Internet Appendix for *THE CAPM HOLDS*

For Online Publication

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A. Results Obtained with Additional Test Assets

In this Internet Appendix, we present additional tests of the dynamic CAPM using monthly and daily returns for value-weighted 25 size-and-operating-profitability-, 25 size-and-investment-, 25 size-and-momentum-, and 49 industry-sorted portfolios. Tables IA.1, IA.2, IA.3, and IA.4 provide the panel regression outputs for the 25 size-and-operating-profitability sorted portfolios, the 25 size-and-investment sorted portfolios, the 25 size-and-momentum sorted portfolios, and the 49 industry sorted portfolios.

The test statistics provided at the bottom of columns (1) and (6) show that, in most cases, we cannot reject the null hypothesis that the intercept is equal to zero and the slope is equal to one at the 5% level. Moreover, the R^2 are large in all cases. These results provide additional evidence that *(i)* the CAPM is hard to reject, *(ii)* the estimated betas are well defined, and *(iii)* a single factor explains about 75% of the total variation in the cross-section of portfolios' returns.

Table IA.1
Panel Regressions: 25 Size-and-Operating-Profitability Sorted Portfolios

This table presents results from a regression of equity portfolio excess returns on month or day $t+1$ on the market risk, Fama and French (1993, 2015), and Carhart (1997) risk components on month or day $t+1$ for the 25 size-and-operating-profitability sorted portfolios. Specifically, we estimate:

$$R_{i,t+1} = a + b[\beta^{M}_{i,t} R_{M,t+1}] + h[\beta^{HML}_{i,t} HML_{t+1}] + s[\beta^{SMB}_{i,t} SMB_{t+1}] + m[\beta^{MOM}_{i,t} MOM_{t+1}] + r[\beta^{RMW}_{i,t} RMW_{t+1}] + c[\beta^{CMA}_{i,t} CMA_{t+1}] + e_{i,t+1},$$

Each β coefficients are estimated using the 24 months (250 trading days) strictly prior to month (day) $t+1$ for each asset i and for each of the respective factor. Panels A and B report the results using monthly and daily returns, respectively for value-weighted portfolios. The standard errors are reported in parentheses and are calculated using Driscoll-Kraay with 12 month lags when using monthly returns and 250 trading day lags when using daily returns. The table further reports the adjusted R^2, the number of observations (N), and the p-values of the Wald statistics testing the joint hypothesis of H_0: $a=0$ and $b=1$ and H_0: $\forall a_i = 0$ and $b=1$ when the intercepts are estimated separately for each portfolio i. ***, **, and * indicate a two-tailed test significance level of less than 1, 5, and 10%, respectively. The sample period is from January 1, 1926 to December 31, 2017 in Columns (1) to (5) and from July 1, 1963 to December 31, 2017 in Columns (6) to (9).

Panel A. Monthly returns

	1926-2017					1963-2017			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept (a)	0.001	0.008***	0.004**	0.006**	0.000	0.001	0.008***	0.009***	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
R_M (b)	0.976***				0.871***	0.976***			0.862***
	(0.022)				(0.025)	(0.022)			(0.025)
HML (h)		0.669***			0.057**				0.003
		(0.083)			(0.022)				(0.039)
SMB (s)			0.841***		0.503***				0.487***
			(0.054)		(0.027)				(0.025)
MOM (m)				0.507***	0.018				0.018
				(0.130)	(0.029)				(0.027)
RMW (r)							0.664***		0.133***
							(0.094)		(0.031)
CMA (c)								0.633***	0.016
								(0.095)	(0.033)
R^2	0.76	0.09	0.28	0.06	0.86	0.76	0.10	0.08	0.86
N	15,750	15,750	15,750	15,750	15,750	15,750	15,750	15,750	15,750
p-value H_0 :a=0, b=1	0.264					0.264			
p-value H_0 :$\forall a_i$=0, b=1	0.005					0.005			

Panel B. Daily returns

	1926-2017					1963-2017			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept (a)	0.0001*	0.0004***	0.0003***	0.0002	0.0001*	0.0001*	0.0004***	0.0004***	0.0001**
	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0000)
R_M (b)	1.0038***				0.9072***	1.0034***			0.8936***
	(0.0082)				(0.0109)	(0.0082)			(0.0124)
HML (h)		0.9733***			0.0928***				0.0471
		(0.0421)			(0.0250)				(0.0278)
SMB (s)			0.8678***		0.3416***				0.3175***
			(0.0799)		(0.0601)				(0.0594)
MOM (m)				0.8498***	0.0975***				0.0887***
				(0.0728)	(0.0181)				(0.0157)
RMW (r)							0.9735***		0.1641***
							(0.0502)		(0.0419)
CMA (c)								0.9044***	0.0142
								(0.0502)	(0.0279)
R^2	0.81	0.23	0.15	0.20	0.83	0.81	0.18	0.15	0.84
N	336,750	336,750	336,750	336,750	336,750	330,400	336,750	336,750	336,750
p-value H_0 :a=0, b=1	0.151					0.177			
p-value H_0 :$\forall a_i$=0, b=1	0.002					0.003			

Table IA.2
Panel Regressions: 25 Size-and-Investment Sorted Portfolios

This table presents results from a regression of equity portfolio excess returns on month or day $t+1$ on the market risk, Fama and French (1993, 2015), and Carhart (1997) risk components on month or day $t+1$ for the 25 size-and-investment sorted portfolios. Specifically, we estimate:

$$R_{i,t+1} = a + b[\beta^{M}_{i,t} R_{M,t+1}] + h[\beta^{HML}_{i,t} HML_{t+1}] + s[\beta^{SMB}_{i,t} SMB_{t+1}] + m[\beta^{MOM}_{i,t} MOM_{t+1}] + r[\beta^{RMW}_{i,t} RMW_{t+1}] + c[\beta^{CMA}_{i,t} CMA_{t+1}] + e_{i,t+1},$$

Each β coefficients are estimated using the 24 months (250 trading days) strictly prior to month (day) $t+1$ for each asset i and for each of the respective factor. Panels A and B report the results using monthly and daily returns, respectively for value-weighted portfolios. The standard errors are reported in parentheses and are calculated using Driscoll-Kraay with 12 month lags when using monthly returns and 250 trading day lags when using daily returns. The table further reports the adjusted R^2, the number of observations (N), and the p-values of the Wald statistics testing the joint hypothesis of H_0: $a = 0$ and $b = 1$ and H_0: $\forall a_i = 0$ and $b = 1$ when the intercepts are estimated separately for each portfolio i. ***, **, and * indicate a two-tailed test significance level of less than 1, 5, and 10%, respectively. The sample period is from January 1, 1926 to December 31, 2017 in Columns (1) to (5) and from July 1, 1963 to December 31, 2017 in Columns (6) to (9).

Panel A. Monthly returns

	1926-2017					1963-2017			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept (a)	0.002**	0.008***	0.005**	0.006***	0.001	0.002**	0.008***	0.009***	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
R_M (b)	0.977***				0.866***	0.977***			0.856***
	(0.022)				(0.025)	(0.022)			(0.026)
HML (h)		0.671***			0.065***				0.001
		(0.081)			(0.023)				(0.037)
SMB (s)			0.855***		0.520***				0.505***
			(0.050)		(0.030)				(0.027)
MOM (m)				0.488***	0.010				0.014
				(0.135)	(0.028)				(0.025)
RMW (r)							0.670***		0.114***
							(0.083)		(0.028)
CMA (c)								0.641***	0.044
								(0.091)	(0.032)
R^2	0.76	0.10	0.30	0.05	0.86	0.76	0.11	0.09	0.86
N	15,750	15,750	15,750	15,750	15,750	15,750	15,750	15,750	15,750
p-value H_0 :a=0, b=1	0.133					0.133			
p-value H_0 :$\forall a_i$=0, b=1	<0.001					<0.001			

Panel B. Daily returns

	1926-2017					1963-2017			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept (a)	0.0001**	0.0004***	0.0003***	0.0002	0.0001**	0.0001**	0.0004***	0.0004***	0.0001**
	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0000)
R_M (b)	1.0028***				0.9049***	1.0024***			0.8919***
	(0.0086)				(0.0125)	(0.0087)			(0.0135)
HML (h)		0.9668***			0.0906***				0.0401
		(0.0434)			(0.0253)				(0.0283)
SMB (s)			0.8736***		0.3483***				0.3268***
			(0.0775)		(0.0593)				(0.0591)
MOM (m)				0.8431***	0.0963***				0.0920***
				(0.0735)	(0.0193)				(0.0174)
RMW (r)							0.9671***		0.1246***
							(0.0500)		(0.0430)
CMA (c)								0.9045***	0.0477
								(0.0467)	(0.0310)
R^2	0.81	0.23	0.15	0.19	0.83	0.81	0.17	0.16	0.84
N	336,750	336,750	336,750	336,750	336,750	330,400	336,750	336,750	336,750
p-value H_0 :a=0, b=1	0.070					0.084			
p-value H_0 :$\forall a_i$=0, b=1	<0.001					<0.001			

Table IA.3
Panel Regressions: 25 Size-and-Momentum Sorted Portfolios

This table presents results from a regression of equity portfolio excess returns on month or day $t+1$ on the market risk, Fama and French (1993, 2015), and Carhart (1997) risk components on month or day $t+1$ for the 25 size-and-momentum sorted portfolios. Specifically, we estimate:

$$R_{i,t+1} = a + b[\beta^{M}_{i,t} R_{M,t+1}] + h[\beta^{HML}_{i,t} HML_{t+1}] + s[\beta^{SMB}_{i,t} SMB_{t+1}] + m[\beta^{MOM}_{i,t} MOM_{t+1}] + r[\beta^{RMW}_{i,t} RMW_{t+1}] + c[\beta^{CMA}_{i,t} CMA_{t+1}] + e_{i,t+1},$$

Each β coefficients are estimated using the 24 months (250 trading days) strictly prior to month (day) $t+1$ for each asset i and for each of the respective factor. Panels A and B report the results using monthly and daily returns, respectively for value-weighted portfolios. The standard errors are reported in parentheses and are calculated using Driscoll-Kraay with 12 month lags when using monthly returns and 250 trading day lags when using daily returns. The table further reports the adjusted R^2, the number of observations (N), and the p-values of the Wald statistics testing the joint hypothesis of H_0: $a = 0$ and $b = 1$ and H_0: $\forall a_i = 0$ and $b = 1$ when the intercepts are estimated separately for each portfolio i. ***, **, and * indicate a two-tailed test significance level of less than 1, 5, and 10%, respectively. The sample period is from January 1, 1926 to December 31, 2017 in Columns (1) to (5) and from July 1, 1963 to December 31, 2017 in Columns (6) to (9).

Panel A. Monthly returns

	1926-2017					1963-2017			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept (a)	0.001	0.007***	0.006***	0.008***	0.001	0.001	0.008***	0.008***	0.000
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
R_M (b)	1.011***				0.831***	0.971***			0.832***
	(0.026)				(0.021)	(0.028)			(0.030)
HML (h)		0.763***			0.025				-0.041
		(0.077)			(0.038)				(0.034)
SMB (s)			0.820***		0.411***				0.433***
			(0.065)		(0.050)				(0.029)
MOM (m)				0.799***	0.265***				0.319***
				(0.089)	(0.035)				(0.050)
RMW (r)							0.632***		0.078**
							(0.106)		(0.036)
CMA (c)								0.586***	0.082*
								(0.107)	(0.047)
R^2	0.74	0.28	0.26	0.24	0.83	0.70	0.09	0.06	0.81
N	26,694	26,694	26,694	26,694	26,694	15,750	15,750	15,750	15,750
p-value H_0 :a=0, b=1	0.313					0.379			
p-value H_0 :$\forall a_i$=0, b=1	<0.001					<0.001			

Panel B. Daily returns

	1926-2017					1963-2017			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept (a)	0.0001**	0.0004***	0.0004***	0.0003***	0.0002**	0.0001*	0.0004***	0.0004***	0.0001*
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0001)	(0.0000)
R_M (b)	1.0028***				0.8431***	1.0104***			0.8500***
	(0.0109)				(0.0160)	(0.0149)			(0.0085)
HML (h)		0.9746***			0.1596***				0.0458*
		(0.0269)			(0.0292)				(0.0239)
SMB (s)			0.8774***		0.3087***				0.3194***
			(0.0418)		(0.0580)				(0.0549)
MOM (m)				0.8321***	0.2169***				0.2681***
				(0.0526)	(0.0254)				(0.0270)
RMW (r)							0.9792***		0.1237***
							(0.0729)		(0.0306)
CMA (c)								0.9122***	0.0486*
								(0.0646)	(0.0270)
R^2	0.58	0.23	0.11	0.16	0.61	0.77	0.17	0.14	0.81
N	593,500	593,500	593,500	593,500	593,500	330,400	336,750	336,750	336,750
p-value H_0 :a=0, b=1	0.053					0.193			
p-value H_0 :$\forall a_i$=0, b=1	<0.001					<0.001			

Table IA.4
Panel Regressions: 49 Industry Portfolios

This table presents results from a regression of equity portfolio excess returns on month or day $t+1$ on the market risk, Fama and French (1993, 2015), and Carhart (1997) risk components on month or day $t+1$ for the 49 industry-sorted portfolios. Specifically, we estimate:

$$R_{i,t+1} = a + b[\beta^{M}_{i,t} R_{M,t+1}] + h[\beta^{HML}_{i,t} HML_{t+1}] + s[\beta^{SMB}_{i,t} SMB_{t+1}] + m[\beta^{MOM}_{i,t} MOM_{t+1}] + r[\beta^{RMW}_{i,t} RMW_{t+1}] + c[\beta^{CMA}_{i,t} CMA_{t+1}] + e_{i,t+1},$$

Each β coefficients are estimated using the 24 months (250 trading days) strictly prior to month (day) $t+1$ for each asset i and for each of the respective factor. Panels A and B report the results using monthly and daily returns, respectively for value-weighted portfolios. The standard errors are reported in parentheses and are calculated using Driscoll-Kraay with 12 month lags when using monthly returns and 250 trading day lags when using daily returns. The table further reports the adjusted R^2, the number of observations (N), and the p-values of the Wald statistics testing the joint hypothesis of H_0: $a = 0$ and $b = 1$ and H_0: $\forall a_i = 0$ and $b = 1$ when the intercepts are estimated separately for each portfolio i. ***, **, and * indicate a two-tailed test significance level of less than 1, 5, and 10%, respectively. The sample period is from January 1, 1926 to December 31, 2017 in Columns (1) to (5) and from July 1, 1963 to December 31, 2017 in Columns (6) to (9).

Panel A. Monthly returns

	1926-2017					1963-2017			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept (a)	0.001*	0.007***	0.006***	0.006***	0.001	0.001	0.006***	0.008***	0.000
	(0.000)	(0.002)	(0.002)	(0.002)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
R_M (b)	0.967***				0.881***	0.948***			0.855***
	(0.014)				(0.018)	(0.017)			(0.021)
HML (h)		0.656***			0.046				0.109***
		(0.089)			(0.032)				(0.034)
SMB (s)			0.633***		0.265***				0.296***
			(0.066)		(0.044)				(0.025)
MOM (m)				0.654***	0.104**				0.167***
				(0.121)	(0.041)				(0.046)
RMW (r)							0.478***		0.037
							(0.112)		(0.041)
CMA (c)								0.611***	0.078**
								(0.085)	(0.032)
R^2	0.56	0.14	0.11	0.10	0.58	0.51	0.04	0.07	0.55
N	49,507	49,507	49,507	49,507	49,507	30,774	30,774	30,774	30,774
p-value H_0 :a=0, b=1	0.020					0.010			
p-value H_0 :$\forall a_i$=0, b=1	<0.001					<0.001			

Panel B. Daily returns

	1926-2017					1963-2017			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept (a)	0.0001**	0.0004***	0.0003***	0.0002**	0.0001**	0.0000	0.0003***	0.0004***	0.0001
	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0000)
R_M (b)	0.9961***				0.9104***	0.9978***			0.8859***
	(0.0060)				(0.0090)	(0.0073)			(0.0102)
HML (h)		0.9556***			0.1205***				0.0659***
		(0.0274)			(0.0143)				(0.0183)
SMB (s)			0.8321***		0.1335***				0.1490***
			(0.0538)		(0.0374)				(0.0390)
MOM (m)				0.7877***	0.0984***				0.1453***
				(0.0547)	(0.0212)				(0.0231)
RMW (r)							0.9324***		0.0953***
							(0.0527)		(0.0214)
CMA (c)								0.9146***	0.1140***
								(0.0489)	(0.0274)
R^2	0.45	0.16	0.07	0.10	0.46	0.53	0.08	0.11	0.54
N	1,097,219	1,097,219	1,097,219	1,097,219	1,097,219	646,105	658,043	658,043	658,043
p-value H_0 :a=0, b=1	0.030					0.504			
p-value H_0 :$\forall a_i$=0, b=1	0.016					0.130			