

Internet Appendix for “Asset Pricing with Systematic Skewness: Two Decades Later”

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ABSTRACT

This document includes supplementary material to the paper. Section 1 provides a variable description and the significance levels for skewness and coskewness used in Table 1 in the paper and Tables IA.3 to IA.9 in this Internet Appendix. Section 2 describes the test assets used in this Internet Appendix and shows (i) replications of Table 1 in the paper for other test assets, including those used in Table 1 in Harvey and Siddique (2000), (ii) replications of Table 4 Panel C in the paper when the NASDAQ stocks are removed from the sample, and (iii) replications of Table 5 in the paper for other sample periods. Section 3 shows summary statistics and the results of asset pricing tests of several coskewness proxies for different sample periods. Section 4 shows robustness checks for asset pricing tests of coskewness proxies.

Keywords: Coskewness, three-moment CAPM, persistent factors.

JEL Codes: G12

1 Variable Description

Table IA.1: Variable Description

$Cosk$	Standardized coskewness, measured as: $Cosk_{i,t} = \frac{E_{t-1}[\varepsilon_{i,t} \varepsilon_{M,t}^2]}{\sqrt{E_{t-1}[\varepsilon_{i,t}^2] E_{t-1}[\varepsilon_{M,t}^2]}}$.
Csk	Coskewness, measured as: $Csk_{i,t} = Cov_{t-1}(r_{i,t}, r_{M,t}^2)$.
S^-	Return of the portfolio of the 30% of stocks with the lowest past standardized coskewness.
S^+	Return of the portfolio of the 30% of stocks with the highest past standardized coskewness.
r_f	Risk-free rate (one-month Treasury bill rate), from Ken French's online data library.
HS^-	Long-short portfolio return calculated as $S^- - r_f$.
HS	Long-short portfolio return calculated as the return difference between the highest 30% and the lowest 30% of stocks ranked by past standardized coskewness, as in Harvey and Siddique (2000); $HS = S^- - S^+$.
PSS	Long-short portfolio return calculated as the return difference between the highest 30% and the lowest 30% of stocks ranked by predicted coskewness, as in Langlois (2020).
$mPSS$	Modified PSS : long-short portfolio return calculated as the return difference between the highest 30% and the lowest 30% of stocks ranked by predicted coskewness; $mPSS$ uses market-only predictors, while the PSS factor of Langlois (2020) also uses firm characteristics to predict the coskewness rank.
MKT	Excess return of the market portfolio; $MKT = r_M - r_f$.
SMB	Small minus Big (market equity) factor, from Ken French's online data library.
HML	High minus Low (book-to-market) factor, from Ken French's online data library.
MOM	Momentum ($t - 12$ to $t - 2$ months) factor, from Ken French's online data library.
RMW	Robust minus Weak (profitability) factor, from Ken French's online data library.
CMA	Conservative minus Aggressive (investment) factor, from Ken French's online data library.
FF3	Fama-French three-factor model: MKT , SMB , and HML .
FF4	Carhart-Fama-French four-factor model: MKT , SMB , HML , and MOM .
FF5	Fama-French five-factor model: MKT , SMB , HML , RMW , and CMA .

Table IA.2: Significance Levels for Skewness and Coskewness

Panel A. Sample Period January 1994 to December 2019 (312 Months)			
Skewness	1%	-0.3588	0.3591
	5%	-0.2699	0.2701
	10%	-0.2255	0.2249
Coskewness	1%	-0.2527	0.2521
	5%	-0.1918	0.1913
	10%	-0.1608	0.1606
Panel B. Sample Period July 1963 to December 1993 (366 Months)			
Skewness	1%	-0.3312	0.3318
	5%	-0.2498	0.2496
	10%	-0.2088	0.2087
Coskewness	1%	-0.2325	0.2332
	5%	-0.1772	0.1770
	10%	-0.1486	0.1485
Panel C. Sample Period July 1926 to June 1963 (444 Months)			
Skewness	1%	-0.3013	0.3010
	5%	-0.2270	0.2274
	10%	-0.1899	0.1902
Coskewness	1%	-0.2110	0.2112
	5%	-0.1608	0.1608
	10%	-0.1347	0.1348
Panel D. Sample Period July 1963 to December 2019 (678 Months)			
Skewness	1%	-0.2424	0.2431
	5%	-0.1838	0.1841
	10%	-0.1540	0.1541
Coskewness	1%	-0.1713	0.1714
	5%	-0.1299	0.1303
	10%	-0.1092	0.1093
Panel E. Sample Period July 1926 to December 2019 (1122 Months)			
Skewness	1%	-0.1890	0.1886
	5%	-0.1014	0.1013
	10%	-0.0849	0.0850
Coskewness	1%	-0.1332	0.1330
	5%	-0.1014	0.1013
	10%	-0.0849	0.0850

Description: The table shows significance levels for standardized skewness and coskewness. Standardized (unconditional) skewness is the third central moment about the mean. Standardized (unconditional) coskewness of the i^{th} asset is defined as $E[\varepsilon_{i,t}\varepsilon_{M,t}^2]/(\sqrt{E[\varepsilon_{i,t}^2]}E[\varepsilon_{M,t}^2])$, where $\varepsilon_{i,t}$ is the residual from regressing i 's excess return on the excess market return, and $\varepsilon_{M,t}$ is the market return minus its unconditional average. The significance levels are computed by generating the statistics 10,000 times simulating it under the null using a standard normal distribution for skewness and a bivariate standard normal distribution for coskewness.

Interpretation: With 366 observations (i.e., the number of months between July 1963 and December 1993), skewness is significant approximately at ± 0.331 at the 1% level, ± 0.250 at the 5% level, and ± 0.193 at the 10% level; and coskewness is significant at ± 0.233 at the 1% level, ± 0.177 at the 5% level, and ± 0.149 at the 10% level.

2 Test Assets and Summary Statistics

In this section, we replicate Table 1 in the paper for other portfolio groups.

All portfolio groups used in this Internet Appendix are value-weighted. The groups that are constructed from multivariate sorts use as cutoffs only the values for the NYSE stocks. Independent sorts are used in all portfolio groups except the 27 Carhart portfolios, which are constructed using dependent sorts. The portfolio groups are:

- 32 industry portfolios, constructed by taking the industry names from Panel A in Table I in Harvey and Siddique (2000) and identifying the industry by its SIC code classification. The only industry that we could not identify is “Distributors,” which we replaced by “Other.”
- 30 Fama-French industry portfolios, from Ken French’s online data library.
- 10 Fama-French portfolios sorted on size (market value of equity), from Ken French’s online data library.
- 10 Fama-French portfolios sorted on momentum (past return performance between months $t - 12$ and $t - 2$), from Ken French’s online data library.
- 25 Fama-French portfolios sorted on size and book-to-market (B/M), from Ken French’s online data library.
- 25 Fama-French portfolios sorted on size and momentum, from Ken French’s online data library.
- 25 portfolios sorted on size and the coskewness measure in Equation (15) in the paper.
- 27 Carhart portfolios with dependent sorts on B/M, size, and momentum. To construct these portfolios, we sort all stocks into terciles, first by B/M, then by size, then by momentum.¹

¹We construct our own book-to-market variable from Compustat data, using the methodology in Davis *et al.* (2000). The portfolios are constructed at the end of every month, using the last known book equity value and the current market equity value.

Table IA.3: Properties of 32 Industry Portfolios as in Harvey and Siddique (2000)

Panel A. Sample Period 1963 to 1993, Original Results										
Industry	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)	
Aerospace, aircraft	-0.118	-0.087	0.069	1.196**	-0.015	Yes	0.562	1.241**	6.421	
Agriculture and forestry	0.592**	-0.075	0.128	1.100**	-0.016	No	0.462	1.119**	9.920	
Auto and gas retailers	0.363**	0.074	0.089	1.195**	-0.012	Yes	1.430	1.226**	9.205	
Beverages	-0.166	0.109**	0.310**	0.981**	-0.006	No	0.800	0.961**	5.150	
Building and construction	0.037	0.103**	-0.058	1.223**	-0.010	No	0.467	1.278**	6.257	
Chemicals	-0.258**	-0.003	0.043	0.953**	-0.010	Yes	0.402	0.976**	4.723	
Computers and electronics	-0.140	0.103**	0.079	1.040**	-0.008	Yes	0.377	1.065**	5.355	
Depository financial inst's	0.129	0.140**	0.182	1.111**	-0.005	Yes	0.342	1.120**	6.432	
Electric and water	0.462	0.184**	0.193**	0.612**	0.002	No	0.251	0.595**	4.085	
Engin.-Prim. metals, mach.	-0.364**	-0.157**	-0.230*	1.058**	-0.013*	Yes	0.363	1.129**	5.551	
Extractive	-0.305**	-0.102**	-0.518**	0.745**	-0.013*	Yes	0.642	0.834**	5.414	
Food manufacturers	0.081	-0.012	0.167	0.854**	-0.009	Yes	0.641	0.848**	4.638	
Food retailers	0.715**	-0.005	0.051	0.900**	-0.009	No	0.455	0.909**	5.429	
General retailers	-0.143	-0.139**	0.382**	1.174**	-0.018**	No	0.593	1.151**	6.060	
Healthcare	0.112	0.136**	0.198	1.469**	-0.005	Yes	0.952	1.465**	9.597	
Holding and investment co's	-0.171	0.089	-0.200*	0.888**	-0.006	No	0.486	0.952**	4.512	
Household goods	0.075	0.118**	0.145	1.095**	-0.005	No	0.574	1.111**	5.865	
Leisure and hotels	-0.436**	-0.212**	0.482**	1.381**	-0.023**	Yes	0.889	1.351**	7.163	
Media	-0.194	-0.163**	0.158	1.155**	-0.018**	Yes	0.801	1.175**	6.214	
Nondep. financial inst's	0.283**	0.280**	0.168	1.124**	-0.000	Yes	0.530	1.135**	6.023	
Oil and gas	-0.016	-0.032	-0.738**	0.746**	-0.010	No	0.499	0.879**	5.276	
Oil and gas transportation	0.118	0.045	-0.488**	0.725**	-0.006	Yes	0.408	0.824**	4.605	
Distributors	-0.293**	-0.058	-0.053	1.174**	-0.014*	No	0.583	1.223**	6.258	
Paper, pulp, and printing	0.476**	0.063	-0.078	1.010**	-0.009	Yes	1.071	1.056**	6.644	
Pharmaceuticals	-0.129	0.009	-0.269*	1.033**	-0.010	Yes	0.486	1.099**	5.756	
Property	0.173	-0.068	0.069	1.263**	-0.017	Yes	0.327	1.312**	7.830	
Support services	-0.014	0.078	0.078	1.273**	-0.012	No	0.609	1.309**	6.628	
Telecommunications	0.068	0.002	0.110	0.572**	-0.004	No	0.356	0.573**	4.087	
Textiles and apparel	-0.284**	-0.204**	0.127	1.130**	-0.019**	No	0.570	1.148**	6.162	
Tobacco	0.018	0.077	0.128	0.888**	-0.006	Yes	0.994	0.891**	5.683	
Transportation	-0.178	-0.020	-0.077	1.147**	-0.012	No	0.446	1.196**	6.265	
Vehicles	0.052	-0.230*	0.221	0.934**	-0.020**	No	0.461	0.941**	5.914	
Corr. with Ave.Ret.	-0.143	-0.067	0.207	0.288	-0.161			0.260	0.348	

Panel B. Sample Period 1963 to 1993, Replication Results										
Industry	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)	
Aerospace, aircraft	0.032	-0.134	0.394**	1.122***	-0.020**	Yes	0.623	1.240***	6.993	
Agriculture and forestry	0.532***	-0.209**	0.346*	0.978***	-0.029***	No	0.340	1.094***	8.726	
Auto and gas retailers	-0.005	0.060	0.476***	1.114***	-0.010	Yes	0.710	1.225***	6.693	
Beverages	-0.070	0.096	0.362***	0.847***	-0.006	No	0.777	0.924***	5.270	
Building and construction	-0.269**	-0.138	0.348**	1.091***	-0.017**	No	0.396	1.206***	5.936	
Chemicals	-0.143	0.115	0.233**	0.896***	-0.008	Yes	0.398	1.002***	4.855	
Computers and electronics	-0.114	0.107	0.407***	1.004***	-0.009	Yes	0.351	1.106***	5.494	
Depository financial inst's	0.120	0.124	0.362**	0.914***	-0.005	No	0.370	1.000***	6.014	
Electric and water	0.413***	0.207**	0.101	0.533***	0.001	No	0.285	0.601***	4.120	
Engin.-Prim. metals, mach.	-0.403***	-0.127	0.284**	1.012***	-0.015**	Yes	0.350	1.130***	5.484	
Extractive	-0.316**	-0.114	0.530***	0.941***	-0.016**	No	0.480	1.034***	5.964	
Food manufacturers	0.189	0.008	0.100	0.753***	-0.009	No	0.610	0.850***	4.684	
Food retailers	0.130	0.010	0.220*	0.805***	-0.009	No	0.550	0.894***	4.997	
General retailers	-0.177	-0.149*	0.334**	1.059***	-0.018**	No	0.591	1.165***	6.026	
Healthcare	0.055	0.069	0.427*	1.304***	-0.012	Yes	0.867	1.470***	9.655	
Holding and investment co's	-0.317**	0.011	0.261**	0.943***	-0.011*	No	0.553	1.051***	5.073	
Household goods	-0.322**	-0.227**	0.399***	1.091***	-0.021***	No	0.587	1.195***	6.161	
Leisure and hotels	-0.405***	-0.219**	0.652***	1.253***	-0.024***	No	0.867	1.356***	7.127	
Media	-0.090	-0.077	0.428***	1.063***	-0.015**	No	0.859	1.167***	6.121	
Nondep. financial inst's	0.110	0.149*	0.171	0.948***	-0.006	Yes	0.536	1.069***	5.671	
Oil and gas	0.243*	0.008	0.415***	0.735***	-0.008	No	0.592	0.797***	5.249	
Oil and gas transportation	0.152	0.041	0.349***	0.734***	-0.007	Yes	0.447	0.806***	4.606	
Other	-0.235*	0.006	0.430***	1.008***	-0.012*	Yes	0.418	1.105***	5.485	
Paper, pulp, and printing	-0.118	-0.006	0.257*	0.981***	-0.012*	No	0.504	1.091***	5.557	
Pharmaceuticals	0.332**	0.179**	0.223*	0.829***	-0.003	Yes	0.567	0.931***	5.299	
Property	0.331**	-0.130	0.655***	1.241***	-0.022**	Yes	0.223	1.346***	7.810	
Support services	0.049	0.159*	0.356**	1.225***	-0.008	Yes	0.608	1.375***	7.125	
Telecommunications	0.035	0.086	0.050	0.506***	-0.003	No	0.408	0.572***	4.143	
Textiles and apparel	-0.370**	-0.230**	0.322**	1.050***	-0.022**	No	0.584	1.163***	6.278	
Tobacco	0.057	0.115	-0.085	0.710***	-0.003	No	0.894	0.825***	5.513	
Transportation	-0.178	-0.065	0.323**	1.093***	-0.015*	No	0.450	1.206***	6.417	
Vehicles	-0.011	-0.181**	0.143	0.898***	-0.018**	No	0.446	1.004***	5.810	
Corr. with Ave.Ret.	-0.197	0.011	0.041	0.231	0.004			0.245	0.257	

(Continued)

Table IA.3: (Continued)

Panel C. Sample Period 1994 to 2019, Post-Sample Results

Industry	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Aerospace, aircraft	-0.789***	-0.045	0.059	0.987***	-0.035***	No	1.061	0.908***	5.721
Agriculture and forestry	-0.089	-0.169*	-0.141	0.779***	-0.043***	No	0.975	0.776***	6.200
Auto and gas retailers	0.083	-0.001	-0.084	0.884***	-0.031***	No	1.137	0.865***	5.587
Beverages	-0.596***	-0.272***	0.318***	0.596***	-0.036***	Yes	0.745	0.498***	4.505
Building and construction	-0.260*	0.065	-0.514***	1.233***	-0.042***	No	0.542	1.302***	6.946
Chemicals	-0.266*	0.102	0.047	0.772***	-0.022***	No	0.719	0.730***	4.064
Computers and electronics	-0.483***	0.135	-1.121***	1.176***	-0.040***	No	0.991	1.368***	6.940
Depository financial inst's	-0.666***	0.024	0.234	1.210***	-0.036***	Yes	0.735	1.058***	6.531
Electric and water	-0.384***	-0.038	0.271***	0.460***	-0.016**	No	0.615	0.396***	3.993
Engin.-Prim. metals, mach.	-0.534***	0.068	-0.306**	1.233***	-0.041***	Yes	0.641	1.249***	6.082
Extractive	-0.011	0.009	0.123	1.093***	-0.037***	No	0.605	1.054***	7.504
Food manufacturers	-0.005	-0.058	0.215**	0.496***	-0.018**	No	0.739	0.974***	3.747
Food retailers	-0.325**	-0.014	0.004	0.636***	-0.022***	No	0.492	0.592***	4.535
General retailers	-0.281**	0.112	-0.284***	0.832**	-0.024**	No	0.692	0.837***	4.622
Healthcare	-0.391***	-0.059	0.320**	0.850***	-0.032***	No	0.632	0.753***	5.844
Holding and investment co's	-0.243*	0.098	0.165	1.071***	-0.027***	No	0.548	0.957***	5.725
Household goods	0.027	0.037	-0.114	1.108***	-0.036***	No	0.470	1.075***	6.018
Leisure and hotels	-0.622***	-0.126	-0.234**	0.976**	-0.041**	No	0.771	0.974***	5.056
Media	-0.389***	0.025	-0.453***	1.021***	-0.037***	No	0.727	1.081***	5.465
Nondep. financial inst's	-0.549***	-0.118	-0.077	1.153***	-0.044***	No	0.703	1.088***	5.437
Oil and gas	0.083	0.018	0.072	0.745***	-0.023**	Yes	0.855	0.685***	5.333
Oil and gas transportation	-0.463***	0.016	0.207	0.771***	-0.025**	Yes	0.646	0.724***	5.578
Other	-0.618***	-0.131	-0.461***	0.910***	-0.040***	Yes	0.809	0.987***	4.802
Paper, pulp, and printing	0.044	0.084	-0.019	0.976**	-0.029***	Yes	0.544	0.932***	5.149
Pharmaceuticals	-0.173	-0.019	-0.045	0.661***	-0.024**	Yes	0.873	0.636***	4.392
Property	-0.173	0.010	-0.151	1.187***	-0.042**	Yes	0.486	1.198***	7.118
Support services	-0.179	0.109	-1.144***	1.233***	-0.041***	Yes	1.010	1.335***	6.802
Telecommunications	0.052	0.020	-0.634***	0.774**	-0.029***	No	0.439	0.861***	5.565
Textiles and apparel	-0.399***	-0.062	-0.148	1.110***	-0.042***	No	0.509	1.067***	6.296
Tobacco	-0.047	0.063	0.197	0.570**	-0.011	No	1.106	0.500***	6.815
Transportation	-0.307**	0.122	-0.049	0.999***	-0.026**	No	0.674	0.946***	5.385
Vehicles	0.306**	0.149	-0.211	1.290***	-0.034**	Yes	0.477	1.266***	6.922
Corr. with Ave.Ret.	-0.148	-0.131	-0.144	-0.221	0.062			-0.141	0.013

Panel D. Sample Period 1963 to 2019, Extended-Sample Results

Industry	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Aerospace, aircraft	-0.238**	-0.073	0.224**	1.068***	-0.025***	No	0.825	1.092***	6.438
Agriculture and forestry	0.379***	-0.179***	0.096	0.898***	-0.034***	No	0.637	0.953***	7.649
Auto and gas retailers	0.021	0.055	0.192*	1.022***	-0.018***	Yes	0.907	1.065***	6.208
Beverages	-0.239**	-0.049	0.342***	0.746**	-0.017***	No	0.762	0.733***	4.929
Building and construction	-0.273***	-0.029	-0.087	1.147***	-0.026***	Yes	0.463	1.247***	6.416
Chemicals	-0.185**	0.135**	0.139*	0.846***	-0.013***	No	0.545	0.880***	4.508
Computers and electronics	-0.338***	0.094	-0.368***	1.073***	-0.020***	Yes	0.645	1.222***	6.205
Depository financial inst's	-0.292***	0.072	0.297***	1.032***	-0.016**	Yes	0.538	1.025***	6.255
Electric and water	0.066	0.104	0.187***	0.503***	-0.005	No	0.437	0.509***	4.063
Engin.-Prim. metals, mach.	-0.477***	-0.039	-0.014	1.102***	-0.024***	No	0.484	1.182***	5.764
Extractive	-0.136	-0.044	0.325***	1.002***	-0.023***	No	0.537	1.041***	6.712
Food manufacturers	0.148	0.015	0.159**	0.650**	-0.012***	Yes	0.669	0.657***	4.276
Food retailers	-0.036	0.023	0.113	0.736***	-0.013***	No	0.523	0.758***	4.787
General retailers	-0.194**	-0.006	0.022	0.968***	-0.020***	No	0.638	1.018***	5.422
Healthcare	0.024	0.051	0.375***	1.112***	-0.019**	No	0.748	1.134***	7.948
Holding and investment co's	-0.289***	0.070	0.214**	0.994**	-0.017**	No	0.550	1.008***	5.379
Household goods	-0.165*	-0.083	0.142	1.097***	-0.026**	No	0.534	1.139***	6.091
Leisure and hotels	-0.440***	-0.146**	0.206**	1.141***	-0.030***	No	0.822	1.184***	6.256
Media	-0.191**	-0.025	-0.015	1.045***	-0.023**	No	0.798	1.126***	5.825
Nondep. financial inst's	-0.172*	0.036	0.047	1.030***	-0.019**	Yes	0.613	1.076***	5.561
Oil and gas	0.167*	0.020	0.242***	0.739***	-0.013**	No	0.713	0.746***	5.285
Oil and gas transportation	-0.232**	0.032	0.278***	0.749**	-0.013**	No	0.539	0.769***	5.074
Other	-0.379***	-0.039	-0.021	0.969**	-0.022***	Yes	0.598	1.052***	5.182
Paper, pulp, and printing	-0.046	0.053	0.119	0.978**	-0.018**	Yes	0.522	1.019***	5.369
Pharmaceuticals	0.170*	0.111*	0.088	0.761***	-0.010**	Yes	0.708	0.800***	4.901
Property	0.134	-0.060	0.247**	1.219***	-0.029**	Yes	0.344	1.279***	7.495
Support services	-0.049	0.140**	-0.403***	1.184***	-0.020***	No	0.793	1.356***	6.976
Telecommunications	0.020	0.031	-0.294***	0.613***	-0.012**	Yes	0.422	0.699***	4.845
Textiles and apparel	-0.383***	-0.137**	0.086	1.073***	-0.029**	No	0.549	1.118***	6.282
Tobacco	-0.014	0.099	0.058	0.654***	-0.006	No	0.991	0.680***	6.143
Transportation	-0.219**	0.038	0.135	1.055***	-0.019**	No	0.553	1.089***	5.961
Vehicles	0.166*	-0.039	-0.034	1.055***	-0.024**	Yes	0.460	1.118***	6.341
Corr. with Ave.Ret.	0.017	0.089	0.051	-0.024	0.112			-0.029	0.155

(Continued)

Table IA.3: (Continued)

Panel E. Sample Period 1926 to 1963, Pre-Sample Results

Industry	Std. Skew.	Std. Cosk.	β to HS	β to HS^-	β to MKT^2	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Aerospace, aircraft	0.977***	0.022	-1.614***	1.376***	0.016***	No	1.542	1.413***	12.054
Agriculture and forestry	2.158***	0.123	-0.239	0.201	0.045	No	1.436	0.311	8.342
Auto and gas retailers	0.889***	-0.220***	-0.902***	0.861***	0.006**	Yes	0.913	0.798***	7.970
Beverages	1.860***	-0.162**	-1.300***	1.101***	0.009***	Yes	1.225	1.060***	9.479
Building and construction	1.498***	0.627***	-1.455***	1.229***	0.018***	Yes	0.926	1.153***	8.237
Chemicals	0.591***	0.114	-1.124***	1.035**	0.012**	Yes	1.077	1.012***	7.079
Computers and electronics	0.769***	0.350**	-1.375***	1.349***	0.016**	Yes	1.144	1.287***	8.857
Depository financial inst's	1.048***	-0.331***	-0.646***	0.767***	-0.018***	No	1.004	0.725***	6.487
Electric and water	0.214*	-0.346***	-0.834***	0.986***	0.007***	No	0.812	0.942***	7.259
Engin.-Prim. metals, mach.	1.638***	1.276***	-1.768***	1.370***	0.022***	No	0.976	1.293***	8.836
Extractive	0.675***	0.234**	-1.142***	0.984**	0.014**	No	1.290	0.950***	8.495
Food manufacturers	-0.074	-0.410***	-0.667***	0.823***	0.006**	Yes	0.767	0.752***	5.325
Food retailers	-0.116	-0.508***	-0.721***	0.873***	0.004	Yes	0.962	0.814***	6.808
General retailers	0.236*	-0.073	-0.879***	0.946***	0.009***	Yes	0.718	0.869***	6.355
Holding and investment co's	0.725***	0.121	-1.437***	1.417***	0.016**	Yes	0.889	1.336**	9.510
Household goods	0.576**	-0.159**	-0.960***	0.735**	0.007**	Yes	0.691	0.735**	6.190
Leisure and hotels	0.415**	-0.037	-1.438***	1.387**	0.014**	Yes	0.870	1.271**	9.654
Media	0.737***	0.171**	-1.286***	1.192**	0.014**	Yes	0.855	1.047**	8.933
Nondep. financial inst's	0.624***	0.065	-1.117***	1.201**	0.013**	Yes	1.160	1.118**	8.333
Oil and gas	0.387**	-0.072	-0.962***	0.968**	0.009**	Yes	0.930	0.910**	6.973
Oil and gas transportation	-0.228**	-0.499***	-0.644**	0.843**	0.004*	No	0.801	0.802**	6.509
Other	1.316***	0.608***	-1.627***	1.344**	0.020**	Yes	1.135	1.275**	9.175
Paper, pulp, and printing	1.014**	0.288**	-1.770***	1.478**	0.018**	No	0.952	1.366**	10.297
Pharmaceuticals	0.272**	0.084	-0.761**	0.941**	0.010**	Yes	1.009	0.847**	6.689
Property	1.023***	0.000	-1.722***	1.403**	0.014**	No	0.748	1.283**	11.727
Support services	1.113***	-0.580***	-0.929**	0.990**	0.000	Yes	0.870	0.940**	9.672
Telecommunications	0.234**	-0.366***	-0.493**	0.614**	0.004**	Yes	0.730	0.576**	4.580
Textiles and apparel	1.669***	0.871**	-1.581**	1.241**	0.021**	Yes	0.782	1.166**	8.508
Tobacco	0.156	0.080	-0.629**	0.693**	0.007**	Yes	0.747	0.613**	5.530
Transportation	0.135	-0.571***	-1.042**	1.046**	0.002	No	0.772	0.934**	8.696
Vehicles	1.282**	0.561**	-1.693***	1.342**	0.019**	No	1.258	1.282**	9.173
Corr. with Ave.Ret.	0.484	0.256	-0.144	0.053	0.479			0.162	0.443

Description: The table summarizes properties of 32 industry portfolios constructed as in Harvey and Siddique (2000). Standardized (unconditional) skewness is the third central moment about the mean. Standardized (unconditional) coskewness of the i^{th} asset is defined as $E[\varepsilon_{i,t}\varepsilon_{M,t}^2]/(\sqrt{E[\varepsilon_{i,t}^2]}E[\varepsilon_{M,t}^2])$, where $\varepsilon_{i,t}$ is the residual from regressing i 's excess return on the excess market return, and $\varepsilon_{M,t}$ is the market return minus its unconditional average. Time-variation in conditional coskewness is captured through the autoregression $E_t[\varepsilon_{i,t+1}\varepsilon_{M,t+1}^2] = \rho_0 + \rho_1\varepsilon_{i,t}\varepsilon_{M,t}^2 + \rho_2\varepsilon_{i,t-1}\varepsilon_{M,t-1}^2$ and whether it is significant at 10% level (i.e., the p-value of the joint test of zero coefficients is below 10%). The coskewness factors are the long-short portfolios $HS = S^- - S^+$ and $HS^- = S^- - r_f$, where S^- (S^+) is the portfolio of the 30% of stocks with the lowest (highest) past standardized coskewness, and r_f is the one-month Treasury bill rate. We also report cross-sectional correlations between the average excess return and other variables. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels. For the original results, 3-star significance is not available.

Interpretation: Theory predicts that a portfolio's average (excess) return should be negatively correlated to the portfolio's (i) standardized coskewness, (ii) beta on $HS = S^- - S^+$, and (iii) beta on $HS^- = S^- - r_f$. For the replication sample period (1963 to 1993), the replicated results in Panel B are qualitatively similar to Harvey and Siddique (2000)'s original results in Panel A: Results (i)-(iii) do not hold, as the corresponding estimates are either positive or close to zero (and thus likely to be insignificant). Results (i)-(iii) also do not hold in the extended sample period (1963 to 2019) but hold for the post-sample period (1994 to 2019), while in the pre-sample period (1926 to 1963) only Result (ii) holds.

Table IA.4: Properties of the 30 Fama-French Industry Portfolios

Panel A. Sample Period 1963 to 1993									
Industry	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	AvE.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Food	0.108	0.048	0.159	0.780***	-0.008	No	0.635	0.873***	4.706
Beer	0.159	0.032	0.384***	0.872***	-0.009	Yes	0.729	0.954***	5.450
Smoke	0.150	0.094	-0.067	0.690***	-0.004	No	0.869	0.799***	5.451
Games	-0.266**	-0.123	0.670***	1.249***	-0.020**	Yes	0.734	1.351***	7.270
Books	-0.187	-0.112	0.403***	1.029***	-0.016**	Yes	0.636	1.129***	5.832
Hshld	-0.283**	0.047	0.327***	0.892***	-0.009	No	0.419	0.982***	5.021
Ciths	-0.012	-0.099	0.369**	1.110***	-0.018**	No	0.608	1.221***	6.749
Hlth	0.178	0.155*	0.242*	0.860***	-0.005	Yes	0.579	0.965***	5.277
Chem	-0.168	0.029	0.256**	0.954***	-0.010	No	0.401	1.064***	5.365
Txtls	-0.467***	-0.341***	0.382***	1.004***	-0.027***	No	0.749	1.102***	6.227
Cnstr	0.003	0.147	0.375***	1.122***	-0.009	No	0.502	1.240***	5.990
Steel	-0.121	-0.114	0.244*	0.970***	-0.017**	Yes	0.232	1.085***	6.215
FabPr	-0.334***	-0.085	0.347**	1.043***	-0.015**	No	0.393	1.159***	5.706
ElcEq	-0.097	0.095	0.349**	1.080***	-0.010	No	0.644	1.198***	6.133
Autos	-0.077	-0.200**	0.141	0.902***	-0.019***	No	0.441	1.008***	5.903
Carry	-0.074	-0.150*	0.406**	1.114***	-0.020**	Yes	0.583	1.228***	6.661
Mines	-0.204	-0.128	0.538***	0.874***	-0.018**	Yes	0.566	0.955***	7.100
Coal	0.607***	0.138	0.421**	0.998***	-0.002	Yes	0.475	1.112***	7.911
Oil	0.130	-0.035	0.446***	0.774***	-0.010	No	0.515	0.840***	5.284
Util	0.321**	0.241***	0.199**	0.560***	0.001	No	0.325	0.621***	3.943
Tele	-0.033	0.074	0.103	0.568***	-0.004	No	0.462	0.637***	4.090
Servs	-0.093	0.054	0.379**	1.196***	-0.012	Yes	0.604	1.335***	6.645
BusEq	-0.061	0.070	0.448***	1.005***	-0.009	Yes	0.330	1.105***	5.724
Paper	-0.155	-0.014	0.219*	0.906***	-0.011*	Yes	0.463	1.010***	5.071
Trans	-0.223*	-0.075	0.307**	1.086***	-0.016**	No	0.504	1.200***	6.287
Whlsl	-0.277**	-0.067	0.356**	1.105***	-0.015**	No	0.719	1.237***	6.250
Rtail	-0.154	-0.132	0.299**	1.002***	-0.016**	No	0.598	1.103***	5.780
Meals	-0.498***	-0.215**	0.495***	1.199***	-0.024**	No	0.824	1.312***	7.080
Fin	-0.116	0.149*	0.259**	0.964***	-0.008	Yes	0.492	1.075***	5.293
Other	-0.278**	-0.038	0.366**	1.086***	-0.014*	No	0.376	1.211***	5.982
Corr. with Ave.Ret.	-0.150	-0.280	0.129	0.216	-0.294			0.211	0.303

Panel B. Sample Period 1994 to 2019									
Industry	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	AvE.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Food	-0.271**	-0.059	0.174**	0.554***	-0.020**	No	0.675	0.483***	3.669
Beer	-0.438***	-0.270***	0.312***	0.574***	-0.036**	No	0.768	0.479***	4.624
Smoke	-0.226*	0.044	0.083	0.522***	-0.012	No	1.057	0.482***	6.783
Games	-0.354**	-0.052	-0.350**	1.279***	-0.050**	Yes	0.863	1.291***	6.956
Books	0.228*	0.194**	-0.141	1.058***	-0.025**	No	0.313	1.035***	5.698
Hshld	-0.379***	-0.054	0.101	0.619***	-0.023**	Yes	0.677	0.573***	4.061
Ciths	-0.188	0.001	-0.082	1.014***	-0.034***	No	0.909	0.962***	6.032
Hlth	-0.383***	-0.057	-0.014	0.692***	-0.027***	Yes	0.834	0.661***	4.185
Chem	-0.125	0.156	-0.125	1.072***	-0.028***	No	0.731	1.044***	5.708
Txtls	0.857***	0.107	0.048	1.275***	-0.031**	Yes	0.456	1.206***	8.160
Cnstr	-0.476***	0.004	-0.142	1.164***	-0.040**	No	0.669	1.134***	6.089
Steel	-0.180	0.029	-0.498**	1.560***	-0.055**	No	0.461	1.630***	8.578
FabPr	-0.457***	0.045	-0.384**	1.305***	-0.045**	No	0.881	1.333***	6.689
ElcEq	-0.309**	0.139	-0.410***	1.230***	-0.037***	Yes	0.929	1.252***	6.328
Autos	0.396***	0.124	-0.206	1.338***	-0.036**	No	0.448	1.314***	7.628
Carry	-0.664***	0.008	-0.003	1.067***	-0.035**	No	1.043	0.994***	5.934
Mines	-0.074	0.003	-0.101	0.999***	-0.036**	No	0.509	1.027***	8.028
Coal	0.048	0.087	0.138	1.254***	-0.027	Yes	0.763	1.244***	12.593
Oil	-0.073	0.022	0.087	0.862***	-0.027***	No	0.650	0.809***	5.662
Util	-0.569***	-0.008	0.268***	0.449***	-0.014**	Yes	0.624	0.386***	3.966
Tele	-0.286**	0.028	-0.473***	0.891***	-0.032***	No	0.523	0.942***	5.084
Servs	-0.190	0.119	-1.014***	1.074***	-0.038***	Yes	0.926	1.251***	6.268
BusEq	-0.476***	0.099	-1.236***	1.256***	-0.045**	No	1.038	1.478***	7.683
Paper	-0.120	0.084	0.001	0.936***	-0.027***	No	0.628	0.883***	4.986
Trans	-0.385***	0.125	-0.034	0.966***	-0.025**	No	0.656	0.910***	5.141
Whlsl	-0.631***	-0.140	-0.085	0.882***	-0.037***	No	0.564	0.870***	4.643
Rtail	-0.223	0.106	-0.277**	0.850***	-0.024***	No	0.810	0.849***	4.820
Meals	-0.446***	-0.044	-0.008	0.741***	-0.027***	No	0.820	0.694***	4.507
Fin	-0.680***	-0.032	0.064	1.156***	-0.039**	Yes	0.758	1.056***	5.480
Other	-0.532***	0.013	-0.244*	0.948***	-0.033**	Yes	0.282	0.946***	5.447
Corr. with Ave.Ret.	-0.400	-0.086	-0.206	-0.095	-0.024			-0.043	0.009

(Continued)

Table IA.4: (Continued)

Panel C. Sample Period 1963 to 2019

Industry	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Food	0.024	0.034	0.168**	0.689***	-0.012***	No	0.654	0.698***	4.257
Beer	-0.032	-0.078	0.349***	0.752***	-0.018***	Yes	0.747	0.741***	5.083
Smoke	-0.092	0.079	0.010	0.622***	-0.007	No	0.956	0.657***	6.096
Games	-0.302***	-0.086	0.155	1.260***	-0.030***	Yes	0.794	1.323***	7.123
Books	0.001	0.048	0.131	1.040***	-0.019***	No	0.487	1.084***	5.768
Hshld	-0.313***	0.033	0.213***	0.782***	-0.014***	No	0.538	0.800***	4.602
Ciths	-0.078	-0.035	0.140	1.071***	-0.023***	No	0.746	1.105***	6.426
Hlth	0.016	0.086	0.113	0.792***	-0.012**	Yes	0.696	0.829***	4.804
Chem	-0.146	0.096	0.063	1.001***	-0.017***	No	0.552	1.054***	5.524
Txtls	0.378***	-0.087	0.216*	1.111***	-0.028***	Yes	0.614	1.145***	7.177
Cnstr	-0.225**	0.075	0.114	1.138***	-0.020***	Yes	0.579	1.191***	6.032
Steel	-0.175*	-0.072	-0.131	1.207***	-0.030***	Yes	0.337	1.326***	7.392
FabPr	-0.404***	-0.031	-0.024	1.148***	-0.025***	No	0.617	1.236***	6.178
ElcEq	-0.201**	0.111*	-0.035	1.140***	-0.019***	Yes	0.775	1.221***	6.221
Autos	0.217**	-0.049	-0.033	1.076***	-0.025***	No	0.444	1.142***	6.746
Carry	-0.302***	-0.060	0.198*	1.095***	-0.025***	No	0.795	1.124***	6.336
Mines	-0.142	-0.066	0.216*	0.923***	-0.025***	No	0.539	0.985***	7.536
Coal	0.183**	0.098	0.278	1.100***	-0.011	Yes	0.607	1.170***	10.325
Oil	0.021	-0.005	0.265***	0.809***	-0.016***	No	0.577	0.825***	5.458
Util	-0.093	0.131**	0.234***	0.516***	-0.004	No	0.462	0.516***	3.954
Telec	-0.213**	0.025	-0.187**	0.697***	-0.014***	No	0.490	0.771***	4.571
Servs	-0.133	0.092	-0.326***	1.147***	-0.021***	No	0.752	1.297***	6.472
BusEq	-0.328***	0.054	-0.406***	1.106***	-0.022***	No	0.656	1.271***	6.701
Paper	-0.138	0.050	0.109	0.917***	-0.017***	Yes	0.539	0.952***	5.029
Trans	-0.269***	0.038	0.135	1.037***	-0.019***	No	0.574	1.070***	5.784
Whlsl	-0.342***	-0.059	0.135	1.015***	-0.023***	No	0.648	1.072***	5.565
Rtail	-0.173*	-0.001	0.008	0.941***	-0.019***	No	0.696	0.989***	5.357
Meals	-0.485***	-0.093	0.242**	1.014***	-0.025***	No	0.822	1.036***	6.030
Fin	-0.393***	0.056	0.161*	1.041***	-0.019***	Yes	0.614	1.066***	5.378
Other	-0.368***	0.014	0.060	1.030***	-0.021***	Yes	0.333	1.091***	5.738
Corr. with Ave.Ret.	-0.106	-0.049	0.067	-0.013	0.030			-0.033	0.060

Panel D. Sample Period 1926 to 1963

Industry	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Food	0.078	-0.316***	-0.681***	0.834***	0.007***	Yes	0.757	0.758***	5.349
Beer	1.899***	-0.153*	-1.302***	1.104***	0.009***	Yes	1.208	1.063***	9.496
Smoke	0.133	0.037	-0.610***	0.683***	0.007***	Yes	0.738	0.606***	5.347
Games	0.973***	0.363***	-1.665***	1.574***	0.021***	Yes	1.007	1.434***	11.107
Books	0.661**	0.312***	-1.494***	1.243***	0.016***	No	0.825	1.119***	8.846
Hshld	0.593***	0.005	-0.916***	1.001***	0.011***	No	0.847	0.956***	7.245
Ciths	1.120***	0.011	-0.910***	0.624***	0.007***	No	0.579	0.615***	5.567
Hlth	0.113	-0.031	-0.747***	0.927***	0.009***	Yes	0.988	0.837***	6.526
Chem	0.542***	0.131	-1.184***	1.049***	0.012***	Yes	1.111	1.032***	7.314
Txtls	1.458***	0.756***	-1.539***	1.205***	0.019***	Yes	0.804	1.137***	8.399
Cnstr	0.634***	0.017	-1.379***	1.243***	0.013***	No	0.831	1.159***	8.002
Steel	2.084***	1.351***	-2.003***	1.479***	0.027***	No	1.056	1.390***	9.848
FabPr	0.851***	0.418***	-1.660***	1.308***	0.016***	No	1.049	1.249***	8.574
ElcEq	0.849***	0.387***	-1.413***	1.392***	0.018***	Yes	1.079	1.326***	9.279
Autos	1.498***	0.671***	-1.739***	1.375***	0.021***	No	1.340	1.320***	9.492
Carry	0.803***	0.190**	-1.585***	1.302***	0.015***	No	0.981	1.230***	9.157
Mines	0.726***	0.127	-0.916***	0.940***	0.011***	Yes	0.759	0.874***	6.904
Coal	4.190***	0.918***	-2.195***	1.525***	0.030***	No	0.874	1.385***	11.456
Oil	0.387***	-0.078	-0.967***	0.968***	0.009***	Yes	0.936	0.911***	6.974
Util	0.086	-0.346***	-0.841***	0.997***	0.007***	No	0.838	0.946***	7.209
Telec	0.219*	-0.377***	-0.494***	0.618***	0.004**	Yes	0.737	0.579***	4.585
Servs	1.448***	-0.407***	-0.118	0.539***	-0.004	Yes	1.258	0.474***	10.473
BusEq	-0.808	-0.480***	-0.949***	1.009***	0.007***	Yes	1.215	0.941***	6.852
Paper	0.510***	0.103	-1.033***	1.004***	0.011***	Yes	1.055	0.948***	6.932
Trans	1.564***	0.579***	-1.607***	1.312***	0.018***	Yes	0.763	1.180***	8.665
Whlsl	0.928***	0.148**	-1.423***	1.189***	0.014***	Yes	0.416	1.100***	9.341
Rtail	0.169	-0.211***	-0.944***	1.007***	0.009***	Yes	0.883	0.940***	6.780
Meals	-0.216*	-0.927***	-0.888***	0.921***	0.000	No	0.764	0.866***	7.057
Fin	0.808***	0.262***	-1.283***	1.318***	0.015***	Yes	0.947	1.225***	8.447
Other	0.715***	0.139*	-1.150***	1.068***	0.013***	Yes	0.797	1.035***	8.048
Corr. with Ave.Ret.	0.152	0.108	-0.110	0.224	0.083			0.250	0.381

(Continued)

Table IA.4: (Continued)

Description: The table summarizes properties of the 30 Fama-French industry portfolios. Standardized (unconditional) skewness is the third central moment about the mean. Standardized (unconditional) coskewness of the i^{th} asset is defined as $E[\varepsilon_{i,t}\varepsilon_{M,t}^2]/(\sqrt{E[\varepsilon_{i,t}^2]}E[\varepsilon_{M,t}^2])$, where $\varepsilon_{i,t}$ is the residual from regressing i 's excess return on the excess market return, and $\varepsilon_{M,t}$ is the market return minus its unconditional average. Time-variation in conditional coskewness is captured through the autoregression $E_t[\varepsilon_{i,t+1}\varepsilon_{M,t+1}^2] = \rho_0 + \rho_1\varepsilon_{i,t}\varepsilon_{M,t}^2 + \rho_2\varepsilon_{i,t-1}\varepsilon_{M,t-1}^2$ and whether it is significant at 10% level (i.e., the p-value of the joint test of zero coefficients is below 10%). The coskewness factors are the long-short portfolios $HS = S^- - S^+$ and $HS^- = S^- - r_f$, where S^- (S^+) is the portfolio of the 30% of stocks with the lowest (highest) past standardized coskewness, and r_f is the one-month Treasury bill rate. We also report cross-sectional correlations between the average excess return and other variables. The stars indicate significance at 1% (***) , 5% (**), and 10% (*) levels.

Interpretation: Theory predicts that a portfolio's average (excess) return should be negatively correlated to the portfolio's (i) standardized coskewness, (ii) beta on $HS = S^- - S^+$, and (iii) beta on $HS^- = S^- - r_f$. For the replication sample period (1963 to 1993), only Result (i) holds, while for the extended sample period (1963 to 2019), Results (i)-(iii) do not hold, as the corresponding numbers are either positive or close to zero (and thus likely to be insignificant). Results (i)-(iii) also do not hold in the extended sample period (1963 to 2019) but hold for the post-sample period (1994 to 2019), while in the pre-sample period (1926 to 1963) only Result (ii) holds.

Table IA.5: Properties of the 10 Fama-French Portfolios Sorted on Size

Panel A. Sample Period 1963 to 1993, Original Results										
Size	Portfolio	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Smallest	1	1.156**	-0.181**	0.410**	1.011**	-0.022**	No	2.122	1.005**	7.994
	2	0.390**	-0.292**	0.249	1.026**	-0.026**	Yes	1.051	1.052**	6.992
	3	0.144	-0.302**	0.212	1.061**	-0.025**	Yes	0.702	1.096**	6.639
	4	0.112	-0.294**	0.235	1.097**	-0.024**	Yes	0.664	1.130**	6.465
	5	-0.154	-0.330**	0.162	1.107**	-0.024**	Yes	0.526	1.151**	6.253
	6	-0.213*	-0.307**	0.163	1.120**	-0.021**	Yes	0.516	1.163**	6.052
	7	-0.386**	-0.341**	0.082	1.115**	-0.021**	Yes	0.505	1.173**	5.841
	8	-0.445**	-0.312**	0.076	1.090**	-0.018**	Yes	0.574	1.145**	5.548
	9	-0.513**	0.313**	0.024	1.050**	-0.016**	Yes	0.549	1.111**	5.198
	Largest	10	-0.232*	0.236**	-0.011	0.984**	-0.007	Yes	0.437	1.044**
Corr. with Ave.Ret.		0.697	0.370	0.794	-0.358	-0.636			-0.527	0.818
Panel B. Sample Period 1963 to 1993, Replication Results										
Size	Portfolio	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Smallest	1	-0.212*	-0.335***	0.593***	1.060***	-0.027***	No	0.691	1.154***	6.460
	2	-0.370***	-0.314***	0.551***	1.115***	-0.024***	Yes	0.617	1.218***	6.193
	3	-0.391***	-0.282***	0.469***	1.110***	-0.021***	Yes	0.738	1.222***	6.028
	4	-0.514***	-0.343***	0.463***	1.088***	-0.022***	Yes	0.720	1.196***	5.840
	5	-0.555***	-0.374***	0.409***	1.052***	-0.021***	Yes	0.750	1.161***	5.550
	6	-0.461***	-0.211**	0.346***	1.021***	-0.016**	Yes	0.633	1.132***	5.340
	7	-0.348***	-0.052	0.367***	1.028***	-0.013*	Yes	0.595	1.136***	5.253
	8	-0.341***	-0.030	0.299**	0.982***	-0.012*	Yes	0.568	1.092***	5.011
	9	-0.214*	0.245***	0.258**	0.916***	-0.008	Yes	0.455	1.021***	4.656
	Largest	10	-0.135	0.313***	0.284***	0.826***	-0.006	Yes	0.336	0.914***
Corr. with Ave.Ret.		-0.767	-0.949	0.672	0.911	-0.851			0.916	0.837
Panel C. Sample Period 1994 to 2019, Post-Sample Results										
Size	Portfolio	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Smallest	1	-0.068	-0.119	-0.612***	0.940***	-0.046***	Yes	0.762	1.062***	6.003
	2	-0.126	-0.001	-0.595***	1.098***	-0.043***	No	0.823	1.205***	6.382
	3	-0.505***	-0.046	-0.451***	1.110***	-0.044***	No	0.847	1.179***	5.907
	4	-0.478***	0.011	-0.404***	1.088***	-0.040***	No	0.733	1.148***	5.674
	5	-0.474***	0.073	-0.427***	1.107***	-0.039***	Yes	0.750	1.168***	5.548
	6	-0.576***	-0.005	-0.361***	1.041***	-0.039***	No	0.785	1.093***	5.089
	7	-0.661***	-0.048	-0.406***	1.035***	-0.040***	No	0.833	1.089***	4.980
	8	-0.631***	0.019	-0.440***	1.029***	-0.038***	No	0.807	1.089***	4.913
	9	-0.750***	0.013	-0.268***	0.973***	-0.035***	Yes	0.778	0.996***	4.418
	Largest	10	-0.631***	0.095	-0.372***	0.911***	-0.032***	Yes	0.666	0.936***
Corr. with Ave.Ret.		0.084	-0.561	-0.240	0.544	-0.616			0.591	0.440
Panel D. Sample Period 1963 to 2019, Extended-Sample Results										
Size	Portfolio	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Smallest	1	-0.149	-0.231***	-0.016	1.012***	-0.034***	No	0.724	1.111***	6.249
	2	-0.253***	-0.154**	-0.028	1.108***	-0.030***	Yes	0.711	1.211***	6.277
	3	-0.441***	-0.161**	0.005	1.109***	-0.029***	Yes	0.788	1.201***	5.968
	4	-0.495***	-0.163**	0.026	1.088***	-0.028***	Yes	0.726	1.173***	5.760
	5	-0.517***	-0.155**	-0.012	1.074***	-0.027***	Yes	0.750	1.162***	5.545
	6	-0.508***	-0.106	-0.011	1.029***	-0.024***	Yes	0.703	1.113***	5.223
	7	-0.479***	-0.040	-0.024	1.030***	-0.022***	Yes	0.705	1.114***	5.127
	8	-0.470***	-0.004	-0.074	1.001***	-0.021***	Yes	0.678	1.090***	4.964
	9	-0.442***	0.142**	-0.008	0.939***	-0.018***	Yes	0.604	1.009***	4.548
	Largest	10	-0.361***	0.206***	-0.048	0.860***	-0.015***	No	0.488	0.923***
Corr. with Ave.Ret.		-0.098	-0.908	0.468	0.931	-0.823			0.936	0.823

(Continued)

Table IA.5: (Continued)

Panel E. Sample Period 1926 to 1963, Pre-Sample Results											
Size	Portfolio	Std. Skew.	Std. Cosk.	β to HS	β to HS^-	β to MKT^2	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stddev. (%/mo)	
Smallest	1	3.729***	0.855***	-2.526***	1.692***	0.035***	Yes	1.645	1.618***	13.625	
	2	2.505***	0.695***	-2.222***	1.569***	0.026***	Yes	1.372	1.497***	11.373	
	3	2.187***	0.882***	-2.010***	1.485***	0.024***	No	1.247	1.409***	10.170	
	4	2.059***	0.936***	-1.872***	1.389***	0.023***	Yes	1.240	1.310***	9.347	
	5	1.350***	0.634***	-1.705***	1.356***	0.018***	No	1.081	1.271***	8.777	
	6	1.514***	1.173***	-1.681***	1.348***	0.020***	Yes	1.201	1.263***	8.571	
	7	1.099***	0.744***	-1.531***	1.231***	0.017***	Yes	1.019	1.175***	7.948	
	8	1.248***	1.165***	-1.415***	1.198***	0.017***	Yes	0.992	1.127***	7.513	
	9	0.751***	0.671***	-1.293***	1.173***	0.014***	Yes	0.928	1.097***	7.237	
Largest	10	0.243**	-0.664***	-0.983***	0.988***	0.009***	Yes	0.821	0.929***	6.095	
Corr. with Ave.Ret.		0.988	0.463	-0.977	0.969	0.992			0.971	0.983	

Description: The table summarizes properties of the 10 Fama-French portfolios sorted on size, using as cutoffs the stocks listed on NYSE. Standardized (unconditional) skewness is the third central moment about the mean. Standardized (unconditional) coskewness of the i^{th} asset is defined as $E[\varepsilon_{i,t}\varepsilon_{M,t}^2]/(\sqrt{E[\varepsilon_{i,t}^2]}E[\varepsilon_{M,t}^2])$, where $\varepsilon_{i,t}$ is the residual from regressing i 's excess return on the excess market return, and $\varepsilon_{M,t}$ is the market return minus its unconditional average. Time-variation in conditional coskewness is captured through the autoregression $E_t[\varepsilon_{i,t+1}\varepsilon_{M,t+1}^2] = \rho_0 + \rho_1\varepsilon_{i,t}\varepsilon_{M,t}^2 + \rho_2\varepsilon_{i,t-1}\varepsilon_{M,t-1}^2$ and whether it is significant at 10% level (i.e., the p-value of the joint test of zero coefficients is below 10%). The coskewness factors are the long-short portfolios $HS = S^- - S^+$ and $HS^- = S^- - r_f$, where S^- (S^+) is the portfolio of the 30% of stocks with the lowest (highest) past standardized coskewness, and r_f is the one-month Treasury bill rate. We also report cross-sectional correlations between the average excess return and other variables. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels. For the original results, 3-star significance is not available.

Interpretation: Theory predicts that a portfolio's average (excess) return should be negatively correlated to the portfolio's (i) standardized coskewness, (ii) beta on $HS = S^- - S^+$, and (iii) beta on $HS^- = S^- - r_f$. For the replication sample period (1963 to 1993), the replicated results in Panel B are qualitatively different from Harvey and Siddique (2000)'s original results in Panel A: In Panel B only Result (i) holds, while in Panel A only Result (iii) holds. In the post-sample period (1994 to 2019) only Results (i) and (ii) hold, in the extended sample period (1963 to 2019) only Result (i) holds, and in the pre-sample period (1926 to 1963) only Result (ii) holds.

Table IA.6: Properties of 27 Portfolios Sorted on Book/Market, Size, and Momentum

Panel A. Sample Period 1963 to 1993, Original Results

B/MSize	Port. Mom. No.	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Low	S Los 1	-0.013	-0.128*	0.010	1.209**	-0.017*	Yes	-0.224	1.282**	6.719
	S Mid 2	-0.465**	-0.264**	0.035	1.165**	-0.019**	Yes	0.388	1.231**	6.146
	S Win 3	-0.718**	-0.425**	-0.020	1.271**	-0.028**	No	0.995	1.354**	6.822
	M Los 4	0.086	0.164**	0.024	1.153**	-0.006	No	-0.074	1.216**	6.017
	M Mid 5	-0.468**	-0.182**	-0.024	1.067**	-0.014**	Yes	0.189	1.138**	5.396
	M Win 6	-0.569	-0.291**	-0.060	1.173**	-0.019**	No	0.962	1.258**	6.087
	B Los 7	0.173	0.406*	-0.000	0.997**	0.002	Yes	0.131	1.046**	5.281
	B Mid 8	-0.159	0.135*	0.028	0.913**	-0.006	Yes	0.271	0.960**	4.547
	B Win 9	-0.312**	-0.102	-0.138	0.981**	-0.012*	No	0.655	1.069**	5.399
Med	S Los 10	0.454**	-0.058	0.180	1.057**	-0.012	Yes	0.361	1.093**	6.058
	S Mid 11	-0.214*	-0.306**	0.087	0.919**	-0.018**	Yes	0.686	0.960**	5.014
	S Win 12	-0.736**	-0.532**	0.111	1.149**	-0.029**	Yes	1.206	1.201**	6.158
	M Los 13	0.494**	0.270**	0.064	0.977**	0.000	No	0.432	1.024**	5.461
	M Mid 14	-0.359**	-0.272**	0.042	0.879**	-0.014**	Yes	0.567	0.924**	4.546
	M Win 15	-0.905**	-0.592**	0.052	1.041**	-0.025**	Yes	0.825	1.095**	5.384
	B Los 16	0.466**	0.499**	-0.003	0.844**	0.008	No	0.471	0.893**	4.855
	B Mid 17	0.160	0.141*	-0.019	0.793**	-0.004	No	0.401	0.851**	4.240
	B Win 18	-0.352**	-0.180**	-0.146	0.902**	-0.013**	No	0.635	0.985**	4.902
High	S Los 19	0.961**	-0.109	0.294**	1.043**	-0.015*	No	0.596	1.057**	6.519
	S Mid 20	0.187	-0.316**	0.243**	0.963**	-0.022**	No	1.105	0.978**	5.649
	S Win 21	-0.302**	-0.455**	0.225*	1.099**	-0.030**	Yes	1.396	1.124**	6.320
	M Los 22	0.461**	-0.043	0.174	1.071**	-0.012	No	0.617	1.105**	6.158
	M Mid 23	-0.026	-0.250**	0.158	0.992**	-0.017**	No	0.963	1.021**	5.360
	M Win 24	-0.832**	-0.538**	0.094	1.092**	-0.029**	Yes	1.371	1.142**	5.928
	B Los 25	0.709**	0.225**	0.133	0.959**	-0.000	No	0.645	0.998**	5.629
	B Mid 26	-0.058	-0.106	-0.045	0.881**	-0.011*	Yes	0.645	0.944**	4.782
	B Win 27	-0.266**	-0.187**	-0.013	0.975**	-0.015**	Yes	0.988	1.024**	5.378
Corr. with Ave.Ret.		-0.407	-0.705	0.237	0.081	-0.685			0.068	0.201

Panel B. Sample Period 1963 to 1993, Replication Results

B/MSize	Port. Mom. No.	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Low	S Los 1	-0.193	-0.161*	0.454***	1.223***	-0.022**	No	-0.443	1.362***	7.198
	S Mid 2	-0.663***	-0.452***	0.573***	1.190***	-0.029***	No	0.448	1.297***	6.492
	S Win 3	-0.710***	-0.427***	0.615***	1.277***	-0.033***	Yes	1.148	1.398***	7.204
	M Los 4	-0.130	-0.004	0.299**	1.075***	-0.013*	No	-0.198	1.204***	5.996
	M Mid 5	-0.405***	-0.191**	0.374***	1.039***	-0.017**	Yes	0.379	1.150***	5.540
	M Win 6	-0.478***	-0.195**	0.474***	1.198***	-0.021**	No	1.170	1.319***	6.553
	B Los 7	0.298**	0.506***	0.283**	0.929***	0.002	No	-0.009	1.036***	5.132
	B Mid 8	-0.084	0.095	0.314***	0.883***	-0.008	No	0.149	0.974***	4.824
	B Win 9	-0.388***	-0.202**	0.450***	1.012***	-0.018**	No	0.618	1.107***	5.643
Med	S Los 10	0.194	-0.094	0.466***	1.125***	-0.018**	No	0.058	1.243***	6.799
	S Mid 11	-0.520***	-0.407***	0.490***	0.988***	-0.025***	Yes	0.579	1.078***	5.604
	S Win 12	-0.869***	-0.509***	0.503***	1.066***	-0.030***	No	1.123	1.158***	5.994
	M Los 13	0.438***	0.200**	0.320**	0.992***	-0.005	No	0.264	1.105***	5.709
	M Mid 14	-0.357***	-0.218**	0.269**	0.787***	-0.015***	No	0.417	0.873***	4.463
	M Win 15	-0.936***	-0.591***	0.365***	0.908***	-0.027***	No	0.699	1.000***	5.090
	B Los 16	0.539***	0.558***	0.231*	0.854***	0.008	No	0.296	0.955***	5.088
	B Mid 17	0.148	0.180**	0.190*	0.719***	-0.004	Yes	0.190	0.802***	4.237
	B Win 18	-0.430***	-0.150*	0.224**	0.836***	-0.013**	No	0.437	0.931***	4.670
High	S Los 19	0.963***	0.014	0.652***	1.162***	-0.013	No	0.650	1.261***	7.812
	S Mid 20	0.877***	-0.094	0.615***	1.013***	-0.016**	No	1.172	1.091***	6.427
	S Win 21	-0.009	-0.281***	0.633***	1.033***	-0.024***	No	1.424	1.109***	6.268
	M Los 22	0.711***	0.210**	0.577***	1.141***	-0.003	No	0.542	1.240***	7.023
	M Mid 23	0.713***	0.187**	0.365***	0.926***	-0.004	No	1.131	1.020***	5.563
	M Win 24	-0.136	-0.221**	0.464***	1.027***	-0.020***	No	1.444	1.118***	5.940
	B Los 25	1.147***	0.630***	0.331**	0.919***	0.017**	No	0.863	1.012***	5.899
	B Mid 26	0.492***	0.329***	0.199*	0.821***	0.001	No	0.646	0.915***	5.024
	B Win 27	0.028	0.130	0.258**	0.905***	-0.007	No	0.957	1.003***	5.163
Corr. with Ave.Ret.		-0.013	-0.265	0.428	0.094	-0.236			0.038	0.150

(Continued)

Table IA.6: (Continued)

Panel C. Sample Period 1994 to 2019, Post-Sample Results

B/MSize	Port. Mom. No.	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Low	S Los 1	0.244*	0.188*	-0.618***	1.470***	-0.041***	Yes	0.298	1.554***	8.027
	S Mid 2	-0.485***	-0.075	-0.423***	1.068***	-0.045***	No	0.622	1.140***	5.803
	S Win 3	-0.022	-0.078	-0.762***	1.129***	-0.052***	No	1.029	1.297***	7.120
	M Los 4	-0.401***	0.040	-0.475***	1.238***	-0.043***	No	0.271	1.278***	6.246
	M Mid 5	-0.731***	-0.128	-0.277**	0.972***	-0.040***	No	0.647	0.989***	4.777
	M Win 6	-0.049	-0.077	-0.667***	0.998***	-0.046***	No	0.958	1.146***	6.210
	B Los 7	-0.319**	0.142	-0.318***	1.020***	-0.030***	Yes	0.719	1.028***	5.158
	B Mid 8	-0.769***	-0.188*	-0.286***	0.856***	-0.037***	No	0.554	0.868***	4.236
	B Win 9	-0.396***	0.056	-0.664***	0.877***	-0.033***	No	0.988	0.997***	5.222
Med	S Los 10	0.460***	0.151	-0.457***	1.285***	-0.037***	No	0.414	1.335***	6.983
	S Mid 11	-0.537***	-0.020	-0.089	0.956***	-0.034***	No	0.762	0.932***	5.027
	S Win 12	-0.416***	-0.004	-0.201	1.017***	-0.037***	No	1.007	1.024***	5.444
	M Los 13	0.337**	0.276***	-0.223	1.273***	-0.028**	No	0.739	1.257***	6.483
	M Mid 14	-0.340**	0.108	-0.011	0.954***	-0.027***	No	0.858	0.906***	4.711
	M Win 15	-0.476***	0.004	0.005	0.993***	-0.034***	No	0.828	0.948***	5.127
	B Los 16	0.006	0.137	-0.208	1.110***	-0.031***	No	0.669	1.081***	5.672
	B Mid 17	-0.382***	0.193**	0.152	0.833***	-0.018**	Yes	0.735	0.749***	4.109
	B Win 18	-0.897***	-0.218**	0.032	0.890***	-0.041***	Yes	0.832	0.851***	4.634
High	S Los 19	1.958***	0.232**	-0.635**	1.660***	-0.030	Yes	1.232	1.731***	10.881
	S Mid 20	0.847***	0.095	-0.251	1.103***	-0.032***	Yes	1.167	1.108***	6.521
	S Win 21	-0.579***	-0.088	-0.141	0.899***	-0.037***	Yes	1.297	0.889***	5.039
	M Los 22	1.227***	0.258***	-0.501**	1.650***	-0.031*	Yes	0.861	1.671***	9.643
	M Mid 23	0.431***	0.125	-0.098	1.125***	-0.030***	No	1.076	1.092***	6.198
	M Win 24	-0.329**	0.087	-0.101	1.037***	-0.031***	Yes	1.204	1.011***	5.658
	B Los 25	0.244*	0.161*	-0.314	1.568***	-0.040***	Yes	0.360	1.530***	8.464
	B Mid 26	-0.660***	0.021	0.240*	1.082***	-0.032***	No	0.883	0.954***	5.831
	B Win 27	-0.557***	0.282***	0.092	0.927***	-0.014*	No	0.849	0.850***	4.964
Corr. with Ave.Ret.		0.186	-0.068	0.122	-0.221	0.217			-0.200	0.004

Panel D. Sample Period 1963 to 2019, Extended-Sample Results

B/MSize	Port. Mom. No.	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Low	S Los 1	0.054	-0.007	-0.091	1.323***	-0.029***	No	-0.102	1.448***	7.594
	S Mid 2	-0.594***	-0.262***	0.070	1.141***	-0.035***	No	0.528	1.226***	6.180
	S Win 3	-0.396***	-0.244***	-0.079	1.217***	-0.039***	No	1.093	1.350***	7.160
	M Los 4	-0.262***	0.009	-0.094	1.141***	-0.024***	No	0.018	1.236***	6.112
	M Mid 5	-0.521***	-0.139**	0.045	1.012***	-0.025***	No	0.502	1.077***	5.201
	M Win 6	-0.290***	-0.116*	-0.100	1.117***	-0.029***	No	1.073	1.240***	6.393
	B Los 7	0.012	0.324***	-0.024	0.966***	-0.009*	No	0.326	1.033***	5.153
	B Mid 8	-0.340***	-0.014	0.010	0.872***	-0.018**	No	0.335	0.926***	4.564
	B Win 9	-0.393***	-0.071	-0.114	0.957***	-0.023***	No	0.788	1.058***	5.452
Med	S Los 10	0.322***	0.009	-0.001	1.189***	-0.024***	No	0.222	1.283***	6.882
	S Mid 11	-0.524***	-0.214***	0.198**	0.974***	-0.028***	No	0.663	1.012***	5.343
	S Win 12	-0.681***	-0.262***	0.149	1.045***	-0.032***	No	1.070	1.096***	5.743
	M Los 13	0.388***	0.221***	0.044	1.105***	-0.013*	No	0.482	1.172***	6.077
	M Mid 14	-0.347***	-0.060	0.127*	0.854***	-0.019**	No	0.620	0.887***	4.580
	M Win 15	-0.721***	-0.281***	0.184**	0.942***	-0.029**	No	0.759	0.976***	5.104
	B Los 16	0.252***	0.339***	0.008	0.957***	-0.006	No	0.468	1.016***	5.364
	B Mid 17	-0.086	0.190***	0.170**	0.765***	-0.009**	No	0.441	0.778***	4.184
	B Win 18	-0.649***	-0.173***	0.126	0.857***	-0.023***	Yes	0.619	0.895***	4.654
High	S Los 19	1.737***	0.108	-0.001	1.362***	-0.019**	Yes	0.917	1.470***	9.347
	S Mid 20	0.860***	-0.008	0.179*	1.049***	-0.022***	No	1.170	1.097***	6.466
	S Win 21	-0.162*	-0.183***	0.244**	0.978***	-0.028***	No	1.365	1.009***	5.732
	M Los 22	1.105***	0.205***	0.031	1.345***	-0.013	No	0.689	1.430***	8.327
	M Mid 23	0.551***	0.149**	0.133	1.005***	-0.013**	No	1.106	1.050***	5.860
	M Win 24	-0.211**	-0.065	0.181*	1.030***	-0.024***	No	1.334	1.068***	5.809
	B Los 25	0.450***	0.334***	0.009	1.178***	-0.003	No	0.631	1.239***	7.193
	B Mid 26	-0.173*	0.159**	0.221**	0.925***	-0.010*	No	0.755	0.932***	5.407
	B Win 27	-0.220**	0.218***	0.177**	0.913***	-0.009*	No	0.908	0.933***	5.069
Corr. with Ave.Ret.		0.062	-0.268	0.464	-0.084	-0.193			-0.114	0.060

(Continued)

Table IA.6: (Continued)

Panel E. Sample Period 1926 to 1963, Pre-Sample Results

B/M	Size	Port.	Std.	Std.	β to	β to	β to	Time-V.	Av.E.Ret.	β to	Stdev.
		Mom. No.	Skew.	Cosk.	HS	HS ⁻	MKT ²	Cosk.	(%/mo)	MKT	(%/mo)
Low	S	Los 1	0.082	0.255***	2.006***	0.784***	0.021	No	-0.335	0.882***	5.502
	S	Mid 2	0.239**	-0.178**	2.124***	0.870***	-0.009	No	0.288	0.969***	5.679
	S	Win 3	-0.323***	-0.393***	2.179***	0.794***	-0.029	No	-0.298	0.881***	5.585
	M	Los 4	0.169	0.212***	2.542***	1.092***	0.026	No	-0.679	1.224***	7.745
	M	Mid 5	-0.808**	-0.262***	1.904**	0.876***	-0.020	No	0.783	0.991***	6.223
	M	Win 6	0.006	-0.198**	2.004**	0.715***	-0.012	No	-0.075	0.776***	4.979
	B	Los 7	-0.188	-0.399***	2.270***	0.952***	-0.022	No	0.525	1.075***	6.158
	B	Mid 8	-0.309***	-0.482***	1.892**	0.783***	-0.031	No	-0.143	0.868***	5.305
	B	Win 9	-0.596***	-0.235***	1.693**	0.807***	-0.015	No	0.170	0.927***	5.710
Med	S	Los 10	-0.598***	-0.094	1.498**	0.616**	-0.007	No	1.126	0.692***	5.076
	S	Mid 11	-0.782***	-0.206**	1.385**	0.657***	-0.016	No	-0.124	0.747***	5.196
	S	Win 12	-0.831***	-0.272***	1.762***	0.660***	-0.025	No	0.528	0.722***	5.410
	M	Los 13	-0.243**	0.065	1.939***	0.724***	0.007	Yes	0.900	0.791***	4.996
	M	Mid 14	-0.691***	-0.531***	1.891***	0.770***	-0.027	No	0.373	0.860***	4.999
	M	Win 15	-1.102***	-0.427***	1.611**	0.652***	-0.035	No	0.570	0.721***	5.081
	B	Los 16	-0.459***	-0.421***	2.072***	0.860***	-0.024	No	0.434	0.951***	5.617
	B	Mid 17	-0.853***	-0.200**	1.766***	0.715***	-0.013	No	0.496	0.789***	5.121
	B	Win 18	-0.980***	-0.611***	1.714**	0.701***	-0.033	No	0.153	0.788***	4.706
High	S	Los 19	1.148***	0.665***	3.797***	1.334***	0.108	No	1.118	1.485***	9.993
	S	Mid 20	0.046	0.003	2.184***	0.793***	0.002	Yes	0.710	0.889***	5.520
	S	Win 21	0.116	0.165**	2.562***	0.900***	0.015	No	0.639	0.982***	6.009
	M	Los 22	0.904***	0.703***	2.769***	0.998***	0.071	No	0.511	1.119***	7.014
	M	Mid 23	-0.330***	-0.141*	1.642***	0.759***	-0.005	No	0.761	0.874***	4.957
	M	Win 24	0.276**	0.387***	2.473***	0.891***	0.048	No	1.323	1.000***	7.007
	B	Los 25	1.673***	0.845***	2.233***	0.784***	0.067	No	0.440	0.876***	5.524
	B	Mid 26	0.016	0.253***	2.201***	0.893***	0.018	Yes	1.210	1.002***	5.782
	B	Win 27	-0.610***	-0.547***	1.427**	0.709***	-0.025	No	0.975	0.813***	4.673
Corr. with Ave.Ret.			0.090	0.226	0.139	0.080	0.275			0.085	0.130

Description: The table summarizes properties of 27 portfolios with dependent sorts on book-to-market, size, and momentum, using as cutoffs the stocks listed on NYSE. Standardized (unconditional) skewness is the third central moment about the mean. Standardized (unconditional) coskewness of the i^{th} asset is defined as $E[\varepsilon_{i,t}\varepsilon_{M,t}^2]/(\sqrt{E[\varepsilon_{i,t}^2]}E[\varepsilon_{M,t}^2])$, where $\varepsilon_{i,t}$ is the residual from regressing i 's excess return on the excess market return, and $\varepsilon_{M,t}$ is the market return minus its unconditional average. Time-variation in conditional coskewness is captured through the autoregression $E_t[\varepsilon_{i,t+1}\varepsilon_{M,t+1}^2] = \rho_0 + \rho_1\varepsilon_{i,t}\varepsilon_{M,t}^2 + \rho_2\varepsilon_{i,t-1}\varepsilon_{M,t-1}^2$ and whether it is significant at 10% level (i.e., the p-value of the joint test of zero coefficients is below 10%). The coskewness factors are the long-short portfolios $HS = S^- - S^+$ and $HS^- = S^- - r_f$, where S^- (S^+) is the portfolio of the 30% of stocks with the lowest (highest) past standardized coskewness, and r_f is the one-month Treasury bill rate. We also report cross-sectional correlations between the average excess return and other variables. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels. For the original results, 3-star significance is not available.

Interpretation: Theory predicts that a portfolio's average (excess) return should be negatively correlated to the portfolio's (i) standardized coskewness, (ii) beta on $HS = S^- - S^+$, and (iii) beta on $HS^- = S^- - r_f$. For the replication sample period (1963 to 1993), the replicated results in Panel B are qualitatively similar to Harvey and Siddique (2000)'s original results in Panel A: Only Result (i) holds, while Results (ii) and (iii) do not. In the post-sample period (1994 to 2019) and extended sample period (1963 to 2019) only Results (i) and (iii) hold, while none of Results (i) to (iii) holds for the pre-sample period (1926 to 1963).

Table IA.7: Properties of the 10 Fama-French Portfolios Sorted on Momentum

Panel A. Sample Period 1963 to 1993										
Perf.	Portfolio	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Losers	1	0.341***	0.179**	0.386**	1.133***	-0.006	No	-0.397	1.262***	6.769
	2	0.193	0.389***	0.246*	0.988***	0.001	No	0.181	1.105***	5.722
	3	0.309**	0.457***	0.192	0.899***	0.002	No	0.340	1.007***	5.103
	4	-0.028	0.271***	0.225**	0.876***	-0.005	No	0.306	0.980***	4.740
	5	-0.306**	-0.041	0.224**	0.852***	-0.011*	Yes	0.277	0.952***	4.506
	6	-0.275**	-0.091	0.222**	0.897***	-0.012**	No	0.427	1.002***	4.681
	7	-0.360***	-0.120	0.237**	0.875***	-0.012**	No	0.421	0.978***	4.560
	8	-0.233*	0.053	0.405***	0.906***	-0.009	Yes	0.589	0.990***	4.694
	9	-0.508**	-0.313***	0.489***	0.975***	-0.018***	No	0.809	1.060***	5.103
	Winners	10	-0.445***	-0.183**	0.548***	1.096***	-0.019**	No	1.183	1.194***
Corr. with Ave.Ret.		-0.765	-0.581	0.527	-0.052	-0.657			-0.150	-0.263

Panel B. Sample Period 1994 to 2019										
Perf.	Portfolio	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Losers	1	0.824***	0.305***	-0.778***	1.680***	-0.030*	No	0.369	1.749***	9.695
	2	0.232*	0.183*	-0.294*	1.350***	-0.036***	Yes	0.583	1.335***	6.841
	3	0.239*	0.236**	-0.072	1.131***	-0.026***	Yes	0.712	1.080***	5.616
	4	-0.301**	0.100	-0.077	1.021***	-0.030***	Yes	0.781	0.970***	4.876
	5	-0.301**	0.182*	-0.087	0.918***	-0.025***	No	0.760	0.887***	4.321
	6	-0.596***	-0.128	-0.003	0.907***	-0.035***	No	0.707	0.861***	4.163
	7	-0.592***	-0.022	-0.088	0.837***	-0.029***	Yes	0.718	0.805***	4.003
	8	-0.549***	-0.025	-0.106	0.842***	-0.030***	Yes	0.811	0.821***	3.968
	9	-0.619***	-0.117	-0.208**	0.862***	-0.035***	Yes	0.674	0.863***	4.238
	Winners	10	-0.469***	-0.017	-0.666***	0.996***	-0.041**	No	0.966	1.125***
Corr. with Ave.Ret.		-0.747	-0.525	0.302	-0.770	-0.226			-0.693	-0.681

Panel C. Sample Period 1963 to 2019										
Perf.	Portfolio	Std. Skew.	Std. Cosk.	β to HS	β to HS ⁻	β to MKT ²	Time-V. Cosk.	Av.E.Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Losers	1	0.746***	0.209***	-0.205	1.353***	-0.014*	No	-0.044	1.478***	8.248
	2	0.222**	0.260***	-0.027	1.133***	-0.012*	Yes	0.366	1.207***	6.260
	3	0.274**	0.332***	0.058	0.992***	-0.008	No	0.511	1.039***	5.345
	4	-0.158*	0.179***	0.072	0.934***	-0.014**	Yes	0.524	0.975***	4.806
	5	-0.306***	0.083	0.065	0.879***	-0.016***	Yes	0.500	0.923***	4.425
	6	-0.396***	-0.083	0.109	0.901***	-0.020***	No	0.556	0.938***	4.449
	7	-0.446***	-0.034	0.073	0.859***	-0.018***	No	0.558	0.901***	4.312
	8	-0.338***	0.043	0.147**	0.880***	-0.017***	Yes	0.691	0.914***	4.373
	9	-0.522***	-0.187***	0.139*	0.929***	-0.024***	No	0.747	0.970***	4.722
	Winners	10	-0.453***	-0.092	-0.064	1.055***	-0.026***	No	1.083	1.161***
Corr. with Ave.Ret.		-0.818	-0.623	0.489	-0.581	-0.652			-0.536	-0.550

(Continued)

Table IA.7: (Continued)

Panel D. Sample Period 1926 to 1963

Perf.	Portfolio	Std. Skew.	Std. Cosk.	β to HS	β to HS^-	β to MKT^2	Time-V. Cosk.	Ave. Ret. (%/mo)	β to MKT	Stdev. (%/mo)
Losers	1	2.103***	1.043***	-2.025***	1.745***	0.031***	Yes	0.461	1.619***	11.880
	2	2.180***	0.969***	-1.711***	1.595***	0.026***	Yes	0.678	1.454***	10.475
	3	1.719***	0.951***	-1.482***	1.386***	0.021***	Yes	0.524	1.279***	8.952
	4	1.718***	1.233***	-1.450***	1.270***	0.021***	No	0.779	1.182***	8.188
	5	1.531***	0.927***	-1.310***	1.224***	0.017***	Yes	0.887	1.112***	7.670
	6	1.004***	0.815***	-1.238***	1.177***	0.015***	Yes	0.866	1.083***	7.295
	7	0.261**	-0.248***	-1.096***	1.084***	0.010***	No	1.060	1.003***	6.809
	8	0.145	-0.575***	-1.003***	1.008***	0.008***	No	1.100	0.937***	6.458
	9	-0.164	-0.914***	-1.069***	1.000***	0.005**	Yes	1.202	0.957***	6.705
Winners	10	-0.521***	-0.945***	-0.971***	0.948***	0.003	Yes	1.490	0.929***	6.992
Corr. with Ave.Ret.		-0.935	-0.881	0.881	-0.893	-0.947			-0.870	-0.800

Description: The table summarizes properties of the 10 Fama-French portfolios sorted on momentum, using as cutoffs the stocks listed on NYSE. Standardized (unconditional) skewness is the third central moment about the mean. Standardized (unconditional) coskewness of the i^{th} asset is defined as $E[\varepsilon_{i,t}\varepsilon_{M,t}^2]/(\sqrt{E[\varepsilon_{i,t}^2]}E[\varepsilon_{M,t}^2])$, where $\varepsilon_{i,t}$ is the residual from regressing i 's excess return on the excess market return, and $\varepsilon_{M,t}$ is the market return minus its unconditional average. Time-variation in conditional coskewness is captured through the autoregression $E_t[\varepsilon_{i,t+1}\varepsilon_{M,t+1}^2] = \rho_0 + \rho_1\varepsilon_{i,t}\varepsilon_{M,t}^2 + \rho_2\varepsilon_{i,t-1}\varepsilon_{M,t-1}^2$ and whether it is significant at 10% level (i.e., the p-value of the joint test of zero coefficients is below 10%). The coskewness factors are the long-short portfolios $HS = S^- - S^+$ and $HS^- = S^- - r_f$, where S^- (S^+) is the portfolio of the 30% of stocks with the lowest (highest) past standardized coskewness, and r_f is the one-month Treasury bill rate. We also report cross-sectional correlations between the average excess return and other variables. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: Theory predicts that a portfolio's average (excess) return should be negatively correlated to the portfolio's (i) standardized coskewness, (ii) beta on $HS = S^- - S^+$, and (iii) beta on $HS^- = S^- - r_f$. In all sample periods considered, Results (i) and (iii) hold, while Result (ii) does not.

Table IA.8: Properties of the 25 Fama-French Portfolios Sorted on Size and Momentum

Panel A. Sample Period 1963 to 1993

Size Quin- Tile	Mom. Quin- Tile	Std. Skew.	Std. Cosk.	β to <i>HS</i>	β to <i>HS</i> ⁻	β to <i>MKT</i> ²	Time- Var. Cosk. (%/mo)	Ave. Exc.Ret. (%/mo)	β to <i>MKT</i>	Std. Dev. (%/mo)
1	1	0.647***	-0.058	0.635***	1.153***	-0.017*	No	-0.212	1.256***	7.295
	2	0.309**	-0.182**	0.511***	0.978***	-0.019**	No	0.626	1.066***	5.952
	3	-0.104	-0.314***	0.530***	0.961***	-0.023***	No	0.899	1.043***	5.694
	4	-0.632***	-0.493***	0.510***	0.995***	-0.029***	No	0.961	1.083***	5.774
	5	-0.653***	-0.468***	0.612***	1.166***	-0.034**	Yes	1.361	1.270***	6.803
2	1	0.196	0.015	0.452***	1.188***	-0.013	No	-0.161	1.318***	6.936
	2	-0.049	-0.131	0.394***	1.004***	-0.016**	No	0.505	1.109***	5.691
	3	-0.398***	-0.330***	0.399***	0.979***	-0.020***	Yes	0.737	1.077***	5.360
	4	-0.674***	-0.494***	0.446***	1.024***	-0.026***	No	0.990	1.121***	5.581
	5	-0.770***	-0.485***	0.551***	1.205***	-0.031**	Yes	1.254	1.315***	6.595
3	1	0.174	0.202**	0.284*	1.088***	-0.005	No	0.001	1.221***	6.439
	2	0.073	0.100	0.290**	0.969***	-0.009	No	0.466	1.080***	5.391
	3	-0.391***	-0.260**	0.319***	0.955***	-0.017***	Yes	0.623	1.058***	5.139
	4	-0.927***	-0.587***	0.377***	0.967***	-0.024***	No	0.767	1.067***	5.142
	5	-0.711***	-0.422***	0.522***	1.166***	-0.027***	Yes	1.328	1.275***	6.302
4	1	0.328**	0.475***	0.376**	1.054***	0.006	No	0.086	1.163***	6.148
	2	0.013	0.232**	0.238*	0.996***	-0.006	No	0.442	1.117***	5.452
	3	-0.210*	-0.022	0.262**	0.942***	-0.012*	Yes	0.472	1.050***	4.978
	4	-0.418***	-0.146	0.336***	0.980***	-0.014**	Yes	0.748	1.085***	5.062
	5	-0.631***	-0.352***	0.487***	1.111***	-0.023***	Yes	1.122	1.214***	5.927
5	1	0.198	0.444***	0.225	1.001***	0.005	No	0.067	1.121***	6.047
	2	0.251**	0.540***	0.178	0.811***	0.004	No	0.316	0.908***	4.626
	3	-0.250*	0.003	0.194*	0.839***	-0.010*	Yes	0.248	0.939***	4.465
	4	0.013	0.148	0.289***	0.855***	-0.007	No	0.406	0.948***	4.518
	5	-0.295**	-0.159*	0.489***	0.989***	-0.016**	No	0.782	1.077***	5.422
Corr. with Ave.Ret.		-0.844	-0.765	0.466	0.199	-0.776			0.140	-0.035

Panel B. Sample Period 1994 to 2019

Size Quin- Tile	Mom. Quin- Tile	Std. Skew.	Std. Cosk.	β to <i>HS</i>	β to <i>HS</i> ⁻	β to <i>MKT</i> ²	Time- Var. Cosk. (%/mo)	Ave. Exc.Ret. (%/mo)	β to <i>MKT</i>	Std. Dev. (%/mo)
1	1	0.863***	0.116	-0.641***	1.478***	-0.045***	Yes	0.341	1.562***	8.708
	2	-0.291**	-0.057	-0.236*	1.043***	-0.041**	Yes	0.692	1.054***	5.654
	3	-0.408***	-0.067	-0.138	0.952***	-0.037***	No	0.970	0.949***	5.084
	4	-0.424***	-0.091	-0.288**	0.862***	-0.037***	No	1.133	0.900***	4.926
	5	-0.085	-0.083	-0.633***	1.019***	-0.047***	Yes	1.246	1.149***	6.498
2	1	0.665***	0.235**	-0.591***	1.600***	-0.039***	Yes	0.551	1.661***	8.657
	2	0.004	0.097	-0.217	1.165***	-0.036***	No	0.915	1.166***	6.011
	3	-0.509***	0.023	-0.156	0.991***	-0.034***	No	0.927	0.984***	5.053
	4	-0.470***	0.001	-0.204*	0.952***	-0.034***	Yes	0.970	0.966***	5.006
	5	0.021	-0.038	-0.624***	1.111***	-0.047***	No	1.094	1.240***	6.627
3	1	0.417***	0.295***	-0.586***	1.544***	-0.033**	Yes	0.570	1.591***	8.315
	2	-0.294**	0.093	-0.231*	1.160***	-0.037***	Yes	0.804	1.151***	5.623
	3	-0.322**	0.109	-0.075	1.002***	-0.030***	No	0.831	0.975***	4.858
	4	-0.464***	0.012	-0.117	0.953***	-0.033**	No	0.759	0.941***	4.684
	5	-0.255*	-0.069	-0.593***	1.035***	-0.045***	No	0.940	1.158***	6.061
4	1	0.320**	0.180*	-0.451**	1.569***	-0.042***	No	0.381	1.588***	8.329
	2	-0.155	0.119	-0.078	1.159***	-0.034***	Yes	0.796	1.111***	5.519
	3	-0.507***	0.036	-0.054	0.992***	-0.032***	No	0.915	0.947***	4.594
	4	-0.703***	-0.039	-0.098	0.903***	-0.033***	No	0.856	0.882***	4.246
	5	-0.382***	-0.184*	-0.526***	0.955***	-0.048***	Yes	0.931	1.067***	5.576
5	1	0.153	0.209**	-0.427**	1.399***	-0.034***	No	0.382	1.397***	7.460
	2	-0.108	0.169*	-0.041	1.036***	-0.026***	Yes	0.720	0.976***	5.084
	3	-0.426***	0.051	-0.023	0.901***	-0.029***	Yes	0.699	0.856***	4.155
	4	-0.504***	-0.013	-0.100	0.824***	-0.029***	No	0.755	0.797***	3.884
	5	-0.558***	-0.005	-0.493***	0.863***	-0.034***	No	0.815	0.944***	4.802
Corr. with Ave.Ret.		-0.609	-0.721	0.117	-0.702	-0.173			-0.600	-0.549

(Continued)

Table IA.8: (Continued)

Panel C. Sample Period 1963 to 2019

Size	Mom.	Std.	Std.	β to	β to	β to	Time-	Ave.	β to	Std.
Quin-	Quin-	Skew.	Cosk.	HS	HS^-	MKT^2	Var.	Exc.Ret.	MKT	Dev.
Tile	Tile						Cosk. (%/mo)			(%/mo)
1	1	0.791***	0.010	-0.012	1.284***	-0.026***	No	0.042	1.392***	7.975
	2	0.058	-0.126*	0.134	1.003***	-0.026***	No	0.656	1.059***	5.813
	3	-0.212**	-0.200***	0.193**	0.957***	-0.028***	No	0.932	0.999***	5.418
	4	-0.557***	-0.298***	0.107	0.941***	-0.032***	No	1.040	1.001***	5.397
	5	-0.405***	-0.275***	-0.016	1.106***	-0.038***	No	1.308	1.214***	6.660
2	1	0.514***	0.102	-0.078	1.354***	-0.023***	No	0.167	1.470***	7.778
	2	-0.021	-0.025	0.085	1.069***	-0.023***	No	0.694	1.134***	5.840
	3	-0.442***	-0.148**	0.119	0.983***	-0.025***	Yes	0.824	1.035***	5.218
	4	-0.587***	-0.238***	0.119	0.994***	-0.029***	No	0.981	1.050***	5.320
	5	-0.401***	-0.245***	-0.041	1.166***	-0.036***	Yes	1.180	1.279***	6.605
3	1	0.352***	0.217***	-0.158	1.271***	-0.015**	No	0.263	1.385***	7.362
	2	-0.108	0.089	0.026	1.046***	-0.018***	No	0.622	1.111***	5.498
	3	-0.360***	-0.067	0.120	0.973***	-0.022***	No	0.718	1.020***	5.009
	4	-0.736***	-0.269***	0.129	0.961***	-0.027***	No	0.763	1.009***	4.933
	5	-0.505***	-0.226***	-0.038	1.112***	-0.033***	No	1.150	1.220***	6.190
4	1	0.331***	0.275***	-0.042	1.260***	-0.011	No	0.222	1.350***	7.230
	2	-0.066	0.175**	0.078	1.061***	-0.016***	Yes	0.605	1.113***	5.481
	3	-0.332***	0.022	0.101	0.962***	-0.019***	Yes	0.676	1.004***	4.807
	4	-0.507***	-0.054	0.117	0.949***	-0.020***	No	0.798	0.993***	4.701
	5	-0.518***	-0.243***	-0.023	1.048***	-0.031***	No	1.034	1.146***	5.765
5	1	0.172*	0.298***	-0.105	1.161***	-0.008	No	0.212	1.243***	6.731
	2	0.062	0.339***	0.067	0.901***	-0.007	No	0.502	0.938***	4.843
	3	-0.325***	0.039	0.083	0.864***	-0.016***	Yes	0.455	0.902***	4.328
	4	-0.172*	0.093	0.092	0.842***	-0.015***	No	0.566	0.880***	4.239
	5	-0.385***	-0.074	-0.007	0.938***	-0.022***	No	0.797	1.016***	5.143
Corr. with Ave.Ret.		-0.837	-0.815	0.330	-0.413	-0.748			-0.359	-0.366

Panel D. Sample Period 1926 to 1963

Size	Mom.	Std.	Std.	β to	β to	β to	Time-	Ave.	β to	Std.
Quin-	Quin-	Skew.	Cosk.	HS	HS^-	MKT^2	Var.	Exc.Ret.	MKT	Dev.
Tile	Tile						Cosk. (%/mo)			(%/mo)
1	1	3.084***	0.884***	-2.454***	1.781***	0.036***	Yes	1.507	1.689***	13.892
	2	3.217***	0.959***	-2.484***	1.708***	0.035***	No	1.812	1.627***	13.176
	3	3.541***	0.817***	-2.335***	1.571***	0.031***	Yes	2.005	1.498***	12.363
	4	3.453***	0.735**	-2.400***	1.538***	0.029***	No	1.830	1.495***	12.333
	5	1.798***	0.149*	-2.039***	1.323***	0.017***	Yes	1.984	1.313***	11.170
2	1	2.505***	1.068***	-2.157***	1.771***	0.032***	Yes	0.740	1.640***	12.183
	2	2.404***	0.850**	-1.973***	1.548***	0.026***	Yes	1.183	1.443***	10.685
	3	1.435***	0.346***	-1.799***	1.354***	0.018***	Yes	1.197	1.283***	9.440
	4	2.285***	0.403***	-1.829***	1.305***	0.018***	Yes	1.444	1.234***	9.314
	5	1.204***	-0.046	-1.719***	1.248***	0.013***	Yes	1.687	1.217***	9.155
3	1	2.405***	1.173***	-2.161***	1.750***	0.032***	Yes	0.501	1.630***	11.819
	2	2.071***	1.319***	-1.875***	1.517***	0.027***	Yes	1.062	1.405***	9.895
	3	1.616***	0.893***	-1.710***	1.352***	0.020***	Yes	1.056	1.261***	8.812
	4	0.418**	-0.282***	-1.443***	1.158***	0.010**	No	1.200	1.092***	7.675
	5	-0.116	-0.775***	-1.280***	1.089***	0.005*	Yes	1.477	1.045***	7.678
4	1	2.771***	1.224***	-2.101***	1.780***	0.033***	Yes	0.606	1.643***	11.958
	2	1.624***	1.069***	-1.721***	1.440***	0.022***	No	0.717	1.331***	9.205
	3	1.390***	0.890**	-1.490***	1.254***	0.018***	Yes	1.018	1.164***	8.005
	4	1.147***	0.456***	-1.388***	1.179***	0.015***	Yes	1.120	1.113***	7.646
	5	-0.107	-0.580***	-1.172***	1.022***	0.007***	Yes	1.591	0.995***	7.235
5	1	-2.397***	0.317***	-1.590***	1.524***	0.023***	Yes	-0.426	1.309***	14.186
	2	1.688***	1.042***	-1.392***	1.264***	0.020***	Yes	0.512	1.182***	8.258
	3	1.432***	1.080***	-1.233***	1.187***	0.017***	Yes	0.856	1.082***	7.346
	4	0.180	-0.455***	-0.995***	1.021***	0.009***	No	1.039	0.944***	6.428
	5	-0.361***	-1.059***	-0.946***	0.934***	0.003	Yes	1.183	0.909***	6.582
Corr. with Ave.Ret.		0.449	-0.258	-0.273	-0.140	-0.080			-0.001	-0.046

(Continued)

Table IA.8: (Continued)

Description: The table summarizes properties of the 25 Fama-French portfolios with independent sorts on size and momentum, using as cutoffs the stocks listed on NYSE. Standardized (unconditional) skewness is the third central moment about the mean. Standardized (unconditional) coskewness of the i^{th} asset is defined as $E[\varepsilon_{i,t}\varepsilon_{M,t}^2]/(\sqrt{E[\varepsilon_{i,t}^2]}E[\varepsilon_{M,t}^2])$, where $\varepsilon_{i,t}$ is the residual from regressing i 's excess return on the excess market return, and $\varepsilon_{M,t}$ is the market return minus its unconditional average. Time-variation in conditional coskewness is captured through the autoregression $E_t[\varepsilon_{i,t+1}\varepsilon_{M,t+1}^2] = \rho_0 + \rho_1\varepsilon_{i,t}\varepsilon_{M,t}^2 + \rho_2\varepsilon_{i,t-1}\varepsilon_{M,t-1}^2$ and whether it is significant at 10% level (i.e., the p-value of the joint test of zero coefficients is below 10%). The coskewness factors are the long-short portfolios $HS = S^- - S^+$ and $HS^- = S^- - r_f$, where S^- (S^+) is the portfolio of the 30% of stocks with the lowest (highest) past standardized coskewness, and r_f is the one-month Treasury bill rate. We also report cross-sectional correlations between the average excess return and other variables. The stars indicate significance at 1% (***) , 5% (**), and 10% (*) levels.

Interpretation: Theory predicts that a portfolio's average (excess) return should be negatively correlated to the portfolio's (i) standardized coskewness, (ii) beta on $HS = S^- - S^+$, and (iii) beta on $HS^- = S^- - r_f$. In all sample periods, Results (i) and (iii) hold while Result (ii) does not, except for the replication sample period (1963 to 1993), where only Result (i) holds.

Table IA.9: Properties of 25 Portfolios Sorted on Size and Coskewness

Panel A. Sample Period 1963 to 1993

Size	Cosk.						Time-	Ave.		Std.
Quin-	Quin-	Std.	Std.	β to	β to	β to	Var.	Exc.Ret.	β to	Dev.
Tile	Tile	Skew.	Cosk.	HS	HS ⁻	MKT ²	Cosk. (%/mo)		MKT	(%/mo)
1	1	0.287**	-0.175*	0.644***	1.068***	-0.020**	No	0.905	1.154***	6.480
	2	0.231*	-0.193**	0.647***	1.117***	-0.022***	No	0.875	1.209***	6.688
	3	0.193	-0.186**	0.633***	1.108***	-0.021**	No	0.893	1.201***	6.669
	4	0.042	-0.227**	0.604***	1.112***	-0.023***	No	0.796	1.209***	6.647
	5	0.227*	-0.116	0.578***	1.130***	-0.018**	No	0.747	1.232***	6.710
2	1	-0.059	-0.139	0.580***	1.099***	-0.017**	No	0.764	1.192***	6.077
	2	-0.138	-0.164*	0.509***	1.096***	-0.018**	Yes	0.903	1.196***	6.080
	3	-0.312**	-0.237***	0.488***	1.109***	-0.020***	No	0.770	1.216***	6.035
	4	-0.310**	-0.261***	0.413***	1.083***	-0.021***	Yes	0.726	1.195***	6.069
	5	-0.425***	-0.226**	0.345**	1.104***	-0.020***	No	0.807	1.228***	6.116
3	1	-0.204	-0.126	0.543***	1.047***	-0.015**	No	0.875	1.137***	5.535
	2	-0.309**	-0.154*	0.447***	1.059***	-0.016**	No	0.733	1.160***	5.636
	3	-0.349***	-0.151*	0.357***	1.012***	-0.016**	Yes	0.815	1.121***	5.441
	4	-0.352***	-0.207**	0.318**	1.040***	-0.018**	No	0.756	1.157***	5.610
	5	-0.486***	-0.231**	0.204	1.006***	-0.018***	Yes	0.733	1.134***	5.545
4	1	0.039	0.146	0.568***	1.038***	-0.009	No	0.685	1.118***	5.352
	2	-0.040	0.240***	0.419***	0.994***	-0.007	No	0.622	1.087***	5.149
	3	-0.129	0.112	0.377***	1.011***	-0.010	Yes	0.739	1.113***	5.251
	4	-0.143	0.125	0.283**	0.995***	-0.009	No	0.721	1.109***	5.219
	5	-0.321**	-0.026	0.105	0.972***	-0.012*	No	0.604	1.105***	5.240
5	1	0.157	0.257***	0.778***	0.944***	-0.004	No	0.509	0.977***	4.830
	2	0.459***	0.559***	0.648***	0.941***	0.001	No	0.476	0.998***	4.825
	3	-0.079	0.207**	0.303***	0.852***	-0.007	No	0.445	0.945***	4.451
	4	-0.310**	0.003	0.162	0.818***	-0.010*	No	0.325	0.924***	4.355
	5	-0.161	0.009	-0.123	0.788***	-0.009*	No	0.317	0.919***	4.385
Corr. with Ave.Ret.		0.017	-0.628	0.498	0.904	-0.739			0.898	0.850

Panel B. Sample Period 1994 to 2019

Size	Cosk.						Time-	Ave.		Std.
Quin-	Quin-	Std.	Std.	β to	β to	β to	Var.	Exc.Ret.	β to	Dev.
Tile	Tile	Skew.	Cosk.	HS	HS ⁻	MKT ²	Cosk. (%/mo)		MKT	(%/mo)
1	1	-0.142	0.029	-0.174	1.075***	-0.037***	No	1.007	1.082***	5.845
	2	0.359**	0.017	-0.367**	1.140***	-0.041***	Yes	0.979	1.184***	6.464
	3	-0.037	-0.031	-0.478***	1.096***	-0.043***	No	0.860	1.163***	6.233
	4	-0.005	-0.047	-0.503***	1.142***	-0.046***	Yes	0.854	1.211***	6.443
	5	0.033	-0.040	-0.672***	1.137***	-0.047***	No	0.903	1.236***	6.765
2	1	-0.132	0.072	-0.172	1.086***	-0.035***	No	1.014	1.095***	5.673
	2	-0.336**	0.041	-0.261*	1.146***	-0.040***	No	0.954	1.170***	5.860
	3	-0.285**	0.044	-0.452***	1.162***	-0.041***	No	0.908	1.217***	6.086
	4	-0.213	0.110	-0.484***	1.146***	-0.037***	Yes	0.924	1.211***	6.088
	5	-0.284**	0.047	-0.613***	1.218***	-0.043***	No	0.934	1.294***	6.496
3	1	-0.263*	0.250**	-0.100	1.049***	-0.026***	No	0.934	1.036***	5.103
	2	-0.257*	0.136	-0.229*	1.107***	-0.034***	No	0.947	1.120***	5.409
	3	-0.446***	0.102	-0.337***	1.089***	-0.036***	Yes	0.696	1.126***	5.354
	4	-0.450***	0.129	-0.455***	1.093***	-0.035**	No	0.842	1.140***	5.458
	5	-0.530***	0.023	-0.512***	1.161***	-0.042***	No	0.789	1.216***	5.868
4	1	-0.344**	0.065	-0.032	1.029***	-0.033***	Yes	0.907	0.994***	4.889
	2	-0.513***	0.097	-0.198*	1.039***	-0.034***	No	0.841	1.041***	4.852
	3	-0.493***	0.132	-0.340***	1.092***	-0.035***	No	0.861	1.116***	5.180
	4	-0.787***	-0.099	-0.240**	1.076***	-0.042***	No	0.804	1.074***	5.064
	5	-0.926***	-0.169*	-0.440***	1.059***	-0.046***	Yes	0.745	1.105***	5.239
5	1	-0.549***	0.058	0.119	0.989***	-0.030***	No	0.802	0.912***	4.516
	2	-0.539***	0.047	-0.080	0.904***	-0.030***	Yes	0.713	0.881***	4.133
	3	-0.655***	0.046	-0.452***	0.898***	-0.033***	No	0.682	0.950***	4.364
	4	-0.463***	0.174*	-0.489***	0.936***	-0.030***	Yes	0.675	0.982***	4.487
	5	-0.625***	-0.059	-0.645***	0.892***	-0.036***	No	0.689	0.966***	4.481
Corr. with Ave.Ret.		0.682	0.172	0.194	0.669	-0.174			0.515	0.649

(Continued)

Table IA.9: (Continued)

Panel C. Sample Period 1963 to 2019

Size Quin- Tile	Cosk. Quin- Tile	Std. Skew.	Std. Cosk.	β to <i>HS</i>	β to <i>HS</i> ⁻	β to <i>MKT</i> ²	Time- Var. Cosk. (%/mo)	Ave. Exc.Ret.	β to <i>MKT</i>	Std. Dev. (%/mo)
1	1	0.127	-0.084	0.231**	1.070***	-0.026***	No	0.952	1.120***	6.192
	2	0.288***	-0.097	0.135	1.126***	-0.028***	No	0.923	1.196***	6.581
	3	0.104	-0.116*	0.073	1.103***	-0.029***	No	0.878	1.182***	6.467
	4	0.023	-0.147**	0.045	1.123***	-0.031***	No	0.823	1.208***	6.549
2	5	0.135	-0.080	-0.054	1.132***	-0.028***	No	0.819	1.232***	6.731
	1	-0.088	-0.032	0.200**	1.094***	-0.024***	No	0.879	1.148***	5.891
	2	-0.222**	-0.068	0.121	1.115***	-0.026***	Yes	0.927	1.183***	5.975
	3	-0.300***	-0.100	0.014	1.130***	-0.027***	No	0.834	1.215***	6.054
	4	-0.265***	-0.089	-0.040	1.108***	-0.027***	Yes	0.817	1.201***	6.074
3	5	-0.357***	-0.095	-0.138	1.149***	-0.028***	Yes	0.865	1.256***	6.290
	1	-0.222**	0.064	0.219**	1.047***	-0.019***	No	0.902	1.090***	5.337
	2	-0.285***	-0.013	0.106	1.078***	-0.023***	No	0.831	1.141***	5.530
	3	-0.390***	-0.033	0.008	1.042***	-0.023***	Yes	0.760	1.121***	5.397
	4	-0.394***	-0.047	-0.072	1.061***	-0.024***	No	0.796	1.148***	5.537
4	5	-0.513***	-0.115*	-0.157*	1.068***	-0.026***	Yes	0.759	1.169***	5.692
	1	-0.110	0.121*	0.265***	1.034***	-0.017***	No	0.787	1.062***	5.142
	2	-0.236**	0.181***	0.107	1.012***	-0.016***	No	0.723	1.065***	5.012
	3	-0.293***	0.122*	0.015	1.043***	-0.019***	Yes	0.795	1.113***	5.215
	4	-0.423***	0.020	0.020	1.027***	-0.021***	No	0.759	1.091***	5.145
5	5	-0.601***	-0.095	-0.170*	1.007***	-0.024***	Yes	0.669	1.104***	5.237
	1	-0.134	0.173***	0.444***	0.962***	-0.013***	No	0.644	0.947***	4.687
	2	0.115	0.361***	0.280***	0.926***	-0.010***	No	0.585	0.945***	4.518
	3	-0.336***	0.132**	-0.079	0.870***	-0.016***	No	0.554	0.946***	4.409
	4	-0.384***	0.071	-0.167**	0.865***	-0.017***	No	0.486	0.949***	4.416
5	-0.383***	-0.030	-0.387***	0.829***	-0.019***	No	0.488	0.939***	4.430	
Corr. with Ave.Ret.		0.391	-0.518	0.376	0.913	-0.670			0.825	0.833

Panel D. Sample Period 1926 to 1963

Size Quin- Tile	Cosk. Quin- Tile	Std. Skew.	Std. Cosk.	β to <i>HS</i>	β to <i>HS</i> ⁻	β to <i>MKT</i> ²	Time- Var. Cosk. (%/mo)	Ave. Exc.Ret.	β to <i>MKT</i>	Std. Dev. (%/mo)
1	1	1.794***	0.844***	-1.840***	1.454***	0.029***	No	1.823	1.406***	11.872
	2	3.211***	0.781***	-2.374***	1.704***	0.032***	Yes	1.843	1.623***	13.428
	3	3.254***	1.033***	-2.532***	1.765***	0.038***	Yes	2.238	1.704***	14.137
	4	4.083***	0.835***	-2.809***	1.787***	0.037***	Yes	2.184	1.748***	14.984
	5	3.296***	1.004***	-2.604***	1.819***	0.039***	No	1.970	1.747***	14.480
2	1	5.114***	1.210***	-2.065***	1.564***	0.033***	Yes	1.468	1.473***	11.576
	2	2.489***	1.037***	-2.006***	1.484***	0.027***	Yes	1.356	1.410***	10.692
	3	2.222***	0.645***	-2.061***	1.559***	0.024***	No	1.370	1.482***	11.194
	4	2.116***	0.484***	-2.139***	1.645***	0.023***	No	1.205	1.557***	11.773
	5	2.317***	1.217***	-2.297***	1.632***	0.032***	Yes	1.345	1.566***	11.704
3	1	1.028***	0.165**	-1.401***	1.314***	0.015***	Yes	1.147	1.230***	8.783
	2	1.289***	0.476**	-1.640***	1.381***	0.018***	No	1.148	1.293***	9.295
	3	0.966***	0.396***	-1.624***	1.390***	0.017***	Yes	1.006	1.313***	9.281
	4	1.380***	0.850***	-1.913***	1.497***	0.022***	Yes	1.077	1.406***	10.007
	5	2.677***	1.684***	-2.247***	1.681***	0.034***	Yes	1.362	1.563***	11.311
4	1	0.327***	-0.113	-1.104***	1.145***	0.011***	Yes	1.012	1.068***	7.420
	2	1.189***	0.786***	-1.398***	1.284***	0.018***	No	1.151	1.202***	8.425
	3	0.537***	-0.035	-1.462***	1.275***	0.013***	Yes	0.938	1.207***	8.389
	4	1.838***	1.375***	-1.743***	1.382***	0.023***	Yes	0.803	1.301***	9.078
	5	2.102***	1.257***	-2.000***	1.481***	0.025***	Yes	1.007	1.385***	9.892
5	1	-0.017	-0.682***	-0.744***	0.987***	0.007***	Yes	0.703	0.911***	6.343
	2	0.400**	-0.074	-0.896***	0.998***	0.010***	Yes	0.717	0.926***	6.390
	3	0.560***	0.005	-1.137***	1.041***	0.011***	No	0.755	0.985***	6.759
	4	0.298**	-0.268**	-1.216**	1.093***	0.010***	Yes	0.812	1.031***	7.077
	5	1.095***	0.765***	-1.593***	1.154***	0.016***	Yes	0.831	1.097***	7.682
Corr. with Ave.Ret.		0.781	0.497	-0.835	0.840	0.875			0.861	0.935

(Continued)

Table IA.9: (Continued)

Description: The table summarizes properties of 25 portfolios with independent sorts on size and coskewness, using as cutoffs the stocks listed on NYSE. Standardized (unconditional) skewness is the third central moment about the mean. Standardized (unconditional) coskewness of the i^{th} asset is defined as $E[\varepsilon_{i,t}\varepsilon_{M,t}^2]/(\sqrt{E[\varepsilon_{i,t}^2]}E[\varepsilon_{M,t}^2])$, where $\varepsilon_{i,t}$ is the residual from regressing i 's excess return on the excess market return, and $\varepsilon_{M,t}$ is the market return minus its unconditional average. Time-variation in conditional coskewness is captured through the autoregression $E_t[\varepsilon_{i,t+1}\varepsilon_{M,t+1}^2] = \rho_0 + \rho_1\varepsilon_{i,t}\varepsilon_{M,t}^2 + \rho_2\varepsilon_{i,t-1}\varepsilon_{M,t-1}^2$ and whether it is significant at 10% level (i.e., the p-value of the joint test of zero coefficients is below 10%). The coskewness factors are the long-short portfolios $HS = S^- - S^+$ and $HS^- = S^- - r_f$, where S^- (S^+) is the portfolio of the 30% of stocks with the lowest (highest) past standardized coskewness, and r_f is the one-month Treasury bill rate. We also report cross-sectional correlations between the average excess return and other variables. The stars indicate significance at 1% (***) , 5% (**), and 10% (*) levels.

Interpretation: Theory predicts that a portfolio's average (excess) return should be negatively correlated to the portfolio's (i) standardized coskewness, (ii) beta on $HS = S^- - S^+$, and (iii) beta on $HS^- = S^- - r_f$. In the replication sample period (1963 to 1993) and the extended sample period (1963 to 2019) only Result (i) holds, in the pre-sample period (1926 to 1963) only Result (ii) holds, and in the post-sample period (1994 to 2019) none of the Results (i) to (iii) holds.

Table IA.10: Risk Premia for FF3 + HS from Individual Stocks in CRSP – NASDAQ

Stock Selection	No. of Stocks	λ_{MKT}	λ_{SMB}	λ_{HML}	λ_{HS}	Time Period/ Source
All stocks	9,268	0.278** (0.023)	0.022* (0.012)	-0.051** (0.012)	0.058** (0.011)	1963.07-1993.12/ Original
T < 24	1,707	0.294** (0.026)	0.109* (0.013)	-0.049** (0.013)	0.074** (0.011)	
24 ≤ T < 60	2,283	0.343** (0.066)	0.144** (0.046)	-0.012 (0.052)	-0.232** (0.048)	
60 ≤ T < 90	1,240	0.349** (0.116)	-0.051 (0.087)	-0.136 (0.097)	-0.054 (0.099)	
T ≥ 90	4,038	0.122* (0.077)	0.075 (0.062)	-0.271** (0.088)	-0.027 (0.173)	
All stocks	14,988	0.289*** (0.017)	0.135*** (0.011)	-0.083*** (0.010)	0.047*** (0.011)	1963.07-1993.12/ Replicated
T < 24	2,539	0.255*** (0.038)	0.127*** (0.024)	-0.056** (0.024)	0.073*** (0.025)	
24 ≤ T < 60	3,609	0.285*** (0.057)	0.116*** (0.035)	-0.197*** (0.033)	-0.022 (0.029)	
60 ≤ T < 90	2,443	0.296*** (0.057)	0.103*** (0.033)	-0.224*** (0.033)	-0.183*** (0.033)	
T ≥ 90	6,397	0.419*** (0.027)	0.086*** (0.014)	-0.277*** (0.017)	-0.067*** (0.019)	
All stocks CRSP – NASDAQ	5,444	0.186*** (0.031)	-0.002 (0.011)	-0.007 (0.013)	0.000 (0.016)	1963.07-1993.12/ Replicated CRSP – NASDAQ
T < 24 CRSP – NASDAQ	590	0.255*** (0.084)	0.025 (0.029)	0.071** (0.034)	0.112** (0.046)	
24 ≤ T < 60 CRSP – NASDAQ	1,077	-0.046 (0.096)	-0.029 (0.064)	-0.262*** (0.057)	-0.228*** (0.054)	
60 ≤ T < 90 CRSP – NASDAQ	756	0.180* (0.101)	-0.010 (0.058)	-0.236*** (0.059)	-0.307*** (0.062)	
T ≥ 90 CRSP – NASDAQ	3,021	0.413*** (0.038)	0.006 (0.016)	-0.320*** (0.025)	0.001 (0.028)	

Description: This table presents risk premia for the individual stocks in CRSP over the extended sample period (1963 to 2019). As risk factors, we use the factors from the Fama-French three-factor model (FF3), to which we add the long-short portfolio $HS = S^- - S^+$, where S^- (S^+) is the portfolio of the 30% of stocks with the lowest (highest) past standardized coskewness. For each stock, we run a time-series regression of its excess returns on a constant and the factor returns. Then we run a cross-sectional regression of the average stock excess returns on a constant and the betas obtained from the time-series regression, and we obtain the factor premia. We weight each stock i by $1/\sigma(\hat{\epsilon}_i)$, where $\sigma(\hat{\epsilon}_i)$ is the standard deviation of residuals from the beta estimation. The first line reports the estimated premia and the second line the weighted least squares (WLS) standard errors in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels. For the original results, 3-star significance is not available.

Interpretation: As theory predicts a negative risk premium associated to coskewness, we should observe a positive premium on $HS = S^- - S^+$. For the replication sample period (1963 to 1993), this result is true for the first two stock groups (“All stocks” and “T < 24”) in the original study and in the replication, but when NASDAQ stocks are removed the result is true only for the second stock group (“T < 24”).

Table IA.11: Summary Statistics on Momentum Strategies

Panel A. Sample Period 1926 to 1963						
Holding Period	Momentum	Decile	Average (%/yr)	Volatility (%/yr)	Skewness	Kurtosis
1	6	1	17.10	45.15	3.04	21.72
1	6	10	17.49	28.39	0.08	7.25
3	6	1	15.74	44.32	2.96	21.07
3	6	10	18.47	29.42	0.31	8.84
1	12	1	13.63	46.55	3.06	23.15
1	12	10	22.37	28.40	0.58	10.40
3	12	1	12.95	45.93	3.37	25.69
3	12	10	22.16	29.23	0.57	9.11
6	12	1	13.13	45.01	3.06	23.19
6	12	10	21.87	30.46	1.44	15.58
1	24	1	20.82	51.23	3.56	26.21
1	24	10	16.17	26.70	-0.22	6.01
3	24	1	20.83	50.09	3.48	25.20
3	24	10	15.41	26.96	-0.29	6.06
6	24	1	21.81	49.24	3.31	23.79
6	24	10	15.13	27.59	0.12	7.38
12	24	1	22.27	48.43	3.53	26.80
12	24	10	14.18	28.13	0.15	7.29

Panel B. Sample Period 1963 to 1993						
Holding Period	Momentum	Decile	Average (%/yr)	Volatility (%/yr)	Skewness	Kurtosis
1	6	1	10.29	26.43	0.80	7.13
1	6	10	18.02	21.38	-0.83	5.93
3	6	1	9.52	26.37	0.81	7.33
3	6	10	17.77	21.12	-0.77	5.70
1	12	1	8.45	27.03	0.91	7.32
1	12	10	23.12	22.51	-0.69	5.77
3	12	1	8.75	26.72	0.91	7.56
3	12	10	21.40	22.39	-0.66	5.70
6	12	1	9.89	26.30	0.93	7.91
6	12	10	19.12	22.01	-0.57	5.15
1	24	1	13.52	28.63	1.27	8.87
1	24	10	19.39	22.92	-0.67	5.26
3	24	1	13.61	28.48	1.28	9.04
3	24	10	17.90	22.81	-0.63	5.14
6	24	1	14.53	28.21	1.31	9.28
6	24	10	16.26	22.33	-0.56	4.78
12	24	1	14.73	27.05	1.24	10.06
12	24	10	13.69	21.90	-0.55	4.84

Panel C. Sample Period 1994 to 2019						
Holding Period	Momentum	Decile	Average (%/yr)	Volatility (%/yr)	Skewness	Kurtosis
1	6	1	8.12	32.35	1.12	9.22
1	6	10	15.65	21.63	-0.18	5.61
3	6	1	7.68	31.64	1.19	9.72
3	6	10	14.29	21.62	-0.37	4.77
1	12	1	8.06	33.14	1.17	9.05
1	12	10	16.14	22.08	-0.20	5.28
3	12	1	7.80	31.78	1.24	9.93
3	12	10	12.95	22.17	-0.32	4.78
6	12	1	8.19	30.75	1.24	10.47
6	12	10	11.74	21.51	-0.35	4.99
1	24	1	10.69	32.90	1.20	8.53
1	24	10	12.02	22.08	-0.44	5.01
3	24	1	10.93	32.08	1.26	8.96
3	24	10	9.88	21.76	-0.58	4.66
6	24	1	10.89	30.91	1.24	9.26
6	24	10	9.67	21.34	-0.53	4.57
12	24	1	11.53	29.26	1.45	10.68
12	24	10	7.97	20.27	-0.57	4.57

(Continued)

Table IA.11: (Continued)

Panel D. Sample Period 1963 to 2019

Holding Period	Momentum	Decile	Average (%/yr)	Volatility (%/yr)	Skewness	Kurtosis
1	6	1	9.04	29.20	1.01	8.86
1	6	10	16.66	21.43	-0.52	5.76
3	6	1	8.44	28.81	1.05	9.16
3	6	10	15.89	21.29	-0.57	5.23
1	12	1	7.87	29.77	1.09	8.90
1	12	10	19.56	22.18	-0.46	5.53
3	12	1	7.91	28.94	1.13	9.41
3	12	10	17.17	22.16	-0.50	5.27
6	12	1	8.74	28.22	1.12	9.80
6	12	10	15.42	21.65	-0.46	5.08
1	24	1	12.03	30.22	1.24	8.98
1	24	10	16.14	22.25	-0.57	5.22
3	24	1	12.22	29.75	1.28	9.27
3	24	10	14.36	22.05	-0.61	5.03
6	24	1	12.72	29.06	1.28	9.50
6	24	10	13.35	21.58	-0.55	4.78
12	24	1	12.24	26.79	0.88	7.99
12	24	10	11.41	21.55	-0.46	4.87

Panel E. Sample Period 1926 to 2019

Holding Period	Momentum	Decile	Average (%/yr)	Volatility (%/yr)	Skewness	Kurtosis
1	6	1	12.12	36.30	2.67	23.08
1	6	10	16.96	24.37	-0.15	7.33
3	6	1	11.23	35.70	2.61	22.38
3	6	10	16.90	24.78	0.01	8.67
1	12	1	10.05	37.14	2.73	24.79
1	12	10	20.68	24.71	0.16	9.28
3	12	1	9.82	36.44	3.01	27.85
3	12	10	19.19	25.09	0.17	8.56
6	12	1	10.46	35.64	2.77	25.58
6	12	10	18.03	25.39	0.84	14.42
1	24	1	15.39	39.47	3.38	30.90
1	24	10	16.29	23.92	-0.40	5.92
3	24	1	15.50	38.69	3.30	29.61
3	24	10	14.89	23.91	-0.45	5.93
6	24	1	16.21	37.95	3.18	28.32
6	24	10	14.13	23.94	-0.16	6.91
12	24	1	17.20	37.01	3.47	32.69
12	24	10	12.46	23.92	-0.09	7.13

Description: This table presents summary statistics for selected momentum portfolios. Among the U.S. stocks listed on NYSE, AMEX, and NASDAQ, we form equally weighted portfolios by sorting on performance over the past (monthly) return history of 24 months ($t - 24$ to $t - 2$), 12 months ($t - 12$ to $t - 2$), or 6 months ($t - 6$ to $t - 2$). The holding period refers to the period over which test portfolio returns are computed: 1 month, 3 months, 6 months, or 12 months. The summary statistics are the average return, volatility, skewness, and kurtosis, and are reported for decile 1 (the “loser” portfolio) and decile 10 (the “winner” portfolio).

Interpretation: Buying the winner portfolio 10 and selling the loser portfolio 1 requires acceptance of significant negative skewness, as a decrease in skewness between portfolios 1 and 10 is shown in all sample periods. The average return of the winner portfolio 10 is larger than the average return of the loser portfolio 1 in all sample periods for the 6-month and 12-month momentum portfolios, but not for the 24-month momentum portfolios.

3 Persistent Coskewness Factors – Different Sample Periods

In this section, we reproduce Tables 6 and 7 in the paper for different sample periods: the pre-sample period (1926 to 1963), the replication sample period (1963 to 1993), the post-sample period (1994 to 2019), and the maximum sample period (1926 to 2019). We also reproduce Table 8 in the paper for different sample periods and different asset pricing models: the CAPM and the Carhart-Fama-French four-factor model (FF4).

Table IA.12: Coskewness and Risk Factors

Factor	Av.Ret. (%/yr)	Volat. (%/yr)	Sharpe Ratio	β_{MKT}	Std. Skew.	Std. Cosk.	CAPM α (%/yr)	FF4 α (%/yr)	FF5 α (%/yr)
Panel A. 1926.07-1963.06									
<i>HS</i>	-3.152	12.173	-0.26	-0.288***	-0.472***	-1.036***	0.086	1.609	
<i>mPSS</i>	0.363	15.705	0.02	0.281***	0.859***	-0.548***	-2.413	-6.296***	
<i>MKT</i>	9.935***	22.802	0.44	1.000	0.041				
<i>SMB</i>	2.753**	11.872	0.23	0.184***	1.512***	0.324***	0.922		
<i>HML</i>	5.187***	15.070	0.34	0.373***	1.032***	1.169***	1.483		
<i>MOM</i>	7.677***	18.835	0.41	-0.416***	-1.922***	-1.228***	11.813***		
Panel B. 1963.07-1993.12									
<i>HS</i>	2.578	7.626	0.34	0.084***	-2.988***	0.265***	2.152	0.746	0.907
<i>mPSS</i>	1.913	13.004	0.15	0.312***	1.354**	-0.408***	0.338	-5.356***	0.934
<i>PSS</i>	6.830***	11.387	0.60	0.150***	2.303***	-0.528***	6.072***	-1.175	4.160***
<i>MKT</i>	5.042***	15.480	0.33	1.000	0.522***				
<i>SMB</i>	3.371**	9.931	0.34	0.233***	2.516***	-0.386***	2.198		
<i>HML</i>	5.586***	8.984	0.62	-0.208***	4.800***	-0.038	6.636***		
<i>RMW</i>	2.257***	5.392	0.42	0.029	-0.672***	0.012	2.112**	4.207***	
<i>CMA</i>	3.962***	6.628	0.60	-0.179***	0.234*	-0.062	4.867***	1.436*	
<i>MOM</i>	10.237***	11.863	0.86	0.018	-8.045***	-0.422***	10.149***		10.235***
Panel C. 1994.01-2019.12									
<i>HS</i>	1.638	8.465	0.19	-0.123***	-2.056***	-0.047	2.650	2.024	1.378
<i>mPSS</i>	1.220	19.674	0.06	0.642***	0.412***	0.018	-4.045	-4.889*	2.168
<i>PSS</i>	3.505***	17.110	0.20	0.299***	0.795***	-0.039	1.091	-1.357	4.381*
<i>MKT</i>	8.201***	14.860	0.55	1.000	0.304**				
<i>SMB</i>	1.128**	11.211	0.10	0.170***	1.916***	-0.055	-0.265		
<i>HML</i>	1.378***	10.513	0.13	-0.098**	3.460***	-0.011	2.178		
<i>RMW</i>	4.067***	9.419	0.43	-0.288***	-0.231*	0.038	6.430***	5.396***	
<i>CMA</i>	2.507***	7.208	0.35	-0.169***	0.342**	0.160	3.895***	2.690***	
<i>MOM</i>	4.833***	17.056	0.28	-0.326***	-2.458***	-0.159	7.507**		5.739*
Panel D. 1926.07-2019.12									
<i>HS</i>	0.211	9.765	0.02	-0.166***	-1.213***	-0.794***	1.576	2.089**	
<i>mPSS</i>	1.120	16.131	0.07	0.353***	0.752***	-0.461***	-1.633	-4.703***	
<i>MKT</i>	7.830***	18.518	0.42	1.000	0.174**				
<i>SMB</i>	2.500**	11.068	0.23	0.192***	1.885***	0.104**	0.993		
<i>HML</i>	4.246***	12.081	0.35	0.153***	2.071***	0.951***	3.046**		
<i>MOM</i>	7.722***	16.309	0.47	-0.300***	-2.964***	-0.953***	10.073***		

Description: This table presents statistics for the skewness factors and for some common factors used in asset pricing tests. We include alphas from several models: the CAPM with the market factor (*MKT*); the Carhart-Fama-French four-factor model (FF4) with *MKT*, size (*SMB*), value (*HML*), and momentum (*MOM*) factors; and the Fama-French five-factor model (FF5) with *MKT*, *SMB*, *HML*, profitability (*RMW*), and investment (*CMA*) factors. $HS = S^- - S^+$ is the Harvey and Siddique (2000) factor, *PSS* is the Langlois (2020) factor, and *mPSS* is our modified *PSS* factor. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: All three coskewness factors have in general positive risk premia (except *HS* during the pre-sample period). During the replication sample (1963 to 1993), the factors *mPSS* and *PSS* have negative coskewness while *HS* has positive coskewness, while the results are mixed for the other sample periods. With respect to FF5, *PSS* has the usually largest and most significant annualized alpha, followed by *mPSS* and *HS*.

Table IA.13: Factor Correlations

Panel A. 1926.07-1963.06						
	<i>HS</i>	<i>mPSS</i>	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>
<i>HS</i>	1.00					
<i>mPSS</i>	-0.13	1.00				
<i>MKT</i>	-0.56	0.36	1.00			
<i>SMB</i>	-0.39	0.41	0.37	1.00		
<i>HML</i>	-0.60	0.45	0.61	0.43	1.00	
<i>MOM</i>	0.33	-0.08	-0.52	-0.28	-0.60	1.00

Panel B. 1963.07-1993.12									
	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>MOM</i>
<i>HS</i>	1.00								
<i>mPSS</i>	0.13	1.00							
<i>PSS</i>	0.12	0.83	1.00						
<i>MKT</i>	0.16	0.37	0.20	1.00					
<i>SMB</i>	0.15	0.77	0.80	0.34	1.00				
<i>HML</i>	-0.02	-0.18	0.08	-0.36	-0.03	1.00			
<i>RMW</i>	0.15	-0.11	-0.22	0.08	-0.17	-0.54	1.00		
<i>CMA</i>	-0.17	-0.30	-0.10	-0.41	-0.17	0.75	-0.55	1.00	
<i>MOM</i>	0.11	0.24	0.21	0.02	-0.11	-0.16	0.18	-0.08	1.00

Panel C. 1994.01-2019.12									
	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>MOM</i>
<i>HS</i>	1.00								
<i>mPSS</i>	-0.32	1.00							
<i>PSS</i>	-0.29	0.87	1.00						
<i>MKT</i>	-0.21	0.50	0.27	1.00					
<i>SMB</i>	-0.11	0.58	0.65	0.22	1.00				
<i>HML</i>	0.39	-0.40	-0.37	-0.15	-0.10	1.00			
<i>RMW</i>	0.35	-0.69	-0.56	-0.46	-0.48	0.44	1.00		
<i>CMA</i>	0.24	-0.38	-0.27	-0.35	-0.04	0.65	0.30	1.00	
<i>MOM</i>	-0.05	0.15	0.37	-0.29	0.02	-0.21	0.07	0.01	1.00

Panel D. 1926.07-2019.12						
	<i>HS</i>	<i>mPSS</i>	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>
<i>HS</i>	1.00					
<i>mPSS</i>	-0.13	1.00				
<i>MKT</i>	-0.32	0.39	1.00			
<i>SMB</i>	-0.20	0.58	0.33	1.00		
<i>HML</i>	-0.26	0.04	0.25	0.13	1.00	
<i>MOM</i>	0.18	0.07	-0.34	-0.14	-0.41	1.00

Description: This table presents correlations between the market (*MKT*), size (*SMB*), value (*HML*), momentum (*MOM*), profitability (*RMW*), and investment (*CMA*) factors, as well as the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), and our modified predicted coskewness (*mPSS*).

Interpretation: The persistent coskewness factors *mPSS* and *PSS* are highly correlated with each other (83% or 87%, depending on the sample period) but not with *HS*. Size is very correlated with *mPSS* and *PSS* (over 55%) in the sample periods after 1963 (when both factors are defined), and fairly correlated (41%) with *mPSS* in the pre-sample period.

Table IA.14: Risk Premia from the 5-Factor Model and Coskewness, 1963 to 1993

Panel A. the 25 portfolios Sorted by Size and B/M								
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
FF5	0.181 (0.333)	0.291*** (0.040)	0.527*** (0.048)	0.450*** (0.141)	0.029 (0.176)			
FF5 + <i>HS</i>	0.156 (0.368)	0.293*** (0.042)	0.525*** (0.050)	0.438*** (0.158)	0.059 (0.231)	0.201 (0.437)		
FF5 – <i>SMB</i> + <i>HS</i>	0.651 (0.401)		0.511*** (0.056)	0.399** (0.183)	–0.361** (0.153)	1.042*** (0.348)		
FF5 + <i>mPSS</i>	0.555* (0.286)	0.315*** (0.033)	0.507*** (0.039)	0.314*** (0.119)	–0.110 (0.146)		–0.650*** (0.213)	
FF5 – <i>SMB</i> + <i>mPSS</i>	0.240 (0.436)		0.516*** (0.057)	0.335* (0.179)	–0.086 (0.214)		0.347*** (0.093)	
FF5 + <i>PSS</i>	–0.086 (0.296)	0.315*** (0.035)	0.494*** (0.042)	0.477*** (0.120)	0.344* (0.184)			1.161*** (0.317)
FF5 – <i>SMB</i> + <i>PSS</i>	0.093 (0.330)		0.504*** (0.045)	0.458*** (0.135)	0.165 (0.174)			0.556*** (0.076)
Panel B. 25 Portfolios Sorted on Size and Momentum								
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
FF5	0.785 (1.098)	0.434*** (0.137)	–1.173* (0.684)	0.680 (0.646)	1.194* (0.714)			
FF5 + <i>HS</i>	0.837 (1.243)	0.424** (0.168)	–1.124 (0.858)	0.659 (0.683)	1.210 (0.738)	–0.185 (1.113)		
FF5 – <i>SMB</i> + <i>HS</i>	3.015** (1.212)		0.565 (0.749)	0.078 (0.678)	1.487* (0.781)	2.230*** (0.723)		
FF5 + <i>mPSS</i>	0.694 (1.056)	0.272* (0.161)	0.284 (1.078)	0.061 (0.709)	1.214* (0.677)		0.646 (0.432)	
FF5 – <i>SMB</i> + <i>mPSS</i>	1.018 (1.025)		0.093 (0.574)	0.191 (0.535)	1.142* (0.623)		0.591*** (0.217)	
FF5 + <i>PSS</i>	–0.397 (0.939)	0.192 (0.127)	0.425 (0.717)	–0.249 (0.576)	0.621 (0.590)			1.166*** (0.448)
FF5 – <i>SMB</i> + <i>PSS</i>	0.265 (0.929)		–0.365 (0.501)	0.246 (0.472)	0.767 (0.554)			0.527*** (0.188)
Panel C. 25 Portfolios Sorted on Size and Coskewness								
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
FF5	1.169** (0.497)	0.325*** (0.078)	–0.011 (0.457)	0.137 (0.163)	–0.172 (0.356)			
FF5 + <i>HS</i>	1.236** (0.518)	0.338*** (0.082)	–0.106 (0.495)	0.081 (0.192)	–0.159 (0.365)	0.209** (0.092)		
FF5 – <i>SMB</i> + <i>HS</i>	1.348*** (0.464)		–0.112 (0.435)	0.049 (0.152)	–0.250 (0.344)	0.219*** (0.072)		
FF5 + <i>mPSS</i>	1.168** (0.498)	0.332*** (0.079)	–0.233 (0.513)	0.204 (0.178)	–0.274 (0.373)		–0.174 (0.585)	
FF5 – <i>SMB</i> + <i>mPSS</i>	1.280*** (0.486)		–0.033 (0.435)	0.121 (0.148)	–0.240 (0.350)		0.434* (0.227)	
FF5 + <i>PSS</i>	0.497 (0.533)	0.323*** (0.071)	0.431 (0.456)	0.171 (0.148)	–0.100 (0.324)			1.004*** (0.335)
FF5 – <i>SMB</i> + <i>PSS</i>	1.118** (0.499)		–0.107 (0.417)	0.183 (0.153)	–0.250 (0.340)			0.358*** (0.116)

Description: This table presents risk premia for the Fama-French five-factor model and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and the 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (*MKT*), size (*SMB*), value (*HML*), profitability (*RMW*), and investment (*CMA*) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the five-factor model, its risk premium should be positive and significant. This is generally true for *HS*, *mPSS*, and *PSS* as long as we remove the size factor *SMB*, which is highly correlated with the persistent coskewness factors.

Table IA.15: Risk Premia from the 5-Factor Model and Coskewness, 1994 to 2019

Panel A. the 25 portfolios Sorted by Size and B/M								
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
FF5	-0.802** (0.370)	0.113** (0.057)	0.037 (0.066)	0.384** (0.155)	-0.003 (0.210)			
FF5 + <i>HS</i>	-0.597* (0.355)	0.104** (0.053)	0.033 (0.061)	0.442*** (0.146)	0.013 (0.195)	-0.391 (0.255)		
FF5 - <i>SMB</i> + <i>HS</i>	-0.247 (0.399)		0.049 (0.070)	0.022 (0.068)	0.417*** (0.159)	-0.473* (0.286)		
FF5 + <i>mPSS</i>	-0.943*** (0.352)	0.141** (0.055)	0.062 (0.063)	0.546*** (0.166)	-0.111 (0.203)		0.677 (0.565)	
FF5 - <i>SMB</i> + <i>mPSS</i>	-0.913** (0.363)		0.060 (0.060)	0.557*** (0.171)	-0.135 (0.194)		0.727** (0.305)	
FF5 + <i>PSS</i>	-0.807** (0.322)	0.117** (0.051)	0.079 (0.061)	0.442*** (0.143)	-0.109 (0.198)			1.092** (0.495)
FF5 - <i>SMB</i> + <i>PSS</i>	-0.795** (0.332)		0.060 (0.058)	0.473*** (0.148)	-0.140 (0.199)			0.721*** (0.244)
Panel B. 25 Portfolios Sorted on Size and Momentum								
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
FF5	-0.302 (0.205)	0.266*** (0.063)	-0.109 (0.120)	0.058 (0.128)	0.557** (0.272)			
FF5 + <i>HS</i>	-0.303 (0.208)	0.258*** (0.065)	-0.049 (0.151)	0.087 (0.137)	0.643** (0.303)	-0.395 (0.523)		
FF5 - <i>SMB</i> + <i>HS</i>	-0.390* (0.215)		0.067 (0.162)	-0.162** (0.073)	0.887*** (0.303)	-0.413 (0.560)		
FF5 + <i>mPSS</i>	-0.402* (0.211)	0.297*** (0.065)	-0.691 (0.424)	0.106 (0.129)	0.380 (0.290)		-0.765* (0.461)	
FF5 - <i>SMB</i> + <i>mPSS</i>	-0.282 (0.213)		0.169 (0.152)	-0.022 (0.118)	0.690*** (0.246)		0.140 (0.177)	
FF5 + <i>PSS</i>	-0.353 (0.293)	0.271*** (0.071)	-0.208 (0.507)	0.066 (0.154)	0.538* (0.290)			0.052 (0.333)
FF5 - <i>SMB</i> + <i>PSS</i>	-0.221 (0.210)		0.165 (0.143)	-0.023 (0.102)	0.630*** (0.233)			0.274** (0.120)
Panel C. 25 Portfolios Sorted on Size and Coskewness								
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
FF5	-0.100 (0.313)	0.108** (0.055)	0.522*** (0.164)	0.147 (0.109)	0.130 (0.170)			
FF5 + <i>HS</i>	-0.064 (0.363)	0.114** (0.058)	0.465* (0.274)	0.121 (0.160)	0.103 (0.203)	0.179** (0.083)		
FF5 - <i>SMB</i> + <i>HS</i>	0.269 (0.253)		0.467* (0.266)	-0.029 (0.107)	0.023 (0.195)	0.186** (0.076)		
FF5 + <i>mPSS</i>	-0.102 (0.322)	0.105* (0.063)	0.514*** (0.178)	0.151 (0.117)	0.134 (0.177)		-0.267 (0.506)	
FF5 - <i>SMB</i> + <i>mPSS</i>	-0.024 (0.274)		0.561*** (0.129)	0.097 (0.082)	0.088 (0.156)		0.140 (0.225)	
FF5 + <i>PSS</i>	-0.094 (0.304)	0.089 (0.061)	0.459** (0.178)	0.166 (0.127)	0.170 (0.167)			-0.386 (0.406)
FF5 - <i>SMB</i> + <i>PSS</i>	0.024 (0.266)		0.566*** (0.118)	0.056 (0.077)	0.095 (0.148)			0.033 (0.203)

Description: This table presents risk premia for the Fama-French five-factor model and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and the 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (*MKT*), size (*SMB*), value (*HML*), profitability (*RMW*), and investment (*CMA*) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the five-factor model, its risk premium should be positive and significant. This is true for *HS* only in the last panel, and it is weakly true for *mPSS* and *PSS* as long as we remove the size factor *SMB*, which is highly correlated with the persistent coskewness factors.

Table IA.16: Risk Premia for CAPM and Coskewness, 1926 to 1963

Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>
Panel A. 25 Portfolios Sorted by Size and B/M			
CAPM	0.811*** (0.151)		
CAPM + <i>HS</i>	0.551** (0.271)	-0.332** (0.157)	
CAPM + <i>mPSS</i>	0.758*** (0.286)		0.287 (0.260)
Panel B. 25 Portfolios Sorted on Size and Momentum			
CAPM	-0.120 (0.397)		
CAPM + <i>HS</i>	-1.938*** (0.291)	-1.448*** (0.191)	
CAPM + <i>mPSS</i>	-0.769*** (0.281)		1.453*** (0.269)
Panel C. 25 Portfolios Sorted on Size and Coskewness			
CAPM	1.294*** (0.162)		
CAPM + <i>HS</i>	1.392*** (0.365)	-0.242 (0.165)	
CAPM + <i>mPSS</i>	0.620*** (0.230)		1.182*** (0.231)

Description: This table presents risk premia for the CAPM model and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (*MKT*). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the CAPM, its risk premium should be positive and significant. This is not true for *HS* in any of the panels, while it is true for *mPSS* in the last two panels.

Table IA.17: Risk Premia from CAPM and Coskewness, 1963 to 1993

Panel A. 25 Portfolios Sorted by Size and B/M				
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
CAPM	-0.149 (0.335)			
CAPM + <i>HS</i>	-0.497 (0.320)	1.349*** (0.489)		
CAPM + <i>mPSS</i>	-1.647*** (0.359)		0.447*** (0.125)	
CAPM + <i>PSS</i>	-1.305*** (0.233)			0.635*** (0.092)
Panel B. 25 Portfolios Sorted on Size and Momentum				
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
CAPM	1.007 (0.724)			
CAPM + <i>HS</i>	0.021 (0.710)	2.121*** (0.693)		
CAPM + <i>mPSS</i>	-0.794 (0.908)		0.833*** (0.240)	
CAPM + <i>PSS</i>	-0.451 (0.871)			0.773*** (0.224)
Panel C. 25 Portfolios Sorted on Size and Coskewness				
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
CAPM	1.639*** (0.141)			
CAPM + <i>HS</i>	1.580*** (0.140)	0.230*** (0.064)		
CAPM + <i>mPSS</i>	1.325*** (0.366)		0.541*** (0.053)	
CAPM + <i>PSS</i>	1.173*** (0.393)			0.326*** (0.067)

Description: This table presents risk premia for the CAPM model and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and the 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (*MKT*). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the CAPM, its risk premium should be positive and significant. This is true for *HS*, *mPSS*, and *PSS* in all panels.

Table IA.18: Risk Premia from the CAPM and Coskewness, 1994 to 2019

Panel A. 25 Portfolios Sorted by Size and B/M				
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
CAPM	-0.249 (0.202)			
CAPM + <i>HS</i>	-0.356 (0.279)	-0.046 (0.119)		
CAPM + <i>mPSS</i>	-0.869** (0.349)		-0.169 (0.122)	
CAPM + <i>PSS</i>	-0.962*** (0.286)			0.151 (0.097)
Panel B. 25 Portfolios Sorted on Size and Momentum				
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
CAPM	-0.424*** (0.158)			
CAPM + <i>HS</i>	-0.570*** (0.153)	-0.449** (0.189)		
CAPM + <i>mPSS</i>	-0.560*** (0.120)		0.200* (0.118)	
CAPM + <i>PSS</i>	-0.462*** (0.110)			0.340*** (0.087)
Panel C. 25 Portfolios Sorted on Size and Coskewness				
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
CAPM	0.560*** (0.168)			
CAPM + <i>HS</i>	0.725*** (0.125)	0.242*** (0.066)		
CAPM + <i>mPSS</i>	0.177 (0.379)		0.496*** (0.158)	
CAPM + <i>PSS</i>	-0.049 (0.421)			0.476*** (0.219)

Description: This table presents risk premia for the CAPM model and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and the 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (*MKT*). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the CAPM, its risk premium should be positive and significant. This is true for *HS* only in last panel, and it is true for *mPSS* and *PSS* only in the last two panels.

Table IA.19: Risk Premia from the CAPM and Coskewness, 1963 to 2019

Panel A. 25 Portfolios Sorted by Size and B/M				
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
CAPM	-0.131 (0.261)			
CAPM + <i>HS</i>	0.350 (0.306)	0.821** (0.334)		
CAPM + <i>mPSS</i>	-1.399*** (0.452)		0.153 (0.128)	
CAPM + <i>PSS</i>	-1.406*** (0.310)			0.494*** (0.118)
Panel B. 25 Portfolios Sorted on Size and Momentum				
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
CAPM	-0.389 (0.400)			
CAPM + <i>HS</i>	-0.043 (0.597)	0.909 (1.162)		
CAPM + <i>mPSS</i>	-1.412*** (0.274)		0.604*** (0.144)	
CAPM + <i>PSS</i>	-1.144*** (0.230)			0.801*** (0.105)
Panel C. 25 Portfolios Sorted on Size and Coskewness				
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
CAPM	1.194*** (0.146)			
CAPM + <i>HS</i>	1.175*** (0.092)	0.271*** (0.048)		
CAPM + <i>mPSS</i>	0.952** (0.382)		0.596*** (0.090)	
CAPM + <i>PSS</i>	0.728 (0.457)			0.395*** (0.133)

Description: This table presents risk premia for the CAPM model and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and the 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (*MKT*). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the CAPM, its risk premium should be positive and significant. This is true for *PSS* in all three panels, for *mPSS* in the last two panels, and for *HS* in the first and last panel.

Table IA.20: Risk Premia from the CAPM and Coskewness, 1926 to 2019

Panel A. 25 Portfolios Sorted by Size and B/M			
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>
CAPM	0.698*** (0.207)		
CAPM + <i>HS</i>	-0.266 (0.343)	-1.086*** (0.309)	
CAPM + <i>mPSS</i>	0.980*** (0.332)		0.067 (0.173)
Panel B. 25 Portfolios Sorted on Size and Momentum			
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>
CAPM	-0.343 (0.374)		
CAPM + <i>HS</i>	-2.028*** (0.485)	-2.036*** (0.507)	
CAPM + <i>mPSS</i>	-1.004*** (0.219)		0.999*** (0.160)
Panel C. 25 Portfolios Sorted on Size and Coskewness			
Model	<i>MKT</i>	<i>HS</i>	<i>mPSS</i>
CAPM	1.037*** (0.118)		
CAPM + <i>HS</i>	1.353*** (0.144)	0.116 (0.085)	
CAPM + <i>mPSS</i>	0.013 (0.183)		1.238*** (0.144)

Description: This table presents risk premia for the CAPM model and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and the 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (*MKT*). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the CAPM, its risk premium should be positive and significant. This is not true for *HS* in any panel, and it is true for *mPSS* only in the last two panels.

Table IA.21: Risk Premia for the 4-Factor Model and Coskewness, 1926 to 1963

Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>	<i>mPSS</i>
Panel A. 25 Portfolios Sorted by Size and B/M						
FF4	-0.679 (0.578)	0.150*** (0.056)	0.447*** (0.087)	0.139 (0.551)		
FF4 + <i>HS</i>	-0.536 (0.522)	0.141** (0.057)	0.467*** (0.094)	0.330 (0.627)	-0.061 (0.216)	
FF4 - <i>SMB</i> + <i>HS</i>	-0.252 (0.502)		0.486*** (0.087)	0.526 (0.648)	-0.165 (0.162)	
FF4 + <i>mPSS</i>	-0.625 (0.600)	0.148** (0.058)	0.445*** (0.090)	0.125 (0.580)		-0.000 (0.436)
FF4 - <i>SMB</i> + <i>mPSS</i>	-0.259 (0.562)		0.447*** (0.088)	0.377 (0.584)		0.430 (0.283)
Panel B. 25 Portfolios Sorted on Size and Momentum						
FF4	-0.357 (0.539)	0.015 (0.244)	1.366* (0.699)	0.765*** (0.085)		
FF4 + <i>HS</i>	-0.866 (0.695)	0.330 (0.205)	0.301 (0.540)	0.751*** (0.100)	-0.459 (0.413)	
FF4 - <i>SMB</i> + <i>HS</i>	-0.653 (0.720)		0.604*** (0.155)	0.797*** (0.098)	-0.739** (0.312)	
FF4 + <i>mPSS</i>	-0.295 (0.541)	-0.069 (0.259)	1.687** (0.759)	0.781*** (0.086)		-0.019 (0.351)
FF4 - <i>SMB</i> + <i>mPSS</i>	-0.128 (0.523)		1.215*** (0.208)	0.778*** (0.082)		-0.069 (0.318)
Panel C. 25 Portfolios Sorted on Size and Coskewness						
FF4	-0.843** (0.380)	0.416*** (0.078)	0.424** (0.181)	-0.544** (0.261)		
FF4 + <i>HS</i>	-0.538* (0.322)	0.327*** (0.113)	0.614** (0.278)	-0.537** (0.261)	0.057 (0.119)	
FF4 - <i>SMB</i> + <i>HS</i>	-0.407 (0.343)		1.000*** (0.111)	-0.503* (0.282)	0.105 (0.113)	
FF4 + <i>mPSS</i>	-0.800** (0.400)	0.398*** (0.090)	0.448** (0.193)	-0.570** (0.272)		0.142 (0.339)
FF4 - <i>SMB</i> + <i>mPSS</i>	-0.538 (0.425)		0.644*** (0.154)	-0.710** (0.286)		0.634*** (0.227)

Description: This table presents risk premia for the Carhart-Fama-French four-factor model (the Fama-French three-factor model and momentum) and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (*MKT*), size (*SMB*), value (*HML*), and momentum (*MOM*) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the four-factor model, its risk premium should be positive and significant. This is not true for *HS* in any of the panels, and it is true for *mPSS* only in the last panel when we remove the size factor *SMB*, which is highly correlated with *mPSS*.

Table IA.22: Risk Premia for the 4-Factor Model and Coskewness, 1963 to 1993

Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
Panel A. 25 Portfolios Sorted by Size and B/M							
FF4	-0.179 (0.420)	0.214*** (0.051)	0.500*** (0.065)	-1.024 (0.792)			
FF4 + <i>HS</i>	-0.312 (0.474)	0.219*** (0.053)	0.495*** (0.066)	-0.961 (0.811)	-0.359 (0.486)		
FF4 - <i>SMB</i> + <i>HS</i>	0.185 (0.320)		0.459*** (0.064)	-1.391* (0.714)	0.110 (0.354)		
FF4 + <i>mPSS</i>	0.628 (0.397)	0.256*** (0.042)	0.466*** (0.052)	-0.570 (0.636)		-0.783*** (0.278)	
FF4 - <i>SMB</i> + <i>mPSS</i>	-0.006 (0.488)		0.479*** (0.064)	-1.426* (0.763)		-0.273 (0.319)	
FF4 + <i>PSS</i>	-0.313 (0.480)	0.222*** (0.054)	0.494*** (0.067)	-0.688 (0.968)			0.313 (0.560)
FF4 - <i>SMB</i> + <i>PSS</i>	-0.290 (0.446)		0.468*** (0.063)	-0.766 (0.824)			0.191 (0.324)
Panel B. 25 Portfolios Sorted on Size and Momentum							
FF4	0.465 (0.944)	0.102 (0.148)	0.678 (0.731)	0.959*** (0.124)			
FF4 + <i>HS</i>	-0.156 (0.986)	0.190 (0.152)	0.243 (0.752)	0.912*** (0.123)	-1.366 (0.942)		
FF4 - <i>SMB</i> + <i>HS</i>	1.052** (0.483)		0.932** (0.397)	0.849*** (0.113)	-0.385 (0.631)		
FF4 + <i>mPSS</i>	1.027 (0.995)	0.336 (0.215)	-0.356 (0.999)	0.948*** (0.121)		-0.493 (0.661)	
FF4 - <i>SMB</i> + <i>mPSS</i>	0.887 (0.998)		0.872 (0.602)	0.920*** (0.120)		0.419* (0.241)	
FF4 + <i>PSS</i>	-2.645** (1.225)	0.055 (0.122)	0.318 (0.609)	0.912*** (0.102)			2.378*** (0.556)
FF4 - <i>SMB</i> + <i>PSS</i>	0.003 (1.114)		0.323 (0.717)	0.906*** (0.118)			0.665*** (0.156)
Panel C. 25 Portfolios Sorted on Size and Coskewness							
FF4	1.240*** (0.409)	0.359*** (0.096)	-0.121 (0.397)	0.425 (0.453)			
FF4 + <i>HS</i>	1.194*** (0.414)	0.364*** (0.097)	-0.212 (0.422)	0.110 (0.641)	0.202** (0.092)		
FF4 - <i>SMB</i> + <i>HS</i>	1.367*** (0.367)		-0.199 (0.345)	-0.109 (0.568)	0.222*** (0.072)		
FF4 + <i>mPSS</i>	1.379*** (0.402)	0.388*** (0.094)	-0.277 (0.393)	-0.040 (0.521)		-0.198 (0.533)	
FF4 - <i>SMB</i> + <i>mPSS</i>	1.404*** (0.404)		-0.080 (0.381)	0.400 (0.436)		0.628** (0.252)	
FF4 + <i>PSS</i>	0.867* (0.447)	0.353*** (0.091)	0.117 (0.403)	1.176* (0.615)			1.088*** (0.422)
FF4 - <i>SMB</i> + <i>PSS</i>	1.195*** (0.423)		-0.188 (0.358)	0.563 (0.456)			0.546*** (0.211)

Description: This table presents risk premia for the Carhart-Fama-French four-factor model (the Fama-French three-factor model and momentum) and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (*MKT*), size (*SMB*), value (*HML*), and momentum (*MOM*) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the four-factor model, its risk premium should be positive and significant. This is true for *HS* only in the last panel, and it is true for *mPSS* and *PSS* in the last two panels as long as we remove the size factor *SMB*, which is highly correlated with the persistent coskewness factors.

Table IA.23: Risk Premia for the 4-Factor Model and Coskewness, 1994 to 2019

Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
Panel A. 25 Portfolios Sorted by Size and B/M							
FF4	-0.465 (0.390)	0.052 (0.047)	0.106* (0.062)	1.315** (0.669)			
FF4 + <i>HS</i>	-0.488 (0.399)	0.047 (0.050)	0.111* (0.064)	1.240* (0.693)	-0.079 (0.227)		
FF4 - <i>SMB</i> + <i>HS</i>	-0.228 (0.260)		0.122* (0.066)	1.503*** (0.540)	-0.213 (0.218)		
FF4 + <i>mPSS</i>	-0.312 (0.450)	0.063 (0.051)	0.089 (0.068)	1.299* (0.682)		-0.113 (0.440)	
FF4 - <i>SMB</i> + <i>mPSS</i>	-0.309 (0.484)		0.116* (0.065)	1.521** (0.680)		0.289 (0.249)	
FF4 + <i>PSS</i>	-0.542 (0.471)	0.053 (0.048)	0.101 (0.065)	1.301* (0.668)			0.453 (0.503)
FF4 - <i>SMB</i> + <i>PSS</i>	-0.544 (0.444)		0.100 (0.062)	1.249* (0.693)			0.474* (0.261)
Panel B. 25 Portfolios Sorted on Size and Momentum							
FF4	-0.021 (0.373)	0.127* (0.070)	0.329 (0.259)	0.407*** (0.062)			
FF4 + <i>HS</i>	-0.010 (0.386)	0.120 (0.081)	0.365 (0.334)	0.410*** (0.068)	-0.004 (0.470)		
FF4 - <i>SMB</i> + <i>HS</i>	0.454 (0.303)		0.754*** (0.251)	0.431*** (0.065)	-0.341 (0.426)		
FF4 + <i>mPSS</i>	0.040 (0.349)	0.266*** (0.097)	-0.279 (0.395)	0.374*** (0.060)		-0.737* (0.443)	
FF4 - <i>SMB</i> + <i>mPSS</i>	0.069 (0.385)		0.536** (0.230)	0.401*** (0.062)		0.286** (0.117)	
FF4 + <i>PSS</i>	0.052 (0.378)	0.161** (0.080)	0.125 (0.331)	0.406*** (0.062)			-0.132 (0.373)
FF4 - <i>SMB</i> + <i>PSS</i>	-0.031 (0.379)		0.439* (0.236)	0.390*** (0.061)			0.345*** (0.096)
Panel C. 25 Portfolios Sorted on Size and Coskewness							
FF4	-0.169 (0.271)	0.003 (0.067)	0.523*** (0.139)	-0.263 (0.306)			
FF4 + <i>HS</i>	-0.021 (0.347)	0.040 (0.084)	0.330 (0.303)	-0.329 (0.324)	0.204** (0.079)		
FF4 - <i>SMB</i> + <i>HS</i>	0.496*** (0.175)		0.132 (0.295)	-0.807*** (0.190)	0.203*** (0.077)		
FF4 + <i>mPSS</i>	-0.175 (0.278)	0.002 (0.069)	0.503*** (0.160)	-0.298 (0.339)		-0.427 (0.450)	
FF4 - <i>SMB</i> + <i>mPSS</i>	-0.107 (0.249)		0.544*** (0.133)	-0.273 (0.315)		-0.039 (0.162)	
FF4 + <i>PSS</i>	-0.135 (0.266)	-0.005 (0.070)	0.482*** (0.130)	-0.305 (0.301)			-0.462 (0.362)
FF4 - <i>SMB</i> + <i>PSS</i>	-0.085 (0.254)		0.479*** (0.122)	-0.353 (0.286)			-0.075 (0.183)

Description: This table presents risk premia for the Carhart-Fama-French four-factor model (the Fama-French three-factor model and momentum) and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (*MKT*), size (*SMB*), value (*HML*), and momentum (*MOM*) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the four-factor model, its risk premium should be positive and significant. This is true for *HS* only in the last panel, and it is weakly true for *mPSS* and *PSS* in the first two panels as long as we remove the size factor *SMB*, which is highly correlated with the persistent coskewness factors.

Table IA.24: Risk Premia from the 4-Factor Model and Coskewness, 1963 to 2019

Panel A. 25 Portfolios Sorted by Size and B/M							
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
FF4	-0.117 (0.437)	0.146*** (0.044)	0.328*** (0.055)	1.684* (1.000)			
FF4 + <i>HS</i>	-0.210 (0.453)	0.139*** (0.045)	0.337*** (0.057)	1.550 (1.017)	-0.201 (0.360)		
FF4 - <i>SMB</i> + <i>HS</i>	0.835*** (0.240)		0.343*** (0.063)	3.100*** (0.928)	-0.096 (0.348)		
FF4 + <i>mPSS</i>	0.249 (0.449)	0.176*** (0.044)	0.295*** (0.055)	1.583* (0.936)		-0.036 (0.398)	
FF4 - <i>SMB</i> + <i>mPSS</i>	0.255 (0.561)		0.335*** (0.060)	2.392** (1.107)		0.871*** (0.309)	
FF4 + <i>PSS</i>	-0.062 (0.490)	0.150*** (0.045)	0.320*** (0.058)	1.742* (1.000)			0.600 (0.507)
FF4 - <i>SMB</i> + <i>PSS</i>	-0.134 (0.496)		0.321*** (0.056)	1.826* (1.045)			0.924*** (0.336)

Panel B. 25 Portfolios Sorted on Size and Momentum							
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
FF4	0.369 (0.590)	0.145* (0.088)	0.532 (0.394)	0.723*** (0.075)			
FF4 + <i>HS</i>	-0.025 (0.627)	0.077 (0.097)	0.835* (0.432)	0.729*** (0.073)	-1.486 (1.077)		
FF4 - <i>SMB</i> + <i>HS</i>	0.782*** (0.291)		1.060*** (0.367)	0.695*** (0.072)	-0.723 (1.062)		
FF4 + <i>mPSS</i>	0.446 (0.579)	0.326** (0.156)	-0.185 (0.644)	0.687*** (0.078)		-0.318 (0.480)	
FF4 - <i>SMB</i> + <i>mPSS</i>	0.543 (0.593)		0.714** (0.301)	0.695*** (0.073)		0.408*** (0.125)	
FF4 + <i>PSS</i>	0.210 (0.666)	0.110 (0.112)	0.675 (0.475)	0.722*** (0.076)			0.694 (0.468)
FF4 - <i>SMB</i> + <i>PSS</i>	0.265 (0.617)		0.557* (0.332)	0.686*** (0.072)			0.533*** (0.124)

Panel C. 25 Portfolios Sorted on Size and Coskewness							
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>	<i>mPSS</i>	<i>PSS</i>
FF4	0.230 (0.222)	0.053 (0.054)	1.017*** (0.169)	0.508* (0.307)			
FF4 + <i>HS</i>	0.384 (0.252)	0.102 (0.064)	0.733*** (0.270)	0.344 (0.328)	0.246*** (0.048)		
FF4 - <i>SMB</i> + <i>HS</i>	0.787*** (0.185)		0.512* (0.302)	-0.196 (0.253)	0.236*** (0.047)		
FF4 + <i>mPSS</i>	0.232 (0.217)	0.070 (0.054)	0.856*** (0.203)	0.276 (0.344)		-0.355 (0.343)	
FF4 - <i>SMB</i> + <i>mPSS</i>	0.296 (0.238)		1.047*** (0.182)	0.436 (0.351)		0.209 (0.170)	
FF4 + <i>PSS</i>	0.337 (0.254)	0.059 (0.054)	0.911*** (0.184)	0.398 (0.325)			0.097 (0.254)
FF4 - <i>SMB</i> + <i>PSS</i>	0.233 (0.268)		1.021*** (0.173)	0.384 (0.339)			0.339* (0.187)

Description: This table presents risk premia for the Carhart-Fama-French four-factor model (the Fama-French three-factor model and momentum) and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and the 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (*MKT*), size (*SMB*), value (*HML*), and momentum (*MOM*) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the four-factor model, its risk premium should be positive and significant. This is true for *HS* only in the last panel, and it is weakly true for *mPSS* and *PSS* in all three panels as long as we remove the size factor *SMB*, which is highly correlated with the persistent coskewness factors.

Table IA.25: Risk Premia for the 4-Factor Model and Coskewness, 1926 to 2019

Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>	<i>mPSS</i>
Panel A. 25 Portfolios Sorted by Size and B/M						
FF4	-0.320 (0.420)	0.160*** (0.042)	0.363*** (0.061)	0.859 (0.752)		
FF4 + <i>HS</i>	-0.343 (0.441)	0.161*** (0.048)	0.363*** (0.065)	0.744 (0.830)	0.103 (0.438)	
FF4 - <i>SMB</i> + <i>HS</i>	0.327 (0.368)		0.388*** (0.068)	1.726** (0.803)	-0.453 (0.385)	
FF4 + <i>mPSS</i>	-0.234 (0.535)	0.160*** (0.044)	0.362*** (0.065)	0.863 (0.783)		0.186 (0.392)
FF4 - <i>SMB</i> + <i>mPSS</i>	-0.146 (0.557)		0.383*** (0.066)	1.508* (0.794)		0.740*** (0.244)
Panel B. 25 Portfolios Sorted on Size and Momentum						
FF4	0.609 (0.429)	0.107 (0.086)	0.832*** (0.270)	0.754*** (0.049)		
FF4 + <i>HS</i>	0.066 (0.507)	0.152* (0.085)	0.494 (0.327)	0.759*** (0.051)	-0.883** (0.411)	
FF4 - <i>SMB</i> + <i>HS</i>	0.108 (0.275)		0.526*** (0.182)	0.748*** (0.046)	-0.965** (0.429)	
FF4 + <i>mPSS</i>	0.746 (0.462)	0.157 (0.105)	0.694** (0.324)	0.750*** (0.051)		0.249 (0.231)
FF4 - <i>SMB</i> + <i>mPSS</i>	0.861** (0.417)		0.860*** (0.136)	0.744*** (0.048)		0.356*** (0.114)
Panel C. 25 Portfolios Sorted on Size and Coskewness						
FF4	-0.335 (0.246)	0.354*** (0.065)	-0.053 (0.202)	-0.633** (0.280)		
FF4 + <i>HS</i>	-0.110 (0.217)	0.286*** (0.072)	0.168 (0.230)	-0.566** (0.272)	0.131** (0.056)	
FF4 - <i>SMB</i> + <i>HS</i>	0.275 (0.282)		0.747*** (0.244)	-0.576 (0.383)	0.182*** (0.068)	
FF4 + <i>mPSS</i>	-0.260 (0.247)	0.364*** (0.065)	-0.105 (0.202)	-0.626** (0.274)		0.529 (0.390)
FF4 - <i>SMB</i> + <i>mPSS</i>	-0.121 (0.234)		-0.192 (0.201)	-0.648** (0.273)		0.829*** (0.183)

Description: This table presents risk premia for the Carhart-Fama-French four-factor model (the Fama-French three-factor model and momentum) and an additional coskewness factor: the Harvey and Siddique (2000) factor ($HS = S^- - S^+$), the Langlois (2020) factor (*PSS*), or the modified predicted coskewness factor (*mPSS*). The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (*MKT*), size (*SMB*), value (*HML*), and momentum (*MOM*) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the four-factor model, its risk premium should be positive and significant. This is true for *HS* only in the last panel, and it is weakly true for *mPSS* in all three panels as long as we remove the size factor *SMB*, which is highly correlated with the persistent coskewness factors.

4 Persistent Coskewness Factors – Robustness Checks

In this section, we perform robustness checks for Table 8 in the paper and also for Tables IA.19 and IA.24 in the Internet Appendix. We modify the Harvey and Siddique (2000) coskewness proxy HS in several ways: First, we reduce the estimation window of HS from 5 years to 3 years. Second, we exclude microcap stocks (i.e., stocks with a market capitalization of less than 250,000 U.S. dollars) from the portfolio formation of HS . Third, we exclude penny stocks (i.e., stocks with a price of less than 5 U.S. dollars) from the portfolio formation of HS . Fourth, we require the stocks included in the definition of HS to have a number of observations over the past 60 months of at least N , where N is equal to 36, 48, or 60.

Table IA.26: Risk Premia from the CAPM and Coskewness, 1963 to 2019
3-Year Estimation Window

Panel A. 25 Portfolios Sorted by Size and B/M		
Model	<i>MKT</i>	<i>HS</i>
CAPM	-0.131 (0.261)	
CAPM + <i>HS</i> (5-Yr Window)	0.350 (0.306)	0.821** (0.334)
CAPM + <i>HS</i> (3-Yr Window)	0.342 (0.248)	1.269*** (0.350)
Panel B. 25 Portfolios Sorted on Size and Momentum		
Model	<i>MKT</i>	<i>HS</i>
CAPM	-0.389 (0.400)	
CAPM + <i>HS</i> (5-Yr Window)	-0.043 (0.597)	0.909 (1.162)
CAPM + <i>HS</i> (3-Yr Window)	-0.460 (0.441)	-0.393 (0.934)
Panel C. 25 Portfolios Sorted on Size and Coskewness		
Model	<i>MKT</i>	<i>HS</i>
CAPM	1.194*** (0.146)	
CAPM + <i>HS</i> (5-Yr Window)	1.175*** (0.092)	0.271*** (0.048)
CAPM + <i>HS</i> (3-Yr Window)	1.181*** (0.093)	0.206*** (0.037)

Description: This table presents risk premia for the CAPM model and an additional coskewness factor, the Harvey and Siddique (2000) factor ($HS = S^- - S^+$). We use two versions of *HS*: the standard version that uses an window of 1-year for the estimation of coskewness, and a modified version that uses an estimation window of 3 years. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (*MKT*). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding the coskewness factor *HS* to the CAPM model, its risk premium should be positive and significant. This result is true only in the first and third panels, regardless of whether we use an estimation window of 5 years or 3 years.

Table IA.27: Risk Premia from the 4-Factor Model and Coskewness, 1963 to 2019
3-Year Estimation Window

Panel A. 25 Portfolios Sorted by Size and B/M					
Model	MKT	SMB	HML	MOM	HS
FF4	-0.117 (0.437)	0.146*** (0.044)	0.328*** (0.055)	1.684* (1.000)	
FF4 + HS (5-Yr Window)	-0.210 (0.453)	0.139*** (0.045)	0.337*** (0.057)	1.550 (1.017)	-0.201 (0.360)
FF4 + HS (3-Yr Window)	-0.130 (0.451)	0.144*** (0.046)	0.332*** (0.058)	1.670 (1.026)	-0.059 (0.522)
FF4 - SMB + HS (5-Yr Window)	0.835*** (0.240)		0.343*** (0.063)	3.100*** (0.928)	-0.096 (0.348)
FF4 - SMB + HS (3-Yr Window)	0.875*** (0.244)		0.334*** (0.065)	3.064*** (0.966)	0.057 (0.518)

Panel B. 25 Portfolios Sorted on Size and Momentum					
Model	MKT	SMB	HML	MOM	HS
FF4	0.369 (0.590)	0.145* (0.088)	0.532 (0.394)	0.723*** (0.075)	
FF4 + HS (5-Yr Window)	-0.025 (0.627)	0.077 (0.097)	0.835* (0.432)	0.729*** (0.073)	-1.486 (1.077)
FF4 + HS (3-Yr Window)	0.259 (0.558)	0.091 (0.088)	0.831** (0.403)	0.699*** (0.072)	-1.250* (0.716)
FF4 - SMB + HS (5-Yr Window)	0.782*** (0.291)		1.060*** (0.367)	0.695*** (0.072)	-0.723 (1.062)
FF4 - SMB + HS (3-Yr Window)	0.969*** (0.256)		1.122*** (0.312)	0.681*** (0.069)	-0.799 (0.662)

Panel C. 25 Portfolios Sorted on Size and Coskewness					
Model	MKT	SMB	HML	MOM	HS
FF4	0.230 (0.222)	0.053 (0.054)	1.017*** (0.169)	0.508* (0.307)	
FF4 + HS (5-Yr Window)	0.384 (0.252)	0.102 (0.064)	0.733*** (0.270)	0.344 (0.328)	0.246*** (0.048)
FF4 + HS (3-Yr Window)	0.367 (0.246)	0.104* (0.062)	0.727*** (0.256)	0.318 (0.333)	0.195*** (0.035)
FF4 - SMB + HS (5-Yr Window)	0.787*** (0.185)		0.512* (0.302)	-0.196 (0.253)	0.236*** (0.047)
FF4 - SMB + HS (3-Yr Window)	0.775*** (0.175)		0.498* (0.283)	-0.240 (0.254)	0.191*** (0.034)

Description: This table presents risk premia for the Carhart-Fama-French four-factor model (the Fama-French three-factor model and momentum) and an additional coskewness factor, the Harvey and Siddique (2000) factor ($HS = S^- - S^+$). We use two versions of HS : the standard version that uses an estimation window of 1-year for the estimation of coskewness, and a modified version that uses an estimation window of 3 years. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (MKT). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding the coskewness factor HS to the four-factor model, its risk premium should be positive and significant. This result is true only in the third panel, regardless of whether we use an estimation window of 5 years or 3 years.

Table IA.28: Risk Premia from the 5-Factor Model and Coskewness, 1963 to 2019
3-Year Estimation Window

Panel A. 25 Portfolios Sorted by Size and B/M						
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>
FF5	-0.474 (0.357)	0.260*** (0.053)	0.264*** (0.056)	0.402** (0.169)	0.035 (0.205)	
FF5 + <i>HS</i> (5-Yr Window)	-0.307 (0.272)	0.238*** (0.040)	0.254*** (0.042)	0.257* (0.133)	0.451** (0.187)	-1.116*** (0.336)
FF5 + <i>HS</i> (3-Yr Window)	-0.321 (0.349)	0.249*** (0.051)	0.264*** (0.053)	0.322* (0.167)	0.284 (0.240)	-0.946 (0.616)
FF5 - <i>SMB</i> + <i>HS</i> (5-Yr Window)	0.360 (0.470)		0.270*** (0.073)	-0.399** (0.202)	0.625* (0.335)	-0.696 (0.582)
FF5 - <i>SMB</i> + <i>HS</i> (3-Yr Window)	0.262 (0.500)		0.264*** (0.076)	-0.238 (0.220)	0.364 (0.361)	-0.034 (0.861)

Panel B. 25 Portfolios Sorted on Size and Momentum						
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>
FF5	0.162 (0.432)	0.448*** (0.081)	-0.661*** (0.191)	0.300 (0.314)	0.760 (0.476)	
FF5 + <i>HS</i> (5-Yr Window)	-0.343 (0.523)	0.410*** (0.081)	-0.673*** (0.184)	0.079 (0.333)	1.053** (0.494)	-1.677* (0.996)
FF5 + <i>HS</i> (3-Yr Window)	-0.033 (0.425)	0.427*** (0.077)	-0.553*** (0.192)	0.192 (0.304)	0.960** (0.466)	-1.329** (0.675)
FF5 - <i>SMB</i> + <i>HS</i> (5-Yr Window)	0.465 (0.712)		-0.274 (0.228)	-0.474 (0.481)	1.439** (0.712)	0.865 (1.263)
FF5 - <i>SMB</i> + <i>HS</i> (3-Yr Window)	-0.000 (0.638)		-0.160 (0.263)	-0.999*** (0.337)	2.063*** (0.622)	-0.561 (1.005)

Panel C. 25 Portfolios Sorted on Size and Coskewness						
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>
FF5	0.408** (0.168)	0.215*** (0.030)	0.342** (0.137)	0.329*** (0.068)	-0.008 (0.131)	
FF5 + <i>HS</i> (5-Yr Window)	0.409** (0.180)	0.218*** (0.033)	0.326** (0.164)	0.325*** (0.077)	-0.005 (0.134)	0.207*** (0.037)
FF5 + <i>HS</i> (3-Yr Window)	0.398** (0.175)	0.218*** (0.032)	0.329** (0.156)	0.329*** (0.081)	-0.002 (0.134)	0.153*** (0.027)
FF5 - <i>SMB</i> + <i>HS</i> (5-Yr Window)	0.869*** (0.203)		0.439** (0.218)	0.073 (0.063)	-0.155 (0.173)	0.216*** (0.044)
FF5 - <i>SMB</i> + <i>HS</i> (3-Yr Window)	0.863*** (0.199)		0.440** (0.210)	0.060 (0.070)	-0.141 (0.175)	0.179*** (0.032)

Description: This table presents risk premia for the Fama-French five-factor model and an additional coskewness factor, the Harvey and Siddique (2000) factor ($HS = S^- - S^+$). We use two versions of *HS*: the standard version that uses an window of 1-year for the estimation of coskewness, and a modified version that uses an estimation window of 3 years. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (*MKT*), size (*SMB*), value (*HML*), profitability (*RMW*), and investment (*CMA*) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***) , 5% (**), and 10% (*) levels.

Interpretation: When adding the coskewness factor *HS* to the five-factor model, its risk premium should be positive and significant. This result is true only in the third panel, regardless of whether we use an estimation window of 5 years or 3 years.

Table IA.29: Risk Premia from the CAPM and Coskewness, 1963 to 2019
No Microcap Stocks

Panel A. 25 Portfolios Sorted by Size and B/M		
Model	<i>MKT</i>	<i>HS</i>
CAPM	-0.131 (0.261)	
CAPM + <i>HS</i> (w/ Microcaps)	0.350 (0.306)	0.821** (0.334)
CAPM + <i>HS</i> (No Microcaps)	0.337 (0.390)	0.680 (0.436)
Panel B. 25 Portfolios Sorted on Size and Momentum		
Model	<i>MKT</i>	<i>HS</i>
CAPM	-0.389 (0.400)	
CAPM + <i>HS</i> (w/ Microcaps)	-0.043 (0.597)	0.909 (1.162)
CAPM + <i>HS</i> (No Microcaps)	-0.385 (1.012)	0.001 (1.932)
Panel C. 25 Portfolios Sorted on Size and Coskewness		
Model	<i>MKT</i>	<i>HS</i>
CAPM	1.194*** (0.146)	
CAPM + <i>HS</i> (w/ Microcaps)	1.175*** (0.092)	0.271*** (0.048)
CAPM + <i>HS</i> (No Microcaps)	1.261*** (0.097)	0.284*** (0.052)

Description: This table presents risk premia for the CAPM model and an additional coskewness factor, the Harvey and Siddique (2000) factor ($HS = S^- - S^+$). We use two versions of *HS*: the standard version that includes microcap stocks in the portfolio formation, and a modified version that does not include microcap stocks. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (*MKT*). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding the coskewness factor *HS* to the CAPM model, its risk premium should be positive and significant. This result is true in the first panel if microcap stocks are included but not if they are excluded, and the result is true in the third panel regardless of whether microcap stocks are included or not.

Table IA.30: Risk Premia from the 4-Factor Model and Coskewness, 1963 to 2019
No Microcap Stocks

Panel A. 25 Portfolios Sorted by Size and B/M					
Model	MKT	SMB	HML	MOM	HS
FF4	-0.117 (0.437)	0.146*** (0.044)	0.328*** (0.055)	1.684* (1.000)	
FF4 + HS (w/ Microcaps)	-0.210 (0.453)	0.139*** (0.045)	0.337*** (0.057)	1.550 (1.017)	-0.201 (0.360)
FF4 + HS (No Microcaps)	-0.193 (0.456)	0.139*** (0.045)	0.334*** (0.057)	1.589 (1.022)	-0.147 (0.381)
FF4 - SMB + HS (w/ Microcaps)	0.835*** (0.240)		0.343*** (0.063)	3.100*** (0.928)	-0.096 (0.348)
FF4 - SMB + HS (No Microcaps)	0.709*** (0.273)		0.343*** (0.061)	2.969*** (0.915)	-0.202 (0.378)
Panel B. 25 Portfolios Sorted on Size and Momentum					
Model	MKT	SMB	HML	MOM	HS
FF4	0.369 (0.590)	0.145* (0.088)	0.532 (0.394)	0.723*** (0.075)	
FF4 + HS (w/ Microcaps)	-0.025 (0.627)	0.077 (0.097)	0.835* (0.432)	0.729*** (0.073)	-1.486 (1.077)
FF4 + HS (No Microcaps)	0.063 (0.645)	0.077 (0.107)	0.770* (0.445)	0.728*** (0.075)	-1.265 (1.247)
FF4 - SMB + HS (w/ Microcaps)	0.782*** (0.291)		1.060*** (0.367)	0.695*** (0.072)	-0.723 (1.062)
FF4 - SMB + HS (No Microcaps)	0.361 (0.501)		0.940*** (0.252)	0.684*** (0.070)	-1.250 (1.169)
Panel C. 25 Portfolios Sorted on Size and Coskewness					
Model	MKT	SMB	HML	MOM	HS
FF4	0.230 (0.222)	0.053 (0.054)	1.017*** (0.169)	0.508* (0.307)	
FF4 + HS (w/ Microcaps)	0.384 (0.252)	0.102 (0.064)	0.733*** (0.270)	0.344 (0.328)	0.246*** (0.048)
FF4 + HS (No Microcaps)	0.369 (0.249)	0.100 (0.064)	0.744*** (0.267)	0.338 (0.331)	0.246*** (0.051)
FF4 - SMB + HS (w/ Microcaps)	0.787*** (0.185)		0.512* (0.302)	-0.196 (0.253)	0.236*** (0.047)
FF4 - SMB + HS (No Microcaps)	0.784*** (0.193)		0.551* (0.309)	-0.229 (0.269)	0.236*** (0.050)

Description: This table presents risk premia for the Carhart-Fama-French four-factor model (the Fama-French three-factor model and momentum) and an additional coskewness factor, the Harvey and Siddique (2000) factor ($HS = S^- - S^+$). We use two versions of HS : the standard version that includes microcap stocks in the portfolio formation, and a modified version that does not include microcap stocks. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (MKT). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding the coskewness factor HS to the four-factor model, its risk premium should be positive and significant. This result is true only in the third panel, regardless of whether we include microcap stocks or not.

Table IA.31: Risk Premia from the 5-Factor Model and Coskewness, 1963 to 2019
No Microcap Stocks

Panel A. 25 Portfolios Sorted by Size and B/M						
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>
FF5	-0.474 (0.357)	0.260*** (0.053)	0.264*** (0.056)	0.402** (0.169)	0.035 (0.205)	
FF5 + <i>HS</i> (w/ Microcaps)	-0.307 (0.272)	0.238*** (0.040)	0.254*** (0.042)	0.257* (0.133)	0.451** (0.187)	-1.116*** (0.336)
FF5 + <i>HS</i> (No Microcaps)	-0.321 (0.277)	0.237*** (0.041)	0.246*** (0.043)	0.265* (0.135)	0.451** (0.193)	-1.178*** (0.367)
FF5 - <i>SMB</i> + <i>HS</i> (w/ Microcaps)	0.360 (0.470)		0.270*** (0.073)	-0.399** (0.202)	0.625* (0.335)	-0.696 (0.582)
FF5 - <i>SMB</i> + <i>HS</i> (No Microcaps)	0.345 (0.441)		0.266*** (0.069)	-0.436** (0.173)	0.764** (0.316)	-1.160* (0.608)

Panel B. 25 Portfolios Sorted on Size and Momentum						
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>
FF5	0.162 (0.432)	0.448*** (0.081)	-0.661*** (0.191)	0.300 (0.314)	0.760 (0.476)	
FF5 + <i>HS</i> (w/ Microcaps)	-0.343 (0.523)	0.410*** (0.081)	-0.673*** (0.184)	0.079 (0.333)	1.053** (0.494)	-1.677* (0.996)
FF5 + <i>HS</i> (No Microcaps)	-0.285 (0.548)	0.411*** (0.084)	-0.726*** (0.195)	0.131 (0.335)	0.981** (0.499)	-1.567 (1.140)
FF5 - <i>SMB</i> + <i>HS</i> (w/ Microcaps)	0.465 (0.712)		-0.274 (0.228)	-0.474 (0.481)	1.439** (0.712)	0.865 (1.263)
FF5 - <i>SMB</i> + <i>HS</i> (No Microcaps)	0.282 (0.773)		-0.172 (0.215)	-0.761* (0.439)	1.771** (0.688)	0.299 (1.620)

Panel C. 25 Portfolios Sorted on Size and Coskewness						
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>RMW</i>	<i>CMA</i>	<i>HS</i>
FF5	0.408** (0.168)	0.215*** (0.030)	0.342** (0.137)	0.329*** (0.068)	-0.008 (0.131)	
FF5 + <i>HS</i> (w/ Microcaps)	0.409** (0.180)	0.218*** (0.033)	0.326** (0.164)	0.325*** (0.077)	-0.005 (0.134)	0.207*** (0.037)
FF5 + <i>HS</i> (No Microcaps)	0.408** (0.177)	0.218*** (0.033)	0.326** (0.160)	0.325*** (0.077)	-0.005 (0.134)	0.214*** (0.038)
FF5 - <i>SMB</i> + <i>HS</i> (w/ Microcaps)	0.869*** (0.203)		0.439** (0.218)	0.073 (0.063)	-0.155 (0.173)	0.216*** (0.044)
FF5 - <i>SMB</i> + <i>HS</i> (No Microcaps)	0.859*** (0.203)		0.465** (0.212)	0.076 (0.065)	-0.153 (0.174)	0.220*** (0.046)

Description: This table presents risk premia for the Fama-French five-factor model and an additional coskewness factor, the Harvey and Siddique (2000) factor ($HS = S^- - S^+$). We use two versions of *HS*: the standard version that includes microcap stocks in the portfolio formation, and a modified version that does not include microcap stocks. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (*MKT*). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding the coskewness factor *HS* to the five-factor model, its risk premium should be positive and significant. This result is true only in the third panel, regardless of whether we include microcap stocks or not.

Table IA.32: Risk Premia from the CAPM and Coskewness, 1963 to 2019
No Penny Stocks

Panel A. 25 Portfolios Sorted by Size and B/M		
Model	<i>MKT</i>	<i>HS</i>
CAPM	-0.131 (0.261)	
CAPM + <i>HS</i> (w/ Penny Stocks)	0.350 (0.306)	0.821** (0.334)
CAPM + <i>HS</i> (No Penny Stocks)	0.372 (0.309)	0.824** (0.331)
Panel B. 25 Portfolios Sorted on Size and Momentum		
Model	<i>MKT</i>	<i>HS</i>
CAPM	-0.389 (0.400)	
CAPM + <i>HS</i> (w/ Penny Stocks)	-0.043 (0.597)	0.909 (1.162)
CAPM + <i>HS</i> (No Penny Stocks)	-0.151 (0.603)	0.621 (1.171)
Panel C. 25 Portfolios Sorted on Size and Coskewness		
Model	<i>MKT</i>	<i>HS</i>
CAPM	1.194*** (0.146)	
CAPM + <i>HS</i> (w/ Penny Stocks)	1.175*** (0.092)	0.271*** (0.048)
CAPM + <i>HS</i> (No Penny Stocks)	1.178*** (0.092)	0.274*** (0.047)

Description: This table presents risk premia for the CAPM model and an additional coskewness factor, the Harvey and Siddique (2000) factor ($HS = S^- - S^+$). We use two versions of *HS*: the standard version that includes penny stocks in the portfolio formation, and a modified version that does not include penny stocks. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market factor (*MKT*). The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding the coskewness factor *HS* to the CAPM model, its risk premium should be positive and significant. This result is true only in the first and third panels, regardless of whether we include penny stocks or not.

Table IA.33: Risk Premia from the 4-Factor Model and Coskewness, 1963 to 2019
No Penny Stocks

Panel A. 25 Portfolios Sorted by Size and B/M					
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>
FF4	-0.117 (0.437)	0.146*** (0.044)	0.328*** (0.055)	1.684* (1.000)	
FF4 + <i>HS</i> (w/ Penny Stocks)	-0.210 (0.453)	0.139*** (0.045)	0.337*** (0.057)	1.550 (1.017)	-0.201 (0.360)
FF4 + <i>HS</i> (No Penny Stocks)	-0.201 (0.453)	0.139*** (0.045)	0.336*** (0.057)	1.563 (1.020)	-0.181 (0.363)
FF4 - <i>SMB</i> + <i>HS</i> (w/ Penny Stocks)	0.835*** (0.240)		0.343*** (0.063)	3.100*** (0.928)	-0.096 (0.348)
FF4 - <i>SMB</i> + <i>HS</i> (No Penny Stocks)	0.829*** (0.241)		0.343*** (0.063)	3.090*** (0.927)	-0.097 (0.353)
Panel B. 25 Portfolios Sorted on Size and Momentum					
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>
FF4	0.369 (0.590)	0.145* (0.088)	0.532 (0.394)	0.723*** (0.075)	
FF4 + <i>HS</i> (w/ Penny Stocks)	-0.025 (0.627)	0.077 (0.097)	0.835* (0.432)	0.729*** (0.073)	-1.486 (1.077)
FF4 + <i>HS</i> (No Penny Stocks)	0.010 (0.619)	0.074 (0.098)	0.852* (0.438)	0.730*** (0.073)	-1.477 (1.077)
FF4 - <i>SMB</i> + <i>HS</i> (w/ Penny Stocks)	0.782*** (0.291)		1.060*** (0.367)	0.695*** (0.072)	-0.723 (1.062)
FF4 - <i>SMB</i> + <i>HS</i> (No Penny Stocks)	0.755** (0.297)		1.080*** (0.362)	0.695*** (0.072)	-0.826 (1.075)
Panel C. 25 Portfolios Sorted on Size and Coskewness					
Model	<i>MKT</i>	<i>SMB</i>	<i>HML</i>	<i>MOM</i>	<i>HS</i>
FF4	0.230 (0.222)	0.053 (0.054)	1.017*** (0.169)	0.508* (0.307)	
FF4 + <i>HS</i> (w/ Penny Stocks)	0.384 (0.252)	0.102 (0.064)	0.733*** (0.270)	0.344 (0.328)	0.246*** (0.048)
FF4 + <i>HS</i> (No Penny Stocks)	0.387 (0.252)	0.103 (0.064)	0.726*** (0.271)	0.338 (0.328)	0.252*** (0.048)
FF4 - <i>SMB</i> + <i>HS</i> (w/ Penny Stocks)	0.787*** (0.185)		0.512* (0.302)	-0.196 (0.253)	0.236*** (0.047)
FF4 - <i>SMB</i> + <i>HS</i> (No Penny Stocks)	0.790*** (0.186)		0.504* (0.304)	-0.204 (0.254)	0.242*** (0.047)

Description: This table presents risk premia for the Carhart-Fama-French four-factor model (the Fama-French three-factor model and momentum) and an additional coskewness factor, the Harvey and Siddique (2000) factor ($HS = S^- - S^+$). We use two versions of *HS*: the standard version that includes penny stocks in the portfolio formation, and a modified version that does not include penny stocks. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (*MKT*), size (*SMB*), value (*HML*), and momentum (*MOM*) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding the coskewness factor *HS* to the four-factor model, its risk premium should be positive and significant. This result is true only in the third panel, regardless of whether we include penny stocks or not.

Table IA.34: Risk Premia from the 5-Factor Model and Coskewness, 1963 to 2019
No Penny Stocks

Panel A. 25 Portfolios Sorted by Size and B/M						
Model	MKT	SMB	HML	RMW	CMA	HS
FF5	-0.474 (0.357)	0.260*** (0.053)	0.264*** (0.056)	0.402** (0.169)	0.035 (0.205)	
FF5 + HS (w/ Penny Stocks))	-0.307 (0.272)	0.238*** (0.040)	0.254*** (0.042)	0.257* (0.133)	0.451** (0.187)	-1.116*** (0.336)
FF5 + HS (No Penny Stocks))	-0.295 (0.274)	0.237*** (0.041)	0.253*** (0.042)	0.259* (0.134)	0.446** (0.188)	-1.121*** (0.342)
FF5 - SMB + HS (w/ Penny Stocks))	0.360 (0.470)		0.270*** (0.073)	-0.399** (0.202)	0.625* (0.335)	-0.696 (0.582)
FF5 - SMB + HS (No Penny Stocks))	0.366 (0.470)		0.270*** (0.073)	-0.400** (0.202)	0.627* (0.334)	-0.709 (0.589)

Panel B. 25 Portfolios Sorted on Size and Momentum						
Model	MKT	SMB	HML	RMW	CMA	HS
FF5	0.162 (0.432)	0.448*** (0.081)	-0.661*** (0.191)	0.300 (0.314)	0.760 (0.476)	
FF5 + HS (w/ Penny Stocks))	-0.343 (0.523)	0.410*** (0.081)	-0.673*** (0.184)	0.079 (0.333)	1.053** (0.494)	-1.677* (0.996)
FF5 + HS (No Penny Stocks))	-0.320 (0.514)	0.411*** (0.081)	-0.667*** (0.184)	0.079 (0.332)	1.051** (0.493)	-1.685* (0.996)
FF5 - SMB + HS (w/ Penny Stocks))	0.465 (0.712)		-0.274 (0.228)	-0.474 (0.481)	1.439** (0.712)	0.865 (1.263)
FF5 - SMB + HS (No Penny Stocks))	0.422 (0.705)		-0.270 (0.230)	-0.505 (0.479)	1.475** (0.712)	0.806 (1.281)

Panel C. 25 Portfolios Sorted on Size and Coskewness						
Model	MKT	SMB	HML	RMW	CMA	HS
FF5	0.408** (0.168)	0.215*** (0.030)	0.342** (0.137)	0.329*** (0.068)	-0.008 (0.131)	
FF5 + HS (w/ Penny Stocks))	0.409** (0.180)	0.218*** (0.033)	0.326** (0.164)	0.325*** (0.077)	-0.005 (0.134)	0.207*** (0.037)
FF5 + HS (No Penny Stocks))	0.409** (0.180)	0.218*** (0.033)	0.326** (0.164)	0.325*** (0.077)	-0.005 (0.134)	0.211*** (0.037)
FF5 - SMB + HS (w/ Penny Stocks))	0.869*** (0.203)		0.439** (0.218)	0.073 (0.063)	-0.155 (0.173)	0.216*** (0.044)
FF5 - SMB + HS (No Penny Stocks))	0.869*** (0.202)		0.437** (0.218)	0.073 (0.063)	-0.155 (0.173)	0.221*** (0.044)

Description: This table presents risk premia for the Fama-French five-factor model and an additional coskewness factor, the Harvey and Siddique (2000) factor ($HS = S^- - S^+$). We use two versions of HS : the standard version that includes penny stocks in the portfolio formation, and a modified version that does not include penny stocks. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the market (MKT), size (SMB), value (HML), profitability (RMW), and investment (CMA) factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding the coskewness factor HS to the five-factor model, its risk premium should be positive and significant. This result is true only in the third panel, regardless of whether we include penny stocks or not.

Table IA.35: Risk Premia from the 5-Factor Model and Coskewness, 1963 to 2019
Different Minimum Number of Observations

Panel A. the 25 portfolios Sorted by Size and B/M						
Model	MKT	SMB	HML	RMW	CMA	HS
FF5	-0.474 (0.357)	0.260*** (0.053)	0.264*** (0.056)	0.402** (0.169)	0.035 (0.205)	
FF5 + HS ₃₆	-0.307 (0.272)	0.238*** (0.040)	0.254*** (0.042)	0.257* (0.133)	0.451** (0.187)	-1.116*** (0.336)
FF5 + HS ₄₈	-0.315 (0.270)	0.238*** (0.040)	0.252*** (0.042)	0.255* (0.132)	0.466** (0.187)	-1.141*** (0.337)
FF5 + HS ₆₀	-0.305 (0.277)	0.239*** (0.041)	0.250*** (0.043)	0.276** (0.134)	0.460** (0.193)	-1.114*** (0.346)
FF5 - SMB + HS ₃₆	0.360 (0.470)		0.270*** (0.073)	-0.399** (0.202)	0.625* (0.335)	-0.696 (0.582)
FF5 - SMB + HS ₄₈	0.361 (0.465)		0.269*** (0.072)	-0.411** (0.198)	0.655* (0.334)	-0.769 (0.585)
FF5 - SMB + HS ₆₀	0.364 (0.467)		0.268*** (0.072)	-0.396** (0.193)	0.650* (0.336)	-0.747 (0.586)

Panel B. 25 Portfolios Sorted on Size and Momentum						
Model	MKT	SMB	HML	RMW	CMA	HS
FF5	0.162 (0.432)	0.448*** (0.081)	-0.661*** (0.191)	0.300 (0.314)	0.760 (0.476)	
FF5 + HS ₃₆	-0.343 (0.523)	0.410*** (0.081)	-0.673*** (0.184)	0.079 (0.333)	1.053** (0.494)	-1.677* (0.996)
FF5 + HS ₄₈	-0.345 (0.530)	0.419*** (0.080)	-0.677*** (0.185)	0.092 (0.331)	1.070** (0.501)	-1.688 (1.030)
FF5 + HS ₆₀	-0.306 (0.510)	0.424*** (0.079)	-0.687*** (0.185)	0.111 (0.325)	1.079** (0.501)	-1.716* (1.035)
FF5 - SMB + HS ₃₆	0.465 (0.712)		-0.274 (0.228)	-0.474 (0.481)	1.439** (0.712)	0.865 (1.263)
FF5 - SMB + HS ₄₈	0.500 (0.706)		-0.280 (0.226)	-0.442 (0.471)	1.371* (0.718)	0.996 (1.264)
FF5 - SMB + HS ₆₀	0.444 (0.690)		-0.267 (0.224)	-0.478 (0.457)	1.390* (0.721)	0.989 (1.275)

Panel C. 25 Portfolios Sorted on Size and Coskewness						
Model	MKT	SMB	HML	RMW	CMA	HS
FF5	0.408** (0.168)	0.215*** (0.030)	0.342** (0.137)	0.329*** (0.068)	-0.008 (0.131)	
FF5 + HS ₃₆	0.409** (0.180)	0.218*** (0.033)	0.326** (0.164)	0.325*** (0.077)	-0.005 (0.134)	0.207*** (0.037)
FF5 + HS ₄₈	0.209 (0.220)	0.270*** (0.049)	0.177 (0.223)	0.450*** (0.088)	-0.040 (0.126)	0.169*** (0.037)
FF5 + HS ₆₀	0.321 (0.290)	0.357*** (0.077)	-0.101 (0.316)	0.450*** (0.106)	-0.165 (0.169)	0.099** (0.042)
FF5 - SMB + HS ₃₆	0.869*** (0.203)		0.439** (0.218)	0.073 (0.063)	-0.155 (0.173)	0.216*** (0.044)
FF5 - SMB + HS ₄₈	0.792*** (0.306)		0.617** (0.313)	0.104 (0.089)	-0.062 (0.197)	0.202*** (0.051)
FF5 - SMB + HS ₆₀	0.947*** (0.350)		0.553 (0.340)	0.148 (0.092)	-0.367* (0.223)	0.093* (0.051)

Description: This table presents risk premia for the Fama-French five-factor model and the Harvey and Siddique (2000) factor $HS_N = S^-_N - S^+_N$, which is computed in three different ways: Denote by S^-_N (S^+_N) the portfolio of the 30% of stocks with the lowest (highest) past standardized coskewness, where the stocks included in the portfolio are required to have a number of observations over the past 60 months of at least N , where N is equal to 36, 48, or 60. The test portfolios are the 25 Fama-French portfolios sorted on size and book-to-market (Panel A), the 25 Fama-French portfolios sorted on size and momentum (Panel B), and the 25 portfolios sorted on size and coskewness (Panel C). For each test portfolio, we run a time-series regression of the portfolio excess return on a constant and the FF5 factors. The factor premia are obtained from a cross-sectional regression of the average portfolio excess return on a constant and the betas obtained from the time-series regression. Standard errors are in parentheses. The stars indicate significance at 1% (***), 5% (**), and 10% (*) levels.

Interpretation: When adding a coskewness factor to the five-factor model, its risk premium should be positive and significant. This result is true only in the third panel, regardless of whether which version of the HS factor we use, but it is most significant for the less restrictive version, HS_{36} .

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