Internet Appendix for
"Asymmetry in Stock Comovements: An Entropy Approach"

Lei Jiang
Tsinghua University

Ke Wu
Renmin University of China

Guofu Zhou*
Washington University in St. Louis

August 2017

*Jiang, jianglei@sem.tsinghua.edu.cn, School of Economics and Management, Tsinghua University, Beijing 100084, China; Wu (corresponding author), ke.wu@ruc.edu.cn, Hanqing Advanced Institute of Economics and Finance, Renmin University of China, Beijing 100872, China; Zhou, zhou@wustl.edu, Olin School of Business, Washington University in St. Louis, St. Louis, MO 63130.

This Internet Appendix describes additional analyses and tabulates additional results that are mentioned in the paper. Below, we briefly describe the contents of the appendix.

- Section IA.I: Description of bootstrap procedures for the entropy test of asymmetry as discussed in footnote 7 of the paper.
- Table IA.1: Maximum likelihood estimates for the GARCH(1,1) processes as discussed in Section III.B of the paper.
- Table IA.2: Maximum likelihood estimates for the TGARCH(1,1) processes as discussed in footnote 10 of the paper.
- Table IA.3: Size and powers for the entropy test and the HTZ test when the marginal distribution is GARCH(1,1) and the nominal size is set to 1% as discussed in Section III.B of the paper.
- Table IA.4: Size and powers for the entropy test and the HTZ test when the marginal distribution is GARCH(1,1) and the nominal size is set to 10% as discussed in Section III.B of the paper.
- Table IA.5: Size and powers for the entropy test and the HTZ test when the marginal distribution is TGARCH(1,1) and the nominal size is set to 5% as discussed in footnote 10 of the paper.
- Table IA.6: Size and powers for the entropy test and the HTZ test when the marginal distribution is TGARCH(1,1) and the nominal size is set to 1% as discussed in footnote 10 of the paper.
- Table IA.7: Size and powers for the entropy test and the HTZ test when the marginal distribution is TGARCH(1,1) and the nominal size is set to 10% as discussed in footnote 10 of the paper.
- Table IA.8: Asymmetry test results of common portfolios in shorter time periods as discussed in footnote 14 of the paper.

IA.I Bootstrap Procedures for the Entropy Test of Asymmetry

To construct a sample under the null hypothesis of equal densities in the bootstrap resampling procedure, let

$$Z_i = \{(x_1, y_1), (x_2, y_2), ..., (x_T, y_T); (-x_1, -y_1), (-x_{i,2}, -y_2), ..., (-x_{i,T}, -y_T)\},$$

which is a vector obtained by stacking together the original data pairs $(x_i,\ y_i)$ with the rotated data pairs $(-x_i,\ -y_i)$. Through bootstrapping samples from Z_i, we construct the empirical distribution of $\hat{S}_\rho(c)$. We repeat the bootstrapping draws B times from Z_i and then obtain B resamples of $\hat{S}_\rho(c)$.

There are many different bootstrap resampling procedures, such as, simple bootstrap, wild bootstrap, and block bootstrap. The choice among procedures depends on the nature of the data. As stock returns are known to be stationary and weakly dependent, the block bootstrap that takes such a dependence structure into account seems to be the natural choice (Künsch (1989)). Politis and Romano (1994) show that using overlapping blocks with lengths that are randomly sampled from a geometric distribution yields stationary bootstrapped data samples, while overlapping or non-overlapping blocks with fixed lengths may not ensure such stationarity. Their procedure is known as the stationary bootstrap. Due to its favorable properties, we use it below.

The selection of the average block length l used in the stationary bootstrap is another important issue. We apply the data-driven and automatic method suggested by Politis and White (2004) and Patton, Politis, and White (2009) to select the optimal block length. Econometrically, this method is beneficial, since it minimizes the mean squared error of the estimated long-run variance of the time series.

In terms of selecting B, the number of bootstrap samples, it is obviously true that the greater the value of B, the more accurate the bootstrapped distribution. However, unlike the common bootstrap procedures used in linear regressions, a kernel estimation can be enormously time-consuming. In similar problems, Davidson and MacKinnon (2000) suggest the use of $B = 399$. In this paper, although we find that a value of $B = 199$ already yields similar results, we follow the suggestion of Davidson and MacKinnon (2000) and use $B = 399$.

After having computed B replications of $\hat{S}_\rho(c)^*$, we easily obtain the sampling distribution of $\hat{S}_\rho(c)$. To find out the critical values for rejection at different confidence levels, we reorder the bootstrapped estimates from smallest to largest and denote the list as $\hat{S}_{\rho,1}(c)^*$, $\hat{S}_{\rho,2}(c)^*$, ..., $\hat{S}_{\rho,B}(c)^*$, and then determine the percentiles from these ordered statistics. For example, to conduct the symmetry test at the 5% level, the null hypothesis of equal densities will be rejected if $\hat{S}_\rho(c) > \hat{S}_{\rho,379}(c)^*$, where $\hat{S}_{\rho,379}(c)^*$ is the 95th percentile of the ordered bootstrapped estimates. Empirical p-values are also obtained by counting the proportion of the ordered bootstrapped statistics that exceeds $\hat{S}_\rho(c)$, the test statistic estimated from the original sample.

Table IA.1: ML Estimates for GARCH(1,1) Processes

The table reports maximum likelihood estimates for parameters of GARCH(1,1) processes used to fit the value-weighted return of the 7th smallest size portfolio (Panel A) and the value-weighted market return (Panel B) data. The GARCH models are then used as the data-generating processes to simulate the return series. The specification is set to follow a standard GARCH(1,1) process: $r_{i,t} = \mu_i + \varepsilon_{i,t}$ where $\varepsilon_{i,t}$ is normally distributed with a time-varying variance $\sigma^2_{i,t} = \omega_i + \alpha_i \varepsilon^2_{i,t-1} + \beta_i \sigma^2_{i,t-1}$. μ_i is the unconditional mean for the return series. ω_i is the constant term in the time-varying conditional volatility process. α_i is the autoregressive parameter and β_i is the moving average parameter in the GARCH(1,1) process.

Panel A: Fitted Parameters for Value-Weighted Monthly Returns of Size 7 Portfolio

	Estimate	S.E.	t-value	p-value
μ_i	0.795	0.207	3.846	0.000
ω_i	2.400	1.186	2.023	0.043
α_i	0.090	0.030	3.035	0.002
β_i	0.827	0.055	14.968	0.000

Panel B: Fitted Parameters for Value-Weighted Monthly Returns of Market Portfolio

	Estimate	S.E.	t-value	p-value
μ_i	0.562	0.171	3.291	0.001
ω_i	1.139	0.556	2.049	0.040
α_i	0.107	0.029	3.709	0.000
β_i	0.844	0.036	23.231	0.000

Table IA.2: ML Estimates for TGARCH(1,1) Processes

The table reports maximum likelihood estimates for parameters of TGARCH(1,1) processes used to fit the value-weighted return of the 7th smallest size portfolio (Panel A) and the value-weighted market return (Panel B) data. The TGARCH models are then used as the data-generating processes to simulate the return series. The specification for the marginal distribution is set to follow a TGARCH(1,1) process: $r_{i,t} = \mu_i + \varepsilon_{i,t}$ where $\varepsilon_{i,t}$ is normally distributed with a time-varying standard deviation $\sigma_{i,t} = \omega_i + \alpha_i(|\varepsilon_{i,t-1}| - \gamma_i \varepsilon_{i,t-1}) + \beta_i \sigma_{i,t-1}$. μ_i is the unconditional mean for the return series. ω_i is the constant term in the time-varying conditional volatility process. α_i is the autoregressive parameter and β_i is the moving average parameter in the TGARCH(1,1) process. γ_i is the asymmetric response parameter that governs leverage effect in conditional volatility.

Panel A: Fitted Parameters for Value-Weighted Monthly Returns of Size 7 Portfolio

	Estimate	S.E.	t-value	p-value
μ_i	0.802	0.222	3.614	0.000
ω_i	0.902	0.421	2.142	0.032
α_i	0.116	0.039	2.984	0.003
β_i	0.732	0.104	7.013	0.000
γ_i	1.000	0.276	3.622	0.000

Panel B: Fitted Parameters for Value-Weighted Monthly Returns of Market Portfolio

	Estimate	S.E.	t-value	p-value
μ_i	0.491	0.175	2.811	0.005
ω_i	0.660	0.328	2.014	0.044
α_i	0.103	0.032	3.255	0.001
β_i	0.769	0.080	9.608	0.000
γ_i	1.000	0.393	2.547	0.011

Table IA.3: Size and Power: Entropy Test and HTZ Test

The nominal size of the tests is set to 1%. This table reports the rejection rates for the null hypothesis of symmetric comovement based on 1,000 Monte Carlo simulations. Different values of κ govern the degree of left tail dependence of the underlying DGP. When $\kappa = 100\%$, the DGP is a joint normal distribution and the rejection rates are the empirical sizes. In all other cases, the rejection rates reflect empirical power. The Clayton copula parameter $\tau = 5.768$ and the Gaussian copula parameter $\rho = 0.951$. The specification for the marginal distribution is set to follow a standard GARCH(1,1) process: $r_{i,t} = \mu_i + \varepsilon_{i,t}$ where $\varepsilon_{i,t}$ is normally distributed with a time-varying variance $\sigma_{i,t}^2 = \omega_i + \alpha_i \varepsilon_{i,t-1}^2 + \beta_i \sigma_{i,t-1}^2$. μ_i is the unconditional mean for the return series. ω_i is the constant term in the time-varying conditional volatility process. α_i is the autoregressive parameter and β_i is the moving average parameter in the GARCH(1,1) process.

	Entropy Test		HTZ Test	
	c={0}	c={0, 0.5, 1,1.5}	c={0}	c={0, 0.5, 1,1.5}
Panel A: $\kappa = 100\%$ **(size)**				
T = 240	0.003	0.003	0.000	0.003
T = 420	0.003	0.006	0.000	0.000
T = 600	0.006	0.005	0.000	0.000
T = 840	0.010	0.014	0.000	0.000
Panel B: $\kappa = 75\%$				
T = 240	0.006	0.006	0.000	0.007
T = 420	0.027	0.018	0.000	0.003
T = 600	0.059	0.038	0.000	0.001
T = 840	0.126	0.062	0.000	0.000
Panel C: $\kappa = 50\%$				
T = 240	0.070	0.068	0.011	0.040
T = 420	0.315	0.221	0.028	0.029
T = 600	0.637	0.476	0.051	0.041
T = 840	0.921	0.773	0.116	0.049
Panel D: $\kappa = 37.5\%$				
T = 240	0.160	0.151	0.030	0.072
T = 420	0.627	0.512	0.097	0.086
T = 600	0.920	0.798	0.192	0.123
T = 840	0.987	0.955	0.390	0.186
Panel E: $\kappa = 25\%$				
T = 240	0.343	0.331	0.096	0.150
T = 420	0.872	0.774	0.300	0.215
T = 600	0.989	0.951	0.531	0.294
T = 840	1.000	0.995	0.745	0.475
Panel F: $\kappa = 0\%$				
T = 240	0.794	0.775	0.396	0.423
T = 420	0.991	0.980	0.780	0.627
T = 600	1.000	1.000	0.935	0.766
T = 840	1.000	1.000	0.986	0.917

Table IA.4: Size and Power: Entropy Test and HTZ Test

The nominal size of the tests is set to 10%. This table reports the rejection rates for the null hypothesis of symmetric comovement based on 1,000 Monte Carlo simulations. Different values of κ govern the degree of left tail dependence of the underlying DGP. When $\kappa = 100\%$, the DGP is a joint normal distribution and the rejection rates are the empirical sizes. In all other cases, the rejection rates reflect empirical power. The Clayton copula parameter $\tau = 5.768$ and the Gaussian copula parameter $\rho = 0.951$. The specification for the marginal distribution is set to follow a standard GARCH(1,1) process: $r_{i,t} = \mu_i + \varepsilon_{i,t}$ where $\varepsilon_{i,t}$ is normally distributed with a time-varying variance $\sigma_{i,t}^2 = \omega_i + \alpha_i \varepsilon_{i,t-1}^2 + \beta_i \sigma_{i,t-1}^2$. μ_i is the unconditional mean for the return series. ω_i is the constant term in the time-varying conditional volatility process. α_i is the autoregressive parameter and β_i is the moving average parameter in the GARCH(1,1) process.

	Entropy Test		HTZ Test	
	c={0}	c={0, 0.5, 1,1.5}	c={0}	c={0, 0.5, 1,1.5}
Panel A: $\kappa = 100\%$ **(size)**				
T = 240	0.077	0.069	0.000	0.010
T = 420	0.083	0.099	0.000	0.000
T = 600	0.096	0.115	0.000	0.000
T = 840	0.113	0.123	0.000	0.001
Panel B: $\kappa = 75\%$				
T = 240	0.138	0.126	0.006	0.045
T = 420	0.254	0.212	0.008	0.020
T = 600	0.408	0.331	0.013	0.014
T = 840	0.627	0.493	0.024	0.016
Panel C: $\kappa = 50\%$				
T = 240	0.454	0.429	0.168	0.165
T = 420	0.820	0.726	0.324	0.181
T = 600	0.969	0.917	0.508	0.221
T = 840	0.994	0.983	0.711	0.315
Panel D: $\kappa = 37.5\%$				
T = 240	0.722	0.675	0.326	0.269
T = 420	0.958	0.917	0.596	0.322
T = 600	0.997	0.977	0.785	0.421
T = 840	1.000	0.999	0.916	0.605
Panel E: $\kappa = 25\%$				
T = 240	0.882	0.857	0.578	0.435
T = 420	0.991	0.984	0.854	0.589
T = 600	1.000	1.000	0.953	0.723
T = 840	1.000	1.000	0.984	0.869
Panel F: $\kappa = 0\%$				
T = 240	0.991	0.983	0.902	0.759
T = 420	1.000	1.000	0.984	0.904
T = 600	1.000	1.000	0.997	0.964
T = 840	1.000	1.000	0.999	0.992

Table IA.5: Size and Power with TGARCH(1,1) Marginals: Entropy Test and HTZ Test

The nominal size of the tests is set to 5%. This table reports the rejection rates for the null hypothesis of symmetric comovement based on 1,000 Monte Carlo simulations. Different values of κ govern the degree of left tail dependence of the underlying DGP. When $\kappa = 100\%$, the DGP is a joint normal distribution and the rejection rates are the empirical sizes. In all other cases, the rejection rates reflect empirical power. The Clayton copula parameter $\tau = 5.768$ and the Gaussian copula parameter $\rho = 0.951$. The specification for the marginal distribution is set to follow a TGARCH(1,1) process: $r_{i,t} = \mu_i + \varepsilon_{i,t}$ where $\varepsilon_{i,t}$ is normally distributed with a time-varying standard deviation $\sigma_{i,t} = \omega_i + \alpha_i(|\varepsilon_{i,t-1}| - \gamma_i \varepsilon_{i,t-1}) + \beta_i \sigma_{i,t-1}$. μ_i is the unconditional mean for the return series. ω_i is the constant term in the time-varying conditional volatility process. α_i is the autoregressive parameter and β_i is the moving average parameter in the TGARCH(1,1) process. γ_i is the asymmetric response parameter that governs leverage effect in conditional volatility.

	Entropy Test		HTZ Test	
	c={0}	c={0, 0.5, 1,1.5}	c={0}	c={0, 0.5, 1,1.5}
Panel A: $\kappa = 100\%$ **(size)**				
T = 240	0.030	0.035	0.000	0.004
T = 420	0.043	0.047	0.000	0.000
T = 600	0.060	0.064	0.000	0.002
T = 840	0.059	0.057	0.000	0.000
Panel B: $\kappa = 75\%$				
T = 240	0.080	0.080	0.001	0.017
T = 420	0.137	0.125	0.001	0.006
T = 600	0.257	0.213	0.002	0.002
T = 840	0.402	0.312	0.002	0.003
Panel C: $\kappa = 50\%$				
T = 240	0.230	0.222	0.014	0.048
T = 420	0.605	0.527	0.033	0.037
T = 600	0.873	0.807	0.063	0.031
T = 840	0.972	0.949	0.123	0.043
Panel D: $\kappa = 37.5\%$				
T = 240	0.396	0.385	0.038	0.077
T = 420	0.825	0.783	0.102	0.056
T = 600	0.956	0.945	0.205	0.079
T = 840	0.995	0.992	0.352	0.123
Panel E: $\kappa = 25\%$				
T = 240	0.546	0.551	0.100	0.108
T = 420	0.926	0.917	0.212	0.128
T = 600	0.985	0.986	0.368	0.192
T = 840	0.997	0.997	0.565	0.300
Panel F: $\kappa = 0\%$				
T = 240	0.789	0.803	0.241	0.229
T = 420	0.977	0.979	0.505	0.320
T = 600	0.996	0.998	0.698	0.459
T = 840	1.000	0.999	0.833	0.675

Table IA.6: Size and Power with TGARCH(1,1) Marginals: Entropy Test and HTZ Test

The nominal size of the tests is set to 1%. This table reports the rejection rates for the null hypothesis of symmetric comovement based on 1,000 Monte Carlo simulations. Different values of κ govern the degree of left tail dependence of the underlying DGP. When $\kappa = 100\%$, the DGP is a joint normal distribution and the rejection rates are the empirical sizes. In all other cases, the rejection rates reflect empirical power. The Clayton copula parameter $\tau = 5.768$ and the Gaussian copula parameter $\rho = 0.951$. The specification for the marginal distribution is set to follow a TGARCH(1,1) process: $r_{i,t} = \mu_i + \varepsilon_{i,t}$ where $\varepsilon_{i,t}$ is normally distributed with a time-varying standard deviation $\sigma_{i,t} = \omega_i + \alpha_i(|\varepsilon_{i,t-1}| - \gamma_i \varepsilon_{i,t-1}) + \beta_i \sigma_{i,t-1}$. μ_i is the unconditional mean for the return series. ω_i is the constant term in the time-varying conditional volatility process. α_i is the autoregressive parameter and β_i is the moving average parameter in the TGARCH(1,1) process. γ_i is the asymmetric response parameter that governs leverage effect in conditional volatility.

	Entropy Test		HTZ Test	
	c={0}	c={0, 0.5, 1,1.5}	c={0}	c={0, 0.5, 1,1.5}
Panel A: $\kappa = 100\%$ **(size)**				
T = 240	0.008	0.003	0.000	0.003
T = 420	0.005	0.004	0.000	0.000
T = 600	0.008	0.007	0.000	0.000
T = 840	0.009	0.006	0.000	0.000
Panel B: $\kappa = 75\%$				
T = 240	0.009	0.010	0.000	0.010
T = 420	0.025	0.021	0.000	0.002
T = 600	0.049	0.037	0.000	0.000
T = 840	0.118	0.069	0.000	0.000
Panel C: $\kappa = 50\%$				
T = 240	0.049	0.049	0.003	0.021
T = 420	0.254	0.192	0.002	0.008
T = 600	0.577	0.460	0.004	0.009
T = 840	0.871	0.749	0.014	0.008
Panel D: $\kappa = 37.5\%$				
T = 240	0.116	0.127	0.010	0.047
T = 420	0.517	0.439	0.015	0.012
T = 600	0.842	0.776	0.038	0.023
T = 840	0.976	0.948	0.086	0.036
Panel E: $\kappa = 25\%$				
T = 240	0.240	0.249	0.015	0.057
T = 420	0.759	0.702	0.053	0.049
T = 600	0.958	0.925	0.132	0.065
T = 840	0.995	0.988	0.259	0.105
Panel F: $\kappa = 0\%$				
T = 240	0.564	0.584	0.072	0.134
T = 420	0.930	0.926	0.229	0.172
T = 600	0.981	0.984	0.429	0.256
T = 840	0.997	0.995	0.624	0.415

Table IA.7: Size and Power with TGARCH(1,1) Marginals: Entropy Test and HTZ Test

The nominal size of the tests is set to 10%. This table reports the rejection rates for the null hypothesis of symmetric comovement based on 1,000 Monte Carlo simulations. Different values of κ govern the degree of left tail dependence of the underlying DGP. When $\kappa = 100\%$, the DGP is a joint normal distribution and the rejection rates are the empirical sizes. In all other cases, the rejection rates reflect empirical power. The Clayton copula parameter $\tau = 5.768$ and the Gaussian copula parameter $\rho = 0.951$. The specification for the marginal distribution is set to follow a TGARCH(1,1) process: $r_{i,t} = \mu_i + \varepsilon_{i,t}$ where $\varepsilon_{i,t}$ is normally distributed with a time-varying standard deviation $\sigma_{i,t} = \omega_i + \alpha_i(|\varepsilon_{i,t-1}| - \gamma_i \varepsilon_{i,t-1}) + \beta_i \sigma_{i,t-1}$. μ_i is the unconditional mean for the return series. ω_i is the constant term in the time-varying conditional volatility process. α_i is the autoregressive parameter and β_i is the moving average parameter in the TGARCH(1,1) process. γ_i is the asymmetric response parameter that governs leverage effect in conditional volatility.

	Entropy Test		HTZ Test	
	c={0}	c={0, 0.5, 1,1.5}	c={0}	c={0, 0.5, 1,1.5}
Panel A: $\kappa = 100\%$ **(size)**				
T = 240	0.083	0.088	0.000	0.007
T = 420	0.097	0.105	0.000	0.001
T = 600	0.124	0.136	0.000	0.002
T = 840	0.128	0.138	0.000	0.000
Panel B: $\kappa = 75\%$				
T = 240	0.167	0.170	0.002	0.027
T = 420	0.277	0.267	0.005	0.009
T = 600	0.428	0.371	0.005	0.007
T = 840	0.587	0.489	0.004	0.005
Panel C: $\kappa = 50\%$				
T = 240	0.391	0.394	0.047	0.077
T = 420	0.759	0.703	0.092	0.058
T = 600	0.942	0.915	0.144	0.061
T = 840	0.991	0.977	0.276	0.086
Panel D: $\kappa = 37.5\%$				
T = 240	0.584	0.576	0.085	0.131
T = 420	0.916	0.893	0.215	0.094
T = 600	0.983	0.979	0.358	0.150
T = 840	0.998	0.998	0.543	0.223
Panel E: $\kappa = 25\%$				
T = 240	0.721	0.712	0.181	0.161
T = 420	0.964	0.962	0.365	0.212
T = 600	0.997	0.995	0.541	0.280
T = 840	0.999	0.998	0.739	0.436
Panel F: $\kappa = 0\%$				
T = 240	0.884	0.890	0.379	0.307
T = 420	0.985	0.989	0.653	0.428
T = 600	0.999	0.999	0.804	0.592
T = 840	1.000	1.000	0.906	0.783

Table IA.8: Testing for Asymmetry

The table reports both the test statistics and the p-values of the entropy test and the HTZ test. We use (value-weighted) monthly returns of size, book-to-market, and momentum portfolios as the test assets. The last two columns report skewness and coskewness. The sample period is from January 1965 to December 1999.

Panel A: Size

	Entropy Test				HTZ Test				Skewness	Coskew
	c={0}		c={0, 0.5, 1,1.5}		c={0}		c={0, 0.5, 1,1.5}			
Portfolios	$S_\rho \times 100$	p-Value	$S_\rho \times 100$	p-Value	Test-stat	p-Value	Test-stat	p-Value		
Size 1	1.820	0.105	1.203	0.165	2.458	0.117	9.728	0.045	-0.274	-0.595
Size 2	1.591	0.083	1.288	0.088	0.790	0.374	0.942	0.918	-0.459	-0.585
Size 3	1.473	0.175	1.237	0.170	0.549	0.459	0.856	0.931	-0.487	-0.566
Size 4	1.280	0.221	1.070	0.190	0.339	0.560	0.584	0.965	-0.577	-0.576
Size 5	1.385	0.165	1.062	0.183	0.252	0.616	4.878	0.300	-0.633	-0.582
Size 6	1.237	0.286	0.942	0.301	0.120	0.729	3.924	0.416	-0.580	-0.540
Size 7	0.971	0.561	0.802	0.471	0.016	0.898	0.706	0.951	-0.472	-0.496
Size 8	1.015	0.454	0.839	0.429	0.023	0.878	0.401	0.982	-0.429	-0.482
Size 9	0.881	0.526	0.645	0.637	0.001	0.972	0.008	1.000	-0.333	-0.433
Size 10	0.954	0.544	0.771	0.571	0.001	0.980	0.111	0.999	-0.296	-0.423

Panel B: Book-to-Market

	Entropy Test				HTZ Test				Skewness	Coskew
	c={0}		c={0, 0.5, 1,1.5}		c={0}		c={0, 0.5, 1,1.5}			
Portfolios	$S_\rho \times 100$	p-Value	$S_\rho \times 100$	p-Value	Test-stat	p-Value	Test-stat	p-Value		
B/M 1	0.820	0.516	0.668	0.501	0.022	0.883	0.341	0.987	-0.137	-0.370
B/M 2	0.928	0.391	0.785	0.313	0.020	0.887	0.208	0.995	-0.437	-0.479
B/M 3	0.704	0.739	0.552	0.754	0.042	0.837	0.251	0.993	-0.573	-0.527
B/M 4	1.054	0.411	0.886	0.363	0.117	0.733	1.716	0.788	-0.390	-0.494
B/M 5	1.164	0.451	0.909	0.398	0.167	0.683	2.638	0.620	-0.443	-0.517
B/M 6	0.866	0.714	0.734	0.694	0.102	0.749	1.500	0.827	-0.410	-0.490
B/M 7	1.410	0.356	1.208	0.303	0.121	0.728	1.008	0.909	0.039	-0.354
B/M 8	1.523	0.185	1.256	0.163	0.278	0.598	2.570	0.632	-0.016	-0.419
B/M 9	1.623	0.183	1.333	0.140	0.504	0.478	1.180	0.881	-0.144	-0.471
B/M 10	1.420	0.308	1.046	0.343	0.588	0.443	2.896	0.575	0.086	-0.421

Panel C: Momentum

	Entropy Test				HTZ Test				Skewness	Coskew
	c={0}		c={0, 0.5, 1,1.5}		c={0}		c={0, 0.5, 1,1.5}			
Portfolios	$S_\rho \times 100$	p-Value	$S_\rho \times 100$	p-Value	Test-stat	p-Value	Test-stat	p-Value		
L	1.760	0.078	1.327	0.075	2.162	0.141	4.449	0.349	0.239	-0.337
2	1.415	0.429	1.037	0.531	1.231	0.267	3.009	0.556	0.079	-0.270
3	1.689	0.268	1.235	0.333	0.946	0.331	4.572	0.334	0.195	-0.255
4	1.280	0.253	0.957	0.273	0.758	0.384	4.412	0.353	-0.127	-0.377
5	1.203	0.479	0.937	0.539	0.694	0.405	4.088	0.394	-0.438	-0.506
6	1.290	0.238	0.993	0.243	0.722	0.396	0.794	0.939	-0.403	-0.523
7	1.237	0.168	1.056	0.115	0.585	0.444	3.445	0.486	-0.493	-0.526
8	0.874	0.692	0.720	0.634	0.670	0.413	0.911	0.923	-0.331	-0.449
9	1.417	0.080	1.145	0.100	1.088	0.297	1.636	0.802	-0.622	-0.558
W	2.242	0.005	1.767	0.008	1.648	0.199	10.266	0.036	-0.416	-0.492

References

Davidson, R., and J. G. MacKinnon. 2000. Bootstrap tests: How many bootstraps? *Econometric Reviews* 19:55–68.

Künsch, H. R. 1989. The jackknife and the bootstrap for general stationary observations. *Annals of statistics* 17:1217–41.

Patton, A., D. N. Politis, and H. White. 2009. Correction to "automatic block-length selection for the dependent bootstrap" by d. politis and h. white. *Econometric Reviews* 28:372–5.

Politis, D. N., and J. P. Romano. 1994. The stationary bootstrap. *Journal of the American Statistical Association* 89:1303–13.

Politis, D. N., and H. White. 2004. Automatic block-length selection for the dependent bootstrap. *Econometric Reviews* 23:53–70.