7.27</i>	<i>8.03</i>	<i>3.34</i>	<i>2.90</i>	<i>2.87</i>	<i>3.08</i>	<i>3.03</i>

(continued)

Appendix 5
(Continued)

Panel B: Quintile Portfolios Sorted on RET_UP

	Alpha (FH 7-factor) (% per month)					Appraisal Ratio					Sharpe Ratio (smoothing adjusted)				
	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y
Low RET_UP Port	0.33	0.34	0.33	0.33	0.34	0.80	0.54	0.44	0.37	0.32	0.57	0.35	0.29	0.26	0.23
<i>t-stat</i>	<i>3.69</i>	<i>3.27</i>	<i>3.32</i>	<i>3.53</i>	<i>4.06</i>	<i>9.29</i>	<i>6.01</i>	<i>4.85</i>	<i>3.99</i>	<i>3.52</i>	<i>10.19</i>	<i>7.93</i>	<i>7.50</i>	<i>5.68</i>	<i>4.39</i>
Port 2	0.35	0.36	0.37	0.37	0.37	0.66	0.44	0.36	0.33	0.30	0.57	0.34	0.27	0.24	0.21
<i>t-stat</i>	<i>4.92</i>	<i>4.30</i>	<i>3.85</i>	<i>3.61</i>	<i>3.73</i>	<i>7.61</i>	<i>5.62</i>	<i>4.57</i>	<i>3.57</i>	<i>3.01</i>	<i>7.13</i>	<i>5.86</i>	<i>5.24</i>	<i>4.61</i>	<i>3.65</i>
Port 3	0.37	0.39	0.39	0.40	0.36	0.53	0.36	0.30	0.27	0.25	0.55	0.31	0.24	0.21	0.18
<i>t-stat</i>	<i>3.58</i>	<i>3.69</i>	<i>3.81</i>	<i>4.27</i>	<i>4.59</i>	<i>6.23</i>	<i>5.07</i>	<i>4.55</i>	<i>4.32</i>	<i>3.86</i>	<i>6.11</i>	<i>5.23</i>	<i>4.98</i>	<i>5.07</i>	<i>4.40</i>
Port 4	0.38	0.35	0.36	0.36	0.34	0.35	0.23	0.20	0.20	0.19	0.39	0.24	0.19	0.16	0.14
<i>t-stat</i>	<i>2.92</i>	<i>3.52</i>	<i>3.46</i>	<i>4.08</i>	<i>4.42</i>	<i>4.74</i>	<i>4.55</i>	<i>4.25</i>	<i>4.15</i>	<i>3.88</i>	<i>4.93</i>	<i>4.21</i>	<i>3.89</i>	<i>3.83</i>	<i>3.99</i>
Hi RET_UP Port	0.30	0.27	0.25	0.22	0.19	0.17	0.08	0.08	0.08	0.09	0.32	0.18	0.14	0.10	0.09
<i>t-stat</i>	<i>1.32</i>	<i>1.61</i>	<i>1.57</i>	<i>1.61</i>	<i>1.37</i>	<i>2.32</i>	<i>2.07</i>	<i>2.28</i>	<i>2.35</i>	<i>2.72</i>	<i>4.04</i>	<i>3.28</i>	<i>2.91</i>	<i>2.49</i>	<i>2.51</i>
High – Low	-0.03	-0.06	-0.08	-0.11	-0.15	-0.64**	-0.46**	-0.35**	-0.29**	-0.23**	-0.25**	-0.17**	-0.15**	-0.16*	-0.14*
<i>t-stat</i>	<i>-0.12</i>	<i>-0.37</i>	<i>-0.48</i>	<i>-0.69</i>	<i>-0.96</i>	<i>-6.05</i>	<i>-5.45</i>	<i>-4.32</i>	<i>-3.56</i>	<i>-2.98</i>	<i>-3.00</i>	<i>-2.72</i>	<i>-2.62</i>	<i>-2.42</i>	<i>-2.13</i>

Appendix 6

Fama-MacBeth Analysis of Hedge Fund Performance on RET_DOWN and RET_UP. (1998–2014)

Appendix 6 reports the Fama-MacBeth regression results for hedge fund performance on RET_DOWN (RET_UP) and other fund characteristics at the quarterly frequency as follows:

$$AbnormalPerformance_{i,t} = c_{0i} + c_{1i}RET_DOWN(RET_UP)_{i,t-1} + c_{2i}Control_{i,t-1} + e_{i,t} .$$

Survivorship and backfill biases are controlled for to the extent that the data allow. Alpha is the annualized FH seven-factor adjusted performance over the subsequent one quarter in percentage. *AR* and *SR* are the corresponding appraisal ratio and smoothing-adjusted Sharpe ratio, respectively. We winsorize the alphas, ARs and SRs at the top and bottom 0.5% level. Control variables are the lagged fund characteristics, including volatility of monthly net fee returns volatility, lengths of the redemption and lockup periods, indicator variables for personal capital commitment and high-water mark, management fees, incentive fees, fund age, AUM, new money flow into funds within the preceding 12 months as a fraction of AUM (as a percentage), average returns over the past two years, minimum investments requirement, and an indicator variable for the use of leverage. Style dummies are included in the regressor set. The *t*-statistics reported in italicized font are adjusted for heteroscedasticity and autocorrelation. * and ** indicate significance at the 5% and 1% levels, respectively.

Panel A: Regression on RET_DOWN

	Alpha(% per annum) FH 7-factor	AR FH 7-factor	SR	Alpha(% per annum) FH 7-factor	AR FH 7-factor	SR
RET_DOWN	2.07**	0.14**	0.07**	2.10**	0.15**	0.05**
<i>t-stat</i>	4.56	10.72	6.13	3.00	9.09	3.67
Past 2Y Volatiltiy(% per month)	0.19 1.02			0.14 0.87		
Redemption Notice(30Days)	0.01 0.84	0.00** 7.44	0.00** 6.86	0.01 0.73	0.00** 7.53	0.00** 6.91
Lockup(months)	0.02 0.94	0.00 -0.77	0.00 1.19	0.02 0.93	0.00 0.09	0.00 0.73
Personal Capital dummy	0.08 0.31	-0.02 -1.72	0.01 0.68	0.04 0.18	-0.01 -1.24	0.01 0.65
High Water Mark dummy	0.96* 2.21	-0.02 -1.76	0.02 1.58	1.07* 2.45	-0.02 -1.41	0.02 1.48
Management Fee(%)	0.29 0.68	-0.02* -2.21	-0.03** -2.75	0.33 0.83	-0.02* -2.17	-0.03** -2.94
Incentive Fee(%)	0.05 1.48	0.00 -0.38	0.00 -1.61	0.04 1.31	0.00 -0.19	0.00 -1.90
Age(years)	-0.01 -1.20	0.00 -1.24	0.00 -0.53	-0.01 -1.42	0.00 -1.47	0.00 -0.74
Missing AUM	1.29 0.43	0.61** 5.36	0.56** 6.14	1.26 0.50	0.66** 5.82	0.57** 6.43
ln(AUM)	0.03 0.18	0.03** 5.17	0.03** 6.09	0.03 0.19	0.03** 5.62	0.03** 6.30
Past 1Y Flow(%, per annum)	-0.34 -1.87	-0.34 -1.87	0.00 0.09	-0.37* -2.18	-0.37* -2.18	0.00 -0.48
Past 2Y Mean Ret(% per month)				0.53 0.55	-0.06** -3.00	0.06** 2.96
ln(Min. Investment+1)	0.30** 2.84	0.01** 3.64	0.01** 4.36	0.31** 3.01	0.01** 3.70	0.01** 4.23
Leverage dummy	0.36 1.37	-0.01 -0.42	0.01 0.45	0.36 1.42	0.00 -0.31	0.00 0.33
AdjR2(%)	8.19	5.55	5.19	10.45	6.40	6.03

Appendix 6
(Continued)

Panel B: Regression on RET_UP

	Alpha(% per annum)	AR	SR	Alpha(% per annum)	AR	SR
	FH 7-factor	FH 7-factor		FH 7-factor	FH 7-factor	
RET_UP	0.29	-0.06**	-0.01	-0.55	-0.12**	-0.06**
<i>t-stat</i>	0.56	-5.51	-0.97	-0.82	-7.09	-4.61
Past 2Y Volatility(%p.m)	-0.17			-0.10		
	-1.08			-0.61		
Redemption Notice(30Days)	0.01	0.00**	0.00**	0.01	0.00**	0.00**
	0.89	7.36	7.05	0.77	7.40	6.88
Lockup(months)	0.02	0.00	0.00	0.01	0.00	0.00
	0.67	-0.29	1.42	0.40	-0.54	0.94
Personal Capital dummy	-0.05	-0.02	0.01	-0.16	-0.02*	0.01
	-0.19	-1.52	1.17	-0.61	-1.99	0.82
High Water Mark dummy	1.24**	-0.02	0.03*	1.10**	-0.02	0.02
	2.90	-1.13	2.29	2.66	-1.38	1.84
Management Fee(%)	0.33	-0.03*	-0.04**	0.31	-0.03**	-0.04**
	0.83	-2.54	-3.16	0.79	-2.62	-3.02
Incentive Fee(%)	0.06*	0.00	0.00	0.04	0.00	0.00
	2.11	0.38	-1.60	1.48	-0.16	-1.92
Age(years)	-0.01	0.00*	0.00	0.00	0.00	0.00
	-1.44	-2.07	-1.47	-0.85	-1.24	-0.86
Missing AUM	3.84	0.88**	0.70**	1.14	0.71**	0.58**
	1.53	7.99	8.41	0.45	6.32	6.55
ln(AUM)	0.17	0.05**	0.04**	0.02	0.04**	0.03**
	1.21	7.89	8.29	0.12	6.16	6.40
Past 1Y Flow(%, per annum)	0.12	0.12	0.02	-0.32	-0.32	0.00
	0.60	0.60	1.95	-1.63	-1.63	-0.35
Past 2Y Mean Ret(% per month)				3.03**	0.19**	0.15**
				3.93	9.14	7.73
ln(Min. Investment+1)	0.36**	0.02**	0.02**	0.31**	0.01**	0.01**
	3.25	4.57	5.07	2.94	3.96	4.46
Leverage dummy	0.45	0.00	0.00	0.41	0.00	0.00
	1.81	-0.14	0.18	1.70	-0.32	0.20
AdjR2(%)	7.52	4.92	5.05	9.79	5.93	6.07

Appendix 7: Use Equity Market Return to Define Market States (1998-2014)

Appendix 7 Repeats analyses in Table 2, Table 3 and Appendix 6 with the CRSP value weighted return in excess of the one-month Treasury bill rate being used to define up and down markets. The analysis is restricted to a sample of equity oriented hedge funds (ie. excluding fixed-income funds, managed futures funds, and funds of funds).

The t -statistics reported in italicized font are adjusted for heteroscedasticity and autocorrelation. * and ** indicate significance at the 5% and 1% levels, respectively.

Panel A: Performance of Equal-weighted Quintile Portfolios Sorted on RET_DOWN

	Alpha (FH 7-factor, % per month)					Appraisal Ratio					Sharpe Ratio (smoothing adjusted)				
	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y
Low RET_DOWN Port	0.01	0.05	0.10	0.12	0.10	0.00	0.01	0.02	0.02	0.03	0.24	0.15	0.13	0.12	0.10
<i>t-stat</i>	<i>0.08</i>	<i>0.36</i>	<i>0.64</i>	<i>0.67</i>	<i>0.49</i>	<i>-0.03</i>	<i>0.22</i>	<i>0.58</i>	<i>0.74</i>	<i>0.90</i>	<i>3.15</i>	<i>3.05</i>	<i>3.30</i>	<i>3.97</i>	<i>4.33</i>
Port 2	0.31	0.33	0.34	0.33	0.33	0.19	0.12	0.11	0.10	0.10	0.33	0.20	0.17	0.14	0.12
<i>t-stat</i>	<i>2.92</i>	<i>3.19</i>	<i>3.26</i>	<i>2.89</i>	<i>2.55</i>	<i>3.96</i>	<i>3.33</i>	<i>3.10</i>	<i>2.57</i>	<i>2.54</i>	<i>4.52</i>	<i>4.01</i>	<i>4.14</i>	<i>4.69</i>	<i>5.01</i>
Port 3	0.43	0.39	0.36	0.35	0.33	0.39	0.26	0.22	0.19	0.17	0.43	0.26	0.21	0.17	0.15
<i>t-stat</i>	<i>4.79</i>	<i>4.25</i>	<i>3.86</i>	<i>3.40</i>	<i>3.07</i>	<i>6.73</i>	<i>5.13</i>	<i>4.39</i>	<i>3.58</i>	<i>3.21</i>	<i>6.49</i>	<i>5.39</i>	<i>5.30</i>	<i>5.79</i>	<i>5.84</i>
Port 4	0.49	0.46	0.43	0.38	0.36	0.69	0.45	0.37	0.31	0.29	0.59	0.36	0.28	0.23	0.20
<i>t-stat</i>	<i>6.59</i>	<i>5.66</i>	<i>4.90</i>	<i>3.92</i>	<i>3.52</i>	<i>10.44</i>	<i>7.02</i>	<i>5.95</i>	<i>4.62</i>	<i>4.03</i>	<i>10.38</i>	<i>8.29</i>	<i>7.40</i>	<i>6.29</i>	<i>5.14</i>
Hi RET_DOWN Port	0.65	0.61	0.55	0.50	0.48	0.61	0.37	0.29	0.24	0.21	0.52	0.30	0.23	0.18	0.16
<i>t-stat</i>	<i>6.11</i>	<i>5.52</i>	<i>5.04</i>	<i>4.68</i>	<i>4.62</i>	<i>12.83</i>	<i>9.91</i>	<i>7.89</i>	<i>6.30</i>	<i>5.49</i>	<i>13.20</i>	<i>11.67</i>	<i>9.65</i>	<i>7.46</i>	<i>6.23</i>
Hi – Low	0.64**	0.56**	0.45**	0.38*	0.38*	0.61**	0.36**	0.28**	0.21**	0.18**	0.28**	0.15**	0.10**	0.07*	0.06*
<i>t-stat</i>	<i>3.99</i>	<i>3.87</i>	<i>3.19</i>	<i>2.45</i>	<i>2.28</i>	<i>9.77</i>	<i>8.66</i>	<i>6.95</i>	<i>5.80</i>	<i>6.30</i>	<i>4.36</i>	<i>3.78</i>	<i>2.89</i>	<i>2.30</i>	<i>2.39</i>

Panel B: Regression Analysis using RET_DOWN

	Panel Regression			Fama-MacBeth Regression		
	Alpha (FH 7-factor, % per annum)	AR (FH 7-factor)	SR	Alpha (FH 7-factor, % per annum)	AR (FH 7-factor)	SR
RET_DOWN	0.929**	0.07**	0.03**	0.79	0.10**	0.04**
<i>t-stat</i>	<i>9.50</i>	<i>16.25</i>	<i>4.83</i>	<i>1.62</i>	<i>7.07</i>	<i>2.90</i>
R2(%)	8.26	8.15	14.90	10.02	5.18	5.39
#FundsQtrObs	86,399	85396	61,434			

Appendix 7 (Continued)

Panel C: Performance of Equal-weighted Quintile Portfolios Sorted on RET_UP

	Alpha (FH 7-factor, % per month)					Appraisal Ratio					Sharpe Ratio (smoothing adjusted)				
	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y
Low RET_UP Port	0.23	0.24	0.26	0.29	0.28	0.37	0.24	0.20	0.18	0.16	0.31	0.20	0.17	0.16	0.14
<i>t-stat</i>	2.45	2.11	2.26	2.32	2.12	6.48	4.25	3.77	3.70	3.37	9.21	7.80	8.24	8.00	5.51
Port 2	0.38	0.39	0.37	0.35	0.34	0.67	0.44	0.35	0.29	0.27	0.58	0.35	0.27	0.22	0.19
<i>t-stat</i>	5.40	4.76	4.09	3.42	3.08	11.12	7.48	6.09	4.76	4.06	10.16	7.90	7.19	6.70	5.37
Port 3	0.46	0.43	0.41	0.39	0.38	0.45	0.29	0.24	0.20	0.19	0.51	0.30	0.23	0.19	0.16
<i>t-stat</i>	5.80	5.08	4.79	4.18	3.64	8.15	6.83	5.96	4.57	3.96	7.70	6.50	6.17	6.11	5.77
Port 4	0.38	0.36	0.34	0.34	0.33	0.24	0.16	0.14	0.12	0.12	0.39	0.24	0.19	0.16	0.14
<i>t-stat</i>	3.89	4.03	3.49	2.94	2.60	5.17	4.69	4.15	3.23	3.04	5.58	4.80	4.49	4.59	4.94
Hi RET_UP Port	0.40	0.36	0.31	0.27	0.25	0.17	0.09	0.07	0.06	0.06	0.34	0.20	0.16	0.13	0.11
<i>t-stat</i>	2.23	2.38	2.05	1.73	1.41	3.08	2.77	2.52	1.85	1.97	4.22	3.77	3.62	3.60	3.77
Hi – Low	0.17	0.12	0.05	-0.02	-0.03	-0.21**	-0.15**	-0.13*	-0.12**	-0.10**	0.03	0.01	-0.01	-0.03	-0.03
<i>t-stat</i>	0.91	0.75	0.37	-0.17	-0.29	-2.92	-2.64	-2.48	-3.27	-3.39	0.38	0.17	-0.30	-0.77	-0.82

Panel D: Regression Analysis using RET_UP

	Panel Regression			Fama-MacBeth Regression		
	Alpha (FH 7-factor, % per annum)	AR (FH 7-factor)	SR	Alpha (FH 7-factor, % per annum)	AR (FH 7-factor)	SR
RET_UP	0.10	-0.05**	-0.02**	-0.07	-0.09**	-0.04**
<i>t-stat</i>	0.92	-10.88	-3.91	-0.12	-5.29	-2.67
R2(%)	7.96	7.55	14.59	9.53	4.61	5.10
#FundsQtrObs	88,822	87,779	62,741			

Appendix 8: Use Individual Hedge Fund Style Return to Define Market States (1998-2014)

Appendix 8 Repeats analyses in Table 2, Table 3 and Appendix 6 with the individual hedge fund style return being used to define up and down markets for funds

within that style. The t -statistics reported in italicized font are adjusted for heteroscedasticity and autocorrelation. * and ** indicate significance at the 5% and 1% levels, respectively.

Panel A: Performance of Equally-weighted Quintile Portfolios Sorted on RET_DOWN

	Alpha (FH 7-factor, % per month)					Appraisal Ratio					Sharpe Ratio (smoothing adjusted)				
	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y
Low RET_DOWN Port	0.06	0.10	0.11	0.11	0.13	0.02	0.02	0.02	0.02	0.03	0.18	0.11	0.09	0.07	0.06
<i>t-stat</i>	<i>0.31</i>	<i>0.67</i>	<i>0.71</i>	<i>0.67</i>	<i>0.76</i>	<i>0.48</i>	<i>0.54</i>	<i>0.79</i>	<i>0.69</i>	<i>0.80</i>	<i>2.81</i>	<i>2.48</i>	<i>2.60</i>	<i>2.77</i>	<i>2.77</i>
Port 2	0.23	0.23	0.22	0.22	0.20	0.15	0.10	0.09	0.09	0.09	0.27	0.15	0.12	0.09	0.07
<i>t-stat</i>	<i>2.02</i>	<i>2.31</i>	<i>2.28</i>	<i>2.04</i>	<i>1.69</i>	<i>2.50</i>	<i>2.34</i>	<i>2.33</i>	<i>2.11</i>	<i>1.90</i>	<i>3.77</i>	<i>2.98</i>	<i>2.94</i>	<i>2.96</i>	<i>2.46</i>
Port 3	0.31	0.30	0.29	0.28	0.25	0.32	0.21	0.18	0.16	0.14	0.33	0.19	0.15	0.12	0.09
<i>t-stat</i>	<i>3.15</i>	<i>3.06</i>	<i>2.79</i>	<i>2.35</i>	<i>1.94</i>	<i>4.50</i>	<i>3.63</i>	<i>3.28</i>	<i>2.68</i>	<i>2.12</i>	<i>4.42</i>	<i>3.70</i>	<i>3.55</i>	<i>3.30</i>	<i>2.64</i>
Port 4	0.37	0.36	0.35	0.33	0.30	0.59	0.37	0.30	0.26	0.24	0.46	0.27	0.21	0.17	0.15
<i>t-stat</i>	<i>5.23</i>	<i>4.84</i>	<i>4.02</i>	<i>3.38</i>	<i>2.84</i>	<i>8.52</i>	<i>6.11</i>	<i>4.88</i>	<i>3.78</i>	<i>3.12</i>	<i>6.86</i>	<i>5.62</i>	<i>4.83</i>	<i>4.02</i>	<i>3.15</i>
Hi RET_DOWN Port	0.58	0.55	0.50	0.44	0.40	0.77	0.49	0.39	0.32	0.28	0.58	0.33	0.25	0.20	0.18
<i>t-stat</i>	<i>8.44</i>	<i>6.87</i>	<i>5.53</i>	<i>4.17</i>	<i>3.49</i>	<i>14.88</i>	<i>10.03</i>	<i>7.81</i>	<i>6.20</i>	<i>5.63</i>	<i>13.20</i>	<i>9.86</i>	<i>8.25</i>	<i>6.49</i>	<i>5.48</i>
Hi – Low	0.53**	0.44**	0.39**	0.33**	0.27*	0.74**	0.47**	0.37**	0.30**	0.26**	0.40**	0.22**	0.17**	0.14**	0.12**
<i>t-stat</i>	<i>3.13</i>	<i>3.40</i>	<i>2.96</i>	<i>2.38</i>	<i>2.15</i>	<i>13.15</i>	<i>12.25</i>	<i>10.25</i>	<i>8.18</i>	<i>8.39</i>	<i>8.42</i>	<i>6.41</i>	<i>5.67</i>	<i>4.99</i>	<i>4.30</i>

Panel B: Regression Analysis using RET_DOWN

	Panel Regression			Fama-MacBeth Regression		
	Alpha (FH 7-factor, % per annum)	AR (FH 7-factor)	SR	Alpha (FH 7-factor, % per annum)	AR (FH 7-factor)	SR
RET_DOWN	0.88**	0.10**	0.03**	0.68	0.11**	0.06**
<i>t-stat</i>	<i>8.67</i>	<i>17.90</i>	<i>5.28</i>	<i>1.32</i>	<i>8.99</i>	<i>6.18</i>
R2(%)	9.56	11.06	16.16	8.72	5.77	5.68
#FundsQtrObs	147,273	145,599	115,807			

Appendix 8 (Continued)

Panel C: Performance of Equal-weighted Quintile Portfolios Sorted on RET_UP

	Alpha (FH 7-factor, % per month)					Appraisal Ratio					Sharpe Ratio (smoothing adjusted)				
	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y
Low RET_UP Port	0.22	0.24	0.25	0.27	0.26	0.50	0.33	0.26	0.23	0.20	0.31	0.17	0.14	0.11	0.10
<i>t-stat</i>	3.48	2.89	2.76	2.66	2.51	9.25	5.99	4.68	3.77	3.26	8.43	6.09	5.22	4.07	3.27
Port 2	0.33	0.33	0.33	0.32	0.30	0.62	0.40	0.33	0.28	0.25	0.49	0.28	0.22	0.18	0.15
<i>t-stat</i>	5.10	4.17	3.68	3.15	2.93	8.70	6.19	4.97	3.74	2.97	7.39	5.96	5.10	3.98	3.01
Port 3	0.38	0.37	0.35	0.34	0.31	0.41	0.27	0.22	0.20	0.17	0.42	0.25	0.19	0.15	0.13
<i>t-stat</i>	4.41	4.15	3.59	3.24	2.99	6.08	4.89	4.28	3.45	2.80	5.83	4.88	4.54	4.03	3.20
Port 4	0.37	0.35	0.33	0.32	0.31	0.27	0.17	0.15	0.13	0.12	0.34	0.20	0.15	0.12	0.10
<i>t-stat</i>	3.35	3.96	3.73	3.46	3.07	4.69	4.35	3.92	3.30	2.90	4.77	3.91	3.64	3.50	3.32
Hi RET_UP Port	0.34	0.31	0.29	0.27	0.24	0.13	0.08	0.07	0.06	0.06	0.26	0.14	0.11	0.09	0.07
<i>t-stat</i>	1.70	1.96	1.89	1.67	1.35	2.35	2.32	2.27	1.84	1.83	3.82	3.20	3.02	2.79	2.63
Hi – Low	0.12	0.06	0.03	0.00	-0.01	-0.37**	-0.25**	-0.19**	-0.16**	-0.14**	-0.04	-0.03	-0.03	-0.03	-0.03
<i>t-stat</i>	0.64	0.47	0.28	-0.03	-0.13	-5.98	-5.57	-4.60	-4.34	-3.99	-0.78	-0.79	-0.84	-0.84	-0.91

Panel D: Regression Analysis using RET_UP

	Panel Regression			Fama-MacBeth Regression		
	Alpha (FH 7-factor, % per annum)	AR (FH 7-factor)	SR	Alpha (FH 7-factor, % per annum)	AR (FH 7-factor)	SR
RET_UP	-0.14	-0.07**	-0.03**	-0.08	-0.10**	-0.05**
<i>t-stat</i>	-1.65	-14.77	-5.03	-0.15	-7.48	-5.26
R2(%)	9.44	10.85	16.13	8.99	5.70	5.72
#FundsQtrObs	144,846	143,214	115,714			

Appendix 9: Equal-weighted Portfolio Performance Sorted on RET_UP within Each Hedge Fund Style

Appendix 9 reports style-by-style analysis for the time-series averages and t -statistics of the difference in post-formation performances between high and low quintile portfolios sorted on RET_UP. Performance measures include FH 7-factor alphas, FH 7-factor-based Appraisal Ratios, and the smoothing-adjusted Sharpe Ratios. The portfolios are equal-weighted buy-and-hold portfolios sorted every 3 months and held for 3 months to 3 years. The t -statistics reported in italicized font are adjusted for heteroscedasticity and autocorrelation. * and ** indicate significance at the 5% and 1% levels, respectively.

	Alpha(FH 7-factor, % per month)					Appraisal Ratio					Sharpe Ratio				
	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y	3m	6m	1y	2y	3y
Convertible Arbitrage	0.17	0.07	-0.09	-0.14	-0.30	-0.17	-0.15	-0.09	-0.03	0.01	-0.14	-0.03	-0.01	0.02	0.01
<i>t-stat</i>	<i>0.25</i>	<i>0.10</i>	<i>-0.15</i>	<i>-0.20</i>	<i>-0.38</i>	<i>-1.23</i>	<i>-1.46</i>	<i>-1.00</i>	<i>-0.34</i>	<i>0.13</i>	<i>-1.11</i>	<i>-0.36</i>	<i>-0.17</i>	<i>0.22</i>	<i>0.09</i>
Emerging Markets	0.39	0.42	0.48	0.56	0.43	-0.08	-0.05	0.03	0.00	0.01	0.24	0.19	0.21	0.15	0.13
	<i>1.10</i>	<i>1.21</i>	<i>1.68</i>	<i>2.29</i>	<i>1.96</i>	<i>-0.31</i>	<i>-0.46</i>	<i>0.28</i>	<i>0.03</i>	<i>0.10</i>	<i>1.04</i>	<i>1.34</i>	<i>1.97</i>	<i>1.57</i>	<i>1.53</i>
Equity Market Neutral	-0.04	-0.08	-0.12	-0.04	0.04	-0.27	-0.19	-0.12	-0.07	-0.04	-0.20	-0.12	-0.08	-0.04	-0.02
	<i>-0.12</i>	<i>-0.22</i>	<i>-0.34</i>	<i>-0.15</i>	<i>0.19</i>	<i>-3.16</i>	<i>-3.18</i>	<i>-2.03</i>	<i>-1.56</i>	<i>-1.75</i>	<i>-2.99</i>	<i>-3.19</i>	<i>-3.15</i>	<i>-2.02</i>	<i>-0.97</i>
Event Driven	0.24	0.14	0.16	0.11	0.10	-0.29	-0.23	-0.17	-0.12	-0.09	-0.02	0.01	0.01	0.01	0.01
	<i>0.75</i>	<i>0.94</i>	<i>1.39</i>	<i>0.84</i>	<i>0.53</i>	<i>-2.48</i>	<i>-2.56</i>	<i>-2.21</i>	<i>-2.12</i>	<i>-1.80</i>	<i>-0.20</i>	<i>0.13</i>	<i>0.17</i>	<i>0.19</i>	<i>0.42</i>
Fixed Income	0.25	0.31	0.33	0.32	0.43	-0.28	-0.20	-0.15	-0.12	-0.10	-0.07	-0.08	-0.08	-0.06	-0.05
	<i>1.11</i>	<i>1.50</i>	<i>1.52</i>	<i>2.44</i>	<i>2.57</i>	<i>-3.19</i>	<i>-3.27</i>	<i>-2.58</i>	<i>-2.23</i>	<i>-1.92</i>	<i>-0.83</i>	<i>-1.54</i>	<i>-1.74</i>	<i>-1.23</i>	<i>-1.12</i>
Global Macro	0.01	-0.09	-0.02	0.07	0.01	0.26	0.14	0.15	0.12	0.09	0.57	0.32	0.23	0.17	0.13
	<i>0.05</i>	<i>-0.41</i>	<i>-0.07</i>	<i>0.35</i>	<i>0.07</i>	<i>1.85</i>	<i>1.23</i>	<i>1.54</i>	<i>1.31</i>	<i>0.98</i>	<i>4.19</i>	<i>3.31</i>	<i>2.82</i>	<i>1.91</i>	<i>1.46</i>
Long/Short Equity	-0.21	-0.27	-0.29	-0.31	-0.33	-0.03	-0.05	-0.02	0.02	0.03	0.06	0.04	0.01	0.00	0.00
	<i>-0.88</i>	<i>-1.54</i>	<i>-1.89</i>	<i>-2.00</i>	<i>-2.28</i>	<i>-0.42</i>	<i>-0.87</i>	<i>-0.37</i>	<i>0.38</i>	<i>0.79</i>	<i>0.65</i>	<i>0.69</i>	<i>0.21</i>	<i>0.11</i>	<i>0.28</i>
Managed Futures	-0.19	-0.28	-0.33	-0.20	-0.02	-0.24	-0.18	-0.13	-0.11	-0.09	0.01	-0.01	-0.03	-0.05	-0.05
	<i>-0.50</i>	<i>-0.85</i>	<i>-0.99</i>	<i>-0.66</i>	<i>-0.08</i>	<i>-2.94</i>	<i>-3.86</i>	<i>-3.40</i>	<i>-3.17</i>	<i>-2.76</i>	<i>0.20</i>	<i>-0.27</i>	<i>-0.64</i>	<i>-0.94</i>	<i>-1.02</i>
Multi-Strategy	-0.17	-0.30	-0.34	-0.35	-0.37	-0.30	-0.16	-0.12	-0.09	-0.04	-0.17	-0.09	-0.07	-0.06	-0.03
	<i>-0.68</i>	<i>-1.54</i>	<i>-1.63</i>	<i>-1.48</i>	<i>-1.50</i>	<i>-3.67</i>	<i>-2.77</i>	<i>-2.51</i>	<i>-1.95</i>	<i>-1.51</i>	<i>-1.77</i>	<i>-2.10</i>	<i>-2.14</i>	<i>-2.97</i>	<i>-2.64</i>
Fund-of-Funds	0.00	-0.06	-0.10	-0.10	-0.10	-0.44	-0.27	-0.23	-0.19	-0.17	-0.08	-0.11	-0.13	-0.13	-0.13
	<i>0.01</i>	<i>-0.34</i>	<i>-0.62</i>	<i>-0.72</i>	<i>-0.69</i>	<i>-4.42</i>	<i>-3.89</i>	<i>-3.34</i>	<i>-2.95</i>	<i>-2.57</i>	<i>-0.79</i>	<i>-1.57</i>	<i>-1.90</i>	<i>-1.69</i>	<i>-1.75</i>