Internet Appendix for The Predictive Performance of Commodity Futures Risk Factors

(Not for Publication)

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This Internet Appendix describes the construction of momentum and value portfolios for commodity futures contracts and provides additional forecasting results for robustness checks.

Momentum Portfolios:

Consistent with the vast literature (see, among others, Jegadeesh and Titman (1993), Fama and French (1996), Miffre and Rallis (2007), Fuertes, Miffre, and Rallis (2010), Gorton, Hayashi, and Rouwenhorst (2013), and references therein), we construct two sets of portfolios based on simple momentum strategies. The first set of portfolios comprise futures contracts of all commodities in the sample sorted into quintiles at the end of each month $t-1$ based on their (monthly) excess returns realized at the end of month $t-2$ (i.e., Δf^j_{t-2}).[1] According to this sorting scheme, portfolio 1 (portfolio 5) contains the 20% of commodity futures with the lowest (highest) excess returns in the preceding month. The second set of momentum portfolios are constructed using all commodity futures contracts sorted into quintiles at the end of each month $t-1$ based on their average excess returns over the previous 12 months (i.e., $\frac{1}{12}\sum_{s=1}^{12}\Delta f^j_{t-s-1}$). This results portfolio 1 (portfolio 5) to contain the 20% of commodity futures with the lowest (highest) average excess returns over the preceding 12 months. In both variants of the momentum portfolios, we compute the monthly excess return on a portfolio that is formed at the end of month $t-1$, but realized at the end of month t as the equally weighted average of excess returns for the constituent futures contracts. The EWA factor is the equally weighted average excess return on a long position in all available commodity futures contracts, while the HML factor is the return difference between the last and first portfolios. We make use of momentum portfolio-specific futures basis as the instrumental variable z^k_t. Finally, to obtain the unconditional and conditional expectations of the risk factors, we follow similar procedures described in Section 2.1 of the main paper.

Value Portfolios:

The value portfolios for commodity futures contracts are constructed as per Asness, Moskowitz, and Pedersen (2013), where value is defined as the logarithm of the spot price five years ago (in particular, the average spot price from 4.5 to 5.5 years ago) divided by the most recent spot price. This simple measure of value is essentially the negative of the spot return over the

[1] We allow for a one-month lag between exploiting the conditioning signal at the end of the formation period and estimating the excess return over the holding period (in our case, one-month). The rationale for this empirical procedure, standard in the literature, is to avert possible liquidity or microstructure related issues (Grinblatt and Moskowitz (2004) and Asness, Moskowitz, and Pedersen (2013)).

past five years. At the end of each month $t-1$, all commodity futures contracts are sorted into five portfolios based on their values. Portfolio 1 (Portfolio 5) is the portfolio with the lowest (highest) value commodity futures contracts. The monthly excess return on a portfolio constructed at the end of month $t-1$, but realized at the end of month t is computed as the equally weighted average of excess returns for the constituent contracts. We construct the EWA factor as the equally weighted average excess return on a long position in all futures contracts. The HML factor is created as the return difference between the last and first portfolios. We utilize value portfolio-specific futures basis as the instrumental variable z_t^k. To compute the unconditional and conditional expectations of the risk factors, we adopt methodologies similar to those described in Section 2.1 of the main paper. The effective in-sample period for the empirical analysis starts from July 1991.

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Table IA1
Full-Sample OLS Estimates

The table reports the ordinary least squares (OLS) estimates of the factor models in equations (3)–(10) for commodity futures excess returns. See also notes to Table 2 in the main paper.

Model	$\hat{a}_0$	$\hat{a}_1$	$\hat{b}_{0,1}$	$\hat{b}_{0,2}$	$\hat{b}_{1,1}$	$\hat{b}_{1,2}$	$R^2_{adj.}$
			Cocoa				
(3)	−0.514		0.886***				15.51
	(0.403)		(0.112)				
(4)	−0.474		0.890***	−0.028			15.32
	(0.412)		(0.113)	(0.079)			
(5)	−0.527		0.999***		0.275*		15.90
	(0.404)		(0.113)		(0.164)		
(6)	−0.519		0.993***	0.026	0.238	0.123	16.48
	(0.406)		(0.112)	(0.112)	(0.158)	(0.114)	
(7)	−0.652	−0.245	0.887***				15.32
	(0.532)	(0.523)	(0.112)				
(8)	−0.606	−0.229	0.891***	−0.026			15.11
	(0.524)	(0.512)	(0.114)	(0.079)			
(9)	−0.654	−0.225	0.999***		0.273*		15.70
	(0.538)	(0.532)	(0.114)		(0.164)		
(10)	−0.852	−0.571	0.992***	0.039	0.228	0.143	16.52
	(0.529)	(0.476)	(0.114)	(0.113)	(0.158)	(0.116)	
			Coffee				
(3)	−0.903*		1.036***				13.59
	(0.534)		(0.162)				
(4)	−0.738		1.054***	−0.115			13.99
	(0.539)		(0.159)	(0.106)			
(5)	−0.853		1.216***		0.304		14.78
	(0.540)		(0.240)		(0.226)		
(6)	−0.488		1.015***	0.001	−0.017	0.228***	22.76
	(0.535)		(0.183)	(0.083)	(0.148)	(0.039)	
(7)	−0.624	0.452	1.041***				13.66
	(0.716)	(0.511)	(0.163)				
(8)	−0.502	0.398	1.057***	−0.108			13.98
	(0.734)	(0.527)	(0.160)	(0.107)			
(9)	−0.480	0.597	1.239***		0.331		15.09
	(0.693)	(0.482)	(0.245)		(0.237)		
(10)	−0.279	0.351	1.030***	0.004	0.003	0.225***	22.72
	(0.663)	(0.395)	(0.186)	(0.083)	(0.154)	(0.040)	
			Copper				
(3)	0.616		1.121***				25.88
	(0.425)		(0.143)				
(4)	0.510		1.110***	0.074			26.09
	(0.396)		(0.140)	(0.062)			
(5)	0.547		1.064***		0.303***		27.42
	(0.412)		(0.136)		(0.116)		
(6)	0.410		1.042***	0.029	0.180	0.190***	31.90
	(0.376)		(0.138)	(0.057)	(0.119)	(0.063)	
(7)	0.447	0.589	1.112***				26.43
	(0.379)	(0.391)	(0.144)				
(8)	0.348	0.579	1.101***	0.071			26.62
	(0.360)	(0.379)	(0.141)	(0.063)			
(9)	0.369	0.615*	1.054***		0.309**		28.05
	(0.373)	(0.353)	(0.137)		(0.127)		
(10)	0.335	0.275	1.038***	0.030	0.188	0.181***	31.85
	(0.359)	(0.328)	(0.138)	(0.057)	(0.121)	(0.063)	

(Continued)

Table IA1 – *Continued*

Model	$\hat{a}_0$	$\hat{a}_1$	$\hat{b}_{0,1}$	$\hat{b}_{0,2}$	$\hat{b}_{1,1}$	$\hat{b}_{1,2}$	$R^2_{adj.}$
			Corn				
(3)	−0.707*		1.061***				26.83
	(0.371)		(0.102)				
(4)	−0.697*		1.062***	−0.007			26.61
	(0.386)		(0.105)	(0.061)			
(5)	−0.691*		1.200***		0.164		27.58
	(0.369)		(0.147)		(0.107)		
(6)	−0.582		1.161***	0.109	0.125	0.148***	30.74
	(0.374)		(0.128)	(0.077)	(0.078)	(0.043)	
(7)	−0.945**	−0.311	1.059***				27.09
	(0.432)	(0.215)	(0.103)				
(8)	−0.930**	−0.314	1.060***	−0.011			26.88
	(0.439)	(0.217)	(0.105)	(0.061)			
(9)	−0.900**	−0.273	1.190***		0.154		27.73
	(0.439)	(0.233)	(0.155)		(0.113)		
(10)	−0.843**	−0.352*	1.147***	0.109	0.112	0.153***	31.15
	(0.414)	(0.194)	(0.134)	(0.079)	(0.084)	(0.045)	
			Cotton				
(3)	−0.156		0.916***				18.27
	(0.437)		(0.118)				
(4)	−0.234		0.908***	0.054			18.28
	(0.437)		(0.116)	(0.060)			
(5)	−0.154		0.906***		−0.017		18.06
	(0.436)		(0.133)		(0.054)		
(6)	−0.149		0.923***	0.114*	−0.019	0.094***	20.31
	(0.440)		(0.122)	(0.064)	(0.053)	(0.033)	
(7)	−0.164	−0.028	0.917***				18.03
	(0.453)	(0.140)	(0.118)				
(8)	−0.238	−0.016	0.908***	0.054			18.03
	(0.449)	(0.139)	(0.115)	(0.060)			
(9)	−0.171	−0.068	0.902***		−0.026		17.84
	(0.459)	(0.226)	(0.145)		(0.080)		
(10)	−0.144	0.024	0.925***	0.115*	−0.016	0.095***	20.07
	(0.452)	(0.216)	(0.129)	(0.065)	(0.071)	(0.032)	
			Crude Oil				
(3)	0.382		1.540***				36.30
	(0.437)		(0.138)				
(4)	0.268		1.527***	0.080			36.48
	(0.426)		(0.141)	(0.095)			
(5)	0.380		1.541***		0.008		36.11
	(0.441)		(0.138)		(0.048)		
(6)	0.488		1.477***	0.020	−0.037	0.220***	45.02
	(0.416)		(0.130)	(0.069)	(0.043)	(0.034)	
(7)	0.343	0.365*	1.533***				36.65
	(0.416)	(0.216)	(0.140)				
(8)	0.220	0.381*	1.520***	0.085			36.88
	(0.419)	(0.214)	(0.142)	(0.094)			
(9)	0.337	0.370*	1.536***		0.018		36.47
	(0.421)	(0.217)	(0.139)		(0.051)		
(10)	0.463	0.166	1.475***	0.023	−0.032	0.216***	44.97
	(0.411)	(0.223)	(0.131)	(0.069)	(0.044)	(0.035)	
			Gasoline				
(3)	1.142***		1.782***				36.81
	(0.437)		(0.179)				
(4)	0.948**		1.761***	0.135			37.44
	(0.430)		(0.179)	(0.094)			
(5)	1.137***		1.792***		−0.009		36.63
	(0.442)		(0.188)		(0.042)		
(6)	0.803*		1.739***	0.084	−0.036	0.090***	42.20
	(0.433)		(0.170)	(0.080)	(0.041)	(0.018)	
(7)	1.225***	−0.086	1.779***				36.72
	(0.458)	(0.132)	(0.180)				
(8)	1.037**	−0.094	1.757***	0.137			37.37
	(0.448)	(0.134)	(0.179)	(0.095)			
(9)	1.219***	−0.083	1.785***		−0.005		36.53
	(0.466)	(0.134)	(0.188)		(0.043)		
(10)	0.947**	−0.152	1.724***	0.084	−0.030	0.092***	42.34
	(0.442)	(0.131)	(0.170)	(0.080)	(0.040)	(0.018)	

(Continued)

Table IA1 – *Continued*

Model	$\hat{a}_0$	$\hat{a}_1$	$\hat{b}_{0,1}$	$\hat{b}_{0,2}$	$\hat{b}_{1,1}$	$\hat{b}_{1,2}$	$R^2_{adj.}$
			Gold				
(3)	0.020		0.545***				20.89
	(0.212)		(0.060)				
(4)	−0.099		0.532***	0.083**			22.54
	(0.206)		(0.063)	(0.037)			
(5)	0.017		0.570***		0.097		20.67
	(0.216)		(0.139)		(0.409)		
(6)	−0.110		0.596***	0.074	0.253	−0.038	22.21
	(0.210)		(0.143)	(0.081)	(0.426)	(0.191)	
(7)	0.704*	2.252**	0.539***				21.56
	(0.419)	(1.139)	(0.062)				
(8)	0.573	2.208*	0.527***	0.082**			23.19
	(0.418)	(1.164)	(0.065)	(0.036)			
(9)	0.699	2.239*	0.551***		0.044		21.33
	(0.431)	(1.151)	(0.147)		(0.420)		
(10)	0.583	2.267*	0.579***	0.057	0.215	−0.092	22.87
	(0.417)	(1.159)	(0.149)	(0.080)	(0.435)	(0.191)	
			Heating Oil				
(3)	0.708*		1.557***				34.47
	(0.417)		(0.155)				
(4)	0.520		1.537***	0.131			35.22
	(0.386)		(0.155)	(0.111)			
(5)	0.677		1.565***		0.063		34.86
	(0.422)		(0.156)		(0.048)		
(6)	0.527		1.532***	0.083	0.030	0.056***	40.30
	(0.374)		(0.156)	(0.096)	(0.040)	(0.016)	
(7)	0.665	0.101	1.554***				34.43
	(0.414)	(0.183)	(0.156)				
(8)	0.478	0.100	1.534***	0.131			35.18
	(0.384)	(0.172)	(0.156)	(0.111)			
(9)	0.628	0.109	1.562***		0.065		34.85
	(0.414)	(0.163)	(0.158)		(0.049)		
(10)	0.524	0.008	1.531***	0.083	0.030	0.055***	40.11
	(0.382)	(0.077)	(0.156)	(0.096)	(0.039)	(0.015)	
			Lean Hogs				
(3)	−0.022		0.364***				3.06
	(0.415)		(0.125)				
(4)	0.068		0.374***	−0.063			3.16
	(0.401)		(0.127)	(0.052)			
(5)	−0.037		0.352***		−0.010		2.83
	(0.415)		(0.127)		(0.024)		
(6)	0.120		0.291**	0.033	0.006	0.049***	8.97
	(0.382)		(0.120)	(0.055)	(0.024)	(0.015)	
(7)	0.105	0.140	0.380***				3.60
	(0.371)	(0.113)	(0.126)				
(8)	0.185	0.135	0.388***	−0.058			3.64
	(0.369)	(0.112)	(0.129)	(0.052)			
(9)	0.089	0.141	0.367***		−0.011		3.38
	(0.372)	(0.113)	(0.130)		(0.023)		
(10)	0.160	0.050	0.298**	0.032	0.005	0.047***	8.79
	(0.364)	(0.109)	(0.123)	(0.056)	(0.024)	(0.015)	
			Live Cattle				
(3)	0.283		0.194**				2.97
	(0.207)		(0.080)				
(4)	0.399*		0.206**	−0.081			4.88
	(0.227)		(0.087)	(0.051)			
(5)	0.279		0.214**		0.054		3.30
	(0.208)		(0.093)		(0.063)		
(6)	0.395∗		0.212**	−0.073**	0.037	−0.011	4.75
	(0.229)		(0.086)	(0.036)	(0.052)	(0.035)	
(7)	0.286	−0.053	0.194**				2.74
	(0.210)	(0.140)	(0.080)				
(8)	0.400*	−0.034	0.206**	−0.080			4.62
	(0.229)	(0.141)	(0.088)	(0.051)			
(9)	0.282	−0.060	0.215**		0.055		3.08
	(0.211)	(0.144)	(0.093)		(0.063)		
(10)	0.396*	−0.029	0.213**	−0.072*	0.038	−0.011	4.48
	(0.231)	(0.155)	(0.085)	(0.037)	(0.052)	(0.036)	

(Continued)

Table IA1 – *Continued*

Model	$\hat{a}_0$	$\hat{a}_1$	$\hat{b}_{0,1}$	$\hat{b}_{0,2}$	$\hat{b}_{1,1}$	$\hat{b}_{1,2}$	$R^2_{adj.}$
			Silver				
(3)	−0.109		1.066***				24.48
	(0.345)		(0.138)				
(4)	−0.169		1.060***	0.042			24.40
	(0.334)		(0.144)	(0.066)			
(5)	−0.085		1.421***		1.401**		26.13
	(0.332)		(0.239)		(0.603)		
(6)	−0.174		1.423***	0.105	1.425**	0.137	26.06
	(0.327)		(0.251)	(0.132)	(0.642)	(0.288)	
(7)	0.789	2.603*	1.067***				24.79
	(0.603)	(1.447)	(0.139)				
(8)	0.719	2.569*	1.061***	0.040			24.70
	(0.592)	(1.441)	(0.145)	(0.065)			
(9)	0.583	1.943	1.401***		1.319**		26.20
	(0.613)	(1.485)	(0.247)		(0.627)		
(10)	0.442	1.779	1.405***	0.095	1.355**	0.113	26.08
	(0.602)	(1.470)	(0.256)	(0.132)	(0.660)	(0.288)	
			Soybeans				
(3)	0.177		0.948***				26.66
	(0.299)		(0.109)				
(4)	0.106		0.941***	0.049			26.72
	(0.308)		(0.115)	(0.058)			
(5)	0.175		0.949***		0.012		26.45
	(0.298)		(0.111)		(0.110)		
(6)	0.303		0.897***	0.047	−0.134	0.151***	33.97
	(0.274)		(0.112)	(0.053)	(0.104)	(0.032)	
(7)	0.188	−0.134	0.950***				26.57
	(0.298)	(0.263)	(0.109)				
(8)	0.119	−0.117	0.942***	0.047			26.60
	(0.300)	(0.255)	(0.114)	(0.057)			
(9)	0.185	−0.142	0.951***		0.020		26.37
	(0.298)	(0.247)	(0.110)		(0.106)		
(10)	0.298	0.069	0.895***	0.049	−0.140	0.153***	33.80
	(0.275)	(0.133)	(0.113)	(0.053)	(0.108)	(0.035)	
			Sugar				
(3)	−0.377		0.871***				6.86
	(0.677)		(0.220)				
(4)	−0.018		0.910***	−0.250			8.85
	(0.538)		(0.236)	(0.252)			
(5)	−0.427		0.840***		−0.054		7.14
	(0.715)		(0.217)		(0.034)		
(6)	−0.098		0.938***	−0.133	0.181*	0.236***	31.06
	(0.506)		(0.188)	(0.116)	(0.104)	(0.061)	
(7)	−0.342	0.125	0.880***				6.77
	(0.647)	(0.111)	(0.227)				
(8)	0.024	0.138	0.920***	−0.252			8.82
	(0.539)	(0.116)	(0.245)	(0.254)			
(9)	−0.361	0.617	0.813***		−0.170		9.06
	(0.653)	(0.633)	(0.226)		(0.157)		
(10)	−0.083	0.141	0.931***	−0.135	0.150**	0.232***	30.96
	(0.506)	(0.318)	(0.180)	(0.116)	(0.064)	(0.053)	
			Wheat				
(3)	−0.699*		1.031***				25.61
	(0.378)		(0.099)				
(4)	−0.585		1.044***	−0.079			25.98
	(0.388)		(0.098)	(0.054)			
(5)	−0.696*		1.013***		−0.019		25.40
	(0.378)		(0.111)		(0.074)		
(6)	−0.599		1.027***	−0.047	−0.017	0.039	25.83
	(0.386)		(0.112)	(0.063)	(0.071)	(0.031)	
(7)	−0.628*	0.121	1.031***				25.46
	(0.365)	(0.163)	(0.099)				
(8)	−0.512	0.122	1.043***	−0.080*			25.83
	(0.378)	(0.166)	(0.098)	(0.044)			
(9)	−0.621*	0.127	1.009***		−0.023		25.25
	(0.365)	(0.168)	(0.111)		(0.075)		
(10)	−0.565	0.056	1.025***	−0.049	−0.018	0.036	25.62
	(0.375)	(0.182)	(0.111)	(0.064)	(0.071)	(0.034)	

Table IA2
Recursive Scheme Forecasts Based on Unconditional Expectations of Factors

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift (RWD) benchmark. The one-month ahead forecasts of commodity futures excess returns are obtained from recursive regressions with an initial 10-year expanding window using unconditional expectations of risk factors. For each alternative factor model specified in equation (i) $(i = 5, 6, \ldots, 10)$ and commodity j, R^2_{OOS} is the Campbell and Thompson (2008) out-of-sample $R^{2,j}_i(\%)$ statistic. CW is the Clark and West (2006, 2007) $\text{MSFE}^j_{i,adj.}$-t statistic based on the Newey and West (1987) estimator, which tests whether the adjusted mean squared forecast error (MSFE) difference between the RWD and the alternative model is zero. RC is the $\max_{i=5,6,\ldots,10} \text{MSFE}^j_{i,adj.}$-$t$ statistic for a reality check following Clark and McCracken (2012), which tests the composite null hypothesis that the RWD is not inferior to any of the alternative models. One-sided critical values are obtained using 10,000 fixed regressor bootstrap replications, as per Clark and McCracken (2012). *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. The out-of-sample data run from January 1996 through October 2013.

		Model						RC
		(5)	(6)	(7)	(8)	(9)	(10)	
Cocoa	R^2_{OOS}	−0.19	−0.07	−0.79	−0.81	−0.98	−1.02	
	CW	−1.96	−0.05	−1.65	−1.73	−1.99	−1.67	−0.05
Coffee	R^2_{OOS}	−0.13	0.37	−2.65	−3.30	−2.64	−0.52	
	CW	−0.25	0.60	−0.76	−0.95	−0.71	0.11	0.60
Copper	R^2_{OOS}	0.23**	0.92***	0.97*	0.97*	1.25*	1.44**	
	CW	0.89	1.59*	1.33	1.33	1.41	1.50*	1.59
Corn	R^2_{OOS}	0.00	−0.66	−1.65	−1.75	−1.79	−0.53	
	CW	0.08	−0.41	−0.58	−0.60	−0.72	−0.21	0.08
Cotton	R^2_{OOS}	−0.02	−0.07	−0.44	−0.42	−0.76	−0.66	
	CW	−2.27	−0.05	−2.61	−2.27	−2.10	−0.53	−0.05
Crude Oil	R^2_{OOS}	−0.13	0.85***	1.15**	1.25**	1.01**	1.63***	
	CW	−1.11	1.42*	1.80**	1.83**	1.88**	1.88**	1.88*
Gasoline	R^2_{OOS}	−0.02	−0.97	−0.11	0.06	0.18	0.19	
	CW	−0.58	−2.10	0.19	0.44	0.63	0.63	0.63
Gold	R^2_{OOS}	0.00	0.15	0.88**	0.85**	0.97**	0.93**	
	CW	0.19	1.57**	1.52**	1.49**	1.59**	1.54**	1.59*
Heating Oil	R^2_{OOS}	0.08	0.61***	−1.01	−0.97	−0.98	0.18	
	CW	1.08	1.56*	−1.69	−1.71	−1.45	0.84	1.56
Lean Hogs	R^2_{OOS}	0.14	0.65**	−0.48	−0.49	−0.50	−0.42	
	CW	1.22*	1.03	0.06	0.03	0.07	0.05	1.22
Live Cattle	R^2_{OOS}	0.00	−0.43	−1.20	−0.88	−1.21	−0.81	
	CW	0.00	−0.84	−0.15	0.00	−0.17	−0.31	0.00
Silver	R^2_{OOS}	−0.01	0.16	−0.46	−0.46	−0.39	−0.39	
	CW	−0.23	0.98	0.13	0.10	0.16	0.19	0.98
Soybeans	R^2_{OOS}	−0.02	0.04	−2.48	−2.56	−2.38	−1.19	
	CW	−0.47	0.37	−1.90	−1.78	−1.75	−0.29	0.37
Sugar	R^2_{OOS}	−0.04	−1.54	−5.17	−5.57	−8.00	−1.83	
	CW	−0.35	0.31	−1.30	−1.32	−1.36	−0.89	0.31
Wheat	R^2_{OOS}	0.10*	0.25**	−0.24	−0.22	−0.21	−0.30	
	CW	1.82**	1.85**	−1.40	−1.22	−1.18	−1.42	1.85*

Table IA3
Recursive Scheme Forecasts Based on Conditional Expectations of Factors

The setup is the same as in Table IA2 except that conditional expectations of risk factors are used to generate one-month ahead forecasts of commodity futures excess returns from factor models in equations (3)–(10). See also notes to Table IA2.

		Model								RC
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Cocoa	R^2_{OOS}	−0.13	−0.11	−0.55	−0.59	−0.83	−0.83	−1.20	−1.30	
	CW	−0.60	−0.53	−1.36	−0.60	−2.01	−2.01	−2.25	−2.54	−0.53
Coffee	R^2_{OOS}	0.19	0.78**	−0.68	−1.85	−2.59	−2.59	−3.36	−2.78	
	CW	0.41	0.86	−0.03	−0.54	−0.58	−0.58	−0.37	−0.66	0.86
Copper	R^2_{OOS}	0.42***	0.41***	0.87***	1.22***	1.20*	1.20*	1.62**	1.63**	
	CW	1.60*	1.61*	1.61*	1.63*	1.42	1.42	1.50*	1.54*	1.63
Corn	R^2_{OOS}	−0.05	−0.01	0.05	−0.44	−1.93	−1.93	−1.97	−1.50	
	CW	−0.12	0.05	0.33	−0.40	−0.53	−0.53	−0.57	−0.11	0.33
Cotton	R^2_{OOS}	−0.11	−0.12	−0.13	0.10	−0.55	−0.55	−0.90	−0.43	
	CW	−2.13	−1.91	−2.37	0.46	−2.74	−2.74	−2.22	−0.60	0.46
Crude Oil	R^2_{OOS}	0.05	−0.03	0.31	0.61**	0.84*	0.84*	1.08**	1.12**	
	CW	0.44	0.32	0.71	1.14	1.20*	1.20*	1.35*	1.39*	1.39
Gasoline	R^2_{OOS}	−0.61	−0.79	−0.58	−1.58	−0.80	−0.80	−0.46	−0.47	
	CW	−1.57	−1.77	−1.46	−1.47	−0.43	−0.43	−0.11	−0.09	−0.09
Gold	R^2_{OOS}	0.17**	0.26***	0.08	0.38**	0.63*	0.63*	0.67*	0.69*	
	CW	0.78	1.02	0.50	1.20*	1.42**	1.42**	1.45**	1.45**	1.45
Heating Oil	R^2_{OOS}	0.60***	0.57***	0.68*	0.75*	−0.18	−0.18	−0.06	0.45	
	CW	1.00	0.94	1.07	0.91	−0.14	−0.14	0.09	0.70	1.07
Lean Hogs	R^2_{OOS}	−0.86	−0.80	−1.53	0.65	−0.94	−0.94	−1.56	−0.29	
	CW	−0.77	−0.71	−0.98	0.86	−0.53	−0.53	−0.88	0.19	0.86
Live Cattle	R^2_{OOS}	−0.03	−0.26	0.01	−0.56	−1.13	−1.13	−1.09	−0.89	
	CW	−0.30	−1.57	0.16	−0.70	−0.19	−0.19	−0.17	−0.38	0.16
Silver	R^2_{OOS}	−0.23	−0.19	−0.19	0.09	−0.53	−0.53	−0.35	−0.29	
	CW	−1.18	−1.03	−0.59	0.41	−0.04	−0.04	0.06	0.16	0.41
Soybeans	R^2_{OOS}	0.02	−0.03	0.01	1.06*	−2.49	−2.49	−2.36	0.67*	
	CW	0.12	−0.01	0.08	0.82	−2.16	−2.16	−2.09	0.78	0.82
Sugar	R^2_{OOS}	−0.33	−0.41	−81.43	−9.19	−4.09	−4.09	−52.20	−17.59	
	CW	−0.67	−0.57	0.98	0.77	−1.26	−1.26	0.70	−0.47	0.98
Wheat	R^2_{OOS}	0.06**	0.03	0.13**	0.21*	−0.21	−0.21	−0.19	−0.33	
	CW	0.69	0.42	1.19	1.21	−0.70	−0.70	−0.63	−1.30	1.21

Table IA4
Rolling Scheme Forecasts Based on Unconditional Expectations of Factors: A Cross-Sectional Approach with Open Interest

The setup is the same as in Table 5 except that the rolling forecasting scheme utilizes commodity-specific open interest. See also notes to Table 5 in the main paper.

	Model					
	(5)	(6)	(7)	(8)	(9)	(10)
Cocoa	0.00[b]	0.00[b]	0.94	0.92	0.00[b]	0.00[b]
	(0.06)	(0.03)	(0.98)	(0.89)	(0.07)	(0.03)
Coffee	0.00[b]	0.00[b]	0.01[b]	0.02[b]	0.00[b]	0.00[b]
	(0.04)	(0.04)	(0.40)	(0.32)	(0.04)	(0.05)
Copper	0.00[b]	0.00[b]	0.97	0.96	0.00[b]	0.00[b]
	(0.02)	(0.03)	(0.25)	(0.23)	(0.08)	(0.05)
Corn	0.00[b]	0.00[b]	0.03[b]	0.04[b]	0.00[b]	0.00[b]
	(0.01)	(0.03)	(0.05)	(0.04)	(0.02)	(0.03)
Cotton	0.00[b]	0.00[b]	0.57	0.57	0.00[b]	0.00[b]
	(0.21)	(0.12)	(0.00)	(0.00)	(0.20)	(0.13)
Crude Oil	0.40	0.00[b]	0.37	0.45	0.09[b]	0.00[b]
	(0.00)	(0.02)	(0.08)	(0.08)	(0.04)	(0.02)
Gasoline	0.05[b]	0.12	0.37	0.34	0.28	0.65
	(0.02)	(0.00)	(0.87)	(0.90)	(0.09)	(0.01)
Gold	0.00[b]	0.00[b]	0.08[b]	0.07[b]	0.00[b]	0.00[b]
	(0.03)	(0.02)	(0.00)	(0.00)	(0.03)	(0.02)
Heating Oil	0.00[b]	0.00[b]	0.09[b]	0.10	0.00[b]	0.00[b]
	(0.00)	(0.08)	(0.22)	(0.23)	(0.03)	(0.08)
Lean Hogs	0.04[b]	0.29	0.77	0.80	0.21	0.16
	(0.36)	(0.07)	(0.03)	(0.03)	(0.09)	(0.00)
Live Cattle	0.00[b]	0.01[b]	0.18	0.34	0.00[b]	0.00[b]
	(0.03)	(0.10)	(0.05)	(0.00)	(0.01)	(0.04)
Silver	0.00[b]	0.00[b]	0.25	0.15	0.00[b]	0.00[b]
	(0.04)	(0.02)	(0.39)	(0.50)	(0.02)	(0.01)
Soybeans	0.00[b]	0.01[b]	0.29	0.30	0.00[b]	0.01[b]
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sugar	0.92	0.00[b]	0.66	0.60	0.00[b]	0.00[b]
	(0.28)	(0.09)	(0.00)	(0.03)	(0.03)	(0.06)
Wheat	0.00[b]	0.00[b]	0.30	0.31	0.00[b]	0.00[b]
	(0.05)	(0.03)	(0.02)	(0.03)	(0.06)	(0.03)

Table IA5
Rolling Scheme Forecasts Based on Conditional Expectations of Factors: A Cross-Sectional Approach with Open Interest

The setup is the same as in Table IA4 except that conditional expectations of risk factors are used to generate one-month ahead forecasts of commodity futures excess returns from factor models in equations (3)–(10). See also notes to Table 5 in the main paper.

	Model							
	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Cocoa	0.35	0.27	0.60	0.88	0.96	0.80	0.99	0.71
	(1.00)	(1.00)	(1.00)	(0.84)	(0.95)	(0.77)	(0.27)	(0.26)
Coffee	0.00^{a}	0.01^{a}	0.00^{a}	0.16	0.00^{b}	0.01^{b}	0.00^{b}	0.06^{b}
	(0.77)	(0.82)	(0.63)	(0.08)	(0.36)	(0.31)	(0.28)	(0.07)
Copper	0.01^{a}	0.00^{a}	0.04^{a}	0.01^{a}	0.63	0.58	0.57	0.34
	(0.81)	(0.78)	(0.80)	(0.78)	(0.98)	(0.91)	(0.83)	(0.65)
Corn	0.01^{b}	0.02^{b}	0.06^{b}	0.05^{b}	0.01^{b}	0.01^{b}	0.00^{b}	0.26
	(0.09)	(0.06)	(0.00)	(0.09)	(0.10)	(0.07)	(0.10)	(0.02)
Cotton	0.00^{a}	0.01^{a}	0.00^{a}	0.00^{a}	0.49	0.53	0.12	0.16
	(0.73)	(0.74)	(0.55)	(0.55)	(0.10)	(0.09)	(0.12)	(0.15)
Crude Oil	0.21	0.22	0.20	0.04^{b}	0.39	0.39	0.07^{b}	0.05^{b}
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)	(0.02)	(0.04)
Gasoline	0.67	0.84	0.56	0.65	0.64	0.88	0.63	0.55
	(0.16)	(0.00)	(0.16)	(0.06)	(0.75)	(0.98)	(0.64)	(0.91)
Gold	0.53	0.61	0.19	0.67	0.08^{b}	0.10	0.03^{b}	0.21
	(0.00)	(0.00)	(0.05)	(0.23)	(0.00)	(0.00)	(0.02)	(0.08)
Heating Oil	0.12	0.33	0.13	0.33	0.55	0.77	0.43	0.24
	(0.53)	(0.53)	(0.49)	(0.36)	(0.18)	(0.09)	(0.32)	(0.36)
Lean Hogs	0.41	0.22	0.38	0.83	0.24	0.13	0.31	0.68
	(0.49)	(0.49)	(0.33)	(0.97)	(0.14)	(0.21)	(0.07)	(0.22)
Live Cattle	0.33	0.25	0.33	0.10	0.17	0.27	0.05^{b}	0.05^{b}
	(0.00)	(0.03)	(0.00)	(0.00)	(0.05)	(0.01)	(0.08)	(0.05)
Silver	0.00^{a}	0.00^{a}	0.02^{a}	0.00^{a}	0.42	0.34	0.14	0.05^{a}
	(0.74)	(0.75)	(0.69)	(0.75)	(0.43)	(0.60)	(0.39)	(0.64)
Soybeans	0.32	0.35	0.47	0.20	0.40	0.42	0.30	0.28
	(0.09)	(0.10)	(0.00)	(0.28)	(0.00)	(0.00)	(0.00)	(0.05)
Sugar	0.72	0.51	0.19	0.00^{b}	0.03^{b}	0.00^{b}	0.17	0.00^{b}
	(0.03)	(0.07)	(0.00)	(0.13)	(0.14)	(0.13)	(0.00)	(0.11)
Wheat	0.50	0.52	0.48	0.57	0.34	0.36	0.33	0.37
	(0.00)	(0.00)	(0.00)	(0.06)	(0.01)	(0.02)	(0.01)	(0.03)

Table IA6
Recursive Scheme Forecasts Based on Unconditional Expectations of Factors: Portfolio-Level

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift (RWD) benchmark. The one-month ahead forecasts of excess returns for basis-sorted commodity futures portfolios are obtained from recursive regressions with an initial 10-year expanding window using unconditional expectations of risk factors. For each alternative factor model in equation (i) $(i = 5, 6, \ldots, 10)$ and portfolio k, R^2_{OOS} is the Campbell and Thompson (2008) out-of-sample $R^{2,k}_i$(%) statistic. CW is the Clark and West (2006, 2007) $\text{MSFE}^k_{i,adj.}$-t statistic based on the Newey and West (1987) estimator, which tests whether the adjusted mean squared forecast error (MSFE) difference between the RWD and the alternative model is zero. RC is the $\max_{i=5,6,\ldots,10} \text{MSFE}^k_{i,adj.}$-$t$ statistic for a reality check following Clark and McCracken (2012), which tests the composite null hypothesis that the RWD is not inferior to any of the alternative models. One-sided critical values are obtained using 10,000 fixed regressor bootstrap replications, as per Clark and McCracken (2012). *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. The out-of-sample data run from January 1996 through October 2013.

		Model						RC
		(5)	(6)	(7)	(8)	(9)	(10)	
Portfolio 1	R^2_{OOS}	0.15*	−0.31	−1.19	−0.54	−1.33	−1.38	
	CW	1.35*	−0.70	−0.96	−0.44	−0.58	−0.56	1.35
Portfolio 2	R^2_{OOS}	−0.17	−0.30	−0.67	−0.63	−0.83	−0.83	
	CW	−1.10	−1.62	−1.19	−1.19	−1.68	−1.70	−1.10
Portfolio 3	R^2_{OOS}	0.01	−0.01	0.08	0.11	0.01	0.07	
	CW	0.62	0.00	0.75	0.81	0.73	0.80	0.81
Portfolio 4	R^2_{OOS}	0.06	0.08	−0.73	−0.65	−0.62	−0.56	
	CW	1.22	1.06	−1.91	−2.01	−1.83	−1.96	1.22
Portfolio 5	R^2_{OOS}	0.06	−0.08	−0.65	−0.34	−0.48	−0.28	
	CW	0.70	−0.82	−2.49	−2.51	−1.75	−1.85	0.70

Table IA7
Recursive Scheme Forecasts Based on Conditional Expectations of Factors: Portfolio-Level

The setup is the same as in Table IA6 except that conditional expectations of risk factors are used to generate one-month ahead forecasts of portfolio excess returns from factor models in equations (3)–(10). See also notes to Table IA6.

		Model								RC
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Portfolio 1	R^2_{OOS}	−0.90	−1.58	−1.01	−2.01	−2.04	−2.04	−1.66	−2.87	
	CW	−1.08	−1.32	−0.41	−1.60	−1.36	−1.36	−1.35	−1.39	−0.41
Portfolio 2	R^2_{OOS}	0.37***	0.33**	0.39**	0.18	−0.55	−0.55	−0.53	−0.58	
	CW	1.03	0.96	1.15	0.89	0.12	0.12	0.29	0.27	1.15
Portfolio 3	R^2_{OOS}	−0.18	−0.21	−0.16	−0.25	−0.19	−0.19	−0.21	−0.19	
	CW	−0.43	−0.51	−0.36	−0.35	0.38	0.38	0.43	0.42	0.43
Portfolio 4	R^2_{OOS}	−0.47	−0.55	−0.45	−0.55	−1.24	−1.24	−1.18	−1.25	
	CW	−2.08	−2.00	−1.97	−1.90	−2.07	−2.07	−2.01	−2.04	−1.90
Portfolio 5	R^2_{OOS}	0.02	−0.31	0.13**	−0.33	−0.64	−0.64	−0.41	−0.53	
	CW	0.22	−0.59	0.58	−0.92	−1.45	−1.45	−1.03	−1.42	0.58

Table IA8
Forecasts Based on Unconditional Expectations of Factors: Momentum Portfolios

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift benchmark. The one-month ahead forecasts of excess returns for momentum portfolios are obtained from rolling regressions with a 10-year window using unconditional expectations of risk factors. Panel A contains results for portfolios constructed using futures contracts of all commodities sorted into quintiles at the end of each month $t-1$ based on their (monthly) excess returns realized at the end of month $t-2$ (i.e., Δf^j_{t-2}). Panel B contains results for portfolios constructed using futures contracts of all commodities sorted into quintiles at the end of each month $t-1$ based on their average excess returns over the previous 12 months (i.e., $\frac{1}{12}\sum_{s=1}^{12}\Delta f^j_{t-s-1}$). The out-of-sample data in Panel A (Panel B) run from March 1996 (February 1997) through October 2013. See also notes to Table 7 in the main paper.

		Model						RC
		(5)	(6)	(7)	(8)	(9)	(10)	
Panel A: Portfolios Sorted on Δf^j_{t-2}								
Portfolio 1	R^2_{OOS}	0.11	0.14	−0.58	0.21	−0.88	0.12	
	CW	0.98	1.48**	0.38	0.48	0.25	0.36	1.48
	GW	0.63	0.31	0.97	0.98	0.94	0.99	
		(1.00)	(1.00)	(0.01)	(0.99)	(0.00)	(0.98)	
Portfolio 2	R^2_{OOS}	0.05	−0.06	0.83***	0.85***	0.93***	0.89***	
	CW	0.48	−0.45	0.88	0.89	0.90	0.89	0.90
	GW	0.80	0.75	0.45	0.43	0.35	0.31	
		(1.00)	(0.20)	(0.94)	(0.94)	(0.94)	(0.92)	
Portfolio 3	R^2_{OOS}	−0.06	0.01	1.42**	1.43**	1.37**	1.42**	
	CW	−0.87	0.10	1.47**	1.47*	1.47*	1.48**	1.48
	GW	0.44	0.92	0.71	0.71	0.70	0.74	
		(0.05)	(0.70)	(0.99)	(0.99)	(0.98)	(0.99)	
Portfolio 4	R^2_{OOS}	−0.11	0.22	1.08**	1.29**	1.30**	1.21**	
	CW	−0.62	0.70	1.68**	1.78**	1.89**	1.77**	1.89*
	GW	0.07^b	0.03^a	0.51	0.47	0.42	0.48	
		(0.19)	(0.75)	(0.99)	(1.00)	(0.99)	(1.00)	
Portfolio 5	R^2_{OOS}	0.18	−0.09	−1.22	0.01	−1.19	−0.08	
	CW	1.61*	−0.75	−1.68	0.41	−1.82	0.25	1.61
	GW	0.00^a	0.01^b	0.00^b	0.00^b	0.00^b	0.00^b	
		(0.76)	(0.14)	(0.06)	(0.20)	(0.06)	(0.21)	
Panel B: Portfolios Sorted on $\frac{1}{12}\sum_{s=1}^{12}\Delta f^j_{t-s-1}$								
Portfolio 1	R^2_{OOS}	−0.15	−0.42	−0.97	−0.66	−1.77	−1.11	
	CW	−1.03	−1.59	−0.70	−0.99	−0.97	−0.98	−0.70
	GW	0.00^b	0.17	0.01^b	0.00^b	0.01^b	0.09^b	
		(0.27)	(0.01)	(0.11)	(0.11)	(0.14)	(0.10)	
Portfolio 2	R^2_{OOS}	0.12	0.24	−0.74	−0.65	−0.79	−0.40	
	CW	1.08	0.96	−0.16	−0.02	−0.11	0.33	1.08
	GW	0.42	0.57	0.38	0.40	0.23	0.32	
		(0.98)	(1.00)	(0.12)	(0.13)	(0.14)	(0.22)	
Portfolio 3	R^2_{OOS}	0.17	0.21	0.59*	0.59*	0.52*	0.59*	
	CW	0.78	0.78	1.29*	1.27*	1.22*	1.34*	1.34
	GW	0.00^a	0.00^a	0.36	0.36	0.60	0.58	
		(0.82)	(0.78)	(0.83)	(0.83)	(0.91)	(0.92)	
Portfolio 4	R^2_{OOS}	−0.24	−0.26	−0.01	0.03	−0.28	−0.27	
	CW	−0.78	−1.22	0.36	0.44	−0.03	0.06	0.44
	GW	0.00^b	0.41	0.97	0.96	0.88	0.82	
		(0.19)	(0.00)	(0.29)	(0.77)	(0.04)	(0.06)	
Portfolio 5	R^2_{OOS}	−0.41	0.01	0.59*	0.09	0.50*	0.08	
	CW	−1.23	0.14	1.18	0.33	1.21	0.35	1.21
	GW	0.09^b	0.78	0.04^a	0.96	0.05^a	0.85	
		(0.06)	(0.56)	(0.73)	(0.95)	(0.70)	(0.78)	

Table IA9
Forecasts Based on Conditional Expectations of Factors: Momentum Portfolios

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift benchmark. The one-month ahead forecasts of excess returns for momentum portfolios are obtained from rolling regressions with a 10-year window using conditional expectations of risk factors. Panel A contains results for portfolios constructed using futures contracts of all commodities sorted into quintiles at the end of each month $t-1$ based on their (monthly) excess returns realized at the end of month $t-2$ (i.e., Δf^j_{t-2}). Panel B contains results for portfolios constructed using futures contracts of all commodities sorted into quintiles at the end of each month $t-1$ based on their average excess returns over the previous 12 months (i.e., $\frac{1}{12}\sum_{s=1}^{12}\Delta f^j_{t-s-1}$). The out-of-sample data in Panel A (Panel B) run from March 1996 (February 1997) through October 2013. See also notes to Table 7 in the main paper.

		Model								RC
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Panel A: Portfolios Sorted on Δf^j_{t-2}										
Portfolio 1	R^2_{OOS}	−0.22	−0.39	0.01	−0.24	−0.97	−0.97	−1.10	−0.83	
	CW	−0.21	0.16	0.32	0.29	0.29	0.29	0.24	0.31	0.32
	GW	0.91	0.74	0.99	0.72	0.85	0.85	0.82	0.85	
		(0.01)	(0.14)	(0.76)	(0.23)	(0.04)	(0.04)	(0.03)	(0.06)	
Portfolio 2	R^2_{OOS}	−4.37	−4.33	−4.40	−4.81	−1.82	−1.82	−4.96	−5.47	
	CW	−1.04	−1.05	−1.03	−1.04	−0.40	−0.40	−0.93	−0.93	−0.40
	GW	0.51	0.50	0.59	0.59	0.76	0.76	0.58	0.58	
		(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	
Portfolio 3	R^2_{OOS}	−0.28	−0.27	−0.17	−0.25	1.08**	1.08**	1.17**	0.91**	
	CW	−1.14	−1.11	−0.63	−0.76	1.42*	1.42*	1.47*	1.43*	1.47
	GW	0.35	0.28	0.71	0.66	0.70	0.70	0.70	0.69	
		(0.05)	(0.06)	(0.00)	(0.00)	(0.92)	(0.92)	(0.94)	(0.89)	
Portfolio 4	R^2_{OOS}	−1.03	−1.24	−0.98	−1.38	−0.74	−0.74	−0.28	−1.01	
	CW	−0.56	−0.79	−0.55	−0.91	0.70	0.70	0.89	0.43	0.89
	GW	0.46	0.34	0.48	0.33	0.83	0.83	0.98	0.59	
		(0.00)	(0.01)	(0.00)	(0.00)	(0.04)	(0.04)	(0.00)	(0.04)	
Portfolio 5	R^2_{OOS}	0.18*	−1.10	0.09	−1.23	−0.99	−0.99	−1.13	−1.09	
	CW	0.77	−1.40	0.78	−1.53	−1.04	−1.04	−1.43	−1.02	0.78
	GW	0.79	0.10[b]	0.91	0.05[b]	0.05[b]	0.05[b]	0.06[b]	0.07[b]	
		(0.99)	(0.08)	(0.99)	(0.09)	(0.07)	(0.07)	(0.05)	(0.08)	
Panel B: Portfolios Sorted on $\frac{1}{12}\sum_{s=1}^{12}\Delta f^j_{t-s-1}$										
Portfolio 1	R^2_{OOS}	−2.53	−2.15	−7.16	−9.54	−3.00	−3.00	−7.04	−9.14	
	CW	−1.14	−1.22	−1.05	−1.16	−1.21	−1.21	−1.09	−1.28	−1.05
	GW	0.01[b]	0.19	0.59	0.53	0.01[b]	0.01[b]	0.59	0.36	
		(0.04)	(0.02)	(0.01)	(0.00)	(0.05)	(0.05)	(0.00)	(0.00)	
Portfolio 2	R^2_{OOS}	−0.78	−0.93	−0.60	−0.32	−1.12	−1.12	−1.11	−0.50	
	CW	−1.36	−1.45	−1.05	−0.33	−1.03	−1.03	−0.97	−0.19	−0.19
	GW	0.09[b]	0.10	0.33	0.82	0.32	0.32	0.16	0.45	
		(0.04)	(0.02)	(0.04)	(0.03)	(0.02)	(0.02)	(0.05)	(0.10)	
Portfolio 3	R^2_{OOS}	0.23**	0.29**	−0.09	0.01	0.13	0.13	−0.12	0.00	
	CW	0.70	0.78	0.11	0.34	1.14	1.14	0.81	1.02	1.14
	GW	0.15	0.17	0.48	0.57	0.51	0.51	0.57	0.55	
		(0.84)	(0.85)	(0.24)	(0.42)	(0.64)	(0.64)	(0.32)	(0.48)	
Portfolio 4	R^2_{OOS}	−1.10	−1.19	−0.96	−1.41	−0.92	−0.92	−0.89	−1.16	
	CW	−1.81	−1.75	−1.63	−1.85	−1.17	−1.17	−0.89	−1.18	−0.89
	GW	0.16	0.17	0.24	0.12	0.38	0.38	0.53	0.37	
		(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)	
Portfolio 5	R^2_{OOS}	0.84***	1.36***	1.60	1.85**	1.17*	1.17**	2.08**	1.96**	
	CW	1.10	1.56*	0.99	1.45*	1.50*	1.50*	1.54*	1.50**	1.56
	GW	0.50	0.02[a]	0.64	0.09[a]	0.01[a]	0.01[a]	0.06[a]	0.06[a]	
		(0.99)	(0.80)	(0.99)	(0.86)	(0.76)	(0.76)	(0.84)	(0.86)	

Table IA10
Forecasts Based on Unconditional Expectations of Factors: Value Portfolios

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift benchmark. The one-month ahead forecasts of excess returns on value portfolios for commodity futures are obtained from rolling regressions with a 10-year window using unconditional expectations of risk factors. The out-of-sample data run from July 2001 through October 2013. See also notes to Table 7 in the main paper.

		Model						RC
		(5)	(6)	(7)	(8)	(9)	(10)	
Portfolio 1	R^2_{OOS}	0.02	0.00	−0.81	−0.09	−1.73	−0.24	
	CW	0.29	0.00	−0.57	−0.20	−0.83	−0.85	0.29
	GW	0.00^{a}	0.02^{a}	0.03^{b}	0.04^{b}	0.00^{b}	0.01^{b}	
		(0.71)	(0.51)	(0.18)	(0.30)	(0.19)	(0.21)	
Portfolio 2	R^2_{OOS}	0.01	−0.09	−0.71	−0.66	−0.59	−0.40	
	CW	0.32	−1.09	−0.44	−0.36	−0.28	−0.14	0.32
	GW	0.81	0.33	0.57	0.65	0.69	0.86	
		(0.82)	(0.08)	(0.04)	(0.04)	(0.04)	(0.01)	
Portfolio 3	R^2_{OOS}	−0.01	0.02	−0.67	−0.66	−0.66	−0.51	
	CW	−0.24	0.44	−0.88	−0.85	−0.75	−0.89	0.44
	GW	0.84	0.25	0.45	0.45	0.45	0.36	
		(0.75)	(0.76)	(0.03)	(0.03)	(0.07)	(0.10)	
Portfolio 4	R^2_{OOS}	0.14	0.13	−0.50	−0.60	−0.41	−0.57	
	CW	1.78^{**}	1.48^{*}	−0.19	−0.25	−0.09	−0.21	1.78^{*}
	GW	0.02^{a}	0.02^{a}	0.82	0.77	0.79	0.78	
		(0.90)	(0.86)	(0.05)	(0.04)	(0.08)	(0.05)	
Portfolio 5	R^2_{OOS}	−0.04	0.01	−0.85	−0.17	−0.52	−0.06	
	CW	−1.26	0.12	−1.15	−0.76	−0.80	0.02	0.12
	GW	0.20	0.93	0.09^{b}	0.00^{b}	0.11	0.00^{b}	
		(0.10)	(0.62)	(0.03)	(0.23)	(0.08)	(0.45)	

Table IA11
Forecasts Based on Conditional Expectations of Factors: Value Portfolios

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift benchmark. The one-month ahead forecasts of excess returns on value portfolios for commodity futures are obtained from rolling regressions with a 10-year window using conditional expectations of risk factors. The out-of-sample data run from July 2001 through October 2013. See also notes to Table 7 in the main paper.

		Model								RC
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Portfolio 1	R^2_{OOS}	−0.04	−0.85	−0.11	−0.86	−0.89	−0.89	−1.96	−1.11	
	CW	−0.18	−0.49	−0.51	−0.50	−0.54	−0.54	−0.81	−0.64	−0.18
	GW	0.34	0.11	0.01^b	0.13	0.11	0.11	0.01^b	0.06^b	
		(0.26)	(0.16)	(0.24)	(0.15)	(0.14)	(0.14)	(0.16)	(0.14)	
Portfolio 2	R^2_{OOS}	−0.66	−0.73	−0.72	−0.85	−1.41	−1.41	−1.33	−1.16	
	CW	−2.06	−2.19	−2.11	−1.93	−0.92	−0.92	−0.85	−0.78	−0.78
	GW	0.03^b	0.05^b	0.06^b	0.08^b	0.16	0.16	0.19	0.30	
		(0.01)	(0.00)	(0.00)	(0.00)	(0.04)	(0.04)	(0.04)	(0.03)	
Portfolio 3	R^2_{OOS}	−0.06	−0.07	−0.12	−0.15	−0.69	−0.69	−0.73	−0.71	
	CW	0.28	0.25	0.17	0.22	−0.75	−0.75	−0.71	−0.59	0.28
	GW	0.01^b	0.01^b	0.37	0.08^b	0.00^b	0.00^b	0.00^b	0.00^b	
		(0.36)	(0.35)	(0.23)	(0.26)	(0.19)	(0.19)	(0.16)	(0.23)	
Portfolio 4	R^2_{OOS}	−1.00	−0.90	−0.92	−0.99	−1.89	−1.89	−1.79	−2.03	
	CW	−0.77	−0.71	−0.68	−0.74	−0.45	−0.45	−0.40	−0.51	−0.40
	GW	0.48	0.51	0.50	0.51	0.63	0.63	0.63	0.63	
		(0.02)	(0.03)	(0.05)	(0.03)	(0.02)	(0.02)	(0.03)	(0.01)	
Portfolio 5	R^2_{OOS}	−2.27	−3.46	−11.01	−6.57	−3.77	−3.77	−12.39	−7.13	
	CW	−0.74	−1.05	−1.03	−1.04	−1.12	−1.12	−1.02	−0.87	−0.74
	GW	0.00^b	0.01^b	0.33	0.15	0.02^b	0.02^b	0.42	0.35	
		(0.08)	(0.05)	(0.01)	(0.01)	(0.03)	(0.03)	(0.01)	(0.01)	

Table IA12
Forecasts Based on Unconditional Expectations of Factors: A 3-Year Rolling Scheme

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift benchmark. The one-month ahead forecasts of commodity futures excess returns are obtained from rolling regressions with a 3-year window using unconditional expectations of risk factors. The out-of-sample data run from January 1989 through October 2013. See also notes to Table 3 in the main paper.

		Model						RC
		(5)	(6)	(7)	(8)	(9)	(10)	
Cocoa	R^2_{OOS}	−1.13	−2.38	−6.52	−6.56	−7.26	−7.86	
	CW	−1.30	−0.63	−1.01	−1.22	−0.77	−1.17	−0.63
	GW	0.11^{b}	0.14	0.01^{b}	0.01^{b}	0.00^{b}	0.00^{b}	
		(0.01)	(0.00)	(0.06)	(0.05)	(0.09)	(0.08)	
Coffee	R^2_{OOS}	−3.13	−0.66	−10.35	−10.48	−10.52	−5.51	
	CW	−1.85	0.08	−0.24	−0.31	−0.08	0.27	0.27
	GW	0.05^{b}	0.00^{b}	0.02^{b}	0.02^{b}	0.03^{b}	0.04^{b}	
		(0.01)	(0.26)	(0.05)	(0.05)	(0.05)	(0.08)	
Copper	R^2_{OOS}	0.45*	1.00**	−2.66	−3.12	−4.26	−3.90	
	CW	1.11	2.03***	0.42	0.32	0.32	1.06	2.03*
	GW	0.24	0.68	0.36	0.27	0.18	0.30	
		(0.87)	(1.00)	(0.01)	(0.01)	(0.00)	(0.01)	
Corn	R^2_{OOS}	−0.51	−1.94	−8.83	−8.48	−14.89	−6.87	
	CW	−0.64	−0.56	−0.85	−0.84	−1.28	−0.54	−0.54
	GW	0.67	0.51	0.07^{b}	0.11	0.07^{b}	0.07^{b}	
		(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.03)	
Cotton	R^2_{OOS}	−0.26	−0.55	−5.37	−5.14	−4.36	−4.75	
	CW	−0.02	−0.07	0.08	0.15	0.27	0.74	0.74
	GW	0.71	0.74	0.33	0.36	0.32	0.09^{b}	
		(0.06)	(0.00)	(0.00)	(0.00)	(0.02)	(0.07)	
Crude Oil	R^2_{OOS}	0.75*	0.89*	−3.85	−3.79	−4.41	−2.52*	
	CW	2.12**	1.39	0.74	0.65	0.97	1.00	2.12*
	GW	0.00^{a}	0.00^{a}	0.01^{b}	0.03^{b}	0.01^{b}	0.00^{b}	
		(0.91)	(0.76)	(0.14)	(0.11)	(0.12)	(0.25)	
Gasoline	R^2_{OOS}	0.89**	−2.06	1.73***	1.77***	1.44***	0.26***	
	CW	2.82***	−0.80	2.02**	1.88**	1.80**	1.20*	2.82***
	GW	0.02^{a}	0.31	0.51	0.32	0.71	0.88	
		(1.00)	(0.01)	(0.97)	(0.94)	(0.99)	(0.82)	
Gold	R^2_{OOS}	0.55*	−0.24	−2.30*	−2.12*	−2.22*	−1.60*	
	CW	1.33*	0.29	0.31	0.23	0.20	0.42	1.33
	GW	0.08^{a}	0.01^{b}	0.26	0.21	0.03^{b}	0.45	
		(0.87)	(0.34)	(0.06)	(0.09)	(0.14)	(0.10)	
Heating Oil	R^2_{OOS}	1.38*	−0.06	−4.94	−5.23	−5.84	−11.82	
	CW	1.76**	0.66	−0.12	−0.36	−0.02	−1.15	1.76
	GW	0.14	0.22	0.07^{b}	0.06^{b}	0.07^{b}	0.07^{b}	
		(0.99)	(0.44)	(0.06)	(0.05)	(0.03)	(0.00)	
Lean Hogs	R^2_{OOS}	−0.11	0.11	−5.72	−5.50	−6.65	−4.67	
	CW	0.20	0.76	−1.14	−1.06	−1.15	−0.59	0.76
	GW	0.00^{b}	0.17	0.13	0.14	0.19	0.24	
		(0.34)	(0.64)	(0.03)	(0.03)	(0.00)	(0.02)	
Live Cattle	R^2_{OOS}	−0.58	−1.95	−4.36	−3.48	−6.26	−4.83	
	CW	−0.17	−1.90	0.77	1.21	0.22	0.23	1.21
	GW	0.00^{b}	0.01^{b}	0.20	0.24	0.06^{b}	0.13	
		(0.20)	(0.03)	(0.03)	(0.07)	(0.00)	(0.00)	

(Continued)

Table IA12 – *Continued*

		Model						RC
		(5)	(6)	(7)	(8)	(9)	(10)	
Silver	R^2_{OOS}	0.49*	0.63*	−0.73**	−0.67**	−2.03**	−3.25	
	CW	1.26*	1.42*	1.74**	1.77**	1.03	0.52	1.77
	GW	0.42	0.53	0.16	0.23	0.73	0.47	
		(0.93)	(0.97)	(0.27)	(0.27)	(0.00)	(0.01)	
Soybeans	R^2_{OOS}	−1.18	−5.96	−14.47	−15.55	−11.18	−17.63	
	CW	−0.91	−0.69	−0.98	−1.00	−0.88	−0.86	−0.69
	GW	0.09[b]	0.14	0.05[b]	0.09[b]	0.04[b]	0.07[b]	
		(0.07)	(0.02)	(0.01)	(0.00)	(0.00)	(0.01)	
Sugar	R^2_{OOS}	−1.86	−10.85	−24.67	−17.29	−7.96	−4.56	
	CW	−2.00	0.22	−1.36	−1.38	−1.17	0.46	0.46
	GW	0.07[b]	0.01[b]	0.58	0.56	0.47	0.24	
		(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	
Wheat	R^2_{OOS}	−0.24	−0.29	−4.87	−5.06	−4.45	−5.51	
	CW	0.18	0.38	−0.40	−0.44	−0.25	−0.49	0.38
	GW	0.90	0.32	0.00[b]	0.00[b]	0.00[b]	0.00[b]	
		(0.05)	(0.25)	(0.09)	(0.08)	(0.12)	(0.10)	

Table IA13
Forecasts Based on Conditional Expectations of Factors: A 3-Year Rolling Scheme

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift benchmark. The one-month ahead forecasts of commodity futures excess returns are obtained from rolling regressions with a 3-year window using conditional expectations of risk factors. The out-of-sample data run from January 1989 through October 2013. See also notes to Table 3 in the main paper.

		Model								RC
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Cocoa	R^2_{OOS}	−1.38	−1.10	−5.22	−9.44	−7.26	−7.26	−10.95	−13.22	
	CW	−1.03	−0.97	−0.87	−1.32	−1.39	−1.39	−1.21	−1.78	−0.87
	GW	0.09^b	0.02^b	0.08^b	0.04^b	0.01^b	0.01^b	0.00^b	0.02^b	
		(0.04)	(0.08)	(0.00)	(0.00)	(0.03)	(0.03)	(0.03)	(0.01)	
Coffee	R^2_{OOS}	−0.70	−1.37	−21.04	−20.92	−12.46	−12.46	−19.10	−23.26	
	CW	0.25	0.03	−1.46	−1.32	−0.13	−0.13	−0.14	−0.77	0.25
	GW	0.01^b	0.02^b	0.22	0.07^b	0.01^b	0.01^b	0.09^b	0.03^b	
		(0.19)	(0.15)	(0.01)	(0.02)	(0.05)	(0.05)	(0.01)	(0.02)	
Copper	R^2_{OOS}	−0.85	−0.65	−0.04	−4.48	−2.89	−2.89	−3.32	−5.15	
	CW	−0.33	0.02	0.60	−0.20	0.32	0.32	0.30	−0.17	0.60
	GW	0.58	0.40	0.99	0.00^b	0.34	0.34	0.35	0.18	
		(0.00)	(0.14)	(0.15)	(0.20)	(0.02)	(0.02)	(0.00)	(0.00)	
Corn	R^2_{OOS}	−6.80	−7.00	−18.93	−20.04	−12.00	−12.00	−20.54	−22.91	
	CW	−0.63	−0.71	0.00	−1.25	−1.38	−1.38	−0.50	−1.09	0.00
	GW	0.00^b	0.00^b	0.00^b	0.00^b	0.10	0.10	0.01^b	0.00^b	
		(0.04)	(0.03)	(0.01)	(0.03)	(0.00)	(0.00)	(0.01)	(0.02)	
Cotton	R^2_{OOS}	−2.21	−2.25	−15.38	−28.06	−9.35	−9.35	−19.42	−34.36	
	CW	0.21	0.15	−0.10	−0.41	0.15	0.15	−0.04	−0.13	0.21
	GW	0.00^b	0.00^b	0.28	0.43	0.03^b	0.03^b	0.20	0.32	
		(0.09)	(0.10)	(0.00)	(0.00)	(0.03)	(0.03)	(0.00)	(0.00)	
Crude Oil	R^2_{OOS}	−1.22	−1.04	−1.72	−6.73	−3.08	−3.08	−3.78	−5.58	
	CW	0.75	0.88	1.14	0.52	1.21	1.21	1.32*	0.68	1.32
	GW	0.01^b	0.03^b	0.06^b	0.20	0.47	0.47	0.25	0.36	
		(0.11)	(0.14)	(0.10)	(0.03)	(0.01)	(0.01)	(0.04)	(0.00)	
Gasoline	R^2_{OOS}	−1.68	−2.00	−0.73	−6.46	−0.25**	−0.25**	−0.23**	−5.99	
	CW	−0.71	−0.70	0.06	−0.88	1.57**	1.57**	1.71**	0.35	1.71
	GW	0.41	0.39	0.86	0.14	0.99	0.99	0.85	0.23	
		(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.26)	(0.00)	
Gold	R^2_{OOS}	−2.73	−2.31	0.43*	−2.87	−4.20	−4.20	−2.80*	−3.82	
	CW	−1.03	−1.07	1.53**	0.41	−0.66	−0.66	0.70	0.63	1.53
	GW	0.00^b	0.21	0.00^a	0.00^b	0.11	0.11	0.00^b	0.01^b	
		(0.07)	(0.02)	(0.73)	(0.13)	(0.05)	(0.05)	(0.19)	(0.13)	
Heating Oil	R^2_{OOS}	−5.45	−4.72	−14.49	−22.50	−6.05	−6.05	−15.56	−16.25	
	CW	0.98	1.17	1.65***	1.56**	0.96	0.96	1.58**	1.35**	1.65*
	GW	0.03^b	0.04^b	0.52	0.56	0.35	0.35	0.56	0.58	
		(0.02)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	
Lean Hogs	R^2_{OOS}	−0.35	−0.73	0.65	−2.60	−5.65	−5.65	−5.20	−6.66	
	CW	−0.12	−0.37	1.00	−0.23	−1.04	−1.04	−0.81	−0.99	1.00
	GW	0.74	0.55	0.38	0.09^b	0.25	0.25	0.32	0.19	
		(0.08)	(0.06)	(0.90)	(0.11)	(0.01)	(0.01)	(0.00)	(0.00)	
Live Cattle	R^2_{OOS}	−0.70	−2.08	−1.32	−4.32	−3.85	−3.85	−5.84	−5.43	
	CW	−0.87	−1.65	−1.24	−1.88	0.65	0.65	0.04	−0.49	0.65
	GW	0.00^b	0.07^b	0.04^b	0.04^b	0.24	0.24	0.05^b	0.03^b	
		(0.09)	(0.01)	(0.06)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	

(Continued)

Table IA13 – *Continued*

		Model								RC
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Silver	R^2_{OOS}	−3.76	−3.44	−2.27	−1.20	−4.69	−4.69	−5.19	−5.16	
	CW	−0.95	−0.94	0.65	1.25*	0.65	0.65	0.97	1.14	1.25
	GW	0.00[b]	0.00[b]	0.00[b]	0.39	0.45	0.45	0.09[b]	0.16	
		(0.06)	(0.06)	(0.09)	(0.12)	(0.02)	(0.02)	(0.06)	(0.06)	
Soybeans	R^2_{OOS}	−4.13	−3.92	−13.77	−39.87	−19.89	−19.89	−22.00	−55.41	
	CW	−0.90	−0.67	−1.12	0.85	−1.13	−1.13	−1.63	0.83	0.85
	GW	0.33	0.35	0.24	0.07[b]	0.01[b]	0.01[b]	0.00[b]	0.13	
		(0.02)	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	
Sugar	R^2_{OOS}	−3.29	−15.52	−7.26	−39.08	−24.86	−24.86	−6.79	−51.57	
	CW	−0.95	−1.10	0.48	−1.04	−1.33	−1.33	−0.20	−0.97	0.48
	GW	0.56	0.00[b]	0.00[b]	0.60	0.59	0.59	0.38	0.60	
		(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	
Wheat	R^2_{OOS}	−3.81	−4.05	−9.93	−11.94	−6.62	−6.62	−10.91	−14.99	
	CW	−0.55	−0.53	−0.83	−0.80	−1.23	−1.23	−1.37	−1.61	−0.53
	GW	0.16	0.16	0.21	0.20	0.01[b]	0.01[b]	0.04[b]	0.03[b]	
		(0.03)	(0.04)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	

Table IA14
Portfolio-Level Forecasts Based on Unconditional Expectations of Factors: A 3-Year Rolling Scheme

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift benchmark. The one-month ahead forecasts of excess returns for basis-sorted commodity futures portfolios are obtained from rolling regressions with a 3-year window using unconditional expectations of risk factors. The out-of-sample data run from January 1989 through October 2013. See also notes to Table 7 in the main paper.

		Model						RC
		(5)	(6)	(7)	(8)	(9)	(10)	
Portfolio 1	R^2_{OOS}	−0.61	−1.49	−4.51	−2.11	−7.21	−7.53	
	CW	−1.01	−1.06	−0.01	−0.10	−0.48	−0.90	−0.01
	GW	0.42	0.11	0.36	0.03^b	0.37	0.06^b	
		(0.01)	(0.03)	(0.01)	(0.05)	(0.00)	(0.02)	
Portfolio 2	R^2_{OOS}	−0.58	−0.64	−2.55	−2.66	−2.93	−4.68	
	CW	−0.42	−0.28	−0.89	−0.41	−0.78	−0.61	−0.28
	GW	0.01^b	0.13	0.00^b	0.10	0.00^b	0.01^b	
		(0.19)	(0.17)	(0.14)	(0.05)	(0.19)	(0.06)	
Portfolio 3	R^2_{OOS}	0.26	−0.23	−1.55*	−1.48*	−1.21*	−2.02	
	CW	1.20	0.37	0.53	0.63	0.77	0.57	1.20
	GW	0.43	0.11	0.16	0.23	0.10	0.03^b	
		(0.90)	(0.30)	(0.14)	(0.13)	(0.22)	(0.17)	
Portfolio 4	R^2_{OOS}	0.67*	0.34	−0.83*	−1.12*	−0.34*	−1.41*	
	CW	1.62*	1.11	0.91	0.84	1.40*	0.81	1.62
	GW	0.03^a	0.55	0.53	0.38	0.86	0.60	
		(0.92)	(0.84)	(0.14)	(0.13)	(0.18)	(0.05)	
Portfolio 5	R^2_{OOS}	0.04	−0.21	−4.90	−1.57	−4.51	−2.03	
	CW	0.33	−0.11	−1.15	−1.03	−0.56	−1.35	0.33
	GW	0.19	0.82	0.03^b	0.09^b	0.08^b	0.04^b	
		(0.55)	(0.03)	(0.00)	(0.06)	(0.00)	(0.06)	

Table IA15
Portfolio-Level Forecasts Based on Conditional Expectations of Factors: A 3-Year Rolling Scheme

The table reports out-of-sample tests of forecast accuracy of factor models relative to a random walk with drift benchmark. The one-month ahead forecasts of excess returns for basis-sorted commodity futures portfolios are obtained from rolling regressions with a 3-year window using conditional expectations of risk factors. The out-of-sample data run from January 1989 through October 2013. See also notes to Table 7 in the main paper.

		Model								RC
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Portfolio 1	R^2_{OOS}	−4.61	−7.68	−12.18	−14.98	−11.58	−11.58	−21.02	−24.66	
	CW	−1.15	−0.75	−0.84	−0.77	−0.64	−0.64	−1.24	−1.13	−0.64
	GW	0.09^{b}	0.04^{b}	0.09^{b}	0.19	0.30	0.30	0.13	0.23	
		(0.03)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	
Portfolio 2	R^2_{OOS}	−1.54	−2.54	−3.50	−4.75	−3.81	−3.81	−4.66	−6.77	
	CW	0.45	0.13	0.43	0.25	−0.26	−0.26	−0.04	−0.32	0.45
	GW	0.64	0.40	0.07^{b}	0.00^{b}	0.15	0.15	0.05^{b}	0.01^{b}	
		(0.01)	(0.00)	(0.07)	(0.13)	(0.01)	(0.01)	(0.03)	(0.05)	
Portfolio 3	R^2_{OOS}	−3.34	−3.68	−2.96	−5.12	−5.23	−5.23	−5.17	−8.72	
	CW	−0.70	−0.71	−0.74	−0.89	−0.16	−0.16	−0.30	−0.50	−0.16
	GW	0.03^{b}	0.03^{b}	0.01^{b}	0.02^{b}	0.02^{b}	0.02^{b}	0.02^{b}	0.01^{b}	
		(0.05)	(0.05)	(0.06)	(0.06)	(0.08)	(0.08)	(0.07)	(0.06)	
Portfolio 4	R^2_{OOS}	0.53*	0.34	−0.57	−2.00	−1.65*	−1.65*	−2.99	−5.82	
	CW	1.47*	1.40	1.02	1.32	1.40*	1.40*	1.20	0.92	1.47
	GW	0.01^{a}	0.00^{a}	0.01^{b}	0.26	0.03^{b}	0.03^{b}	0.03^{b}	0.05^{b}	
		(0.77)	(0.69)	(0.25)	(0.07)	(0.22)	(0.22)	(0.13)	(0.04)	
Portfolio 5	R^2_{OOS}	1.59***	−1.65	−0.44	−2.21	−4.62	−4.62	−8.14	−5.54	
	CW	2.05**	0.97	2.04***	0.87	0.42	0.42	0.75	0.30	2.05
	GW	0.09^{a}	0.70	0.03^{b}	0.54	0.17	0.17	0.00^{b}	0.09^{b}	
		(0.90)	(0.00)	(0.36)	(0.00)	(0.01)	(0.01)	(0.06)	(0.00)	

Table IA16
Economic Value of Commodity Futures Excess Return Predictability: The Recursive Scheme

The table reports out-of-sample economic value of factor models. The one-month ahead forecasts of commodity futures excess returns are obtained from recursive regressions with an initial 10-year expanding window. See also notes to Table 9 in the main paper.

	Unconditional Expectations of Factors			Conditional Expectations of Factors		
Model	Sharpe Ratio	Φ	Θ	Sharpe Ratio	Φ	Θ
			Panel A: Commodity Stand-alone Strategy			
RWD	0.317			0.317		
(3)				0.319	0.000	0.000
(4)				0.316	0.000	0.000
(5)	0.308	0.000	0.000	0.288	−0.001	−0.001
(6)	0.490	0.005	0.005	0.274	−0.002	−0.002
(7)	0.002	−0.010	−0.010	−0.061	−0.011	−0.011
(8)	0.024	−0.009	−0.009	−0.061	−0.011	−0.011
(9)	−0.002	−0.010	−0.010	−0.057	−0.011	−0.011
(10)	0.168	−0.005	−0.005	0.037	−0.009	−0.009
			Panel B: Diversification Strategy			
S+B	0.677			0.677		
(3)				0.653	−0.002	−0.002
(4)				0.646	−0.002	−0.002
(5)	0.633	−0.002	−0.002	0.615	−0.003	−0.003
(6)	0.840	−0.002	−0.002	0.598	−0.004	−0.004
(7)	0.445	−0.008	−0.008	0.436	−0.008	−0.008
(8)	0.460	−0.007	−0.007	0.436	−0.008	−0.008
(9)	0.459	−0.008	−0.008	0.439	−0.008	−0.008
(10)	0.604	−0.004	−0.004	0.498	−0.007	−0.007

Table IA17
Economic Value of Commodity Futures Excess Return Predictability: A Cross-Sectional Approach with Open Interest

The table reports out-of-sample economic value of factor models. The one-month ahead forecasts of commodity futures excess returns are obtained by the Fama and MacBeth (1973) cross-sectional procedure following Brennan, Chordia, and Subrahmanyam (1998). The forecasting scheme based on rolling regressions with a 10-year window utilizes commodity-specific open interest. The out-of-sample data run from February 1996 through October 2013. See also notes to Table 9 in the main paper.

	Unconditional Expectations of Factors			Conditional Expectations of Factors		
Model	Sharpe Ratio	Φ	Θ	Sharpe Ratio	Φ	Θ
			Panel B: Commodity Stand-alone Strategy			
RWD	0.246			0.246		
(3)				−0.124	−0.014	−0.015
(4)				0.096	−0.005	−0.005
(5)	0.287	−0.003	−0.003	0.076	−0.006	−0.006
(6)	0.192	−0.003	−0.003	0.009	−0.006	−0.006
(7)	−0.342	−0.011	−0.011	−0.308	−0.011	−0.011
(8)	−0.356	−0.012	−0.012	−0.241	−0.010	−0.010
(9)	−0.197	−0.006	−0.006	−0.181	−0.009	−0.009
(10)	−0.313	−0.007	−0.007	−0.214	−0.009	−0.009
			Panel B: Diversification Strategy			
S+B	0.554			0.554		
(3)				0.639	−0.002	−0.002
(4)				0.713	−0.002	−0.002
(5)	0.218	−0.013	−0.013	0.652	−0.002	−0.002
(6)	0.073	−0.014	−0.014	0.550	−0.006	−0.006
(7)	0.224	−0.012	−0.012	0.256	−0.011	−0.011
(8)	0.223	−0.012	−0.012	0.339	−0.010	−0.010
(9)	−0.065	−0.015	−0.015	0.314	−0.011	−0.011
(10)	−0.226	−0.016	−0.016	0.265	−0.011	−0.011

Table IA18
Economic Value of Commodity Futures Excess Return Predictability: A 3-Year Rolling Scheme

The table reports out-of-sample economic value of factor models. The one-month ahead forecasts of commodity futures excess returns are obtained from rolling regressions with a 3-year window. The out-of-sample data run from January 1989 through October 2013. See also notes to Table 9 in the main paper.

	Unconditional Expectations of Factors			Conditional Expectations of Factors		
Model	Sharpe Ratio	Φ	Θ	Sharpe Ratio	Φ	Θ
			Panel A: Commodity Stand-alone Strategy			
RWD	0.159			0.159		
(3)				−0.019	−0.003	−0.003
(4)				−0.020	−0.003	−0.003
(5)	0.164	0.002	0.002	0.039	−0.002	−0.002
(6)	0.190	0.002	0.002	−0.020	−0.003	−0.003
(7)	0.096	−0.001	−0.001	−0.005	−0.003	−0.003
(8)	0.087	−0.001	−0.001	−0.005	−0.003	−0.003
(9)	0.151	−0.001	−0.001	0.125	−0.001	−0.001
(10)	0.133	−0.001	−0.001	0.018	−0.002	−0.002
			Panel B: Diversification Strategy			
S+B	0.644			0.644		
(3)				0.173	−0.015	−0.015
(4)				0.160	−0.015	−0.015
(5)	0.475	−0.010	−0.010	0.204	−0.014	−0.014
(6)	0.557	−0.010	−0.010	0.102	−0.016	−0.016
(7)	0.312	−0.013	−0.013	0.073	−0.016	−0.016
(8)	0.321	−0.013	−0.013	0.073	−0.016	−0.016
(9)	0.268	−0.014	−0.014	0.163	−0.015	−0.015
(10)	0.310	−0.014	−0.014	0.101	−0.016	−0.016