



Research article

The impact of business conditions and commodity market on US stock returns: An asset pricing modelling experiment

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Supplementary

Appendix

Piecewise polynomial matrix with 0 knot:

$$S_0 = \begin{bmatrix} 1^0 & 1 & 1^2 & 1^3 \\ 2^0 & 2 & 2^2 & 2^3 \\ 3^0 & 3 & 3^2 & 3^3 \\ 4^0 & 4 & 4^2 & 4^3 \\ \vdots & \vdots & \vdots & \vdots \\ t^0 & t & t^2 & t^3 \end{bmatrix} \quad (\text{A.1})$$

Piecewise polynomial matrix with 1 knot:

$$S_1 = \begin{bmatrix} 1^0 & 1 & 1^2 & 1^3 & 0 & 0 & 0 & 0 \\ 2^0 & 2 & 2^2 & 2^3 & 0 & 0 & 0 & 0 \\ 3^0 & 3 & 3^2 & 3^3 & 0 & 0 & 0 & 0 \\ 4^0 & 4 & 4^2 & 4^3 & 0 & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \left(\frac{t}{2}\right)^0 & \left(\frac{t}{2}\right) & \left(\frac{t}{2}\right)^2 & \left(\frac{t}{2}\right)^3 & 0 & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & 1^0 & 1^1 & 1^2 & 1^3 \\ \vdots & \vdots & \vdots & \vdots & 2^0 & 2^1 & 2^2 & 2^3 \\ \vdots & \vdots & \vdots & \vdots & 3^0 & 3^1 & 3^2 & 3^3 \\ \vdots & \vdots & \vdots & \vdots & 4^0 & 4^1 & 4^2 & 4^4 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ t^0 & t & t^2 & t^3 & \left(\frac{t}{2}\right)^0 & \left(\frac{t}{2}\right) & \left(\frac{t}{2}\right)^2 & \left(\frac{t}{2}\right)^3 \end{bmatrix} \quad (\text{A.2})$$

Piecewise polynomial matrix with 2 knot:

$$S_2 = \begin{bmatrix} 1^0 & 1^1 & 1^2 & 1^3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 2^0 & 2^1 & 2^2 & 2^3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 3^0 & 3^1 & 3^2 & 3^3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 4^0 & 4^1 & 4^2 & 4^3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \left(\frac{t}{3}\right)^0 & \vdots & \vdots & \vdots & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & 1^0 & 1^1 & 1^2 & 1^3 & 0 & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & 2^0 & 2^1 & 2^2 & 2^3 & \vdots & \vdots & \vdots & \vdots \\ \left(\frac{2t}{3}\right)^0 & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & 0 & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & 1^0 & 1^1 & 1^2 & 1^3 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ t^0 & t^1 & t^2 & t^3 & \left(\frac{2t}{3}\right)^0 & \left(\frac{2t}{3}\right)^1 & \left(\frac{2t}{3}\right)^2 & \left(\frac{2t}{3}\right)^3 & \left(\frac{t}{3}\right)^0 & \left(\frac{t}{3}\right)^1 & \left(\frac{t}{3}\right)^2 & \left(\frac{t}{3}\right)^3 \end{bmatrix} \quad (\text{A.3})$$

Piecewise polynomial matrix with 3 knot:

$$S_3 = \begin{bmatrix} 1^0 & 1^1 & 1^2 & 1^3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 2^0 & 2^1 & 2^2 & 2^3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 3^0 & 3^1 & 3^2 & 3^3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \left(\frac{t}{4}\right)^0 & \vdots & \vdots & \vdots & 0 & 0 & 0 & 0 & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & 1^0 & 1^1 & 1^2 & 1^3 & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & 2^0 & 2^1 & 2^2 & 2^3 & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \left(\frac{t}{2}\right)^0 & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & 0 & 0 & 0 & 0 & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & 1^0 & 1^1 & 1^2 & 1^3 & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & 2^0 & 2^1 & 2^2 & 2^3 & \vdots & \vdots & \vdots & \vdots \\ \left(\frac{3t}{4}\right)^0 & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & 1^0 & 1^1 & 1^2 & 1^3 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & 2^0 & 2^1 & 2^2 & 2^3 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ t^0 & t^1 & t^2 & t^3 & \left(\frac{3t}{4}\right)^0 & \left(\frac{3t}{4}\right)^1 & \left(\frac{3t}{4}\right)^2 & \left(\frac{3t}{4}\right)^3 & \left(\frac{t}{2}\right)^0 & \left(\frac{t}{2}\right)^1 & \left(\frac{t}{2}\right)^2 & \left(\frac{t}{2}\right)^3 & \left(\frac{t}{4}\right)^0 & \left(\frac{t}{4}\right)^1 & \left(\frac{t}{4}\right)^2 & \left(\frac{t}{4}\right)^3 \end{bmatrix} \quad (\text{A.4})$$

Table A1. Excess stock returns sorted by stock market factor loadings of the FFF model.

Panel 1 Stocks Sorted by b_F^*					Panel 2 Stocks Sorted by b_F^{-*}				
Portfolio	Return	b_F^*	b_F^{-*}	b_F^{+*}	Portfolio	Return	b_F^*	b_F^{-*}	b_F^{+*}
1 Low	5.24%	-1.09	-0.78	-0.87	1 Low	13.83%	-0.50	-2.08	0.36
2	8.22%	-0.33	-0.26	-0.27	2	10.58%	-0.20	-0.43	-0.05
3	9.28%	-0.01	0.00	-0.03	3	9.92%	0.00	0.00	0.00
4	10.98%	0.32	0.27	0.22	4	9.86%	0.20	0.43	0.05
5 High	20.08%	1.11	0.79	0.94	5 High	9.59%	0.51	2.08	-0.36
High-Low	14.84%	2.20	1.57	1.81	High-Low	-4.23%	1.01	4.16	-0.72
Panel 3 Stocks Sorted by b_F^{+*}					Panel 4 Stocks Sorted by $(b_F^{-*} - b_F^*)$				
Portfolio	Return	b_F^*	b_F^{-*}	b_F^{+*}	Portfolio	Return	b_F^*	b_F^{-*}	b_F^{+*}
1 Low	4.05%	-0.58	0.42	-1.93	1 Low	18.92%	0.27	-1.68	1.07
2	8.31%	-0.22	-0.05	-0.39	2	12.82%	0.03	-0.30	0.22
3	10.20%	-0.02	0.00	-0.01	3	10.33%	-0.01	-0.01	-0.01
4	11.75%	0.20	0.04	0.38	4	8.21%	-0.05	0.29	-0.24
5 High	19.46%	0.62	-0.41	1.96	5 High	3.51%	-0.24	1.70	-1.04
High-Low	15.40%	1.20	-0.83	3.89	High-Low	-15.41%	-0.50	3.38	-2.11
Panel 5 Stocks Sorted by $(b_F^{+*} - b_F^*)$					Panel 6 Stocks Sorted by $(b_F^{-*} b_F^{+*})$				
Portfolio	Return	b_F^*	b_F^{-*}	b_F^{+*}	Portfolio	Return	b_F^*	b_F^{-*}	b_F^{+*}
1 Low	8.17%	0.17	1.08	-1.53	1 Low	17.52%	0.08	-1.63	1.50
2	9.49%	0.08	0.27	-0.23	2	12.81%	-0.01	-0.30	0.23
3	9.66%	0.00	-0.01	-0.01	3	10.01%	-0.01	-0.01	-0.01
4	11.74%	-0.09	-0.28	0.23	4	8.56%	0.00	0.30	-0.24
5 High	14.73%	-0.15	-1.06	1.54	5 High	4.88%	-0.05	1.65	-1.48
High-Low	6.56%	-0.32	-2.14	3.07	High-Low	-12.64%	-0.13	3.28	-2.98

Note: This table presents the relationship between excess stock returns and stock market factor loadings associated with the FFF model. The column labeled “return” reports the annual average stock returns over the one-month T-bill rate. “High-Low” reports the difference between portfolio 5 and portfolio 1.

Table A2. Excess stock returns sorted by commodity market factor loadings of the FFF model.

Panel 1 Stocks Sorted by c_F^*					Panel 2 Stocks Sorted by c_F^{-*}				
Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}	Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}
1 Low	14.96%	-1.57	-1.36	-1.03	1 Low	16.32%	-0.76	-3.51	1.00
2	11.37%	-0.38	-0.37	-0.26	2	11.89%	-0.22	-0.60	0.15
3	10.06%	0.00	-0.01	0.00	3	10.29%	0.00	-0.01	0.02
4	8.93%	0.37	0.36	0.22	4	9.53%	0.22	0.59	-0.16
5 High	8.48%	1.58	1.38	1.08	5 High	5.75%	0.75	3.53	-1.00
High-Low	-6.48%	3.15	2.73	2.11	High-Low	-10.57%	1.51	7.04	-2.00
Panel 3 Stocks Sorted by c_F^{+*}					Panel 4 Stocks Sorted by $(c_F^{-*} - c_F^*)$				
Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}	Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}
1 Low	6.88%	-0.54	0.97	-4.06	1 Low	14.24%	0.21	-3.01	1.85
2	9.80%	-0.16	0.12	-0.59	2	11.17%	0.01	-0.49	0.41
3	10.54%	0.00	0.00	0.00	3	10.38%	0.00	-0.01	0.02
4	11.39%	0.15	-0.15	0.57	4	10.11%	-0.01	0.48	-0.40
5 High	15.17%	0.55	-0.94	4.07	5 High	7.87%	-0.19	3.03	-1.87
High-Low	8.29%	1.10	-1.91	8.13	High-Low	-6.38%	-0.40	6.04	-3.73
Panel 5 Stocks Sorted by $(c_F^{+*} - c_F^*)$					Panel 6 Stocks Sorted by $(c_F^{-*} - c_F^{+*})$				
Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}	Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}
1 Low	5.23%	0.35	1.77	-3.61	1 Low	16.34%	-0.09	-2.77	3.43
2	9.15%	0.12	0.41	-0.45	2	12.01%	-0.06	-0.50	0.44
3	10.29%	-0.01	-0.02	0.00	3	10.47%	-0.01	-0.01	0.00
4	12.21%	-0.13	-0.42	0.44	4	9.47%	0.05	0.48	-0.46
5 High	16.90%	-0.34	-1.75	3.62	5 High	5.49%	0.11	2.81	-3.41
High-Low	11.67%	-0.69	-3.52	7.23	High-Low	-10.85%	0.20	5.59	-6.84

Note: This table presents the relationship between excess stock returns and the commodity market factor loadings associated with the FFF model. The column labeled “return” reports the annual average stock returns over the one-month T-bill rate. “High-Low” reports the difference between portfolio 5 and portfolio 1.

Table A3. Excess stock returns sorted by business condition factor loadings of the FFF model.

Panel 1 Stocks Sorted by d_F^*					Panel 2 Stocks Sorted by d_F^{-*}				
Portfolio	Return	d_F^*	d_F^{-*}	d_F^{+*}	Portfolio	Return	d_F^*	d_F^{-*}	d_F^{+*}
1 Low	11.77%	-0.06	0.00	-0.04	1 Low	16.72%	-0.02	-1.05	0.02
2	10.37%	-0.01	-0.01	-0.01	2	11.80%	-0.01	-0.02	0.01
3	9.63%	0.00	-0.02	0.00	3	10.40%	0.00	0.00	0.00
4	10.26%	0.01	-0.01	0.01	4	9.44%	0.01	0.02	-0.01
5 High	11.76%	0.06	0.05	0.04	5 High	5.44%	0.02	1.05	-0.02
High-Low	-0.01%	0.12	0.05	0.08	High-Low	-11.28%	0.04	2.10	-0.04
Panel 3 Stocks Sorted by d_F^{+*}					Panel 4 Stocks Sorted by $(d_F^{-*} - d_F^*)$				
Portfolio	Return	d_F^*	d_F^{-*}	d_F^{+*}	Portfolio	Return	d_F^*	d_F^{-*}	d_F^{+*}
1 Low	6.13%	-0.02	-0.12	-0.18	1 Low	15.62%	0.01	-1.03	0.04
2	9.03%	-0.01	0.00	-0.02	2	11.16%	0.00	-0.01	0.01
3	10.06%	0.00	0.00	0.00	3	10.13%	0.00	0.00	0.00
4	11.50%	0.00	-0.01	0.02	4	9.83%	0.00	0.01	-0.01
5 High	17.06%	0.02	0.13	0.18	5 High	7.05%	-0.01	1.03	-0.04
High-Low	10.93%	0.04	0.25	0.36	High-Low	-8.56%	-0.02	2.07	-0.09
Panel 5 Stocks Sorted by $(d_F^{+*} - d_F^*)$					Panel 6 Stocks Sorted by $(d_F^{-*} - d_F^{+*})$				
Portfolio	Return	d_F^*	d_F^{-*}	d_F^{+*}	Portfolio	Return	d_F^*	d_F^{-*}	d_F^{+*}
1 Low	7.79%	0.01	-0.07	-0.16	1 Low	16.13%	0.00	-1.02	0.14
2	9.26%	0.00	0.00	-0.02	2	12.06%	0.00	-0.01	0.02
3	10.10%	0.00	0.00	0.00	3	10.30%	0.00	0.00	0.00
4	11.26%	0.00	-0.02	0.02	4	8.76%	0.00	0.01	-0.02
5 High	15.37%	-0.01	0.09	0.16	5 High	6.54%	0.00	1.02	-0.13
High-Low	7.58%	-0.02	0.15	0.33	High-Low	-9.59%	0.00	2.04	-0.27

Note: This table presents the relationship between excess stock returns and business conditions factor loadings associated with the FFF model. The column labeled “return” reports the annual average stock returns over the one-month T-bill rate. “High-Low” reports the difference between portfolio 5 and portfolio 1.

Table A4. Fama-macbeth regression of the both models' factor loadings.

	1	2	3	4	5	6	7
b_S^*	0.00292*** [3.56]		0.00125** [2.08]		0.00255*** [3.61]	0.000892* [1.93]	
c_S^*	-0.0000123 [-0.02]		0.000106 [0.25]		-0.0000623 [-0.10]	0.000122 [0.36]	
d_S^*	-0.0208 [-0.49]		0.00230 [0.22]		-0.0154 [-0.43]		0.00457 [0.57]
b_F^*	0.00312*** [2.62]			0.00257*** [3.53]		0.00263** [2.45]	0.00128** [2.56]
c_F^*	-0.00150** [2.01]			-0.00105** [-2.21]		-0.000579 [-0.92]	-0.000327 [-1.39]
d_F^*	-0.00837 [-0.17]			-0.0021 [-0.09]		0.00967 [0.46]	0.0127 [1.50]
b_S^{-*}		-0.00789*** [-6.49]	-0.00799*** [-6.46]			-0.00796*** [-6.54]	-0.00778*** [-6.42]
b_S^{+*}		0.0106*** [10.73]	0.0107*** [10.57]			0.0107*** [10.73]	0.0105*** [10.64]
c_S^{-*}		-0.00580*** [-6.30]	-0.00586*** [-6.28]			-0.00587*** [-6.32]	-0.00572*** [-6.25]
c_S^{+*}		0.00469*** [6.45]	0.00473*** [6.44]			0.00475*** [6.45]	0.00462*** [6.45]
d_S^{-*}		-0.244*** [-3.80]	-0.247*** [3.79]			-0.245*** [-3.81]	-0.241*** [-3.79]
d_S^{+*}		0.211*** [6.23]	0.212*** [6.25]			0.214*** [6.23]	0.208*** [6.24]
b_F^{-*}		-0.00486*** [-6.17]		-0.00998*** [-9.10]	-0.00885*** [-7.99]		-0.00388*** [-6.24]
b_F^{+*}		0.00668*** [8.85]		0.0128*** [13.35]	0.0111*** [12.73]		0.00434*** [8.30]
c_F^{-*}		-0.00305*** [-7.64]		-0.00667*** [-8.25]	-0.00606*** [8.08]		-0.00212*** [-7.19]
c_F^{+*}		0.00262*** [6.50]		0.00599*** [7.48]	0.00477*** [8.11]		0.00179*** [6.91]
d_F^{-*}		-0.0660*** [-4.80]		-0.235*** [-4.30]	-0.198*** [-4.35]		-0.0473*** [-4.58]
d_F^{+*}		0.0687*** [5.97]		0.209*** [6.86]	0.177*** [6.83]		0.0420*** [5.79]
Cons	0.00567*** [3.59]	0.00304** [2.30]	0.00160 [1.39]	0.00769*** [4.23]	0.00468*** [3.31]	0.00349** [2.44]	0.00261** [2.56]
No. of Obs	2396262	2396262	2396262	2396262	2396262	2396262	2396262
Adjusted R^2	0.160	0.135	0.347	0.094	0.099	0.075	0.380

Note: This table reports the result of the Fama-Macbeth regression of both the CPPF model and the FFF

model factor loadings on excess stock returns. The t-statistics in the square brackets are calculated by using Newey-West (1987) heteroscedastic robust standard error with 12 lags. * denotes significance at the 10% level, ** denotes significance at the 5% level and ***denotes significance at the 1% level.

Table A5. Future Excess Stock Returns Sorted by Stock Market Factor Loadings of the FFF Model.

Panel 1 Stocks Sorted by b_F^*					Panel 2 Stocks Sorted by b_F^{*}				
Portfolio	Return	b_F^*	b_F^{*}	b_F^{*}	Portfolio	Return	b_F^*	b_F^{*}	b_F^{*}
1 Low	19.19%	0.82	0.83	0.84	1 Low	-3.61%	0.93	0.50	1.16
2	19.48%	0.96	0.97	0.98	2	13.40%	0.98	0.94	1.00
3	19.66%	1.00	1.00	1.00	3	20.08%	1.00	1.00	1.00
4	16.99%	1.03	1.02	1.03	4	24.21%	1.02	1.04	1.00
5 High	-1.48%	1.20	1.14	1.19	5 High	19.77%	1.09	1.48	0.87
High-Low	-20.67%	0.38	0.31	0.35	High-Low	23.38%	0.16	0.98	-0.29
Panel 3 Stocks Sorted by b_F^{*}					Panel 4 Stocks Sorted by $(b_F^{*} - b_F^*)$				
Portfolio	Return	b_F^*	b_F^{*}	b_F^{*}	Portfolio	Return	b_F^*	b_F^{*}	b_F^{*}
1 Low	29.28%	0.91	1.13	0.57	1 Low	-9.21%	1.04	0.55	1.27
2	21.82%	0.98	1.00	0.96	2	6.64%	0.99	0.95	1.02
3	21.32%	1.00	1.00	1.00	3	20.98%	1.00	1.00	1.00
4	10.25%	1.02	0.99	1.04	4	25.84%	0.99	1.03	0.97
5 High	-8.84%	1.10	0.83	1.46	5 High	29.61%	0.99	1.42	0.77
High-Low	-38.12%	0.18	-0.30	0.89	High-Low	38.82%	-0.05	0.87	-0.50
Panel 5 Stocks Sorted by $(b_F^{*} - b_F^*)$					Panel 6 Stocks Sorted by $(b_F^{*} - b_F^{*})$				
Portfolio	Return	b_F^*	b_F^{*}	b_F^{*}	Portfolio	Return	b_F^*	b_F^{*}	b_F^{*}
1 Low	23.47%	1.02	1.25	0.63	1 Low	-9.57%	1.02	0.58	1.38
2	23.44%	1.00	1.02	0.97	2	8.23%	0.99	0.95	1.02
3	21.27%	1.00	0.99	1.00	3	20.00%	1.00	0.99	1.00
4	10.98%	0.99	0.96	1.02	4	26.19%	1.00	1.03	0.97
5 High	-5.33%	1.00	0.72	1.41	5 High	29.00%	1.00	1.39	0.66
High-Low	-28.80%	-0.03	-0.53	0.78	High-Low	38.57%	-0.02	0.81	-0.72

Note: This table presents the relationship between future excess stock returns and stock market factor loadings associated with the FFF model. The column labeled “return” reports the annual average future stock returns over the one-month T-bill rate. “High-Low” reports the difference between portfolio 5 and portfolio 1.

Table A6. Future excess stock returns sorted by commodity market factor loadings of the FFF model.

Panel 1 Stocks Sorted by c_F^*					Panel 2 Stocks Sorted by c_F^{-*}				
Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}	Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}
1 Low	-0.18%	-1.31	-1.33	-1.28	1 Low	2.80%	-1.14	-1.96	1.23
2	19.79%	-1.04	-1.04	-1.03	2	15.89%	-1.03	-1.08	1.00
3	20.56%	0.90	-1.00	-1.01	3	19.39%	-1.01	-1.01	-1.01
4	21.96%	1.04	1.02	1.03	4	20.35%	1.02	1.06	-1.02
5 High	11.71%	1.30	1.30	1.13	5 High	15.42%	1.14	1.94	-1.35
High-Low	11.89%	2.62	2.63	2.41	High-Low	12.62%	2.28	3.90	-2.59
Panel 3 Stocks Sorted by c_F^{+*}					Panel 4 Stocks Sorted by $(c_F^{-*} - c_F^*)$				
Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}	Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}
1 Low	15.40%	0.90	1.25	-0.16	1 Low	5.36%	1.01	0.12	1.39
2	22.85%	0.97	0.99	0.93	2	15.92%	0.99	0.93	1.04
3	22.08%	1.00	0.99	0.99	3	20.40%	1.00	0.99	1.00
4	13.80%	1.02	0.97	1.06	4	18.29%	1.00	1.05	0.96
5 High	-0.29%	1.09	0.74	2.03	5 High	13.88%	0.98	1.86	0.45
High-Low	-15.69%	0.19	-0.50	2.18	High-Low	8.52%	-0.03	1.74	-0.94
Panel 5 Stocks Sorted by $(c_F^{+*} - c_F^*)$					Panel 6 Stocks Sorted by $(c_F^{-*} - c_F^{+*})$				
Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}	Portfolio	Return	c_F^*	c_F^{-*}	c_F^{+*}
1 Low	19.70%	1.05	1.38	-0.08	1 Low	-1.55%	0.97	0.23	1.87
2	23.17%	1.00	1.04	0.94	2	15.03%	0.99	0.94	1.05
3	22.16%	1.00	0.99	0.99	3	20.38%	0.99	0.99	0.99
4	13.30%	0.99	0.94	1.04	4	21.22%	1.00	1.05	0.94
5 High	-4.49%	0.94	0.59	1.95	5 High	18.77%	1.02	1.74	-0.01
High-Low	-24.19%	-0.11	-0.79	2.03	High-Low	20.32%	0.04	1.51	-1.87

Note: This table presents the relationship between future excess stock returns and commodity market factor loadings associated with the FFF model. The column labeled “return” reports the annual average future stock returns over the one-month T-bill rate. “High-Low” reports the difference between portfolio 5 and portfolio 1.

Table A7. Future excess stock returns sorted by business condition factor loadings of the FFF model.

Panel 1 Stocks Sorted by d_F^*					Panel 2 Stocks Sorted by d_F^{+*}				
Portfolio	Return	d_F^*	d_F^{+*}	d_F^{+*}	Portfolio	Return	d_F^*	d_F^{+*}	d_F^{+*}
1 Low	-0.91%	0.99	0.63	0.99	1 Low	-3.70%	1.00	-0.68	1.00
2	17.59%	1.00	0.85	1.00	2	16.25%	1.00	1.00	1.00
3	23.82%	1.00	1.30	1.00	3	22.31%	1.00	1.00	1.00
4	23.05%	1.00	1.40	1.40	4	20.83%	1.00	1.00	1.00
5 High	10.29%	1.01	1.43	1.41	5 High	18.16%	1.00	1.56	0.99
High-Low	11.20%	0.03	0.80	0.42	High-Low	21.86%	0.01	2.24	-0.01
Panel 3 Stocks Sorted by d_F^{+*}					Panel 4 Stocks Sorted by $(d_F^{+*} - d_F^*)$				
Portfolio	Return	d_F^*	d_F^{+*}	d_F^{+*}	Portfolio	Return	d_F^*	d_F^{+*}	d_F^{+*}
1 Low	16.08%	1.00	0.34	0.94	1 Low	1.28%	1.00	-0.68	1.00
2	15.88%	1.00	0.85	1.00	2	18.61%	1.00	1.00	1.00
3	20.54%	1.00	0.96	1.00	3	20.29%	1.00	1.00	1.00
4	19.19%	1.00	1.01	1.00	4	17.82%	1.00	1.00	1.00
5 High	2.16%	1.00	0.72	1.05	5 High	15.85%	1.00	1.56	0.99
High-Low	-13.92%	0.01	0.37	0.10	High-Low	14.57%	0.00	2.24	-0.02
Panel 5 Stocks Sorted by $(d_F^{+*} - d_F^*)$					Panel 6 Stocks Sorted by $(d_F^{+*} - d_F^*)$				
Portfolio	Return	d_F^*	d_F^{+*}	d_F^{+*}	Portfolio	Return	d_F^*	d_F^{+*}	d_F^{+*}
1 Low	14.57%	1.00	0.25	0.95	1 Low	-2.45%	1.00	-0.68	1.03
2	17.45%	1.00	0.99	1.00	2	18.30%	1.00	1.00	1.00
3	22.26%	1.00	0.91	1.00	3	21.17%	1.00	1.00	1.00
4	18.84%	1.00	0.98	1.00	4	18.35%	1.00	1.00	1.00
5 High	0.72%	1.00	0.75	1.05	5 High	18.48%	1.00	1.55	0.96
High-Low	-13.85%	0.00	0.50	0.10	High-Low	20.93%	0.00	2.23	-0.08

Note: This table presents the relationship between future excess stock returns and the business conditions factor loadings associated with the FFF model. The column labeled “return” reports the annual average future stock returns over the one-month T-bill rate. “High-Low” reports the difference between portfolio 5 and portfolio 1.



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