

Internet Appendix

Best of the best: A comparison of factor models

(Not for Publication)

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April 27, 2018

JEL Classification: C51, C52, and G12.

Keywords: Asset pricing model, Factor model, and Model evaluation.

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[§]We are grateful to Hendrik Bessembinder (the editor), an anonymous referee, Abhay Abhyankar, Albert J. Menkveld, Sanjay Banerji, Weimin Liu, and Xiaoquan Liu for useful comments and suggestions.

This Internet Appendix describes the construction of test asset portfolios, which are not available in the Data Library maintained by Kenneth R. French. We obtain daily and monthly stock return data from the Center for Research in Security Prices (CRSP) and a host of firm-specific accounting information from the Compustat Annual Industrial Files. The sample for constructing anomaly portfolios includes all NYSE-, AMEX-, and NASDAQ-listed ordinary common stocks (CRSP share codes 10 and 11).¹ In line with [Fama and French \(1992\)](#), we employ all accounting variables at the end of June of calendar year t by using accounting information available for the fiscal year ending in the calendar year $t-1$ from Compustat. Finally, this Internet Appendix also describes the sequential test for comparing nonnested models and provides additional results on the factor model time-series and cross-sectional regressions.

25 size-CI and D10–1 CI portfolios:

In line with [Titman, Wei, and Xie \(2004\)](#), we first estimate abnormal capital investment (CI) at the end of June of year t as $CE_{t-1}/[(CE_{t-2} + CE_{t-3} + CE_{t-4})/3] - 1$, where CE_{t-j} is capital expenditure (Compustat item CAPX) scaled by sales (Compustat item SALE) for the fiscal year ending in calendar year $t-j$. We then construct 25 value-weighted portfolios at the end of June of each year t from independent sorts of stocks into quintiles of size and CI. The size quintiles are based on NYSE market equity breakpoints at the end of June of year t . The CI quintile breakpoints are also based on NYSE stocks. We compute monthly portfolio returns from July of year t to June of year $t+1$ and rebalance portfolios at the end of June of year $t+1$.

At the end of June of each year t , we also use NYSE breakpoints to assign stocks into deciles based on CI. Then value-weighted monthly decile returns are computed from July of year t to June of year $t+1$ and the deciles are rebalanced at the end of June of year $t+1$. Decile 1 contains stocks with the lowest CI and decile 10 contains stocks with the highest CI. The return difference between decile 10 and decile 1 is the D10–1 (high minus low decile) CI portfolio.

25 size-DR and D10–1 DR portfolios:

To proxy for distress risk (DR), we use the [Bharath and Shumway \(2008\)](#) measure of expected default frequency (EDF), which is a simplified version of the distance to default (DD) measure

¹ To compute excess returns on independent two-way sorted portfolios, we subtract monthly risk-free security return taken from Kenneth R. French's website.

introduced by [Merton \(1974\)](#). The EDF of firm i is estimated as follows:

$$DD_{i,t} = \frac{\log\left(\frac{\text{Equity}_{i,t} + \text{Debt}_{i,t}}{\text{Debt}_{i,t}}\right) + \left(r_{i,t-1} - \frac{\sigma_{V_{i,t}}^2}{2}\right) \times T_{i,t}}{\sigma_{V_{i,t}} \times \sqrt{T_{i,t}}}, \quad (\text{IA1})$$

$$\sigma_{V_{i,t}} = \frac{\text{Equity}_{i,t}}{\text{Equity}_{i,t} + \text{Debt}_{i,t}} \times \sigma_{E_{i,t}} + \frac{\text{Equity}_{i,t}}{\text{Equity}_{i,t} + \text{Debt}_{i,t}} \times (0.05 + 0.25 \times \sigma_{E_{i,t}}), \quad (\text{IA2})$$

and

$$\text{EDF}_{i,t} = N(-DD_{i,t}), \quad (\text{IA3})$$

where $\text{Equity}_{i,t}$ is the market value of equity (in millions of dollars) calculated as the number of shares outstanding times the (absolute) price of the stock at the end of June of year t ; $\text{Debt}_{i,t}$ is the face value of debt computed as the sum of debt in current liabilities (Compustat item DLC) and one-half of long-term debt (Compustat item DLTT) at the end of June of year t ; $r_{i,t-1}$ is the past 12-month cumulative return; $\sigma_{E_{i,t}}$ is the stock return volatility estimated using the monthly stock return from the past 12-month; $\sigma_{V_{i,t}}$, calculated from $\sigma_{E_{i,t}}$, is an approximation of the volatility of assets; and $N(\cdot)$ is the cumulative standard normal distribution function. We set $T_{i,t}$ to one year and construct $DD_{i,t}$ of all sample firms at the end of June of each year.

The 25 value-weighted size-DR portfolios are constructed in the same way as the 25 value-weighted size-CI portfolios, except the second sort is on EDF, which we estimate as above to proxy for DR. Analogous to D10–1 CI portfolio, we construct D10–1 DR portfolio as the return difference between EDF decile 10 (high EDF) and EDF decile 1 (low EDF).

25 size-MAX and D10–1 MAX portfolios:

Consistent with [Bali, Cakici, and Whitelaw \(2011\)](#), we compute lottery demand at the beginning of each month using MAX, defined as the maximum daily return within the previous month. Then the 25 value-weighted size-MAX portfolios are constructed from independent sorts of stocks into quintiles of size and MAX. The monthly size quintile and MAX quintile breakpoints are based on NYSE stocks. We compute portfolio returns for the current month and rebalance portfolios at the beginning of the following month.

At the beginning of each month, we use NYSE breakpoints to sort stocks into deciles based on their MAX. Monthly decile returns are computed for the current month and the deciles are rebalanced at the beginning of the next month. The D10–1 MAX portfolio is then constructed as the return difference between MAX decile 10 (high MAX) and MAX decile 1 (low MAX).

Sequential test:

The testing of $H_0: \rho_A^2 = \rho_B^2$ for nonnested models entails a sequential procedure (see [Kan, Robotti, and Shanken \(2013\)](#) and [Vuong \(1989\)](#)). First, we test $H_0: y_A = y_B$, where y_A and y_B are the normalized stochastic discount factors for models A and B , respectively. If we reject $H_0: y_A = y_B$ at the 5% level of significance, then we proceed to test $H_0: \rho_A^2 = \rho_B^2 = 1$. Finally, if we still reject $H_0: \rho_A^2 = \rho_B^2 = 1$ at the 5% significance level, then we perform the normal test of $H_0: 0 < \rho_A^2 = \rho_B^2 < 1$.

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Table IA1
Factor correlations

The table reports factor correlations. MKT, SMB* (small minus big), and HML (high minus low) are, respectively, the market, size, and value factors of [Fama and French \(1993\)](#); LIQ is the traded liquidity factor of [Pástor and Stambaugh \(2003\)](#); HML^m is the value factor of [Asness and Frazzini \(2013\)](#); r_{ME} , $r_{I/A}$, and r_{ROE} are, respectively, the size, investment, and profitability factors of [Hou, Xue, and Zhang \(2015\)](#); SMB, RMW (robust minus weak), CMA (conservative minus aggressive), and UMD (up minus down) are, respectively, the size, profitability, investment, and momentum factors of [Fama and French \(2015, 2016\)](#); and SMB_M , MGMT, and PERF are the size and two mispricing factors of [Stambaugh and Yuan \(2016\)](#), respectively. The sample period is from January 1968 to December 2016.

	SMB*	HML	SMB	RMW	CMA	UMD	LIQ	HML^m	SMB_M	MGMT	PERF	r_{ME}	$r_{I/A}$	r_{ROE}
MKT	0.290	-0.274	0.269	-0.240	-0.397	-0.141	-0.012	-0.122	0.255	-0.542	-0.265	0.262	-0.381	-0.203
SMB*		-0.210	0.985	-0.428	-0.146	-0.023	-0.002	-0.105	0.922	-0.404	-0.132	0.952	-0.250	-0.384
HML			-0.087	0.098	0.698	-0.185	0.032	0.778	-0.056	0.708	-0.307	-0.044	0.676	-0.133
SMB				-0.372	-0.078	-0.050	-0.007	-0.006	0.942	-0.331	-0.156	0.974	-0.178	-0.382
RMW					-0.007	0.108	0.002	-0.049	-0.290	0.232	0.438	-0.375	0.106	0.669
CMA						0.007	0.003	0.511	-0.054	0.781	-0.056	-0.044	0.909	-0.081
UMD							-0.013	-0.648	0.004	0.046	0.721	-0.021	0.029	0.503
LIQ								0.074	0.006	-0.006	0.027	-0.015	0.009	-0.082
HML^m									-0.029	0.489	-0.633	0.001	0.494	-0.453
SMB_M										-0.280	-0.093	0.926	-0.139	-0.292
MGMT											0.018	-0.299	0.771	0.086
PERF												-0.152	-0.049	0.644
r_{ME}													-0.141	-0.320
$r_{I/A}$														0.048

Table IA2
Average excess returns and alphas of the 25 size-STR portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 25 size-STR (short-term reversal) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of [Sharpe \(1964\)](#) and [Lintner \(1965\)](#); the [Fama and French \(1993\)](#) three-factor (FF3) model; the [Fama and French \(1993\)](#) and [Carhart \(1997\)](#) four-factor (FFC) model; the [Fama and French \(1993\)](#) and [Pástor and Stambaugh \(2003\)](#) four-factor (FFPS) model; the [Asness and Frazzini \(2013\)](#) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the [Hou, Xue, and Zhang \(2015\)](#) q -factor (HXZ) model; the [Fama and French \(2015\)](#) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the [Stambaugh and Yuan \(2016\)](#) four-factor (SY4) model; and the [Barillas and Shanken \(2018\)](#) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. All t -statistics are adjusted following [Newey and West \(1987\)](#). The sample period is from January 1968 to December 2016.

	Low	1	2	3	High	Low	1	2	3	High
	Average excess returns					t -statistic (average excess returns)				
Small	0.99	0.68	0.65	0.59	-0.03	2.85	2.27	2.28	2.05	-0.09
2	1.01	0.98	0.76	0.58	0.29	3.07	3.71	3.03	2.38	1.02
3	0.92	0.85	0.78	0.59	0.29	3.04	3.51	3.29	2.61	1.12
4	0.80	0.94	0.70	0.53	0.27	2.74	3.92	3.31	2.52	1.12
Big	0.53	0.59	0.50	0.45	0.27	2.15	2.78	2.68	2.31	1.30
	CAPM α					t -statistic (CAPM α)				
Small	0.29	0.12	0.15	0.10	-0.60	1.49	0.74	0.90	0.59	-3.18
2	0.28	0.40	0.23	0.05	-0.31	1.74	3.20	1.83	0.41	-2.25
3	0.22	0.29	0.25	0.08	-0.27	1.53	2.64	2.55	0.92	-2.15
4	0.12	0.38	0.20	0.04	-0.27	0.85	3.84	2.42	0.55	-2.75
Big	-0.05	0.11	0.05	0.01	-0.20	-0.41	1.46	0.84	0.11	-2.10
	FF3 α					t -statistic (FF3 α)				
Small	0.07	-0.14	-0.11	-0.15	-0.75	0.56	-1.58	-1.17	-1.61	-6.62
2	0.14	0.20	0.02	-0.12	-0.38	1.24	2.80	0.33	-1.90	-4.26
3	0.14	0.13	0.08	-0.04	-0.31	1.11	1.68	1.14	-0.70	-3.17
4	0.07	0.25	0.08	-0.05	-0.27	0.49	3.15	1.29	-0.70	-2.99
Big	-0.07	0.09	0.06	0.02	-0.14	-0.51	1.29	1.20	0.31	-1.53
	FFC α					t -statistic (FFC α)				
Small	0.40	-0.01	0.01	-0.07	-0.68	2.92	-0.13	0.06	-0.74	-5.28
2	0.35	0.29	0.07	-0.08	-0.37	3.17	4.29	1.21	-1.14	-3.76
3	0.33	0.21	0.11	-0.03	-0.34	2.76	2.91	1.66	-0.43	-3.27
4	0.24	0.33	0.11	-0.04	-0.27	1.80	4.11	1.61	-0.47	-2.69
Big	0.07	0.10	0.04	0.01	-0.22	0.45	1.26	0.68	0.17	-2.28
	FFPS α					t -statistic (FFPS α)				
Small	0.06	-0.13	-0.10	-0.14	-0.76	0.52	-1.50	-1.09	-1.51	-6.75
2	0.14	0.20	0.03	-0.12	-0.37	1.21	2.85	0.42	-1.78	-4.10
3	0.12	0.12	0.07	-0.04	-0.29	0.95	1.69	1.06	-0.70	-3.06
4	0.03	0.23	0.07	-0.05	-0.30	0.21	3.03	1.11	-0.71	-3.32
Big	-0.09	0.07	0.07	0.02	-0.13	-0.66	1.00	1.32	0.33	-1.41
	FFAF α					t -statistic (FFAF α)				
Small	0.00	-0.09	-0.05	-0.08	-0.73	0.04	-1.17	-0.55	-0.84	-6.43
2	0.09	0.24	0.08	-0.07	-0.37	0.89	3.66	1.23	-1.13	-4.21
3	0.08	0.16	0.13	0.00	-0.29	0.72	2.23	1.97	0.04	-3.12
4	0.00	0.27	0.12	-0.01	-0.27	0.01	3.55	1.78	-0.10	-3.07
Big	-0.12	0.10	0.07	0.03	-0.13	-1.00	1.36	1.46	0.46	-1.47

(Continued)

Table IA2 – *Continued*

	Low	1	2	3	High	Low	1	2	3	High
	HXZ α					t -statistic (HXZ α)				
Small	0.58	0.01	0.00	−0.07	−0.53	2.49	0.09	−0.01	−0.58	−4.05
2	0.45	0.24	0.03	−0.09	−0.28	2.58	2.19	0.34	−1.16	−2.41
3	0.42	0.11	0.03	−0.06	−0.22	2.67	1.15	0.38	−0.79	−1.68
4	0.35	0.26	0.00	−0.11	−0.18	2.03	2.71	0.00	−1.29	−1.56
Big	0.12	0.08	−0.04	−0.02	−0.13	0.70	0.99	−0.71	−0.22	−1.20
	FF5 α					t -statistic (FF5 α)				
Small	0.30	−0.10	−0.12	−0.15	−0.65	1.67	−1.06	−1.24	−1.60	−5.69
2	0.33	0.20	−0.01	−0.14	−0.31	2.21	2.43	−0.13	−2.27	−3.26
3	0.31	0.08	0.03	−0.07	−0.23	2.07	1.02	0.51	−1.08	−2.20
4	0.23	0.22	−0.01	−0.10	−0.21	1.44	2.73	−0.09	−1.41	−2.20
Big	0.03	0.08	0.01	−0.01	−0.09	0.21	1.22	0.11	−0.11	−0.94
	FF4 α					t -statistic (FF4 α)				
Small	0.29	−0.11	−0.13	−0.16	−0.65	1.55	−1.03	−1.19	−1.54	−5.74
2	0.32	0.19	−0.01	−0.15	−0.30	2.07	2.09	−0.22	−2.19	−3.05
3	0.30	0.07	0.02	−0.07	−0.23	2.00	0.84	0.34	−1.15	−2.10
4	0.22	0.22	−0.01	−0.11	−0.20	1.37	2.49	−0.15	−1.50	−2.08
Big	0.03	0.08	0.01	−0.01	−0.09	0.17	1.19	0.11	−0.12	−0.90
	SY4 α					t -statistic (SY4 α)				
Small	0.57	−0.06	−0.06	−0.15	−0.63	3.58	−0.66	−0.69	−1.26	−4.16
2	0.58	0.27	0.00	−0.17	−0.37	4.66	3.93	−0.03	−2.48	−3.62
3	0.59	0.15	0.06	−0.06	−0.30	4.50	2.07	0.83	−0.89	−2.75
4	0.50	0.34	0.03	−0.05	−0.20	3.50	3.91	0.42	−0.55	−1.75
Big	0.26	0.10	0.01	−0.06	−0.17	1.73	1.25	0.23	−0.76	−1.67
	BS6 α					t -statistic (BS6 α)				
Small	0.48	−0.11	−0.12	−0.15	−0.50	2.78	−1.19	−1.29	−1.66	−3.76
2	0.38	0.12	−0.08	−0.17	−0.21	2.60	1.49	−1.37	−2.42	−1.86
3	0.38	0.00	−0.09	−0.12	−0.17	2.77	−0.01	−1.21	−1.76	−1.43
4	0.28	0.15	−0.08	−0.14	−0.10	1.86	1.86	−0.99	−1.60	−0.95
Big	0.07	0.04	−0.04	0.00	−0.10	0.46	0.52	−0.68	−0.01	−0.98

Table IA3
Average excess returns and alphas of the 25 size-CI portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 25 size-CI (abnormal capital investment) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of Sharpe (1964) and Lintner (1965); the Fama and French (1993) three-factor (FF3) model; the Fama and French (1993) and Carhart (1997) four-factor (FFC) model; the Fama and French (1993) and Pástor and Stambaugh (2003) four-factor (FFPS) model; the Asness and Frazzini (2013) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the Hou, Xue, and Zhang (2015) q -factor (HXZ) model; the Fama and French (2015) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the Stambaugh and Yuan (2016) four-factor (SY4) model; and the Barillas and Shanken (2018) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. All t -statistics are adjusted following Newey and West (1987). The sample period is from January 1968 to December 2016.

	Low	1	2	3	High	Low	1	2	3	High
	Average excess returns					t -statistic (average excess returns)				
Small	0.82	0.87	1.05	0.89	0.70	2.67	3.00	3.62	3.17	2.36
2	0.76	0.85	0.87	0.88	0.66	2.75	3.20	3.39	3.50	2.50
3	0.82	0.90	0.83	0.80	0.56	3.28	3.76	3.45	3.16	2.22
4	0.71	0.73	0.74	0.68	0.56	2.97	3.28	3.43	2.84	2.16
Big	0.60	0.55	0.44	0.41	0.51	2.71	2.71	2.37	2.12	2.41
	CAPM α					t -statistic (CAPM α)				
Small	0.21	0.31	0.48	0.32	0.12	1.24	1.85	3.01	2.14	0.73
2	0.14	0.27	0.30	0.31	0.06	0.97	1.97	2.28	2.31	0.45
3	0.22	0.35	0.28	0.23	-0.03	1.96	3.15	2.62	2.17	-0.24
4	0.15	0.19	0.21	0.13	-0.03	1.54	2.08	2.36	1.32	-0.23
Big	0.08	0.06	0.01	-0.06	0.00	0.89	1.00	0.12	-0.89	-0.06
	FF3 α					t -statistic (FF3 α)				
Small	-0.02	0.03	0.20	0.06	-0.12	-0.27	0.45	2.91	0.69	-1.55
2	-0.03	0.04	0.08	0.08	-0.11	-0.32	0.45	1.12	1.03	-1.34
3	0.11	0.18	0.10	0.02	-0.18	1.34	2.41	1.23	0.26	-2.10
4	0.04	0.06	0.10	0.00	-0.10	0.43	0.75	1.21	0.03	-0.97
Big	0.18	0.11	0.03	-0.05	0.02	2.10	1.64	0.57	-0.82	0.24
	FFC α					t -statistic (FFC α)				
Small	0.14	0.19	0.34	0.24	0.06	1.28	2.10	4.32	3.09	0.64
2	0.10	0.17	0.21	0.19	0.06	1.30	2.27	2.83	2.26	0.78
3	0.22	0.27	0.18	0.17	-0.01	2.66	3.52	2.31	2.35	-0.19
4	0.12	0.19	0.21	0.12	0.07	1.38	2.57	2.74	1.51	0.66
Big	0.24	0.16	0.10	0.04	0.10	2.32	2.29	1.85	0.69	1.19
	FFPS α					t -statistic (FFPS α)				
Small	-0.02	0.01	0.19	0.07	-0.13	-0.23	0.18	2.84	0.86	-1.79
2	0.00	0.03	0.09	0.08	-0.13	-0.05	0.38	1.16	0.99	-1.65
3	0.12	0.16	0.08	0.00	-0.19	1.59	2.24	1.07	-0.03	-2.30
4	0.02	0.05	0.08	-0.03	-0.12	0.27	0.63	1.07	-0.39	-1.22
Big	0.18	0.10	0.03	-0.05	0.01	2.07	1.49	0.65	-0.92	0.08
	FFAF α					t -statistic (FFAF α)				
Small	-0.01	0.06	0.24	0.09	-0.11	-0.18	0.90	3.69	1.23	-1.67
2	-0.03	0.07	0.12	0.13	-0.11	-0.35	0.98	1.72	1.58	-1.51
3	0.10	0.21	0.14	0.04	-0.18	1.35	2.98	1.96	0.62	-2.26
4	0.06	0.07	0.11	0.02	-0.13	0.69	0.93	1.46	0.21	-1.31
Big	0.11	0.07	0.00	-0.06	-0.01	1.26	1.14	0.07	-1.13	-0.09

(Continued)

Table IA3 – *Continued*

	Low	1	2	3	High	Low	1	2	3	High
	HXZ α					t -statistic (HXZ α)				
Small	0.29	0.25	0.40	0.27	0.19	1.82	1.75	3.23	1.79	1.28
2	0.11	0.11	0.16	0.11	0.06	0.94	0.84	1.45	1.06	0.61
3	0.21	0.21	0.08	0.06	−0.04	1.99	2.29	0.78	0.61	−0.35
4	0.06	0.12	0.11	0.04	0.04	0.68	1.07	1.28	0.41	0.34
Big	0.31	0.17	0.03	−0.07	0.14	2.18	2.19	0.41	−1.12	1.66
	FF5 α					t -statistic (FF5 α)				
Small	0.10	0.06	0.23	0.09	−0.03	0.87	0.56	2.51	0.83	−0.31
2	0.01	−0.01	0.08	0.02	−0.08	0.08	−0.08	0.91	0.23	−0.87
3	0.14	0.14	0.01	−0.04	−0.16	1.47	1.81	0.17	−0.54	−1.64
4	0.03	0.03	0.02	−0.07	−0.07	0.38	0.31	0.31	−0.85	−0.71
Big	0.29	0.14	−0.02	−0.13	0.07	2.56	2.01	−0.35	−2.31	0.85
	FF4 α					t -statistic (FF4 α)				
Small	0.09	0.05	0.22	0.08	−0.04	0.83	0.46	2.31	0.69	−0.37
2	0.01	−0.01	0.07	0.01	−0.08	0.06	−0.15	0.76	0.13	−0.89
3	0.14	0.14	0.01	−0.05	−0.17	1.43	1.77	0.08	−0.59	−1.60
4	0.03	0.02	0.02	−0.07	−0.08	0.33	0.23	0.26	−0.91	−0.74
Big	0.29	0.14	−0.02	−0.13	0.07	2.54	2.01	−0.35	−2.30	0.84
	SY4 α					t -statistic (SY4 α)				
Small	0.12	0.12	0.26	0.17	0.04	0.84	1.07	2.56	1.72	0.35
2	0.09	0.06	0.15	0.03	0.03	0.90	0.75	1.68	0.42	0.39
3	0.26	0.18	0.08	0.09	0.01	2.71	2.19	0.92	0.99	0.07
4	0.13	0.19	0.14	0.08	0.13	1.36	2.34	1.70	0.78	1.26
Big	0.28	0.15	0.07	−0.01	0.12	1.92	1.85	0.96	−0.15	1.28
	BS6 α					t -statistic (BS6 α)				
Small	0.22	0.13	0.27	0.16	0.09	1.62	1.20	2.94	1.56	0.84
2	0.06	−0.02	0.07	−0.02	0.00	0.65	−0.28	0.86	−0.30	0.01
3	0.18	0.12	−0.03	−0.07	−0.13	1.88	1.59	−0.37	−1.02	−1.52
4	0.02	0.02	0.06	−0.03	0.01	0.16	0.24	0.74	−0.32	0.14
Big	0.35	0.16	0.03	−0.03	0.18	2.42	1.91	0.39	−0.47	1.99

Table IA4
Average excess returns and alphas of the 25 size-DR portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 25 size-DR (distress risk) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of [Sharpe \(1964\)](#) and [Lintner \(1965\)](#); the [Fama and French \(1993\)](#) three-factor (FF3) model; the [Fama and French \(1993\)](#) and [Carhart \(1997\)](#) four-factor (FFC) model; the [Fama and French \(1993\)](#) and [Pástor and Stambaugh \(2003\)](#) four-factor (FFPS) model; the [Asness and Frazzini \(2013\)](#) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the [Hou, Xue, and Zhang \(2015\)](#) q -factor (HXZ) model; the [Fama and French \(2015\)](#) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the [Stambaugh and Yuan \(2016\)](#) four-factor (SY4) model; and the [Barillas and Shanken \(2018\)](#) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. All t -statistics are adjusted following [Newey and West \(1987\)](#). The sample period is from January 1968 to December 2016.

	Low	1	2	3	High	Low	1	2	3	High
	Average excess returns					t -statistic (average excess returns)				
Small	0.64	0.72	0.77	0.73	0.72	2.45	2.47	2.63	2.40	2.03
2	0.71	0.69	0.79	0.76	0.70	2.86	2.71	3.02	2.76	2.11
3	0.72	0.67	0.70	0.70	0.76	3.10	2.77	2.91	2.60	2.40
4	0.63	0.70	0.64	0.61	0.87	2.83	2.96	2.89	2.38	2.74
Big	0.47	0.53	0.48	0.47	0.60	2.53	2.71	2.33	1.94	1.98
	CAPM α					t -statistic (CAPM α)				
Small	0.12	0.17	0.19	0.14	0.07	0.88	0.95	1.22	0.84	0.35
2	0.17	0.12	0.20	0.16	0.02	1.40	0.91	1.65	1.13	0.11
3	0.18	0.12	0.14	0.11	0.10	1.87	1.15	1.35	0.91	0.59
4	0.10	0.15	0.11	0.05	0.24	1.22	1.56	1.29	0.39	1.28
Big	0.03	0.07	-0.01	-0.06	0.00	0.44	0.95	-0.11	-0.56	-0.01
	FF3 α					t -statistic (FF3 α)				
Small	-0.03	0.02	0.02	-0.12	-0.35	-0.43	0.19	0.24	-1.50	-3.41
2	0.07	0.00	0.04	-0.09	-0.41	0.98	-0.04	0.54	-1.07	-3.88
3	0.14	0.01	-0.04	-0.13	-0.30	1.92	0.10	-0.54	-1.56	-2.91
4	0.12	0.07	-0.04	-0.20	-0.12	1.64	0.74	-0.54	-2.17	-0.82
Big	0.14	0.02	-0.11	-0.28	-0.39	3.20	0.37	-1.69	-3.47	-3.18
	FFC α					t -statistic (FFC α)				
Small	0.06	0.14	0.16	0.05	-0.09	0.72	1.23	1.90	0.56	-0.77
2	0.13	0.07	0.17	0.10	-0.10	1.98	0.74	2.40	1.30	-1.03
3	0.23	0.09	0.10	0.05	-0.04	3.22	0.99	1.44	0.59	-0.39
4	0.20	0.15	0.08	-0.02	0.09	2.64	1.77	1.05	-0.20	0.53
Big	0.17	0.07	-0.01	-0.10	-0.18	3.06	1.18	-0.10	-1.24	-1.41
	FFPS α					t -statistic (FFPS α)				
Small	-0.04	0.02	0.02	-0.11	-0.33	-0.48	0.22	0.34	-1.44	-3.32
2	0.08	0.01	0.02	-0.09	-0.41	1.08	0.15	0.35	-1.13	-4.04
3	0.14	0.02	-0.05	-0.14	-0.29	1.92	0.22	-0.69	-1.71	-2.86
4	0.11	0.04	-0.06	-0.22	-0.12	1.47	0.40	-0.76	-2.46	-0.83
Big	0.14	0.02	-0.14	-0.27	-0.35	3.21	0.30	-2.11	-3.31	-2.97
	FFAF α					t -statistic (FFAF α)				
Small	-0.02	0.02	0.01	-0.10	-0.29	-0.25	0.17	0.20	-1.35	-3.05
2	0.08	0.01	0.04	-0.07	-0.36	1.12	0.07	0.67	-1.02	-4.69
3	0.12	0.02	-0.02	-0.11	-0.24	1.70	0.28	-0.29	-1.48	-2.55
4	0.09	0.07	-0.02	-0.16	-0.04	1.22	0.81	-0.35	-2.19	-0.32
Big	0.09	0.02	-0.10	-0.24	-0.28	1.99	0.40	-1.60	-3.08	-2.10

(Continued)

Table IA4 – *Continued*

	Low	1	2	3	High	Low	1	2	3	High
	HXZ α					t -statistic (HXZ α)				
Small	0.04	0.14	0.22	0.14	0.06	0.29	0.91	1.68	0.99	0.35
2	0.04	−0.02	0.18	0.09	−0.01	0.40	−0.17	1.59	0.66	−0.03
3	0.11	0.00	0.04	0.12	0.00	1.02	0.02	0.39	0.96	−0.03
4	0.09	0.02	0.07	−0.06	0.07	0.95	0.18	0.82	−0.56	0.43
Big	0.09	0.04	−0.05	−0.16	−0.20	1.26	0.59	−0.58	−1.46	−1.23
	FF5 α					t -statistic (FF5 α)				
Small	−0.05	0.05	0.08	−0.05	−0.25	−0.53	0.37	0.89	−0.52	−1.86
2	0.02	−0.05	0.08	−0.05	−0.31	0.25	−0.51	0.92	−0.52	−2.25
3	0.10	−0.02	−0.04	−0.04	−0.26	1.23	−0.21	−0.52	−0.41	−2.25
4	0.09	−0.01	−0.04	−0.21	−0.11	1.12	−0.15	−0.50	−2.17	−0.73
Big	0.09	−0.01	−0.14	−0.25	−0.29	1.59	−0.19	−1.90	−2.83	−2.17
	FF4 α					t -statistic (FF4 α)				
Small	−0.05	0.04	0.08	−0.06	−0.27	−0.55	0.35	0.83	−0.57	−1.81
2	0.02	−0.05	0.07	−0.06	−0.33	0.24	−0.53	0.79	−0.56	−1.99
3	0.10	−0.02	−0.05	−0.05	−0.28	1.22	−0.25	−0.54	−0.48	−2.01
4	0.09	−0.02	−0.05	−0.22	−0.13	1.13	−0.18	−0.55	−2.10	−0.80
Big	0.09	−0.01	−0.14	−0.26	−0.31	1.61	−0.23	−1.75	−2.47	−1.99
	SY4 α					t -statistic (SY4 α)				
Small	−0.01	0.14	0.15	0.01	−0.11	−0.13	0.98	1.42	0.13	−0.74
2	0.03	−0.05	0.19	0.10	−0.09	0.37	−0.51	2.37	1.24	−0.67
3	0.17	0.07	0.10	0.16	−0.02	2.11	0.63	1.31	1.64	−0.16
4	0.21	0.15	0.11	0.02	0.08	2.59	1.69	1.18	0.22	0.48
Big	0.13	0.07	0.03	−0.01	−0.14	1.57	0.96	0.41	−0.05	−0.98
	BS6 α					t -statistic (BS6 α)				
Small	−0.02	0.09	0.16	0.02	−0.14	−0.18	0.76	1.65	0.23	−1.12
2	0.00	−0.08	0.08	−0.05	−0.26	0.01	−0.90	0.97	−0.56	−2.68
3	0.09	−0.07	−0.08	−0.07	−0.25	1.08	−0.65	−1.23	−0.76	−2.75
4	0.13	−0.04	−0.06	−0.22	−0.12	1.67	−0.44	−0.73	−2.41	−0.67
Big	0.15	−0.01	−0.15	−0.31	−0.41	2.21	−0.22	−2.16	−3.45	−2.88

Table IA5
Average excess returns and alphas of the 25 size- β portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 25 size- β (market beta) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of [Sharpe \(1964\)](#) and [Lintner \(1965\)](#); the [Fama and French \(1993\)](#) three-factor (FF3) model; the [Fama and French \(1993\)](#) and [Carhart \(1997\)](#) four-factor (FFC) model; the [Fama and French \(1993\)](#) and [Pástor and Stambaugh \(2003\)](#) four-factor (FFPS) model; the [Asness and Frazzini \(2013\)](#) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the [Hou, Xue, and Zhang \(2015\)](#) q -factor (HXZ) model; the [Fama and French \(2015\)](#) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the [Stambaugh and Yuan \(2016\)](#) four-factor (SY4) model; and the [Barillas and Shanken \(2018\)](#) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. All t -statistics are adjusted following [Newey and West \(1987\)](#). The sample period is from January 1968 to December 2016.

	Low	1	2	3	High	Low	1	2	3	High
	Average excess returns					t -statistic (average excess returns)				
Small	0.66	0.83	0.81	0.88	0.63	3.24	3.61	2.98	2.99	1.68
2	0.65	0.81	0.90	0.80	0.58	3.49	3.94	3.87	3.01	1.72
3	0.67	0.84	0.81	0.74	0.62	4.01	4.02	3.58	2.82	1.85
4	0.65	0.79	0.72	0.52	0.65	3.80	3.79	3.17	1.99	1.96
Big	0.52	0.54	0.47	0.45	0.33	3.33	2.89	2.26	1.68	1.02
	CAPM α					t -statistic (CAPM α)				
Small	0.29	0.39	0.31	0.29	-0.10	2.19	2.63	1.84	1.79	-0.48
2	0.28	0.37	0.38	0.21	-0.18	2.44	3.10	2.93	1.49	-1.10
3	0.32	0.38	0.29	0.15	-0.14	3.55	3.58	2.67	1.18	-1.01
4	0.30	0.32	0.19	-0.08	-0.11	2.98	3.55	1.83	-0.72	-0.75
Big	0.19	0.10	-0.04	-0.15	-0.37	2.19	1.31	-0.66	-1.69	-2.39
	FF3 α					t -statistic (FF3 α)				
Small	0.05	0.12	0.03	0.04	-0.26	0.66	1.74	0.48	0.71	-2.52
2	0.04	0.13	0.16	0.00	-0.29	0.56	1.99	2.04	0.00	-3.34
3	0.13	0.21	0.11	-0.03	-0.19	1.74	2.98	1.64	-0.38	-2.02
4	0.15	0.18	0.06	-0.19	-0.13	1.68	2.45	0.82	-2.25	-1.05
Big	0.13	0.09	-0.04	-0.16	-0.29	1.90	1.46	-0.63	-1.77	-1.95
	FFC α					t -statistic (FFC α)				
Small	0.04	0.10	0.00	0.06	-0.16	0.50	1.33	0.03	1.01	-1.48
2	0.00	0.11	0.15	0.01	-0.16	-0.06	1.61	2.08	0.19	-1.92
3	0.08	0.18	0.10	0.01	-0.06	0.99	2.50	1.53	0.07	-0.68
4	0.09	0.17	0.07	-0.13	0.00	0.99	2.36	0.91	-1.49	-0.01
Big	0.07	0.05	0.00	-0.09	-0.14	1.04	0.88	-0.03	-1.07	-0.98
	FFPS α					t -statistic (FFPS α)				
Small	0.05	0.14	0.05	0.05	-0.26	0.69	1.99	0.70	0.95	-2.63
2	0.04	0.13	0.16	0.00	-0.30	0.54	1.96	2.13	-0.01	-3.44
3	0.13	0.22	0.11	-0.04	-0.20	1.78	3.16	1.61	-0.43	-2.12
4	0.14	0.17	0.05	-0.20	-0.16	1.60	2.31	0.63	-2.38	-1.28
Big	0.16	0.08	-0.04	-0.20	-0.31	2.26	1.23	-0.61	-2.13	-2.14
	FFAF α					t -statistic (FFAF α)				
Small	0.14	0.23	0.14	0.11	-0.27	1.58	2.72	1.61	1.69	-2.54
2	0.15	0.23	0.24	0.07	-0.32	1.62	2.99	2.90	0.87	-3.57
3	0.22	0.29	0.19	0.03	-0.23	2.77	3.66	2.49	0.34	-2.52
4	0.22	0.24	0.12	-0.16	-0.18	2.35	3.05	1.36	-1.87	-1.40
Big	0.18	0.11	-0.04	-0.17	-0.36	2.40	1.68	-0.58	-1.88	-2.36

(Continued)

Table IA5 – *Continued*

	Low	1	2	3	High	Low	1	2	3	High
	HXZ α					t -statistic (HXZ α)				
Small	0.10	0.09	0.06	0.16	0.12	1.03	0.84	0.74	2.26	0.85
2	0.00	0.04	0.08	−0.05	−0.06	−0.04	0.46	0.80	−0.68	−0.58
3	0.02	0.09	0.00	−0.07	−0.01	0.20	1.17	0.05	−0.74	−0.05
4	−0.02	0.04	−0.10	−0.21	0.19	−0.17	0.42	−1.26	−2.19	1.37
Big	−0.12	−0.08	−0.09	−0.04	−0.05	−1.38	−1.27	−1.12	−0.42	−0.32
	FF5 α					t -statistic (FF5 α)				
Small	0.08	0.07	0.02	0.07	−0.07	1.07	1.09	0.28	1.34	−0.72
2	0.03	0.04	0.08	−0.07	−0.20	0.33	0.73	1.14	−1.08	−2.33
3	0.08	0.11	0.02	−0.10	−0.10	1.11	1.77	0.33	−1.29	−1.09
4	0.05	0.04	−0.08	−0.26	0.02	0.57	0.51	−1.18	−3.00	0.19
Big	−0.07	−0.06	−0.11	−0.13	−0.11	−0.95	−1.03	−1.74	−1.29	−0.71
	FF4 α					t -statistic (FF4 α)				
Small	0.07	0.06	0.01	0.07	−0.07	0.79	0.79	0.19	1.15	−0.69
2	0.02	0.03	0.07	−0.07	−0.19	0.18	0.47	0.91	−1.08	−2.29
3	0.07	0.11	0.02	−0.11	−0.10	0.84	1.57	0.24	−1.34	−1.04
4	0.04	0.03	−0.08	−0.26	0.03	0.49	0.43	−1.22	−2.98	0.20
Big	−0.07	−0.06	−0.11	−0.13	−0.11	−0.95	−1.04	−1.81	−1.37	−0.70
	SY4 α					t -statistic (SY4 α)				
Small	−0.04	−0.04	−0.10	0.00	−0.10	−0.44	−0.44	−1.12	−0.03	−0.75
2	−0.09	−0.03	0.02	−0.07	−0.11	−0.93	−0.37	0.27	−0.89	−1.04
3	0.03	0.06	0.02	−0.05	−0.02	0.32	0.76	0.20	−0.46	−0.13
4	0.09	0.06	−0.03	−0.13	0.14	0.85	0.64	−0.39	−1.30	1.16
Big	−0.06	−0.13	−0.05	−0.03	0.09	−0.68	−1.91	−0.66	−0.37	0.55
	BS6 α					t -statistic (BS6 α)				
Small	−0.04	−0.06	−0.06	0.06	0.14	−0.45	−0.72	−0.68	0.90	1.05
2	−0.18	−0.11	−0.06	−0.16	−0.02	−1.93	−1.67	−0.73	−2.52	−0.22
3	−0.15	−0.01	−0.12	−0.16	0.04	−1.74	−0.14	−1.69	−1.61	0.36
4	−0.17	−0.06	−0.17	−0.27	0.25	−1.60	−0.73	−2.37	−2.93	1.73
Big	−0.18	−0.10	−0.11	−0.05	0.08	−2.10	−1.44	−1.59	−0.47	0.48

Table IA6
Average excess returns and alphas of the 35 size-NI portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 35 size-NI (net share issues) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of [Sharpe \(1964\)](#) and [Lintner \(1965\)](#); the [Fama and French \(1993\)](#) three-factor (FF3) model; the [Fama and French \(1993\)](#) and [Carhart \(1997\)](#) four-factor (FFC) model; the [Fama and French \(1993\)](#) and [Pástor and Stambaugh \(2003\)](#) four-factor (FFPS) model; the [Asness and Frazzini \(2013\)](#) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the [Hou, Xue, and Zhang \(2015\)](#) q -factor (HXZ) model; the [Fama and French \(2015\)](#) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the [Stambaugh and Yuan \(2016\)](#) four-factor (SY4) model; and the [Barillas and Shanken \(2018\)](#) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. All t -statistics are adjusted following [Newey and West \(1987\)](#). The sample period is from January 1968 to December 2016.

	Neg	Zero	Low	1	2	3	High		Neg	Zero	Low	1	2	3	High
	Average excess returns								t -statistic (average excess returns)						
Small	0.97	0.64	0.79	0.88	0.92	0.56	0.10		3.67	2.35	2.75	2.92	2.95	1.75	0.27
2	0.83	0.82	0.82	0.80	0.80	0.75	0.22		3.63	3.14	3.27	2.98	2.93	2.73	0.74
3	0.90	0.68	0.77	0.84	0.77	0.69	0.21		4.06	2.60	3.37	3.51	3.03	2.66	0.72
4	0.92	0.61	0.61	0.69	0.77	0.54	0.24		4.34	2.97	2.66	2.96	3.10	2.14	0.87
Big	0.62	0.68	0.49	0.48	0.58	0.38	0.20		3.51	3.55	2.56	2.50	2.72	1.54	0.81
	CAPM α								t -statistic (CAPM α)						
Small	0.47	0.16	0.24	0.31	0.31	-0.08	-0.58		2.96	0.93	1.46	1.81	1.81	-0.45	-2.97
2	0.34	0.33	0.27	0.22	0.19	0.12	-0.46		2.61	1.95	2.08	1.63	1.52	0.99	-3.09
3	0.40	0.19	0.26	0.28	0.19	0.09	-0.43		3.73	1.28	2.21	2.69	1.85	0.84	-3.54
4	0.42	0.20	0.10	0.14	0.21	-0.04	-0.37		4.22	1.56	0.97	1.44	2.31	-0.44	-2.97
Big	0.19	0.33	0.07	0.01	0.08	-0.17	-0.31		2.75	2.47	0.78	0.19	0.99	-1.63	-2.96
	FF3 α								t -statistic (FF3 α)						
Small	0.18	-0.09	-0.02	0.07	0.15	-0.20	-0.63		2.58	-1.01	-0.29	0.95	1.87	-2.62	-6.07
2	0.09	0.10	0.04	0.04	0.06	0.05	-0.46		1.31	0.89	0.51	0.59	0.91	0.74	-4.74
3	0.22	-0.04	0.04	0.13	0.10	0.04	-0.40		2.90	-0.28	0.46	1.90	1.45	0.49	-4.57
4	0.25	0.07	-0.06	0.04	0.20	-0.02	-0.36		3.27	0.47	-0.81	0.46	2.51	-0.20	-3.33
Big	0.15	0.25	0.07	0.07	0.15	-0.02	-0.34		2.73	1.77	0.95	0.96	1.84	-0.26	-3.26
	FFC α								t -statistic (FFC α)						
Small	0.16	-0.11	0.00	0.09	0.16	-0.17	-0.58		2.33	-1.10	-0.07	1.26	2.08	-2.23	-5.66
2	0.09	0.06	0.08	0.03	0.07	0.07	-0.40		1.45	0.53	1.06	0.48	1.06	1.02	-4.45
3	0.21	0.00	0.03	0.14	0.10	0.05	-0.31		2.93	-0.02	0.32	2.01	1.31	0.70	-3.57
4	0.27	0.04	-0.02	0.09	0.18	-0.02	-0.31		3.69	0.27	-0.25	1.05	2.17	-0.18	-2.97
Big	0.15	0.24	0.03	0.09	0.12	0.01	-0.23		2.74	1.72	0.46	1.18	1.44	0.06	-2.25
	FFPS α								t -statistic (FFPS α)						
Small	0.21	-0.09	-0.01	0.07	0.16	-0.20	-0.63		2.91	-0.96	-0.17	1.07	1.97	-2.57	-6.21
2	0.10	0.09	0.04	0.03	0.05	0.04	-0.45		1.52	0.79	0.56	0.52	0.77	0.61	-4.74
3	0.21	-0.03	0.03	0.12	0.10	0.02	-0.41		2.95	-0.25	0.32	1.74	1.41	0.25	-4.66
4	0.23	0.07	-0.08	0.02	0.18	-0.04	-0.40		3.12	0.52	-1.02	0.26	2.16	-0.39	-3.69
Big	0.15	0.27	0.07	0.05	0.12	-0.06	-0.33		2.60	1.93	0.96	0.77	1.42	-0.66	-3.08
	FFAF α								t -statistic (FFAF α)						
Small	0.29	-0.01	0.06	0.14	0.18	-0.19	-0.67		3.50	-0.08	0.77	1.74	2.14	-2.44	-6.40
2	0.18	0.20	0.11	0.10	0.10	0.05	-0.51		2.47	1.52	1.41	1.36	1.31	0.77	-4.97
3	0.29	0.04	0.14	0.18	0.13	0.04	-0.47		3.79	0.29	1.49	2.49	1.77	0.54	-4.98
4	0.32	0.11	-0.01	0.06	0.20	-0.04	-0.41		4.00	0.84	-0.18	0.73	2.47	-0.47	-3.65
Big	0.18	0.29	0.09	0.04	0.13	-0.10	-0.35		2.93	2.07	1.20	0.65	1.59	-1.04	-3.47
	HXZ α								t -statistic (HXZ α)						
Small	0.13	-0.05	0.07	0.13	0.33	0.02	-0.25		1.38	-0.38	0.73	1.45	3.18	0.21	-2.05
2	-0.02	-0.02	0.00	0.00	0.08	0.17	-0.19		-0.20	-0.15	0.03	-0.04	1.11	2.29	-1.98
3	0.05	-0.14	-0.07	0.09	0.12	0.11	-0.08		0.58	-0.87	-0.59	1.27	1.57	1.39	-1.02
4	0.09	-0.11	-0.18	-0.03	0.21	0.13	0.00		1.00	-0.73	-2.05	-0.42	2.46	1.13	-0.02
Big	0.00	0.08	-0.11	0.08	0.18	0.17	-0.16		0.07	0.52	-1.46	1.02	1.96	1.67	-1.27

(Continued)

Table IA6 – *Continued*

	Neg	Zero	Low	1	2	3	High		Neg	Zero	Low	1	2	3	High
	FF5 α								t -statistic (FF5 α)						
Small	0.11	−0.13	−0.03	0.06	0.22	−0.07	−0.39		1.77	−1.30	−0.38	0.91	2.62	−1.00	−4.44
2	−0.04	0.04	−0.02	−0.03	0.06	0.16	−0.24		−0.79	0.32	−0.27	−0.50	0.87	2.39	−2.51
3	0.06	−0.10	−0.05	0.06	0.11	0.14	−0.13		0.95	−0.71	−0.63	0.98	1.45	1.82	−1.64
4	0.08	−0.13	−0.21	−0.07	0.21	0.12	−0.06		1.15	−1.01	−2.72	−0.85	2.40	1.21	−0.61
Big	0.01	0.06	−0.09	0.04	0.18	0.15	−0.17		0.24	0.39	−1.27	0.62	2.10	1.81	−1.55
	FF4 α								t -statistic (FF4 α)						
Small	0.10	−0.13	−0.03	0.06	0.22	−0.07	−0.38		1.40	−1.28	−0.44	0.83	2.58	−0.99	−3.98
2	−0.05	0.03	−0.03	−0.03	0.06	0.16	−0.23		−0.78	0.23	−0.33	−0.52	0.86	2.39	−2.53
3	0.05	−0.11	−0.06	0.06	0.11	0.14	−0.13		0.81	−0.72	−0.65	0.94	1.45	1.82	−1.65
4	0.07	−0.14	−0.21	−0.07	0.21	0.12	−0.07		1.02	−1.01	−2.77	−0.89	2.33	1.21	−0.63
Big	0.01	0.06	−0.09	0.05	0.18	0.16	−0.17		0.24	0.39	−1.25	0.63	2.11	1.81	−1.51
	SY4 α								t -statistic (SY4 α)						
Small	−0.01	−0.19	−0.13	0.00	0.13	−0.14	−0.41		−0.19	−1.75	−1.35	−0.02	1.22	−1.37	−3.26
2	−0.11	−0.14	0.00	−0.06	−0.04	0.10	−0.19		−1.54	−1.11	−0.02	−0.72	−0.51	1.20	−1.78
3	0.04	−0.08	−0.07	0.07	0.07	0.11	−0.01		0.49	−0.56	−0.58	0.96	0.86	1.36	−0.07
4	0.10	−0.18	−0.14	0.04	0.19	0.12	0.05		1.30	−1.23	−1.33	0.41	2.27	1.39	0.52
Big	−0.03	0.19	−0.08	0.05	0.11	0.30	0.10		−0.64	1.18	−1.15	0.69	1.36	3.15	1.02
	BS6 α								t -statistic (BS6 α)						
Small	−0.01	−0.19	−0.04	0.06	0.32	0.03	−0.17		−0.18	−1.82	−0.46	0.77	3.06	0.32	−1.46
2	−0.16	−0.22	−0.10	−0.07	0.05	0.18	−0.15		−2.49	−1.86	−1.28	−0.94	0.65	2.27	−1.57
3	−0.06	−0.23	−0.21	0.03	0.08	0.08	−0.04		−0.80	−1.54	−1.86	0.37	1.05	0.99	−0.52
4	0.00	−0.22	−0.28	−0.10	0.21	0.17	−0.01		−0.03	−1.39	−3.16	−1.17	2.16	1.41	−0.08
Big	−0.03	0.00	−0.11	0.09	0.19	0.25	−0.21		−0.44	−0.03	−1.48	1.10	2.02	2.28	−1.91

Table IA7
Average excess returns and alphas of the 25 size-MAX portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 25 size-MAX (lottery demand) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of [Sharpe \(1964\)](#) and [Lintner \(1965\)](#); the [Fama and French \(1993\)](#) three-factor (FF3) model; the [Fama and French \(1993\)](#) and [Carhart \(1997\)](#) four-factor (FFC) model; the [Fama and French \(1993\)](#) and [Pástor and Stambaugh \(2003\)](#) four-factor (FFPS) model; the [Asness and Frazzini \(2013\)](#) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the [Hou, Xue, and Zhang \(2015\)](#) q -factor (HXZ) model; the [Fama and French \(2015\)](#) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the [Stambaugh and Yuan \(2016\)](#) four-factor (SY4) model; and the [Barillas and Shanken \(2018\)](#) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. All t -statistics are adjusted following [Newey and West \(1987\)](#). The sample period is from January 1968 to December 2016.

	Low	1	2	3	High	Low	1	2	3	High
	Average excess returns					t -statistic (average excess returns)				
Small	0.84	1.18	1.11	0.88	0.09	3.97	4.69	3.92	2.90	0.24
2	1.03	1.01	0.95	0.70	0.23	5.02	4.46	3.60	2.44	0.67
3	0.85	0.88	0.84	0.65	0.27	4.27	3.94	3.41	2.37	0.82
4	0.73	0.76	0.70	0.60	0.44	3.93	3.66	3.01	2.20	1.38
Big	0.46	0.54	0.44	0.57	0.50	2.76	3.10	2.10	2.35	1.51
	CAPM α					t -statistic (CAPM α)				
Small	0.49	0.71	0.57	0.29	-0.61	3.41	4.87	3.63	1.76	-3.12
2	0.63	0.52	0.39	0.06	-0.54	5.13	4.40	2.85	0.44	-3.30
3	0.46	0.39	0.28	0.01	-0.47	3.94	3.50	2.47	0.11	-3.07
4	0.34	0.28	0.15	-0.03	-0.28	3.49	2.93	1.48	-0.34	-1.87
Big	0.11	0.10	-0.07	0.00	-0.18	1.32	1.66	-1.00	0.00	-1.13
	FF3 α					t -statistic (FF3 α)				
Small	0.28	0.46	0.32	0.05	-0.79	2.65	5.07	3.64	0.61	-7.85
2	0.41	0.30	0.17	-0.12	-0.57	4.67	4.44	2.14	-1.80	-6.38
3	0.25	0.18	0.12	-0.13	-0.44	3.00	2.34	1.50	-1.92	-4.27
4	0.16	0.12	0.02	-0.10	-0.21	2.10	1.41	0.28	-1.32	-1.75
Big	0.05	0.08	-0.06	0.02	-0.12	0.70	1.54	-0.87	0.25	-0.78
	FFC α					t -statistic (FFC α)				
Small	0.31	0.54	0.42	0.20	-0.54	3.24	7.12	5.46	2.42	-4.26
2	0.43	0.33	0.22	-0.03	-0.40	5.30	4.97	3.19	-0.50	-3.74
3	0.28	0.21	0.16	-0.07	-0.32	3.49	2.86	2.12	-0.97	-2.99
4	0.18	0.15	0.07	-0.03	-0.05	2.32	1.90	0.99	-0.36	-0.37
Big	0.01	0.06	-0.05	0.09	-0.06	0.14	1.02	-0.79	0.91	-0.37
	FFPS α					t -statistic (FFPS α)				
Small	0.27	0.47	0.33	0.06	-0.80	2.65	5.21	3.79	0.73	-8.07
2	0.39	0.30	0.17	-0.09	-0.56	4.61	4.52	2.26	-1.47	-6.25
3	0.24	0.17	0.12	-0.13	-0.43	2.94	2.31	1.58	-1.88	-4.11
4	0.14	0.11	0.01	-0.12	-0.24	1.96	1.36	0.13	-1.46	-1.94
Big	0.06	0.09	-0.06	0.00	-0.13	0.87	1.62	-0.96	0.04	-0.83
	FFAF α					t -statistic (FFAF α)				
Small	0.35	0.53	0.37	0.07	-0.85	3.33	5.92	4.39	1.02	-8.15
2	0.49	0.38	0.23	-0.09	-0.65	5.37	5.18	2.86	-1.42	-6.52
3	0.33	0.26	0.16	-0.10	-0.52	3.63	3.18	2.05	-1.41	-4.80
4	0.23	0.18	0.06	-0.10	-0.33	2.82	2.15	0.75	-1.33	-2.46
Big	0.10	0.11	-0.05	-0.01	-0.18	1.33	1.92	-0.87	-0.13	-1.17

(Continued)

Table IA7 – *Continued*

	Low	1	2	3	High	Low	1	2	3	High
	HXZ α					t -statistic (HXZ α)				
Small	0.24	0.46	0.37	0.21	−0.28	1.80	3.72	2.92	1.58	−1.57
2	0.34	0.21	0.11	−0.11	−0.18	3.09	2.33	1.07	−1.26	−1.67
3	0.12	0.03	0.00	−0.12	−0.07	1.13	0.32	0.02	−1.48	−0.59
4	0.00	−0.02	−0.09	−0.03	0.17	−0.04	−0.17	−1.18	−0.32	1.26
Big	−0.12	−0.09	−0.11	0.12	0.23	−1.36	−1.67	−1.54	1.23	1.44
	FF5 α					t -statistic (FF5 α)				
Small	0.19	0.39	0.27	0.06	−0.54	1.79	4.21	2.84	0.61	−4.20
2	0.30	0.19	0.08	−0.15	−0.31	4.11	3.22	1.04	−2.07	−4.01
3	0.11	0.03	−0.01	−0.16	−0.16	1.46	0.51	−0.09	−2.23	−1.72
4	0.00	−0.03	−0.10	−0.09	0.06	0.04	−0.37	−1.54	−1.08	0.50
Big	−0.10	−0.06	−0.08	0.09	0.14	−1.41	−1.14	−1.23	1.00	0.94
	FF4 α					t -statistic (FF4 α)				
Small	0.18	0.38	0.26	0.05	−0.55	1.58	3.65	2.49	0.51	−4.24
2	0.29	0.18	0.07	−0.15	−0.31	3.34	2.63	0.84	−2.02	−3.84
3	0.10	0.02	−0.01	−0.16	−0.16	1.17	0.31	−0.16	−2.28	−1.63
4	−0.01	−0.04	−0.10	−0.09	0.06	−0.06	−0.43	−1.58	−1.11	0.52
Big	−0.10	−0.06	−0.08	0.09	0.14	−1.42	−1.19	−1.24	0.98	0.95
	SY4 α					t -statistic (SY4 α)				
Small	0.15	0.39	0.30	0.16	−0.35	1.49	4.84	3.55	1.93	−2.15
2	0.25	0.17	0.10	−0.04	−0.17	2.94	2.51	1.32	−0.56	−1.45
3	0.12	0.05	0.03	−0.07	−0.01	1.50	0.55	0.37	−0.79	−0.07
4	0.05	0.05	0.02	0.03	0.24	0.50	0.54	0.27	0.31	1.67
Big	−0.12	−0.09	−0.08	0.20	0.27	−1.46	−1.24	−1.20	2.11	1.65
	BS6 α					t -statistic (BS6 α)				
Small	0.12	0.32	0.24	0.11	−0.31	1.08	3.66	2.80	1.22	−2.06
2	0.18	0.06	−0.02	−0.18	−0.09	2.03	0.96	−0.27	−2.88	−0.88
3	−0.04	−0.13	−0.10	−0.19	0.05	−0.49	−1.61	−1.25	−2.43	0.41
4	−0.13	−0.13	−0.17	−0.06	0.31	−1.43	−1.37	−2.12	−0.74	2.48
Big	−0.17	−0.12	−0.12	0.11	0.27	−1.93	−1.77	−1.66	1.11	1.68

Table IA8
Average excess returns and alphas of the 25 size-RVar portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 25 size-RVar (residual variance) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of [Sharpe \(1964\)](#) and [Lintner \(1965\)](#); the [Fama and French \(1993\)](#) three-factor (FF3) model; the [Fama and French \(1993\)](#) and [Carhart \(1997\)](#) four-factor (FFC) model; the [Fama and French \(1993\)](#) and [Pástor and Stambaugh \(2003\)](#) four-factor (FFPS) model; the [Asness and Frazzini \(2013\)](#) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the [Hou, Xue, and Zhang \(2015\)](#) q -factor (HXZ) model; the [Fama and French \(2015\)](#) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the [Stambaugh and Yuan \(2016\)](#) four-factor (SY4) model; and the [Barillas and Shanken \(2018\)](#) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. All t -statistics are adjusted following [Newey and West \(1987\)](#). The sample period is from January 1968 to December 2016.

	Low	1	2	3	High	Low	1	2	3	High
	Average excess returns					t -statistic (average excess returns)				
Small	1.02	1.09	0.96	0.67	-0.41	4.69	4.05	3.05	1.87	-0.97
2	0.91	1.00	1.00	0.86	0.08	4.68	4.14	3.79	2.85	0.20
3	0.76	0.90	0.83	0.86	0.24	4.21	4.13	3.45	3.14	0.70
4	0.73	0.74	0.73	0.73	0.32	4.23	3.73	3.19	2.92	0.97
Big	0.47	0.53	0.51	0.49	0.39	2.98	3.01	2.60	2.21	1.34
	CAPM α					t -statistic (CAPM α)				
Small	0.66	0.58	0.36	-0.01	-1.16	4.53	3.68	2.16	-0.07	-4.71
2	0.53	0.50	0.43	0.20	-0.72	4.47	3.62	3.05	1.37	-4.02
3	0.40	0.42	0.30	0.25	-0.53	3.82	3.64	2.34	1.89	-3.50
4	0.38	0.29	0.20	0.14	-0.42	3.76	2.76	2.04	1.35	-3.17
Big	0.11	0.10	0.03	-0.05	-0.27	1.74	1.70	0.42	-0.73	-2.31
	FF3 α					t -statistic (FF3 α)				
Small	0.38	0.29	0.08	-0.25	-1.36	3.98	3.18	0.83	-2.54	-8.64
2	0.28	0.22	0.19	0.01	-0.76	3.45	2.71	1.97	0.17	-6.97
3	0.18	0.20	0.09	0.08	-0.50	2.27	2.38	0.98	0.94	-5.13
4	0.19	0.12	0.05	0.03	-0.36	2.22	1.41	0.64	0.40	-3.22
Big	0.08	0.12	0.01	-0.05	-0.12	1.32	2.10	0.21	-0.74	-1.14
	FFC α					t -statistic (FFC α)				
Small	0.42	0.37	0.25	0.02	-1.01	5.06	4.48	2.79	0.19	-5.52
2	0.28	0.26	0.24	0.12	-0.55	3.70	3.38	2.70	1.48	-4.28
3	0.17	0.23	0.13	0.13	-0.35	2.24	2.99	1.59	1.34	-3.38
4	0.19	0.16	0.09	0.09	-0.23	2.16	2.05	1.30	0.94	-2.05
Big	0.05	0.06	-0.02	-0.05	-0.05	0.70	1.00	-0.29	-0.86	-0.43
	FFPS α					t -statistic (FFPS α)				
Small	0.38	0.30	0.07	-0.26	-1.37	4.02	3.40	0.82	-2.68	-8.68
2	0.28	0.23	0.20	0.03	-0.75	3.44	2.87	2.16	0.35	-6.88
3	0.17	0.19	0.09	0.09	-0.49	2.17	2.39	1.00	1.04	-4.99
4	0.18	0.11	0.04	0.04	-0.39	2.12	1.34	0.48	0.45	-3.52
Big	0.08	0.13	0.02	-0.06	-0.13	1.32	2.23	0.38	-0.89	-1.18
	FFAF α					t -statistic (FFAF α)				
Small	0.48	0.37	0.11	-0.28	-1.45	4.65	3.98	1.37	-3.19	-8.73
2	0.39	0.32	0.26	0.04	-0.85	4.15	3.56	2.75	0.48	-7.37
3	0.28	0.28	0.16	0.13	-0.59	3.17	3.14	1.69	1.48	-5.80
4	0.27	0.19	0.11	0.06	-0.45	3.01	2.00	1.30	0.72	-4.00
Big	0.12	0.14	0.04	-0.04	-0.22	1.93	2.53	0.56	-0.66	-1.93

(Continued)

Table IA8 – *Continued*

	Low	1	2	3	High	Low	1	2	3	High
	HXZ α					t -statistic (HXZ α)				
Small	0.31	0.24	0.19	0.14	−0.55	2.40	1.85	1.35	0.84	−2.50
2	0.16	0.06	0.03	−0.03	−0.27	1.50	0.54	0.24	−0.25	−2.24
3	0.01	0.05	−0.09	−0.01	−0.14	0.15	0.50	−0.80	−0.12	−1.35
4	0.02	−0.05	−0.10	−0.07	0.01	0.20	−0.52	−1.08	−0.69	0.07
Big	−0.04	−0.10	−0.14	−0.05	0.21	−0.63	−1.51	−2.19	−0.77	1.99
	FF5 α					t -statistic (FF5 α)				
Small	0.28	0.16	0.04	−0.12	−0.95	3.14	1.97	0.42	−0.97	−5.46
2	0.16	0.05	0.04	−0.07	−0.47	2.21	0.82	0.44	−0.89	−4.72
3	0.03	0.06	−0.08	−0.04	−0.25	0.49	0.78	−1.01	−0.50	−2.87
4	0.03	−0.05	−0.11	−0.08	−0.11	0.38	−0.69	−1.47	−0.90	−1.11
Big	−0.01	−0.03	−0.10	−0.04	0.10	−0.13	−0.57	−1.69	−0.59	1.13
	FF4 α					t -statistic (FF4 α)				
Small	0.27	0.15	0.03	−0.13	−0.96	2.43	1.59	0.29	−1.01	−0.52
2	0.15	0.05	0.03	−0.08	−0.47	1.66	0.56	0.32	−0.92	−4.67
3	0.02	0.05	−0.09	−0.05	−0.25	0.29	0.53	−0.99	−0.56	−2.71
4	0.02	−0.06	−0.11	−0.08	−0.11	0.25	−0.72	−1.47	−0.92	−1.04
Big	−0.01	−0.03	−0.10	−0.04	0.11	−0.18	−0.53	−1.70	−0.61	1.16
	SY4 α					t -statistic (SY4 α)				
Small	0.23	0.19	0.18	0.11	−0.68	2.58	2.25	1.80	0.75	−3.01
2	0.07	0.04	0.09	0.07	−0.27	0.79	0.52	0.97	0.84	−1.94
3	0.00	0.07	−0.02	0.06	−0.06	0.01	0.80	−0.27	0.57	−0.54
4	0.04	0.03	0.00	0.06	0.07	0.39	0.35	0.02	0.54	0.60
Big	−0.08	−0.08	−0.12	−0.02	0.25	−1.12	−1.19	−1.77	−0.24	2.23
	BS6 α					t -statistic (BS6 α)				
Small	0.13	0.06	0.05	0.06	−0.57	1.50	0.74	0.54	0.49	−2.74
2	−0.02	−0.12	−0.11	−0.12	−0.17	−0.24	−1.56	−1.24	−1.50	−1.49
3	−0.15	−0.12	−0.23	−0.11	−0.04	−1.78	−1.35	−2.76	−1.08	−0.35
4	−0.13	−0.17	−0.21	−0.13	0.12	−1.26	−1.96	−2.59	−1.25	0.97
Big	−0.09	−0.10	−0.17	−0.08	0.32	−1.22	−1.33	−2.42	−1.14	2.84

Table IA9
Average excess returns and alphas of the 25 size-AC portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 25 size-AC (accruals) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of [Sharpe \(1964\)](#) and [Lintner \(1965\)](#); the [Fama and French \(1993\)](#) three-factor (FF3) model; the [Fama and French \(1993\)](#) and [Carhart \(1997\)](#) four-factor (FFC) model; the [Fama and French \(1993\)](#) and [Pástor and Stambaugh \(2003\)](#) four-factor (FFPS) model; the [Asness and Frazzini \(2013\)](#) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the [Hou, Xue, and Zhang \(2015\)](#) q -factor (HXZ) model; the [Fama and French \(2015\)](#) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the [Stambaugh and Yuan \(2016\)](#) four-factor (SY4) model; and the [Barillas and Shanken \(2018\)](#) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. All t -statistics are adjusted following [Newey and West \(1987\)](#). The sample period is from January 1968 to December 2016.

	Low	1	2	3	High	Low	1	2	3	High
	Average excess returns					t -statistic (average excess returns)				
Small	0.72	0.85	0.73	0.85	0.42	2.20	2.91	2.61	2.92	1.26
2	0.73	0.78	0.78	0.65	0.54	2.54	3.11	3.18	2.58	1.86
3	0.76	0.75	0.77	0.71	0.49	2.82	3.30	3.36	2.86	1.70
4	0.65	0.63	0.59	0.73	0.64	2.63	2.87	2.71	3.17	2.33
Big	0.60	0.51	0.50	0.47	0.21	2.68	2.76	2.88	2.36	0.94
	CAPM α					t -statistic (CAPM α)				
Small	0.09	0.27	0.18	0.27	-0.22	0.50	1.70	1.13	1.69	-1.23
2	0.09	0.21	0.23	0.07	-0.11	0.69	1.74	1.90	0.60	-0.81
3	0.14	0.21	0.25	0.14	-0.16	1.20	2.18	2.46	1.42	-1.37
4	0.08	0.10	0.08	0.20	0.01	0.70	1.30	1.06	2.11	0.05
Big	0.08	0.07	0.08	0.00	-0.31	0.82	1.07	1.46	-0.01	-3.07
	FF3 α					t -statistic (FF3 α)				
Small	-0.06	0.12	0.02	0.12	-0.37	-0.70	1.51	0.29	1.70	-5.06
2	-0.02	0.10	0.11	-0.04	-0.19	-0.36	1.46	1.68	-0.57	-2.58
3	0.08	0.15	0.15	0.04	-0.22	0.96	2.19	2.16	0.57	-2.51
4	0.05	0.05	-0.01	0.16	0.00	0.59	0.62	-0.18	2.11	0.03
Big	0.21	0.15	0.11	0.07	-0.21	2.54	2.74	2.20	0.98	-2.07
	FFC α					t -statistic (FFC α)				
Small	-0.03	0.15	0.01	0.13	-0.32	-0.30	1.77	0.10	1.96	-4.09
2	0.00	0.12	0.11	-0.02	-0.14	0.03	1.99	1.72	-0.25	-2.07
3	0.09	0.19	0.17	0.07	-0.14	1.07	2.71	2.41	1.09	-1.58
4	0.07	0.08	0.02	0.16	0.04	0.74	1.10	0.24	2.29	0.48
Big	0.19	0.15	0.11	0.08	-0.16	2.16	2.65	2.23	1.16	-1.55
	FFPS α					t -statistic (FFPS α)				
Small	-0.07	0.12	0.02	0.11	-0.38	-0.81	1.45	0.27	1.53	-5.15
2	-0.03	0.09	0.10	-0.05	-0.19	-0.52	1.29	1.57	-0.69	-2.61
3	0.09	0.14	0.13	0.00	-0.23	0.98	1.95	1.84	0.06	-2.62
4	0.04	0.03	-0.05	0.14	-0.03	0.48	0.34	-0.77	1.81	-0.32
Big	0.20	0.14	0.11	0.05	-0.22	2.33	2.42	2.09	0.69	-2.17
	FFAF α					t -statistic (FFAF α)				
Small	-0.05	0.14	0.06	0.15	-0.36	-0.55	1.66	0.74	2.03	-4.97
2	-0.01	0.11	0.14	-0.02	-0.19	-0.17	1.71	2.05	-0.24	-2.67
3	0.08	0.14	0.18	0.06	-0.24	0.97	2.12	2.48	0.87	-2.84
4	0.05	0.05	0.01	0.17	-0.02	0.51	0.70	0.19	2.03	-0.25
Big	0.15	0.12	0.10	0.04	-0.26	1.65	1.93	1.98	0.64	-2.48

(Continued)

Table IA9 – *Continued*

	Low	1	2	3	High	Low	1	2	3	High
	HXZ α					t -statistic (HXZ α)				
Small	0.17	0.34	0.16	0.28	−0.12	1.52	3.37	1.98	3.47	−1.42
2	0.05	0.11	0.14	0.02	−0.08	0.81	1.51	2.02	0.23	−1.05
3	0.12	0.21	0.18	0.05	−0.14	1.34	2.69	2.22	0.71	−1.30
4	0.06	0.08	0.00	0.16	0.11	0.63	1.14	0.04	1.78	1.15
Big	0.25	0.21	0.02	0.09	−0.19	2.30	3.27	0.30	1.14	−1.85
	FF5 α					t -statistic (FF5 α)				
Small	0.05	0.25	0.10	0.19	−0.25	0.58	3.41	1.33	2.56	−3.50
2	0.03	0.09	0.12	−0.04	−0.15	0.46	1.37	1.87	−0.60	−2.16
3	0.13	0.18	0.15	0.02	−0.21	1.44	2.56	2.05	0.34	−2.42
4	0.03	0.05	−0.05	0.13	0.03	0.30	0.75	−0.59	1.48	0.33
Big	0.24	0.18	0.00	0.04	−0.23	2.83	3.13	0.03	0.54	−2.40
	FF4 α					t -statistic (FF4 α)				
Small	0.05	0.25	0.10	0.19	−0.25	0.59	3.39	1.32	2.55	−3.53
2	0.03	0.09	0.12	−0.04	−0.15	0.46	1.38	1.87	−0.58	−2.15
3	0.13	0.19	0.15	0.02	−0.21	1.44	2.58	2.05	0.31	−2.40
4	0.03	0.06	−0.05	0.13	0.03	0.33	0.76	−0.63	1.44	0.34
Big	0.25	0.18	0.00	0.04	−0.23	2.68	3.11	0.09	0.58	−2.37
	SY4 α					t -statistic (SY4 α)				
Small	−0.02	0.16	−0.01	0.06	−0.28	−0.14	1.57	−0.12	0.72	−2.74
2	0.03	0.05	0.03	−0.11	−0.14	0.42	0.72	0.37	−1.34	−1.64
3	0.17	0.18	0.11	0.02	−0.08	1.70	2.30	1.41	0.20	−0.92
4	0.11	0.10	−0.02	0.12	0.07	1.07	1.28	−0.25	1.49	0.74
Big	0.26	0.14	0.02	0.02	−0.06	2.31	1.73	0.46	0.31	−0.55
	BS6 α					t -statistic (BS6 α)				
Small	0.19	0.33	0.16	0.26	−0.14	1.82	3.33	1.74	3.25	−1.83
2	0.04	0.08	0.12	0.01	−0.10	0.54	1.20	1.77	0.09	−1.42
3	0.12	0.22	0.16	0.01	−0.17	1.25	2.78	1.98	0.12	−1.75
4	0.07	0.08	−0.04	0.17	0.10	0.66	1.06	−0.43	1.65	1.03
Big	0.30	0.25	0.03	0.13	−0.14	2.79	3.66	0.56	1.64	−1.33

Table IA10
Average excess returns and alphas of the 30 IND portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 30 IND (industry) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of [Sharpe \(1964\)](#) and [Lintner \(1965\)](#); the [Fama and French \(1993\)](#) three-factor (FF3) model; the [Fama and French \(1993\)](#) and [Carhart \(1997\)](#) four-factor (FFC) model; the [Fama and French \(1993\)](#) and [Pástor and Stambaugh \(2003\)](#) four-factor (FFPS) model; the [Asness and Frazzini \(2013\)](#) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the [Hou, Xue, and Zhang \(2015\)](#) q -factor (HXZ) model; the [Fama and French \(2015\)](#) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the [Stambaugh and Yuan \(2016\)](#) four-factor (SY4) model; and the [Barillas and Shanken \(2018\)](#) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. Numbers in parentheses are t -statistics adjusted following [Newey and West \(1987\)](#). The sample period is from January 1968 to December 2016.

Industry	Average excess returns	CAPM α	FF3 α	FFC α	FFPS α	FFAF α	HXZ α	FF5 α	FF4 α	SY4 α	BS6 α
Food	0.68 (3.64)	0.34 (2.40)	0.30 (2.23)	0.29 (2.17)	0.29 (2.10)	0.33 (2.38)	-0.02 (-0.16)	-0.01 (-0.05)	0.00 (-0.04)	-0.01 (-0.07)	-0.05 (-0.32)
Beer	0.74 (3.44)	0.37 (2.25)	0.36 (2.16)	0.29 (1.78)	0.37 (2.14)	0.40 (2.46)	-0.02 (-0.10)	0.04 (0.24)	0.04 (0.27)	-0.01 (-0.05)	0.00 (-0.02)
Smoke	1.06 (4.10)	0.74 (3.03)	0.70 (2.94)	0.70 (3.07)	0.75 (3.22)	0.72 (2.99)	0.31 (1.29)	0.27 (1.15)	0.27 (1.18)	0.22 (0.88)	0.30 (1.20)
Games	0.68 (2.12)	0.03 (0.17)	-0.07 (-0.45)	0.10 (0.63)	-0.09 (-0.56)	-0.10 (-0.60)	0.04 (0.20)	-0.14 (-0.83)	-0.14 (-0.86)	0.06 (0.33)	-0.03 (-0.16)
Books	0.42 (1.51)	-0.11 (-0.75)	-0.27 (-2.01)	-0.22 (-1.60)	-0.29 (-2.09)	-0.22 (-1.59)	-0.38 (-2.68)	-0.43 (-3.22)	-0.44 (-3.24)	-0.38 (-2.67)	-0.48 (-3.52)
Hshld	0.43 (2.12)	0.03 (0.25)	0.06 (0.51)	0.04 (0.36)	0.07 (0.53)	0.08 (0.57)	-0.22 (-1.75)	-0.20 (-1.82)	-0.20 (-1.81)	-0.25 (-1.87)	-0.18 (-1.37)
Clths	0.63 (2.09)	0.08 (0.43)	-0.12 (-0.62)	0.06 (0.36)	-0.13 (-0.70)	-0.07 (-0.40)	-0.27 (-1.21)	-0.31 (-1.73)	-0.32 (-1.79)	-0.18 (-0.97)	-0.39 (-2.09)
Hlth	0.64 (3.19)	0.23 (1.74)	0.41 (3.49)	0.36 (2.89)	0.45 (3.71)	0.37 (3.13)	0.06 (0.41)	0.20 (1.56)	0.21 (1.54)	0.17 (1.17)	0.26 (1.81)
Chems	0.58 (2.44)	0.07 (0.48)	-0.09 (-0.62)	-0.01 (-0.04)	-0.13 (-0.94)	-0.03 (-0.25)	-0.19 (-1.13)	-0.25 (-1.79)	-0.26 (-1.82)	-0.14 (-0.82)	-0.25 (-1.47)
Txtls	0.60 (1.84)	0.04 (0.17)	-0.36 (-1.93)	-0.11 (-0.62)	-0.34 (-1.82)	-0.28 (-1.49)	-0.35 (-1.50)	-0.57 (-3.13)	-0.58 (-2.89)	-0.44 (-2.23)	-0.59 (-2.89)
Cnstr	0.54 (2.01)	-0.05 (-0.36)	-0.28 (-2.30)	-0.26 (-2.16)	-0.28 (-2.37)	-0.19 (-1.51)	-0.44 (-2.95)	-0.46 (-3.67)	-0.47 (-3.46)	-0.40 (-2.58)	-0.62 (-4.32)
Steel	0.32 (1.01)	-0.32 (-1.46)	-0.52 (-2.57)	-0.42 (-2.19)	-0.58 (-2.81)	-0.48 (-2.32)	-0.10 (-0.52)	-0.36 (-1.79)	-0.36 (-1.80)	-0.25 (-1.20)	-0.22 (-1.09)
FabPr	0.53 (1.92)	-0.07 (-0.50)	-0.16 (-1.11)	-0.04 (-0.27)	-0.20 (-1.42)	-0.16 (-1.15)	-0.05 (-0.32)	-0.17 (-1.14)	-0.17 (-1.14)	0.01 (0.07)	-0.07 (-0.49)
ElcEq	0.69 (2.65)	0.09 (0.82)	0.09 (0.75)	0.11 (0.94)	0.10 (0.86)	0.08 (0.67)	0.04 (0.37)	0.03 (0.27)	0.03 (0.27)	0.02 (0.19)	0.04 (0.29)

(Continued)

Table IA10 – *Continued*

Industry	Average excess returns	CAPM α	FF3 α	FFC α	FFPS α	FFAF α	HXZ α	FF5 α	FF4 α	SY4 α	BS6 α
Autos	0.42 (1.35)	-0.14 (-0.71)	-0.46 (-2.60)	-0.20 (-1.09)	-0.52 (-2.86)	-0.43 (-2.67)	-0.19 (-0.90)	-0.49 (-2.66)	-0.51 (-2.58)	-0.32 (-1.64)	-0.42 (-2.22)
Carry	0.66 (2.27)	0.10 (0.57)	-0.05 (-0.32)	0.02 (0.13)	-0.05 (-0.31)	0.00 (-0.02)	-0.20 (-1.09)	-0.27 (-1.67)	-0.28 (-1.69)	-0.09 (-0.50)	-0.30 (-1.69)
Mines	0.40 (1.25)	-0.06 (-0.24)	-0.22 (-0.82)	-0.21 (-0.80)	-0.26 (-0.95)	-0.17 (-0.64)	-0.13 (-0.45)	-0.30 (-1.05)	-0.30 (-1.06)	-0.12 (-0.44)	-0.27 (-0.89)
Coal	0.66 (1.31)	0.07 (0.16)	-0.11 (-0.23)	-0.19 (-0.41)	-0.28 (-0.61)	-0.06 (-0.13)	-0.13 (-0.26)	-0.21 (-0.44)	-0.21 (-0.44)	0.15 (0.26)	-0.37 (-0.70)
Oil	0.62 (2.75)	0.23 (1.31)	0.12 (0.71)	0.04 (0.23)	0.10 (0.55)	0.18 (1.03)	0.00 (0.02)	-0.02 (-0.11)	-0.02 (-0.13)	0.20 (1.11)	-0.16 (-0.93)
Util	0.48 (2.78)	0.23 (1.67)	0.07 (0.58)	0.01 (0.09)	0.05 (0.39)	0.13 (1.06)	-0.09 (-0.59)	-0.06 (-0.43)	-0.06 (-0.46)	0.07 (0.46)	-0.31 (-1.95)
Telcm	0.55 (2.63)	0.16 (1.13)	0.11 (0.85)	0.18 (1.28)	0.10 (0.79)	0.09 (0.67)	0.34 (2.33)	0.17 (1.32)	0.17 (1.27)	0.25 (1.82)	0.27 (1.84)
Servs	0.60 (2.14)	-0.04 (-0.32)	0.16 (1.50)	0.22 (2.09)	0.18 (1.69)	0.03 (0.30)	0.39 (2.88)	0.34 (3.03)	0.34 (2.93)	0.26 (1.98)	0.49 (3.78)
BusEq	0.48 (1.56)	-0.16 (-0.92)	0.07 (0.47)	0.20 (1.45)	0.04 (0.30)	-0.07 (-0.45)	0.50 (2.99)	0.35 (2.65)	0.36 (2.54)	0.25 (1.39)	0.74 (4.65)
Paper	0.55 (2.60)	0.08 (0.63)	-0.05 (-0.43)	0.01 (0.05)	-0.05 (-0.48)	0.01 (0.05)	-0.29 (-2.40)	-0.27 (-2.55)	-0.28 (-2.52)	-0.25 (-1.92)	-0.34 (-2.79)
Trans	0.53 (2.12)	0.01 (0.06)	-0.16 (-1.17)	-0.10 (-0.78)	-0.14 (-1.01)	-0.08 (-0.62)	-0.23 (-1.39)	-0.30 (-2.33)	-0.30 (-2.25)	-0.19 (-1.42)	-0.34 (-2.22)
Whlsl	0.52 (2.09)	0.00 (-0.01)	-0.08 (-0.72)	-0.07 (-0.52)	-0.05 (-0.44)	-0.04 (-0.40)	-0.25 (-1.88)	-0.25 (-2.28)	-0.25 (-2.27)	-0.17 (-1.19)	-0.28 (-2.00)
Rtail	0.66 (2.77)	0.17 (1.21)	0.14 (1.03)	0.22 (1.63)	0.12 (0.88)	0.15 (1.06)	0.02 (0.13)	-0.01 (-0.08)	-0.01 (-0.08)	0.00 (-0.04)	0.04 (0.26)
Meals	0.67 (2.42)	0.15 (0.81)	0.07 (0.41)	0.14 (0.82)	0.08 (0.45)	0.11 (0.62)	-0.24 (-1.13)	-0.23 (-1.35)	-0.24 (-1.35)	-0.10 (-0.55)	-0.24 (-1.20)
Fin	0.62 (2.46)	0.08 (0.66)	-0.15 (-1.54)	-0.09 (-0.83)	-0.12 (-1.22)	-0.05 (-0.47)	-0.24 (-1.89)	-0.13 (-1.41)	-0.15 (-1.26)	-0.03 (-0.27)	-0.38 (-3.47)
Other	0.28 (1.08)	-0.26 (-2.03)	-0.37 (-2.66)	-0.32 (-2.24)	-0.29 (-2.10)	-0.33 (-2.43)	-0.50 (-3.52)	-0.47 (-3.55)	-0.47 (-3.48)	-0.40 (-2.72)	-0.53 (-3.45)

Table IA11
Average excess returns and alphas of the 8 D10–1 portfolios

The table reports the value-weighted average monthly excess returns and alphas of the 8 D10–1 (high minus low decile) portfolios relative to ten different factor models: the capital asset pricing model (CAPM) of [Sharpe \(1964\)](#) and [Lintner \(1965\)](#); the [Fama and French \(1993\)](#) three-factor (FF3) model; the [Fama and French \(1993\)](#) and [Carhart \(1997\)](#) four-factor (FFC) model; the [Fama and French \(1993\)](#) and [Pástor and Stambaugh \(2003\)](#) four-factor (FFPS) model; the [Asness and Frazzini \(2013\)](#) three-factor (FFAF) model, which combines their value factor with the market and size factors of the FF3 model; the [Hou, Xue, and Zhang \(2015\)](#) q -factor (HXZ) model; the [Fama and French \(2015\)](#) five-factor (FF5) model; the four-factor (FF4) model that excludes the value factor from the FF5 model; the [Stambaugh and Yuan \(2016\)](#) four-factor (SY4) model; and the [Barillas and Shanken \(2018\)](#) six-factor (BS6) model, which includes the market, size, and momentum factors from the FF5 model, the profitability and investment factors from the HXZ model, and the value factor from the FFAF model. Numbers in parentheses are t -statistics adjusted following [Newey and West \(1987\)](#). The sample period is from January 1968 to December 2016.

	STR	CI	DR	β	NI	MAX	RVar	AC
Average excess returns	−0.32 (−1.62)	−0.24 (−1.75)	0.17 (0.70)	−0.06 (−0.21)	−0.66 (−4.46)	−0.51 (−1.82)	−0.77 (−2.43)	−0.43 (−3.72)
CAPM α	−0.13 (−0.69)	−0.22 (−1.51)	−0.06 (−0.27)	−0.56 (−2.62)	−0.79 (−5.94)	−0.93 (−4.43)	−1.21 (−4.83)	−0.47 (−4.16)
FF3 α	−0.06 (−0.30)	−0.25 (−1.87)	−0.64 (−4.11)	−0.48 (−2.89)	−0.74 (−6.33)	−0.83 (−4.90)	−1.14 (−6.39)	−0.47 (−4.10)
FFC α	−0.39 (−1.96)	−0.11 (−0.77)	−0.43 (−2.54)	−0.25 (−1.51)	−0.67 (−5.70)	−0.64 (−3.57)	−0.83 (−4.57)	−0.39 (−3.42)
FFPS α	−0.03 (−0.13)	−0.27 (−1.93)	−0.60 (−4.05)	−0.50 (−3.00)	−0.74 (−6.06)	−0.87 (−5.12)	−1.16 (−6.49)	−0.47 (−4.13)
FFAF α	0.05 (0.26)	−0.28 (−2.13)	−0.47 (−2.91)	−0.61 (−3.36)	−0.79 (−6.51)	−0.99 (−5.43)	−1.33 (−6.60)	−0.48 (−4.20)
HXZ α	−0.31 (−1.13)	−0.15 (−0.98)	−0.28 (−1.40)	0.01 (0.05)	−0.46 (−3.71)	−0.20 (−1.08)	−0.25 (−1.34)	−0.43 (−3.14)
FF5 α	−0.15 (−0.64)	−0.28 (−2.05)	−0.43 (−2.77)	−0.18 (−1.07)	−0.45 (−4.05)	−0.35 (−2.41)	−0.56 (−3.54)	−0.50 (−3.98)
FF4 α	−0.14 (−0.59)	−0.28 (−2.03)	−0.46 (−2.39)	−0.18 (−1.02)	−0.45 (−4.02)	−0.34 (−2.37)	−0.56 (−3.51)	−0.50 (−3.99)
SY4 α	−0.57 (−2.66)	−0.17 (−0.99)	−0.37 (−1.96)	0.01 (0.06)	−0.19 (−1.75)	−0.14 (−0.79)	−0.20 (−0.94)	−0.43 (−3.39)
BS6 α	−0.22 (−1.06)	−0.17 (−0.97)	−0.61 (−2.97)	0.18 (0.93)	−0.45 (−3.44)	−0.05 (−0.26)	−0.08 (−0.43)	−0.40 (−3.01)

Table IA12
(Sequential) Tests of equality of cross-sectional R^2 s: 25 size-STR portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 3 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 3 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.577 (0.046)	−0.582 (0.062)	−0.622 (0.132)	−0.487 (0.021)	−0.510 (0.128)	−0.627 (0.098)	−0.573 (0.049)	−0.553 (0.066)	−0.660 (0.023)
FF3		−0.006 (0.649)	−0.046 (0.155)	0.090 (0.195)	0.066 (0.138)	−0.050 (0.311)	0.004 (0.909)	0.024 (0.372)	−0.083 (0.105)
FFC			−0.040 (0.266)	0.096 (0.203)	0.072 (0.177)	−0.045 (0.483)	0.010 (0.887)	0.030 (0.066)	−0.077 (0.328)
FFPS				0.135 (0.170)	0.112 (0.156)	−0.005 (0.417)	0.050 (0.201)	0.069 (0.061)	0.000 (0.381)
FFAF					−0.023 (0.108)	−0.140 (0.113)	−0.086 (0.475)	−0.066 (0.432)	−0.173 (0.107)
HXZ						−0.117 (0.120)	−0.062 (0.657)	−0.042 (0.070)	−0.149 (0.167)
FF5							0.055 (0.528)	0.074 (0.258)	−0.033 (0.065)
FF4								0.020 (0.681)	−0.087 (0.101)
SY4									−0.107 (0.164)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.213 (0.009)	−0.221 (0.025)	−0.304 (0.040)	−0.193 (0.004)	−0.115 (0.180)	−0.277 (0.083)	−0.190 (0.046)	−0.163 (0.063)	−0.474 (0.014)
FF3		−0.008 (0.567)	−0.091 (0.171)	0.020 (0.202)	0.097 (0.449)	−0.064 (0.596)	0.023 (0.311)	0.049 (0.112)	−0.261 (0.161)
FFC			−0.083 (0.333)	0.028 (0.164)	0.106 (0.454)	−0.056 (0.710)	0.031 (0.415)	0.058 (0.182)	−0.252 (0.051)
FFPS				0.111 (0.454)	0.189 (0.130)	0.027 (0.740)	0.114 (0.070)	0.141 (0.168)	−0.170 (0.087)
FFAF					0.078 (0.172)	−0.084 (0.104)	0.003 (0.896)	0.030 (0.052)	−0.280 (0.078)
HXZ						−0.161 (0.162)	−0.074 (0.087)	−0.048 (0.300)	−0.358 (0.095)
FF5							0.087 (0.528)	0.113 (0.147)	−0.197 (0.075)
FF4								0.026 (0.759)	−0.284 (0.096)
SY4									−0.310 (0.129)

Table IA13
(Sequential) Tests of equality of cross-sectional R^2 s: 25 size-CI portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 4 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 4 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.352 (0.023)	−0.482 (0.150)	−0.365 (0.036)	−0.301 (0.034)	−0.403 (0.048)	−0.352 (0.043)	−0.352 (0.036)	−0.442 (0.052)	−0.486 (0.141)
FF3		−0.130 (0.035)	−0.013 (0.398)	0.051 (0.116)	−0.051 (0.122)	0.000 (0.745)	0.001 (0.149)	−0.090 (0.225)	−0.134 (0.151)
FFC			0.117 (0.099)	0.181 (0.118)	0.079 (0.298)	0.130 (0.117)	0.131 (0.128)	0.040 (0.057)	−0.003 (0.084)
FFPS				0.064 (0.421)	−0.038 (0.092)	0.013 (0.737)	0.013 (0.213)	−0.077 (0.068)	0.000 (0.060)
FFAF					−0.102 (0.066)	−0.051 (0.143)	−0.050 (0.139)	−0.141 (0.054)	−0.185 (0.067)
HXZ						0.050 (0.068)	0.051 (0.067)	−0.039 (0.080)	−0.083 (0.323)
FF5							0.001 (0.287)	−0.090 (0.067)	−0.133 (0.284)
FF4								−0.090 (0.092)	−0.134 (0.218)
SY4									−0.044 (0.114)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.273 (0.002)	−0.507 (0.009)	−0.300 (0.010)	−0.127 (0.045)	−0.383 (0.008)	−0.297 (0.036)	−0.287 (0.013)	−0.467 (0.004)	−0.474 (0.032)
FF3		−0.233 (0.025)	−0.026 (0.359)	0.146 (0.072)	−0.110 (0.071)	−0.023 (0.552)	−0.014 (0.846)	−0.193 (0.179)	−0.201 (0.224)
FFC			0.207 (0.054)	0.379 (0.076)	0.124 (0.425)	0.210 (0.109)	0.220 (0.150)	0.040 (0.160)	0.032 (0.051)
FFPS				0.172 (0.097)	−0.084 (0.211)	0.003 (0.557)	0.013 (0.743)	−0.167 (0.290)	−0.175 (0.323)
FFAF					−0.256 (0.079)	−0.169 (0.122)	−0.160 (0.169)	−0.339 (0.043)	−0.347 (0.067)
HXZ						0.087 (0.063)	0.096 (0.054)	−0.084 (0.191)	−0.091 (0.129)
FF5							0.010 (0.287)	−0.170 (0.218)	−0.178 (0.128)
FF4								−0.180 (0.176)	−0.187 (0.156)
SY4									−0.008 (0.749)

Table IA14
(Sequential) Tests of equality of cross-sectional R^2 s: 25 size-DR portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 5 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 5 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.217 (0.495)	−0.297 (0.561)	−0.219 (0.573)	−0.251 (0.454)	−0.246 (0.536)	−0.252 (0.611)	−0.187 (0.658)	−0.270 (0.513)	−0.298 (0.712)
FF3		−0.081 (0.235)	−0.002 (0.831)	−0.034 (0.342)	−0.029 (0.810)	−0.035 (0.940)	0.029 (0.874)	−0.053 (0.767)	−0.081 (0.851)
FFC			0.078 (0.400)	0.047 (0.443)	0.051 (0.830)	0.045 (0.815)	0.110 (0.821)	0.027 (0.789)	−0.001 (1.000)
FFPS				−0.032 (0.528)	−0.027 (0.885)	−0.033 (0.976)	0.032 (0.932)	−0.051 (0.830)	0.000 (0.855)
FFAF					0.005 (0.743)	−0.001 (0.776)	0.063 (0.727)	−0.019 (0.739)	−0.048 (0.954)
HXZ						−0.006 (0.813)	0.059 (0.807)	−0.024 (0.864)	−0.052 (0.750)
FF5							0.065 (0.413)	−0.018 (0.894)	−0.046 (0.820)
FF4								−0.083 (0.843)	−0.111 (0.805)
SY4									−0.028 (0.897)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.086 (0.431)	−0.242 (0.362)	−0.088 (0.650)	−0.133 (0.278)	−0.148 (0.452)	−0.102 (0.779)	−0.058 (0.800)	−0.149 (0.430)	−0.256 (0.632)
FF3		−0.156 (0.191)	−0.002 (0.861)	−0.047 (0.279)	−0.062 (0.754)	−0.016 (0.969)	0.028 (0.858)	−0.063 (0.743)	−0.170 (0.773)
FFC			0.154 (0.402)	0.109 (0.371)	0.094 (0.701)	0.140 (0.826)	0.184 (0.743)	0.093 (0.733)	−0.014 (0.998)
FFPS				−0.045 (0.435)	−0.060 (0.832)	−0.015 (0.990)	0.029 (0.920)	−0.062 (0.831)	−0.169 (0.841)
FFAF					−0.015 (0.710)	0.030 (0.748)	0.074 (0.662)	−0.017 (0.660)	−0.124 (0.896)
HXZ						0.046 (0.782)	0.090 (0.600)	−0.001 (0.785)	−0.108 (0.665)
FF5							0.044 (0.413)	−0.047 (0.858)	−0.154 (0.750)
FF4								−0.091 (0.785)	−0.198 (0.776)
SY4									−0.107 (0.841)

Table IA15
(Sequential) Tests of equality of cross-sectional R^2 s: 25 size- β portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 6 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 6 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	-0.693 (0.071)	-0.785 (0.099)	-0.710 (0.096)	-0.554 (0.113)	-0.743 (0.039)	-0.749 (0.044)	-0.745 (0.034)	-0.750 (0.045)	-0.778 (0.072)
FF3		-0.091 (0.063)	-0.016 (0.321)	0.139 (0.200)	-0.050 (0.599)	-0.056 (0.480)	-0.052 (0.693)	-0.057 (0.378)	-0.084 (0.090)
FFC			0.075 (0.149)	0.231 (0.080)	0.041 (0.070)	0.035 (0.417)	0.040 (0.074)	0.034 (0.102)	0.007 (0.224)
FFPS				0.156 (0.103)	-0.034 (0.098)	-0.039 (0.630)	-0.035 (0.101)	-0.041 (0.089)	0.000 (0.150)
FFAF					-0.189 (0.058)	-0.195 (0.100)	-0.191 (0.060)	-0.196 (0.053)	-0.224 (0.224)
HXZ						-0.006 (0.145)	-0.001 (0.097)	-0.007 (0.067)	-0.034 (0.204)
FF5							0.004 (0.965)	-0.001 (0.092)	-0.028 (0.342)
FF4								-0.006 (0.075)	-0.033 (0.264)
SY4									-0.027 (0.199)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	-0.218 (0.021)	-0.443 (0.029)	-0.246 (0.047)	-0.070 (0.347)	-0.337 (0.013)	-0.325 (0.028)	-0.323 (0.013)	-0.429 (0.009)	-0.448 (0.051)
FF3		-0.225 (0.051)	-0.028 (0.365)	0.148 (0.175)	-0.119 (0.184)	-0.107 (0.267)	-0.105 (0.256)	-0.212 (0.249)	-0.230 (0.255)
FFC			0.198 (0.116)	0.373 (0.097)	0.106 (0.537)	0.118 (0.155)	0.120 (0.542)	0.014 (0.229)	-0.004 (0.124)
FFPS				0.175 (0.078)	-0.091 (0.306)	-0.079 (0.371)	-0.077 (0.468)	-0.184 (0.053)	-0.202 (0.077)
FFAF					-0.267 (0.100)	-0.255 (0.089)	-0.253 (0.091)	-0.359 (0.054)	-0.377 (0.071)
HXZ						0.012 (0.413)	0.014 (0.522)	-0.093 (0.141)	-0.111 (0.085)
FF5							0.002 (0.965)	-0.105 (0.450)	-0.123 (0.165)
FF4								-0.107 (0.063)	-0.125 (0.109)
SY4									-0.018 (0.061)

Table IA16
(Sequential) Tests of equality of cross-sectional R^2 s: 35 size-NI portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 7 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 7 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.438 (0.006)	−0.641 (0.055)	−0.463 (0.016)	−0.315 (0.017)	−0.645 (0.004)	−0.607 (0.004)	−0.596 (0.005)	−0.660 (0.003)	−0.665 (0.020)
FF3		−0.203 (0.009)	−0.025 (0.349)	0.124 (0.047)	−0.206 (0.011)	−0.169 (0.025)	−0.158 (0.031)	−0.222 (0.015)	−0.227 (0.020)
FFC			0.178 (0.070)	0.326 (0.010)	−0.004 (0.136)	0.034 (0.734)	0.045 (0.677)	−0.019 (0.138)	−0.024 (0.229)
FFPS				0.148 (0.064)	−0.182 (0.052)	−0.144 (0.109)	−0.133 (0.134)	−0.197 (0.045)	0.001 (0.037)
FFAF					−0.330 (0.004)	−0.292 (0.008)	−0.282 (0.013)	−0.345 (0.003)	−0.350 (0.004)
HXZ						0.038 (0.434)	0.048 (0.056)	−0.015 (0.745)	−0.020 (0.241)
FF5							0.011 (0.365)	−0.053 (0.404)	−0.058 (0.416)
FF4								−0.064 (0.067)	−0.069 (0.051)
SY4									−0.005 (0.439)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.094 (0.007)	−0.278 (0.013)	−0.101 (0.108)	−0.029 (0.207)	−0.307 (0.000)	−0.226 (0.004)	−0.223 (0.001)	−0.336 (0.000)	−0.329 (0.016)
FF3		−0.184 (0.019)	−0.008 (0.605)	0.065 (0.128)	−0.214 (0.023)	−0.132 (0.075)	−0.130 (0.068)	−0.242 (0.018)	−0.235 (0.053)
FFC			0.177 (0.065)	0.249 (0.081)	−0.029 (0.498)	0.052 (0.702)	0.055 (0.689)	−0.058 (0.543)	−0.051 (0.831)
FFPS				0.072 (0.155)	−0.206 (0.041)	−0.125 (0.132)	−0.122 (0.127)	−0.235 (0.027)	−0.227 (0.066)
FFAF					−0.278 (0.006)	−0.197 (0.014)	−0.194 (0.017)	−0.307 (0.003)	−0.300 (0.018)
HXZ						0.081 (0.229)	0.084 (0.223)	−0.029 (0.815)	−0.021 (0.325)
FF5							0.003 (0.365)	−0.110 (0.180)	−0.103 (0.329)
FF4								−0.113 (0.196)	−0.105 (0.333)
SY4									0.007 (0.563)

Table IA17
(Sequential) Tests of equality of cross-sectional R^2 s: 25 size-MAX portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 8 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 8 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.313 (0.007)	−0.383 (0.039)	−0.315 (0.011)	−0.212 (0.023)	−0.345 (0.009)	−0.366 (0.056)	−0.354 (0.012)	−0.359 (0.007)	−0.393 (0.034)
FF3		−0.069 (0.091)	−0.002 (0.691)	0.101 (0.108)	−0.032 (0.147)	−0.052 (0.376)	−0.041 (0.124)	−0.046 (0.301)	−0.080 (0.231)
FFC			0.067 (0.242)	0.170 (0.061)	0.037 (0.458)	0.017 (0.206)	0.028 (0.051)	0.023 (0.554)	−0.011 (0.062)
FFPS				0.103 (0.088)	−0.030 (0.124)	−0.050 (0.454)	−0.039 (0.097)	−0.044 (0.342)	0.001 (0.238)
FFAF					−0.133 (0.123)	−0.153 (0.051)	−0.142 (0.080)	−0.147 (0.081)	−0.181 (0.072)
HXZ						−0.020 (0.293)	−0.009 (0.535)	−0.014 (0.200)	−0.048 (0.369)
FF5							0.011 (0.824)	0.007 (0.756)	−0.028 (0.185)
FF4								−0.005 (0.668)	−0.039 (0.067)
SY4									−0.034 (0.145)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.107 (0.003)	−0.219 (0.032)	−0.110 (0.040)	−0.024 (0.371)	−0.229 (0.004)	−0.245 (0.058)	−0.238 (0.015)	−0.293 (0.002)	−0.263 (0.169)
FF3		−0.113 (0.092)	−0.003 (0.682)	0.082 (0.093)	−0.122 (0.243)	−0.138 (0.167)	−0.132 (0.145)	−0.186 (0.053)	−0.156 (0.121)
FFC			0.109 (0.243)	0.195 (0.157)	−0.009 (0.327)	−0.025 (0.070)	−0.019 (0.425)	−0.074 (0.476)	−0.044 (0.647)
FFPS				0.086 (0.110)	−0.119 (0.251)	−0.135 (0.080)	−0.128 (0.148)	−0.183 (0.058)	−0.153 (0.126)
FFAF					−0.205 (0.048)	−0.221 (0.015)	−0.214 (0.010)	−0.269 (0.016)	−0.239 (0.017)
HXZ						−0.016 (0.965)	−0.010 (0.917)	−0.064 (0.474)	−0.034 (0.376)
FF5							0.007 (0.824)	−0.048 (0.607)	−0.018 (0.427)
FF4								−0.055 (0.594)	−0.025 (0.392)
SY4									0.030 (0.133)

Table IA18
(Sequential) Tests of equality of cross-sectional R^2 s: 25 size-RVar portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 9 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 9 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.296 (0.006)	−0.481 (0.071)	−0.314 (0.019)	−0.096 (0.162)	−0.542 (0.002)	−0.580 (0.017)	−0.580 (0.008)	−0.520 (0.013)	−0.579 (0.013)
FF3		−0.185 (0.048)	−0.018 (0.409)	0.200 (0.069)	−0.246 (0.034)	−0.285 (0.012)	−0.284 (0.011)	−0.224 (0.054)	−0.283 (0.010)
FFC			0.167 (0.087)	0.385 (0.062)	−0.061 (0.363)	−0.099 (0.117)	−0.099 (0.118)	−0.039 (0.440)	−0.098 (0.116)
FFPS				0.218 (0.089)	−0.228 (0.061)	−0.267 (0.024)	−0.266 (0.023)	−0.206 (0.094)	0.003 (0.017)
FFAF					−0.446 (0.006)	−0.485 (0.003)	−0.484 (0.003)	−0.424 (0.011)	−0.483 (0.004)
HXZ						−0.039 (0.388)	−0.038 (0.360)	0.022 (0.458)	−0.037 (0.341)
FF5							0.001 (0.360)	0.060 (0.207)	0.002 (0.061)
FF4								0.060 (0.180)	0.001 (0.952)
SY4									−0.059 (0.055)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.028 (0.220)	−0.051 (0.400)	−0.030 (0.495)	−0.006 (0.778)	−0.266 (0.001)	−0.450 (0.006)	−0.449 (0.001)	−0.170 (0.040)	−0.392 (0.013)
FF3		−0.023 (0.431)	−0.003 (0.725)	0.021 (0.248)	−0.238 (0.069)	−0.422 (0.012)	−0.422 (0.010)	−0.143 (0.056)	−0.364 (0.019)
FFC			0.020 (0.704)	0.045 (0.346)	−0.215 (0.051)	−0.399 (0.016)	−0.398 (0.015)	−0.119 (0.228)	−0.341 (0.037)
FFPS				0.024 (0.380)	−0.235 (0.075)	−0.420 (0.011)	−0.419 (0.010)	−0.140 (0.088)	−0.361 (0.021)
FFAF					−0.259 (0.035)	−0.444 (0.007)	−0.443 (0.006)	−0.164 (0.055)	−0.386 (0.012)
HXZ						−0.184 (0.137)	−0.184 (0.127)	0.095 (0.190)	−0.126 (0.250)
FF5							0.001 (0.360)	0.280 (0.035)	0.058 (0.283)
FF4								0.279 (0.031)	0.057 (0.247)
SY4									−0.222 (0.131)

Table IA19
(Sequential) Tests of equality of cross-sectional R^2 s: 25 size-AC portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 10 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 10 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.360 (0.093)	−0.639 (0.201)	−0.382 (0.144)	−0.335 (0.121)	−0.494 (0.079)	−0.584 (0.048)	−0.551 (0.025)	−0.489 (0.106)	−0.680 (0.202)
FF3		−0.279 (0.007)	−0.022 (0.568)	0.025 (0.280)	−0.134 (0.092)	−0.224 (0.056)	−0.191 (0.099)	−0.129 (0.070)	−0.320 (0.083)
FFC			0.257 (0.185)	0.304 (0.143)	0.145 (0.420)	0.055 (0.717)	0.088 (0.556)	0.150 (0.412)	−0.041 (0.144)
FFPS				0.047 (0.349)	−0.112 (0.067)	−0.202 (0.095)	−0.169 (0.203)	−0.107 (0.129)	0.001 (0.098)
FFAF					−0.159 (0.083)	−0.249 (0.080)	−0.216 (0.078)	−0.154 (0.076)	−0.345 (0.081)
HXZ						−0.090 (0.393)	−0.057 (0.111)	0.005 (0.640)	−0.186 (0.176)
FF5							0.033 (0.507)	0.095 (0.246)	−0.096 (0.466)
FF4								0.062 (0.525)	−0.129 (0.324)
SY4									−0.191 (0.275)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.080 (0.103)	−0.301 (0.066)	−0.106 (0.328)	−0.077 (0.158)	−0.140 (0.092)	−0.212 (0.059)	−0.158 (0.033)	−0.174 (0.092)	−0.352 (0.111)
FF3		−0.222 (0.054)	−0.026 (0.510)	0.003 (0.691)	−0.061 (0.063)	−0.132 (0.235)	−0.078 (0.077)	−0.095 (0.087)	−0.272 (0.145)
FFC			0.196 (0.135)	0.225 (0.288)	0.161 (0.410)	0.089 (0.658)	0.144 (0.468)	0.127 (0.069)	−0.050 (0.194)
FFPS				0.029 (0.713)	−0.035 (0.117)	−0.106 (0.094)	−0.052 (0.057)	−0.068 (0.172)	−0.246 (0.103)
FFAF					−0.064 (0.165)	−0.135 (0.241)	−0.081 (0.097)	−0.097 (0.066)	−0.275 (0.142)
HXZ						−0.072 (0.177)	−0.017 (0.811)	−0.034 (0.090)	−0.211 (0.083)
FF5							0.055 (0.507)	0.038 (0.642)	−0.140 (0.179)
FF4								−0.017 (0.485)	−0.194 (0.135)
SY4									−0.178 (0.064)

Table IA20
(Sequential) Tests of equality of cross-sectional R^2 s: 30 IND portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 11 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 11 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.044 (0.782)	−0.046 (0.936)	−0.045 (0.941)	−0.046 (0.773)	−0.168 (0.644)	−0.280 (0.645)	−0.206 (0.635)	−0.210 (0.550)	−0.183 (0.907)
FF3		−0.001 (0.927)	−0.001 (0.953)	−0.001 (0.926)	−0.123 (0.881)	−0.235 (0.461)	−0.162 (0.791)	−0.166 (0.764)	−0.139 (0.967)
FFC			0.001 (0.996)	0.000 (0.983)	−0.122 (0.940)	−0.234 (0.596)	−0.161 (0.869)	−0.164 (0.858)	−0.138 (0.948)
FFPS				−0.001 (0.985)	−0.123 (0.886)	−0.235 (0.564)	−0.161 (0.787)	−0.165 (0.793)	0.000 (0.958)
FFAF					−0.122 (0.916)	−0.234 (0.687)	−0.161 (0.881)	−0.164 (0.688)	−0.138 (0.927)
HXZ						−0.112 (0.818)	−0.039 (0.946)	−0.042 (0.850)	−0.016 (0.998)
FF5							0.073 (0.805)	0.070 (0.825)	0.096 (0.705)
FF4								−0.004 (0.861)	0.023 (0.921)
SY4									0.027 (0.937)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.087 (0.381)	−0.102 (0.520)	−0.087 (0.591)	−0.080 (0.404)	−0.113 (0.498)	−0.164 (0.518)	−0.161 (0.361)	−0.104 (0.562)	−0.170 (0.671)
FF3		−0.015 (0.574)	0.000 (0.967)	0.007 (0.833)	−0.027 (0.753)	−0.077 (0.481)	−0.074 (0.623)	−0.017 (0.759)	−0.083 (0.776)
FFC			0.015 (0.846)	0.022 (0.924)	−0.012 (0.695)	−0.062 (0.498)	−0.059 (0.624)	−0.002 (0.727)	−0.068 (0.632)
FFPS				0.007 (0.940)	−0.026 (0.843)	−0.077 (0.623)	−0.074 (0.741)	−0.017 (0.854)	−0.083 (0.853)
FFAF					−0.033 (0.659)	−0.084 (0.630)	−0.081 (0.664)	−0.024 (0.702)	−0.090 (0.613)
HXZ						−0.051 (0.843)	−0.048 (0.783)	0.009 (0.869)	−0.057 (0.738)
FF5							0.003 (0.805)	0.060 (0.824)	−0.006 (0.845)
FF4								0.057 (0.792)	−0.009 (0.858)
SY4									−0.066 (0.877)

Table IA21
(Sequential) Tests of equality of cross-sectional R^2 s: 8 D10–1 portfolios

The table reports pairwise tests of equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 12 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 12 in the main paper.

Panel A: OLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.690 (0.026)	−0.861 (0.035)	−0.832 (0.291)	−0.543 (0.051)	−0.889 (0.011)	−0.914 (0.009)	−0.817 (0.008)	−0.972 (0.007)	−0.986 (0.039)
FF3		−0.171 (0.071)	−0.142 (0.198)	0.147 (0.065)	−0.199 (0.096)	−0.224 (0.054)	−0.127 (0.052)	−0.281 (0.195)	−0.296 (0.056)
FFC			0.029 (0.175)	0.318 (0.111)	−0.028 (0.573)	−0.053 (0.670)	0.043 (0.466)	−0.111 (0.133)	−0.126 (0.362)
FFPS				0.289 (0.192)	−0.057 (0.067)	−0.082 (0.973)	0.014 (0.376)	−0.140 (0.632)	0.017 (0.801)
FFAF					−0.346 (0.066)	−0.371 (0.099)	−0.275 (0.125)	−0.429 (0.112)	−0.444 (0.111)
HXZ						−0.025 (0.979)	0.071 (0.071)	−0.083 (0.396)	−0.098 (0.743)
FF5							0.097 (0.412)	−0.058 (0.272)	−0.072 (0.406)
FF4								−0.154 (0.100)	−0.169 (0.183)
SY4									−0.015 (0.596)
Panel B: GLS									
Model	FF3	FFC	FFPS	FFAF	HXZ	FF5	FF4	SY4	BS6
CAPM	−0.607 (0.005)	−0.669 (0.010)	−0.687 (0.111)	−0.461 (0.016)	−0.797 (0.001)	−0.823 (0.002)	−0.782 (0.001)	−0.883 (0.000)	−0.913 (0.014)
FF3		−0.062 (0.310)	−0.080 (0.389)	0.146 (0.181)	−0.191 (0.070)	−0.216 (0.129)	−0.175 (0.082)	−0.276 (0.197)	−0.306 (0.110)
FFC			−0.018 (0.535)	0.207 (0.153)	−0.129 (0.091)	−0.154 (0.233)	−0.114 (0.192)	−0.214 (0.272)	−0.244 (0.112)
FFPS				0.226 (0.209)	−0.110 (0.556)	−0.136 (0.054)	−0.095 (0.701)	−0.196 (0.349)	−0.226 (0.462)
FFAF					−0.336 (0.134)	−0.361 (0.110)	−0.321 (0.103)	−0.422 (0.112)	−0.452 (0.105)
HXZ						−0.025 (0.903)	0.015 (0.588)	−0.085 (0.398)	−0.116 (0.733)
FF5							0.040 (0.412)	−0.060 (0.292)	−0.090 (0.379)
FF4								−0.101 (0.224)	−0.131 (0.424)
SY4									−0.030 (0.778)

Table IA22
Summary of factor model performance: (Sequential) Tests of equality of cross-sectional R^2 s

The table reports summary of pairwise tests for equality of the ordinary least squares (OLS) and generalized least squares (GLS) cross-sectional regression R^2 s for ten different factor models. The setup is the same as in Table 13 of the main paper except that the test of $H_0: \rho_i^2 = \rho_j^2$ for nonnested models entails a sequential test. The sample period is from January 1968 to December 2016. See also notes to Table 13 in the main paper.

Panel A: OLS										
Model	Size-STR	Size-CI	Size-DR	Size- β	Size-NI	Size-MAX	Size-RVar	Size-AC	IND	D10-1
CAPM	0	0	0	0	0	0	0	0	0	0
FF3	1	1	0	0	2	1	1	0	0	1
FFC	0	1	0	0	2	1	1	1	0	1
FFPS	0	1	0	0	2	1	2	0	0	0
FFAF	1	1	0	0	1	1	0	0	0	0
HXZ	0	1	0	1	3	1	3	0	0	1
FF5	0	1	0	1	3	0	4	1	0	1
FF4	1	1	0	1	3	1	4	1	0	1
SY4	0	0	0	1	4	1	2	0	0	1
BS6	1	0	0	0	3	1	3	0	0	1
Panel B: GLS										
CAPM	0	0	0	0	0	0	0	0	0	0
FF3	1	1	0	1	1	1	0	0	0	1
FFC	1	2	0	1	2	1	0	0	0	1
FFPS	1	1	0	1	0	1	0	0	0	0
FFAF	1	1	0	0	0	0	0	0	0	1
HXZ	0	1	0	1	4	2	2	0	0	1
FF5	0	1	0	1	2	1	6	0	0	1
FF4	1	1	0	1	2	2	6	1	0	1
SY4	0	2	0	1	4	2	1	0	0	1
BS6	1	1	0	0	2	1	5	0	0	1