Supplementary Appendix for "Continuous-Time Models, Realized Volatilities, and Testable Distributional Implications for Daily Stock Returns"

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Appendix A: Detailed Tables and Figures

Table A1: DJIA Stocks

Ticker symbol	Company
AA	Alcoa Inc.
AXP	American Express Co.
BA	Boeing Co.
C	Citigroup Inc.
CAT	Caterpillar Inc.
DD	E.I. DuPont de nemours & Co.
DIS	Walt Disney Co.
EK	Eastman Kodak Co.
GE	General Electric Co.
GM	General Motors Corp.
HD	Home Depot Inc.
HON	Honeywell International Inc.
HPQ	Hewlett-Packard Co.
IBM	International Business Machines Corp.
INTC	Intel Corp.
IP	International Paper Co.
JNJ	Johnson & Johnson
JPM	JPMorgan Chase & Co.
KO	Coca-Cola Co.
MCD	McDonalds Corp.
MMM	3M Co.
MO	Philip Morris Cos.
MRK	Merck & Co. Inc.
MSFT	Microsoft Corp.
PG	Procter & Gamble Co.
SBC	SBC Communications Inc.
T	AT&T Corp.
UTX	United Technologies Corp.
WMT	Wal-mart Stores Inc.
XOM	Exxon Mobil Corp.

Table A2: Jump Statistics - Simple Method

Ticker	Mean duration	Rel. jump contribution JV_t/RV_t	Mean size of jump component (×10,000)	Mean size of actual jumps (%)
AA	4.6270	0.0640	1.1124	0.9585
AXP	7.6503	0.0354	1.5130	1.0419
BA	4.7786	0.0609	1.1738	1.0030
C	6.8022	0.0421	1.7782	1.1129
CAT	4.9524	0.0577	1.2022	1.0292
DD	7.1782	0.0373	1.1006	0.9871
DIS	4.9133	0.0615	1.5087	1.0842
EK	4.2990	0.0679	1.0711	0.9446
GE	10.0976	0.0256	1.0117	0.9172
GM	5.2661	0.0553	0.8704	0.8398
HD	6.3503	0.0449	1.3689	1.0559
HON	4.1325	0.0716	1.2323	0.9825
HPQ	6.2923	0.0434	2.0825	1.3121
IBM	8.9429	0.0296	1.2891	0.9332
INTC	8.3557	0.0323	1.8501	1.2570
IP	5.1975	0.0553	1.2874	1.0673
JNJ	6.0680	0.0458	0.6247	0.7352
JPM	7.2069	0.0371	1.2865	1.0315
KO	5.8762	0.0469	0.7670	0.8189
MCD	4.9176	0.0594	0.9186	0.8942
MMM	5.4304	0.0503	0.8019	0.8301
MO	4.1940	0.0746	1.2886	0.9435
MRK	8.3758	0.0330	1.4525	0.9711
MSFT	6.6543	0.0411	1.2839	1.0321
PG	7.4083	0.0371	0.9408	0.8694
SBC	4.7778	0.0584	0.9903	0.9257
T	6.0197	0.0448	1.2514	1.0244
UTX	5.7569	0.0488	1.1999	0.9565
WMT	8.6276	0.0330	1.3469	1.0684
XOM	8.4527	0.0316	0.7529	0.8088

Note: The table reports the mean durations between jumps, the relative jump contributions to the total realized variation, the mean size of the jump component (×10,000) on days of non-zero jumps, and the mean size in percent of the square-root of the jump component (i.e. the absolute value of the actual jumps) on days of non-zero jumps.

Table A3: Jump Statistics - Sequential Method

Ticker	Rel. jump contribution JVS_t/RV_t	Mean size of jump component (×10,000)	Mean size of actual jumps (%)
AA	0.0498	0.9110	0.8965
AXP	0.0288	1.3529	1.0064
BA	0.0477	0.9933	0.9488
C	0.0349	1.6895	1.0507
CAT	0.0455	0.9816	1.0005
DD	0.0297	0.8888	0.9216
DIS	0.0461	1.2555	1.0201
EK	0.0532	0.9216	0.8844
GE	0.0212	0.8845	0.8616
GM	0.0464	0.7901	0.8007
HD	0.0350	1.1157	0.9818
HON	0.0566	1.0739	0.9494
HPQ	0.0354	1.8309	1.2464
IBM	0.0256	1.2385	0.9036
INTC	0.0240	1.3542	1.1379
IP	0.0432	1.0255	1.0082
JNJ	0.0359	0.5065	0.6828
JPM	0.0303	1.0900	0.9689
KO	0.0327	0.5474	0.7318
MCD	0.0438	0.7365	0.8536
MMM	0.0397	0.6832	0.7814
MO	0.0575	1.3316	0.9646
MRK	0.0277	1.3683	0.9507
MSFT	0.0317	1.1158	0.9763
PG	0.0302	0.8741	0.8306
SBC	0.0448	0.8432	0.8908
T	0.0357	1.0333	0.9563
UTX	0.0375	1.0344	0.8970
WMT	0.0255	1.1120	1.0057
XOM	0.0233	0.5973	0.7362

Note: The table reports the relative jump contributions to the total realized variation, the mean size of the jump component (×10,000) on days of non-zero jumps, and the mean size in percent of the absolute value of the actual jumps.

Table A4: Simple and Sequential Jumps Correlations

Ticker	Correlation	RMSE	Theil's U
AA	0.9592	0.0048	0.2566
AXP	0.9940	0.0051	0.1086
BA	0.9171	0.0049	0.3014
C	0.9764	0.0105	0.2409
CAT	0.9421	0.0042	0.2621
DD	0.9118	0.0043	0.3012
DIS	0.9833	0.0062	0.1823
EK	0.9450	0.0046	0.2856
GE	0.9213	0.0048	0.3180
GM	0.9486	0.0049	0.3417
HD	0.9595	0.0058	0.2524
HON	0.9643	0.0063	0.2669
HPQ	0.9636	0.0069	0.2212
IBM	0.9941	0.0062	0.1381
INTC	0.9112	0.0084	0.3404
IP	0.9219	0.0051	0.2975
JNJ	0.9146	0.0030	0.3302
JPM	0.9399	0.0050	0.2697
KO	0.9389	0.0032	0.3142
MCD	0.9532	0.0034	0.2759
MMM	0.9075	0.0042	0.3857
MO	0.9927	0.0200	0.4912
MRK	0.9928	0.0055	0.1264
MSFT	0.9597	0.0124	0.5508
PG	0.9439	0.0079	0.4760
SBC	0.9285	0.0044	0.3344
T	0.8987	0.0064	0.3512
UTX	0.9945	0.0056	0.1670
WMT	0.8722	0.0078	0.4176
XOM	0.9005	0.0039	0.3905

Note: The table reports the correlation, the root mean squared error (RMSE), and Theil's U statistic for the two jump component series based on the simple and sequential jumps identification schemes. Observations where both series are zero have been removed.

Table A5: Leverage and Volatility Feedback Effect Estimates

Ticker	Leverage	Feedback	p-value
AA	0.0053 (0.0013)	0.0100 (0.0025)	0.600
AXP	-0.0306^c (-0.0059)	0.0068 (0.0017)	0.001
BA	-0.0104 (-0.0026)	-0.0069 (-0.0011)	0.716
C	-0.0025^a (-0.0049)	0.0109 (0.0024)	0.020
CAT	0.0029 (0.0009)	0.0088 (0.0023)	0.481
DD	-0.0119^b (-0.0032)	0.0140^b (0.0038)	0.001
DIS	0.0050 (0.0007)	0.0217^c (0.0046)	0.154
EK	-0.0121 (-0.0031)	-0.0006 (-0.0001)	0.316
GE	-0.0222^c (-0.0058)	0.0045 (0.0015)	0.004
GM	-0.0192^c (-0.0060)	-0.0010 (0.0003)	0.038
HD	-0.0357^c (-0.0069)	0.0016 (0.0006)	0.005
HON	-0.0461^c (-0.0092)	-0.0098 (-0.0016)	0.019
HPQ	-0.0192^a (-0.0026)	0.0163^a (0.0029)	0.034
IBM	-0.0253^c (-0.0068)	0.0102^b (0.0025)	0.000
INTC	-0.0560^c (-0.0075)	0.0098 (0.0058)	0.000
IP	-0.0097^a (-0.0019)	0.0095^a (0.0020)	0.047
JNJ	-0.0021 (-0.0011)	0.0139^c (0.0058)	0.010
JPM	-0.0046 (-0.0008)	0.0226^a (0.0045)	0.145
KO	-0.0064^a (-0.0022)	0.0051 (0.0023)	0.041
MCD	-0.0184^b (-0.0051)	0.0065 (0.0019)	0.009
MMM	-0.0051 (-0.0015)	0.0041 (0.0016)	0.162
MO	-0.0294^c (-0.0082)	-0.0155 (-0.0041)	0.214
MRK	-0.0083^a (-0.0029)	0.0162^c (0.0047)	0.001
MSFT	-0.0294^c (-0.0064)	0.0103 (0.0026)	0.000
PG	-0.0145^c (-0.0046)	-0.0044 (-0.0012)	0.227
SBC	-0.0199^b (-0.0045)	0.0139^b (0.0030)	0.001
T	0.0039 (0.0007)	0.0163^b (0.0039)	0.279
UTX	-0.0309^c (-0.0075)	0.0078 (0.0022)	0.000
WMT	-0.0364^c (-0.0083)	0.0165^b (0.0039)	0.000
XOM	-0.0121^a (-0.0046)	0.0092^a (0.0037)	0.000
SP500	-0.0126^c (-0.0081)	0.0063^a (0.0042)	0.000

Note: The two main columns report the leverage and volatility feedback effect estimates based on the (average) cross-covariances (multiplied by 10^5), as described in the main text of the paper. The superscripts a, b, and c refer to significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses give the corresponding (average) cross-covariances. The last column reports the p-values for the test for significant differences in the mean leverage and volatility feedback effects for each of the stocks calculated on the basis of an autocorrelation heteroskedasticity consistent robust covariance matrix estimator.

Table A6: Normality Tests for Stocks AA, AXP, BA, C and CAT

Ticker	m_1	p_1	m_2	p_2	m_3	p_3	m_4	p_4	p_{joint}	$p_{\text{joint-dm}}$
AA										
$R_t/\sqrt{Var(R_t)}$	-0.0013	0.9622	0.9992	0.9841	0.5293	0.0000	5.0647	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0057	0.8397	0.9850	0.7069	0.4797	0.0000	4.8573	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0341	0.2266	1.1737	0.0000	0.1284	0.2403	3.6360	0.0101	0.0000	0.0000
$\tilde{R}_t/\sqrt{CV_t}$	-0.0443	0.1164	1.2119	0.0000	0.0079	0.9425	3.9528	0.0002	0.0000	0.0000
$\hat{R}_t/\sqrt{CVS_t}$	-0.0437	0.1220	1.1792	0.0000	0.0265	0.8083	3.7326	0.0035	0.0000	0.0000
$\hat{R}_k^*/\sqrt{E(CVS_t)}$	-0.0027	0.9267	1.2058	0.0000	-0.0180	0.8718	3.9207	0.0002	0.0000	0.0000
$\hat{R}_{5k,5}^*/\sqrt{5E(CVS_t)}$	-0.0130	0.8382	1.1577	0.0791	0.2327	0.3441	4.0151	0.0951	0.1689	0.1601
AXP										
$R_t/\sqrt{Var(R_t)}$	-0.0066	0.8146	0.9992	0.9850	-0.0503	0.6452	4.5829	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0046	0.8702	0.9786	0.5923	-0.0199	0.8556	3.7047	0.0048	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0044	0.8754	1.0505	0.2059	0.1571	0.1508	2.9843	0.8302	0.0407	0.0381
$\tilde{R}_t/\sqrt{CV_t}$	-0.0065	0.8167	1.0770	0.0537	0.1512	0.1667	3.2073	0.3073	0.0150	0.0090
$\hat{R}_t/\sqrt{CVS_t}$	-0.0034	0.9035	1.0523	0.1901	0.1580	0.1483	3.0090	0.7613	0.0221	0.0169
$\hat{R}_k^*/\sqrt{E(CVS_t)}$	-0.0200	0.4913	1.0319	0.4369	-0.0428	0.7040	2.6373	0.4606	0.0224	0.0279
$\hat{R}_{5k,5}^*/\sqrt{5E(CVS_t)}$	-0.0443	0.4867	0.9613	0.6674	-0.1169	0.6353	2.4566	0.4075	0.8081	0.8913
BA										
$R_t/\sqrt{Var(R_t)}$	0.0371	0.1891	1.0006	0.9885	0.1010	0.3557	4.6790	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0425	0.1326	0.9963	0.9256	0.1154	0.2912	4.5216	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0525	0.0628	0.9298	0.0785	0.1592	0.1453	2.3603	0.0412	0.0766	0.2485
$\tilde{R}_t/\sqrt{CV_t}$	0.0275	0.3293	0.9560	0.2703	0.1140	0.2971	2.4674	0.0980	0.2610	0.3446
$\hat{R}_t/\sqrt{CVS_t}$	0.0257	0.3622	0.9314	0.0858	0.0923	0.3987	2.3550	0.0393	0.1953	0.2531
$\hat{R}_k^*/\sqrt{E(CVS_t)}$	0.0204	0.4804	0.9978	0.9579	0.0235	0.8341	2.5910	0.3267	0.2308	0.2818
$\hat{R}_{5k,5}^*/\sqrt{5E(CVS_t)}$	0.0462	0.4672	1.0880	0.3273	0.3087	0.2094	4.0264	0.0914	0.2088	0.3119
C										
$R_t/\sqrt{Var(R_t)}$	-0.0428	0.1312	1.0010	0.9795	0.1364	0.2148	7.6305	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0143	0.6144	1.0000	0.9991	-0.1776	0.1062	4.3208	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0356	0.2099	0.8387	0.0001	-0.0044	0.9683	1.8834	0.0002	0.0002	0.0008
$\tilde{R}_t/\sqrt{CV_t}$	-0.0372	0.1902	0.8452	0.0001	-0.0427	0.6978	1.9754	0.0006	0.0010	0.0026
$\hat{R}_t/\sqrt{CVS_t}$	-0.0360	0.2053	0.8352	0.0000	-0.0258	0.8148	1.9262	0.0003	0.0003	0.0009
$\hat{R}_k^*/\sqrt{E(CVS_t)}$	-0.0388	0.1837	0.9479	0.2073	-0.1099	0.3318	2.5854	0.3694	0.4688	0.7554
$\hat{R}_{5k,5}^*/\sqrt{5E(CVS_t)}$	-0.0894	0.1619	0.8692	0.1478	-0.2372	0.3378	1.7745	0.0569	0.1917	0.3617
CAT										
$R_t/\sqrt{Var(R_t)}$	-0.0446	0.1142	1.0012	0.9762	0.0645	0.5549	4.0521	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0497	0.0780	0.9981	0.9615	-0.0485	0.6574	3.6947	0.0054	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0577	0.0410	1.0267	0.5042	-0.0518	0.6355	3.0050	0.7724	0.0851	0.3906
$\tilde{R}_t/\sqrt{CV_t}$	-0.0600	0.0335	1.0584	0.1436	-0.1223	0.2633	3.2897	0.1873	0.1130	0.5326
$\hat{R}_t/\sqrt{CVS_t}$	-0.0569	0.0437	1.0189	0.6361	-0.0663	0.5444	2.9537	0.9173	0.1323	0.5491
$\hat{R}_k^*/\sqrt{E(CVS_t)}$	-0.0448	0.1202	1.0800	0.0497	-0.1163	0.2973	3.1881	0.2627	0.1028	0.2704
$\hat{R}_{5k,5}^*/\sqrt{5E(CVS_t)}$	-0.0953	0.1334	1.1518	0.0909	-0.0119	0.9615	3.9204	0.1301	0.0805	0.1328

Table A6 cont.: Normality Tests for Stocks DD, DIS, EK, GE and GM

Ticker	m_1	p_1	m_2	p_2	m_3	p_3	m_4	p_4	p_{joint}	$p_{\text{joint-dm}}$
DD										
$R_t/\sqrt{Var(R_t)}$	0.0128	0.6494	0.9994	0.9874	0.3109	0.0045	4.7612	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0121	0.6689	0.9857	0.7196	0.3195	0.0035	4.4075	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0027	0.9240	0.9331	0.0939	0.2061	0.0594	2.5258	0.1489	0.0162	0.0142
$\tilde{R}_t/\sqrt{CV_t}$	-0.0084	0.7664	0.9427	0.1510	0.1648	0.1317	2.5471	0.1718	0.0289	0.0276
$\hat{R}_t/\sqrt{CVS_t}$	-0.0033	0.9063	0.9268	0.0666	0.1851	0.0904	2.4567	0.0904	0.0136	0.0123
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0033	0.9082	1.0575	0.1592	0.2148	0.0546	3.2094	0.2415	0.0167	0.0178
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.0162	0.7988	0.9712	0.7476	0.0138	0.9552	2.4606	0.4049	0.8179	0.8327
DIS										
$R_t/\sqrt{Var(R_t)}$	-0.0134	0.6343	0.9994	0.9877	0.0768	0.4822	4.3863	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0187	0.5069	0.9867	0.7398	-0.0446	0.6832	4.3731	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0327	0.2467	0.9044	0.0166	-0.0233	0.8311	2.1274	0.0039	0.0129	0.0204
$\tilde{R}_t/\sqrt{CV_t}$	-0.0403	0.1531	0.9302	0.0802	-0.1135	0.2993	2.4743	0.1032	0.2484	0.3698
$\hat{R}_t/\sqrt{CVS_t}$	-0.0345	0.2222	0.8799	0.0026	-0.0664	0.5434	2.0933	0.0026	0.0136	0.0196
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0148	0.6091	0.9725	0.5010	-0.0378	0.7360	2.5674	0.3036	0.7230	0.7694
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.0282	0.6580	0.9663	0.7083	0.0606	0.8057	2.6918	0.6500	0.8602	0.9000
EK										
$R_t/\sqrt{Var(R_t)}$	-0.0581	0.0396	1.0026	0.9485	-0.5582	0.0000	8.1642	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0681	0.0159	1.0004	0.9914	-0.6332	0.0000	8.5247	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0810	0.0041	0.8478	0.0001	-0.0769	0.4820	2.0331	0.0013	0.0000	0.0003
$\tilde{R}_t/\sqrt{CV_t}$	-0.0699	0.0132	0.8939	0.0078	-0.0800	0.4642	2.3318	0.0320	0.0018	0.0207
$\hat{R}_t/\sqrt{CVS_t}$	-0.0716	0.0112	0.8622	0.0006	-0.0662	0.5446	2.1187	0.0036	0.0001	0.0016
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0400	0.1695	1.0713	0.0831	-0.0301	0.7894	3.0523	0.4566	0.0593	0.1205
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.1043	0.1012	1.0342	0.7042	-0.2700	0.2732	2.6607	0.6184	0.2132	0.5777
GE										
$R_t/\sqrt{Var(R_t)}$	-0.0099	0.7260	0.9993	0.9860	0.1136	0.2987	4.6779	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0212	0.4528	0.9906	0.8132	-0.1219	0.2650	4.0252	0.0001	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0048	0.8660	1.0031	0.9372	0.1630	0.1361	2.7449	0.5150	0.0989	0.0890
$\tilde{R}_t/\sqrt{CV_t}$	-0.0044	0.8761	0.9965	0.9304	0.1303	0.2333	2.7468	0.5195	0.1664	0.1403
$\hat{R}_t/\sqrt{CVS_t}$	-0.0025	0.9294	0.9894	0.7909	0.1370	0.2100	2.7114	0.4400	0.1648	0.1407
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0209	0.4689	0.9391	0.1362	-0.0616	0.5824	2.3854	0.0979	0.3916	0.4587
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.0381	0.5482	1.0155	0.8628	-0.1877	0.4454	3.3306	0.5657	0.8414	0.9147
GM										
$R_t/\sqrt{Var(R_t)}$	-0.0614	0.0297	1.0030	0.9407	-0.1011	0.3552	3.9479	0.0002	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0581	0.0397	0.9767	0.5590	-0.0417	0.7030	3.5313	0.0284	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0791	0.0051	1.2509	0.0000	-0.1396	0.2016	4.1136	0.0000	0.0000	0.0000
$\tilde{R}_t/\sqrt{CV_t}$	-0.0833	0.0032	1.2700	0.0000	-0.1875	0.0864	4.2958	0.0000	0.0000	0.0000
$\hat{R}_t/\sqrt{CVS_t}$	-0.0840	0.0029	1.2457	0.0000	-0.1688	0.1227	4.1078	0.0000	0.0000	0.0000
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0719	0.0134	1.3383	0.0000	-0.3245	0.0040	4.8491	0.0000	0.0000	0.0000
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.1591	0.0124	1.2387	0.0080	-0.5198	0.0349	4.3316	0.0296	0.0091	0.2074

Table A6 cont.: Normality Tests for Stocks HD, HON, HPQ, IBM and INTC

Ticker	m_1	p_1	m_2	p_2	m_3	p_3	m_4	p_4	p_{joint}	$p_{\text{joint-dm}}$
HD										
$R_t/\sqrt{Var(R_t)}$	-0.0406	0.1507	1.0008	0.9830	0.1111	0.3095	4.7731	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0412	0.1447	0.9741	0.5164	0.0604	0.5809	4.0722	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0316	0.2636	1.0089	0.8226	0.0387	0.7235	2.6000	0.2400	0.0057	0.0114
$\tilde{R}_t/\sqrt{CV_t}$	-0.0309	0.2742	1.0308	0.4408	0.0216	0.8432	2.6636	0.3446	0.0017	0.0030
$\hat{R}_t/\sqrt{CVS_t}$	-0.0299	0.2891	1.0060	0.8800	0.0283	0.7960	2.5488	0.1738	0.0041	0.0078
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0427	0.1401	1.0682	0.0959	-0.1459	0.1935	2.9087	0.8334	0.0155	0.0417
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.0874	0.1695	0.9910	0.9206	-0.1653	0.5025	2.6876	0.6504	0.5803	0.9337
HON										
$R_t/\sqrt{Var(R_t)}$	-0.0322	0.2538	1.0002	0.9952	-0.6711	0.0000	8.4935	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0283	0.3159	0.9976	0.9528	-0.5925	0.0000	7.9188	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0103	0.7150	1.0808	0.0429	0.0248	0.8203	3.3133	0.1604	0.2441	0.1195
$\tilde{R}_t/\sqrt{CV_t}$	-0.0264	0.3492	1.1132	0.0046	0.0079	0.9421	3.5644	0.0208	0.0272	0.0124
$\hat{R}_t/\sqrt{CVS_t}$	-0.0281	0.3197	1.0672	0.0921	0.0261	0.8110	3.2504	0.2393	0.1409	0.0986
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0463	0.1139	1.1051	0.0112	-0.2398	0.0346	3.3114	0.0997	0.0111	0.0487
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.1045	0.1013	1.1420	0.1153	-0.2887	0.2423	4.5269	0.0128	0.0272	0.0785
HPQ										
$R_t/\sqrt{Var(R_t)}$	0.0074	0.7925	0.9993	0.9852	0.2672	0.0147	4.6537	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0075	0.7894	0.9824	0.6603	0.2907	0.0079	4.7255	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0095	0.7366	1.0486	0.2242	0.1043	0.3406	2.8920	0.9052	0.0539	0.0550
$\tilde{R}_t/\sqrt{CV_t}$	0.0063	0.8229	1.0356	0.3737	0.0939	0.3907	2.8250	0.7181	0.0847	0.0841
$\hat{R}_t/\sqrt{CVS_t}$	0.0063	0.8226	1.0288	0.4712	0.1018	0.3523	2.7767	0.5922	0.0720	0.0710
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0020	0.9451	1.0117	0.7764	-0.0787	0.4863	2.8148	0.9066	0.6575	0.6568
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.0179	0.7788	1.0161	0.8586	0.0313	0.8993	3.1704	0.7510	0.9928	0.9963
IBM										
$R_t/\sqrt{Var(R_t)}$	-0.0114	0.6869	0.9993	0.9867	0.0767	0.4829	4.8981	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0179	0.5262	0.9728	0.4953	-0.0010	0.9924	4.3591	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0130	0.6439	1.0219	0.5839	0.0935	0.3924	2.7572	0.5441	0.0373	0.0442
$\tilde{R}_t/\sqrt{CV_t}$	-0.0213	0.4511	1.0293	0.4635	0.0880	0.4207	2.8093	0.6758	0.0202	0.0289
$\hat{R}_t/\sqrt{CVS_t}$	-0.0246	0.3841	1.0203	0.6114	0.0751	0.4922	2.7644	0.5615	0.0256	0.0413
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0290	0.3157	1.0398	0.3305	-0.0279	0.8033	2.9176	0.8583	0.3157	0.4444
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.0598	0.3465	1.0529	0.5557	-0.1811	0.4615	2.6768	0.6298	0.2499	0.3487
INTC										
$R_t/\sqrt{Var(R_t)}$	-0.0202	0.4739	0.9996	0.9922	-0.0093	0.9323	4.0023	0.0001	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0231	0.4130	0.9845	0.6982	-0.0886	0.4180	3.7339	0.0035	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0053	0.8513	1.1430	0.0003	0.1922	0.0789	3.5605	0.0216	0.0001	0.0000
$\tilde{R}_t/\sqrt{CV_t}$	0.0026	0.9271	1.1446	0.0003	0.1675	0.1256	3.6386	0.0099	0.0004	0.0001
$\hat{R}_t/\sqrt{CVS_t}$	0.0020	0.9441	1.1278	0.0014	0.1687	0.1230	3.5182	0.0320	0.0012	0.0003
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0268	0.3517	0.9848	0.7090	-0.0299	0.7885	2.8718	0.9843	0.7160	0.8494
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.0560	0.3778	0.9747	0.7778	-0.1426	0.5619	2.9095	0.9156	0.9157	0.9950

Table A6 cont.: Normality Tests for Stocks IP, JNJ, JPM, KO and MCD

Ticker	m_1	p_1	m_2	p_2	m_3	p_3	m_4	p_4	p_{joint}	$p_{\text{joint-dm}}$
IP										
$R_t/\sqrt{Var(R_t)}$	-0.0640	0.0234	1.0033	0.9342	0.1503	0.1692	4.0798	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0712	0.0116	0.9805	0.6258	-0.0312	0.7753	3.4195	0.0738	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0681	0.0159	0.9353	0.1048	-0.0299	0.7842	2.3500	0.0376	0.0012	0.0289
$\tilde{R}_t/\sqrt{CV_t}$	-0.0618	0.0285	0.9507	0.2170	-0.0537	0.6235	2.5235	0.1466	0.0253	0.2135
$\hat{R}_t/\sqrt{CVS_t}$	-0.0614	0.0296	0.9326	0.0915	-0.0249	0.8196	2.4044	0.0598	0.0058	0.0630
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0582	0.0432	1.0930	0.0224	-0.1657	0.1375	3.1792	0.2819	0.0124	0.0784
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.1275	0.0451	0.9547	0.6146	-0.0964	0.6956	2.6639	0.6133	0.1028	0.4712
JNJ										
$R_t/\sqrt{Var(R_t)}$	0.0474	0.0935	1.0014	0.9711	0.2218	0.0425	4.9252	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0437	0.1212	0.9700	0.4521	0.1934	0.0769	3.9416	0.0002	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0377	0.1822	0.8962	0.0093	0.1591	0.1457	2.2501	0.0147	0.0438	0.0585
$\tilde{R}_t/\sqrt{CV_t}$	0.0408	0.1483	0.9067	0.0195	0.1336	0.2218	2.2819	0.0201	0.0716	0.1152
$\hat{R}_t/\sqrt{CVS_t}$	0.0428	0.1299	0.8873	0.0048	0.1471	0.1786	2.1953	0.0083	0.0246	0.0422
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0491	0.0899	0.9623	0.3574	0.1610	0.1511	2.6513	0.4793	0.4196	0.8894
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.1142	0.0720	0.8504	0.0956	-0.1225	0.6183	2.4421	0.3931	0.0023	0.0074
JPM										
$R_t/\sqrt{Var(R_t)}$	-0.0056	0.8432	0.9992	0.9847	0.7355	0.0000	11.2179	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0199	0.6124	1.0000	0.9995	0.1088	0.3196	5.3609	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0325	0.2496	1.0485	0.2245	0.0194	0.8595	2.9310	0.9826	0.0298	0.0387
$\tilde{R}_t/\sqrt{CV_t}$	-0.0405	0.1512	1.0464	0.2451	-0.0314	0.7743	2.9548	0.9142	0.0647	0.1138
$\hat{R}_t/\sqrt{CVS_t}$	-0.0428	0.1297	1.0365	0.3610	-0.0294	0.7877	2.8893	0.8973	0.0563	0.1161
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0169	0.5647	1.0779	0.0600	0.0076	0.9468	2.9587	0.6735	0.0227	0.0262
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.0340	0.5927	0.9949	0.9544	-0.2541	0.3025	2.5178	0.4813	0.5261	0.5426
KO										
$R_t/\sqrt{Var(R_t)}$	0.0663	0.0187	1.0036	0.9280	0.1896	0.0828	5.4486	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0751	0.0078	0.9858	0.7227	0.3347	0.0022	4.3434	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0728	0.0099	0.9523	0.2321	0.3366	0.0021	2.6987	0.4133	0.0185	0.2096
$\tilde{R}_t/\sqrt{CV_t}$	0.0680	0.0161	1.0171	0.6677	0.3294	0.0026	3.1288	0.4611	0.0299	0.4278
$\hat{R}_t/\sqrt{CVS_t}$	0.0699	0.0132	0.9797	0.6112	0.3332	0.0023	2.9020	0.9337	0.0283	0.3411
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0639	0.0269	1.0097	0.8121	0.1062	0.3419	2.9687	0.7280	0.1642	0.7194
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.1351	0.0334	1.0268	0.7656	0.3613	0.1418	3.0198	0.9451	0.3049	0.9950
MCD										
$R_t/\sqrt{Var(R_t)}$	0.0407	0.1491	1.0009	0.9828	-0.1446	0.1860	6.7429	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0375	0.1839	1.0004	0.9926	-0.3083	0.0048	6.8464	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0404	0.1523	0.8683	0.0010	0.1263	0.2479	2.1399	0.0045	0.0093	0.0194
$\tilde{R}_t/\sqrt{CV_t}$	0.0402	0.1544	0.9257	0.0626	0.1251	0.2524	2.4848	0.1115	0.2260	0.4304
$\hat{R}_t/\sqrt{CVS_t}$	0.0416	0.1403	0.8724	0.0014	0.1206	0.2701	2.1587	0.0056	0.0119	0.0268
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0544	0.1784	0.9981	0.9734	0.0958	0.5404	2.9946	0.8758	0.6577	0.9480
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.0984	0.1214	0.9611	0.6649	0.3320	0.1770	2.5952	0.5409	0.5736	0.9487

Table A6 cont.: Normality Tests for Stocks MM, MO, MRK, MSFT and PG

Ticker	m_1	p_1	m_2	p_2	m_3	p_3	m_4	p_4	p_{joint}	$p_{\text{joint-dm}}$
MMM										
$R_t/\sqrt{Var(R_t)}$	0.0077	0.7839	0.9993	0.9853	0.2053	0.0604	4.4250	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0067	0.8124	0.9887	0.7762	0.1971	0.0714	4.3277	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0149	0.5971	0.8875	0.0048	-0.0340	0.7557	2.2041	0.0092	0.0621	0.0544
$\tilde{R}_t/\sqrt{CV_t}$	-0.0114	0.6869	0.9085	0.0219	-0.0346	0.7515	2.3932	0.0545	0.2287	0.1896
$\hat{R}_t/\sqrt{CVS_t}$	-0.0122	0.6644	0.8827	0.0033	-0.0574	0.5995	2.2169	0.0105	0.0527	0.0435
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0123	0.6722	0.9797	0.6204	0.0361	0.7480	2.6082	0.3659	0.7641	0.7950
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.0299	0.6380	0.9974	0.9773	0.0111	0.9642	3.1362	0.7991	0.9366	0.9606
MO										
$R_t/\sqrt{Var(R_t)}$	-0.0177	0.5318	0.9995	0.9903	-0.6655	0.0000	8.1469	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0105	0.7106	0.9678	0.4194	-0.5370	0.0000	7.6965	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0029	0.9194	1.1071	0.0073	0.0692	0.5270	3.2627	0.2221	0.0101	0.0063
$\tilde{R}_t/\sqrt{CV_t}$	-0.0008	0.9770	1.1499	0.0002	0.0615	0.5737	3.5559	0.0225	0.0008	0.0003
$\hat{R}_t/\sqrt{CVS_t}$	-0.0019	0.9455	1.1076	0.0070	0.0638	0.5596	3.2265	0.2757	0.0045	0.0020
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0300	0.3075	1.1743	0.0000	-0.0593	0.6024	3.3800	0.0616	0.0000	0.0000
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.0608	0.3412	1.3292	0.0003	-0.3859	0.1189	4.9408	0.0016	0.0028	0.0071
MRK										
$R_t/\sqrt{Var(R_t)}$	0.0512	0.0696	1.0018	0.9635	0.1398	0.2010	5.4439	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0478	0.0902	0.9885	0.7725	-0.0053	0.9613	5.3820	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0536	0.0574	1.0176	0.6594	0.2851	0.0091	2.8277	0.7249	0.0368	0.1143
$\tilde{R}_t/\sqrt{CV_t}$	0.0568	0.0442	1.0077	0.8480	0.2912	0.0077	2.7697	0.5745	0.0350	0.1249
$\hat{R}_t/\sqrt{CVS_t}$	0.0528	0.0613	1.0042	0.9159	0.2870	0.0087	2.7653	0.5636	0.0432	0.1211
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0510	0.0786	1.0194	0.6358	0.2046	0.0685	2.9420	0.7825	0.3787	0.9281
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.1167	0.0666	1.1426	0.1131	0.3620	0.1418	3.5580	0.3494	0.1555	0.5856
MSFT										
$R_t/\sqrt{Var(R_t)}$	0.0094	0.7383	0.9993	0.9858	0.2211	0.0432	3.8981	0.0004	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0066	0.8149	0.9916	0.8334	0.1651	0.1311	3.5600	0.0217	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0174	0.5389	1.1276	0.0014	0.1926	0.0782	3.2160	0.2930	0.0000	0.0000
$\tilde{R}_t/\sqrt{CV_t}$	0.0164	0.5619	1.1645	0.0000	0.1926	0.0783	3.5206	0.0313	0.0000	0.0000
$\hat{R}_t/\sqrt{CVS_t}$	0.0172	0.5418	1.1331	0.0009	0.1742	0.1112	3.3082	0.1660	0.0001	0.0001
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0004	0.9878	1.0406	0.3204	0.1940	0.0826	3.1411	0.3434	0.0362	0.0366
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.0057	0.9282	1.0663	0.4602	0.1756	0.4751	3.3179	0.5828	0.7971	0.8004
PG										
$R_t/\sqrt{Var(R_t)}$	0.0809	0.0042	1.0057	0.8857	-0.0287	0.7927	6.4023	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0845	0.0028	0.9820	0.6521	-0.0651	0.5513	5.6220	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.1135	0.0001	0.8651	0.0007	0.3066	0.0050	2.1305	0.0041	0.0000	0.0044
$\tilde{R}_t/\sqrt{CV_t}$	0.1042	0.0002	0.8795	0.0025	0.2890	0.0082	2.1833	0.0073	0.0001	0.0162
$\hat{R}_t/\sqrt{CVS_t}$	0.1050	0.0002	0.8663	0.0008	0.2893	0.0081	2.1164	0.0035	0.0000	0.0056
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0719	0.0133	0.8918	0.0085	0.2108	0.0610	2.2512	0.0339	0.0086	0.0815
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.1600	0.0119	0.8375	0.0709	0.3665	0.1370	1.9701	0.1076	0.0377	0.3456

Table A6 cont.: Normality Tests for Stocks SBC, T, UTX, WMT and XOM

Ticker	m_1	p_1	m_2	p_2	m_3	p_3	m_4	p_4	p_{joint}	$p_{\text{joint-dm}}$
SBC										
$R_t/\sqrt{Var(R_t)}$	0.0090	0.7498	0.9993	0.9857	0.2213	0.0429	4.0972	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0090	0.7504	0.9742	0.5178	0.1828	0.0946	3.6803	0.0063	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0188	0.5050	1.0207	0.6048	0.1531	0.1613	2.8130	0.6855	0.1687	0.1890
$\tilde{R}_t/\sqrt{CV_t}$	0.0230	0.4148	1.0561	0.1601	0.1582	0.1480	3.0478	0.6570	0.1259	0.1626
$\hat{R}_t/\sqrt{CVS_t}$	0.0242	0.3912	1.0288	0.4710	0.1585	0.1472	2.9077	0.9500	0.2639	0.3319
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0151	0.6020	1.0403	0.3254	0.0728	0.5168	3.1209	0.3454	0.7967	0.8584
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.0310	0.6254	1.0186	0.8355	0.4636	0.0594	3.0607	0.8886	0.1834	0.2035
T										
$R_t/\sqrt{Var(R_t)}$	-0.0349	0.2169	1.0004	0.9916	0.0983	0.3685	4.3611	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0465	0.0995	0.9947	0.8940	0.0529	0.6286	4.3034	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0733	0.0095	1.0984	0.0137	-0.1751	0.1091	3.2388	0.2565	0.0016	0.0273
$\tilde{R}_t/\sqrt{CV_t}$	-0.0946	0.0008	1.1377	0.0006	-0.2550	0.0197	3.4481	0.0586	0.0000	0.0025
$\hat{R}_t/\sqrt{CVS_t}$	-0.0887	0.0017	1.1071	0.0073	-0.2064	0.0591	3.2393	0.2558	0.0001	0.0087
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0525	0.0698	1.1208	0.0032	-0.1208	0.2811	3.2834	0.1306	0.0021	0.0095
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.1137	0.0739	1.1715	0.0567	-0.5444	0.0272	3.6133	0.3064	0.0367	0.1737
UTX										
$R_t/\sqrt{Var(R_t)}$	-0.0246	0.3833	0.9998	0.9962	-0.5102	0.0000	6.7359	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0264	0.3488	0.9790	0.5984	-0.5060	0.0000	7.1273	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0172	0.5428	0.9313	0.0854	-0.0375	0.7316	2.2774	0.0192	0.1006	0.1141
$\tilde{R}_t/\sqrt{CV_t}$	-0.0101	0.7216	0.9458	0.1747	0.0184	0.8662	2.4234	0.0697	0.2871	0.2783
$\hat{R}_t/\sqrt{CVS_t}$	-0.0144	0.6091	0.9163	0.0361	-0.0093	0.9321	2.2263	0.0115	0.0817	0.0880
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0232	0.4228	1.0298	0.4667	-0.0532	0.6351	2.9987	0.6383	0.8574	0.9516
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.0575	0.3662	0.9638	0.6878	-0.1354	0.5826	2.4982	0.4465	0.7752	0.9187
WMT										
$R_t/\sqrt{Var(R_t)}$	-0.0185	0.5123	0.9995	0.9909	-0.0301	0.7833	4.5764	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	-0.0161	0.5689	0.9677	0.4178	0.0287	0.7930	3.9897	0.0001	0.0000	0.0000
$R_t/\sqrt{RV_t}$	-0.0132	0.6397	0.9488	0.1993	0.1050	0.3370	2.6264	0.2804	0.1488	0.1681
$\tilde{R}_t/\sqrt{CV_t}$	-0.0089	0.7524	0.9744	0.5215	0.1134	0.2995	2.7954	0.6393	0.2769	0.2734
$\hat{R}_t/\sqrt{CVS_t}$	-0.0116	0.6799	0.9543	0.2525	0.0950	0.3848	2.6521	0.3237	0.2446	0.2653
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	-0.0193	0.5035	1.0215	0.5978	-0.0240	0.8303	3.0130	0.6057	0.9052	0.9568
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	-0.0442	0.4861	0.7781	0.0135	-0.3031	0.2179	1.9784	0.1085	0.0612	0.0646
XOM										
$R_t/\sqrt{Var(R_t)}$	0.0105	0.7099	0.9993	0.9863	0.5357	0.0000	6.6417	0.0000	0.0000	0.0000
$R_t/\sqrt{GARCH(1,1)}$	0.0084	0.7665	0.9674	0.4141	0.4019	0.0002	5.0410	0.0000	0.0000	0.0000
$R_t/\sqrt{RV_t}$	0.0131	0.6418	0.8689	0.0010	0.1136	0.2988	2.0265	0.0012	0.0066	0.0066
$\tilde{R}_t/\sqrt{CV_t}$	0.0165	0.5600	0.8676	0.0009	0.1111	0.3096	2.0995	0.0028	0.0112	0.0117
$\hat{R}_t/\sqrt{CVS_t}$	0.0165	0.5583	0.8561	0.0003	0.1011	0.3549	1.9995	0.0008	0.0043	0.0045
$\hat{R}^*_k/\sqrt{E(CVS_t)}$	0.0124	0.6671	0.8342	0.0000	-0.0070	0.9504	2.0316	0.0031	0.0009	0.0010
$\hat{R}^*_{5k,5}/\sqrt{5E(CVS_t)}$	0.0285	0.6540	0.8065	0.0312	0.1186	0.6295	2.2390	0.2374	0.1473	0.1560

Note: The table reports the first four moments (m_1–m_4) for the different return series, along with the corresponding p-values for testing $m_1 = 0$, $m_2 = 1$, $m_3 = 0$, and $m_4 = 3$, respectively, except for the realized volatility standardized return series, for which the test for the fourth moment is based on the finite sample correction, $m_4 = 3\frac{78}{80} = 2.925$. The column labelled p_{joint} gives the p-value for testing the four moment conditions jointly, while $p_{\text{joint-dm}}$ refers to the same test involving the (unconditionally) demeaned return series. The raw daily returns are denoted by R_t, while $\tilde{R}_t$ and $\hat{R}_t$ refer to the daily jump-adjusted returns based on the simple and sequential procedures, respectively. The daily realized volatility and the corresponding continuous component based on the simple and sequential jump-adjustment procedures are denoted by RV_t, CV_t, and CVS_t, respectively. Lastly, $\hat{R}^*_k$ refers to the financial-time return series constructing from the sequential jump-adjusted intra-day returns spanning $E(CVS_t)$ time-units. Lastly, $\hat{R}^*_{5k,5} \equiv \hat{R}^*_{5k} + \hat{R}^*_{5k-1} + \hat{R}^*_{5k-2} + \hat{R}^*_{5k-3} + \hat{R}^*_{5k-4}$ defines the financial-time return series spanning $5E(CVS_t)$ time-units.

Figure A1: Generalized volatility signature plots for AA-INTC stocks

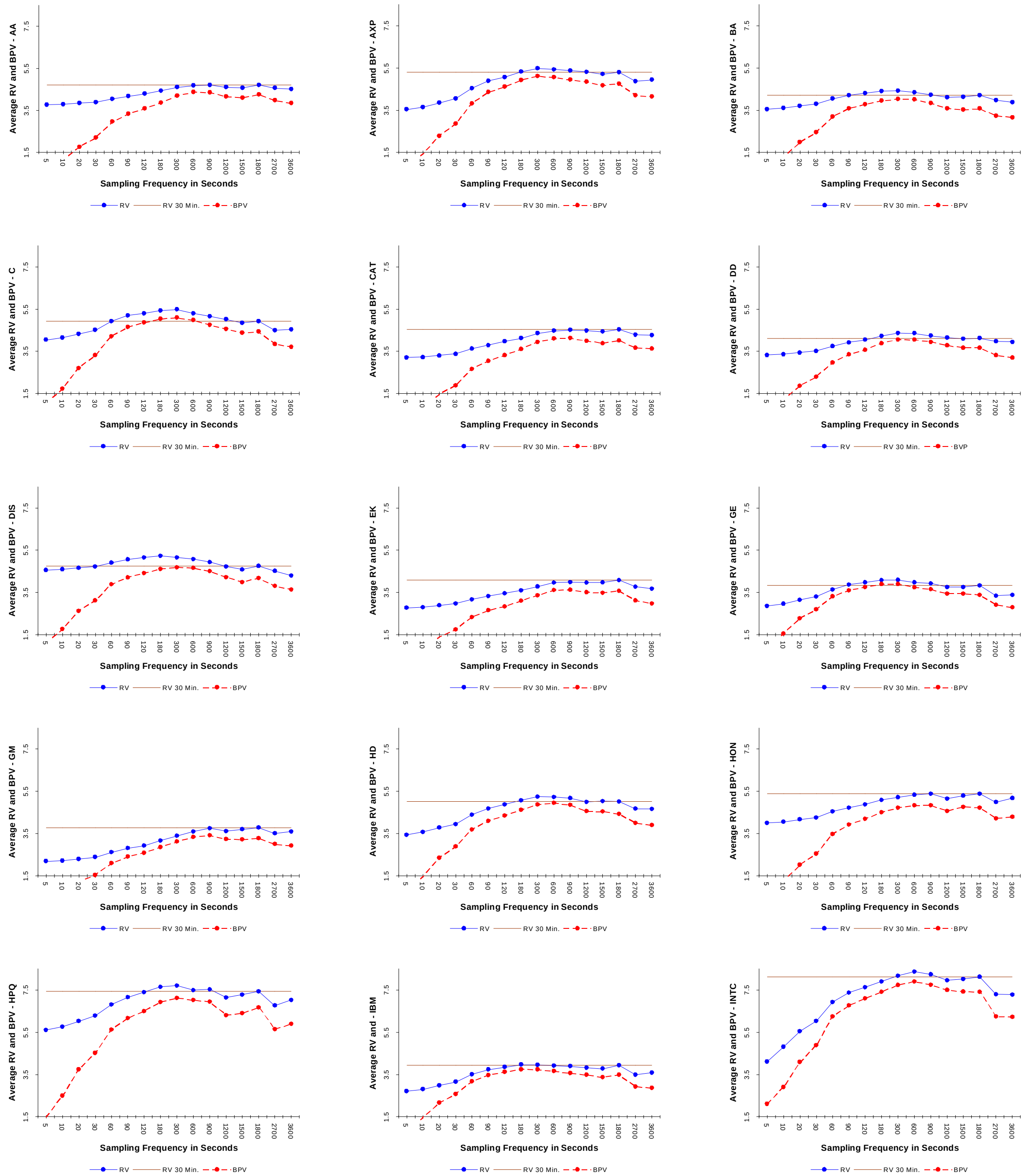


Figure A1 cont.: Generalized volatility signature plots for IP-XOM stocks

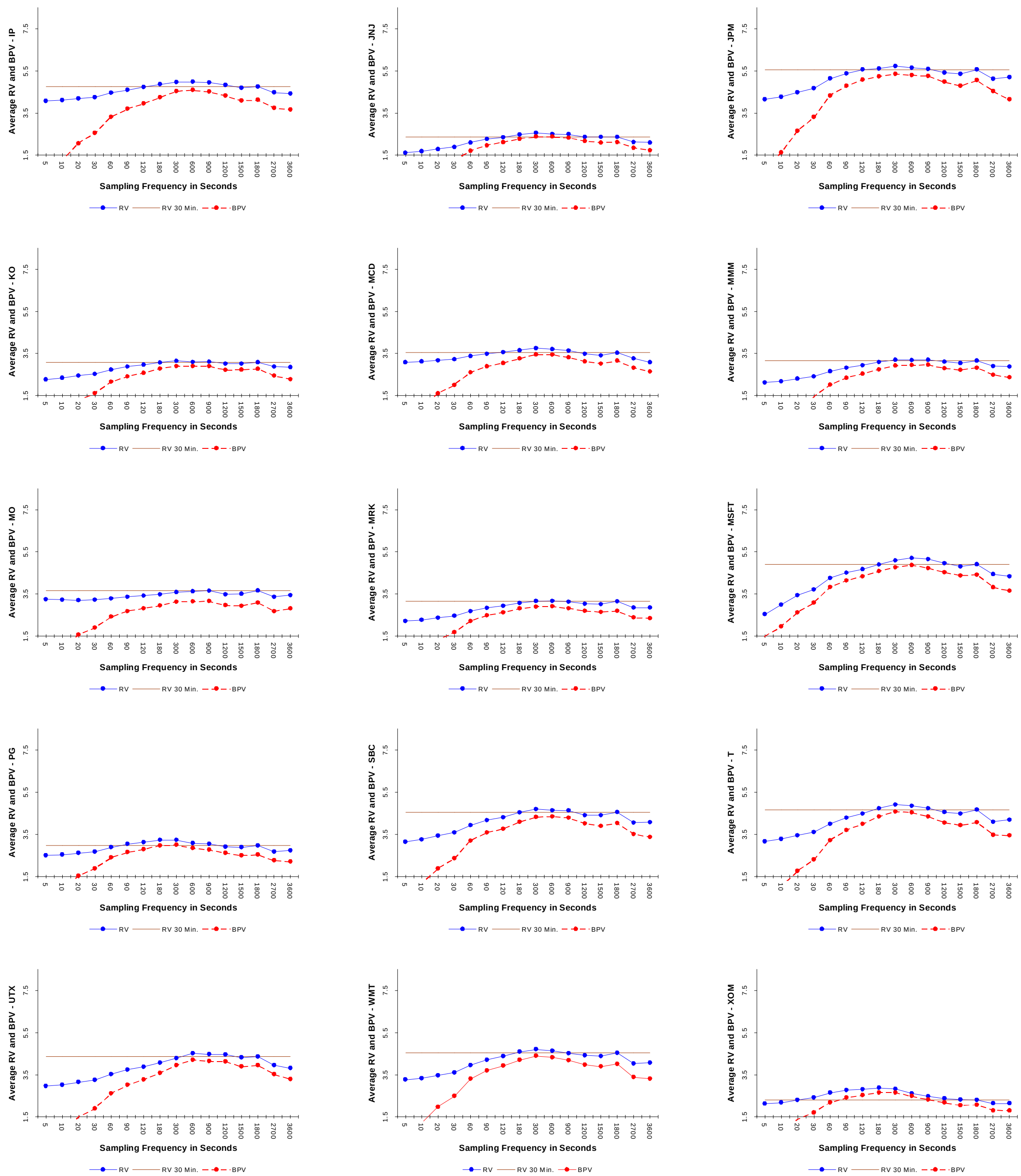


Figure A2: Histograms for number of jumps per day for AA-INTC stocks

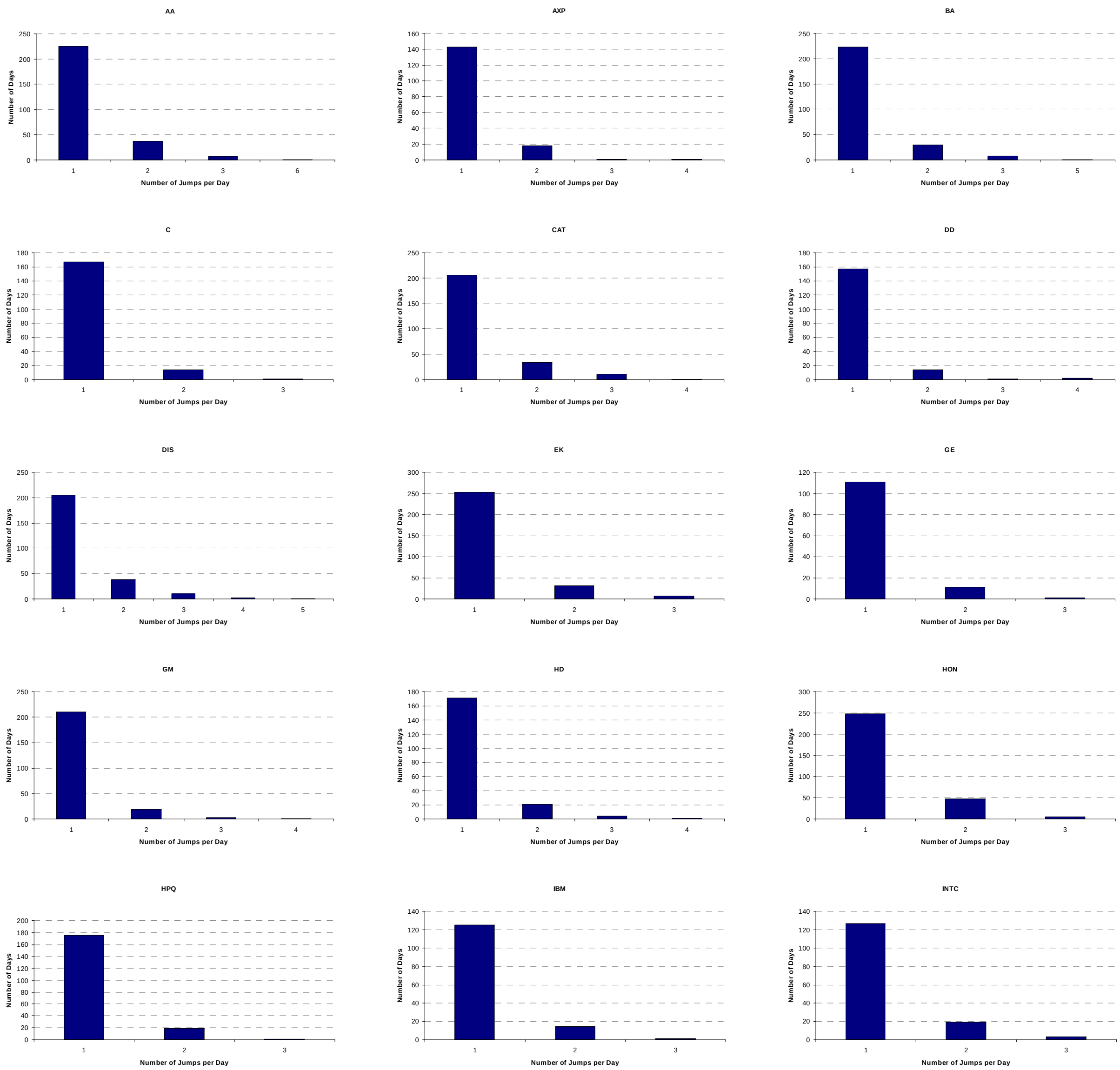


Figure A2 cont.: Histograms for number of jumps per day for IP-XOM stocks

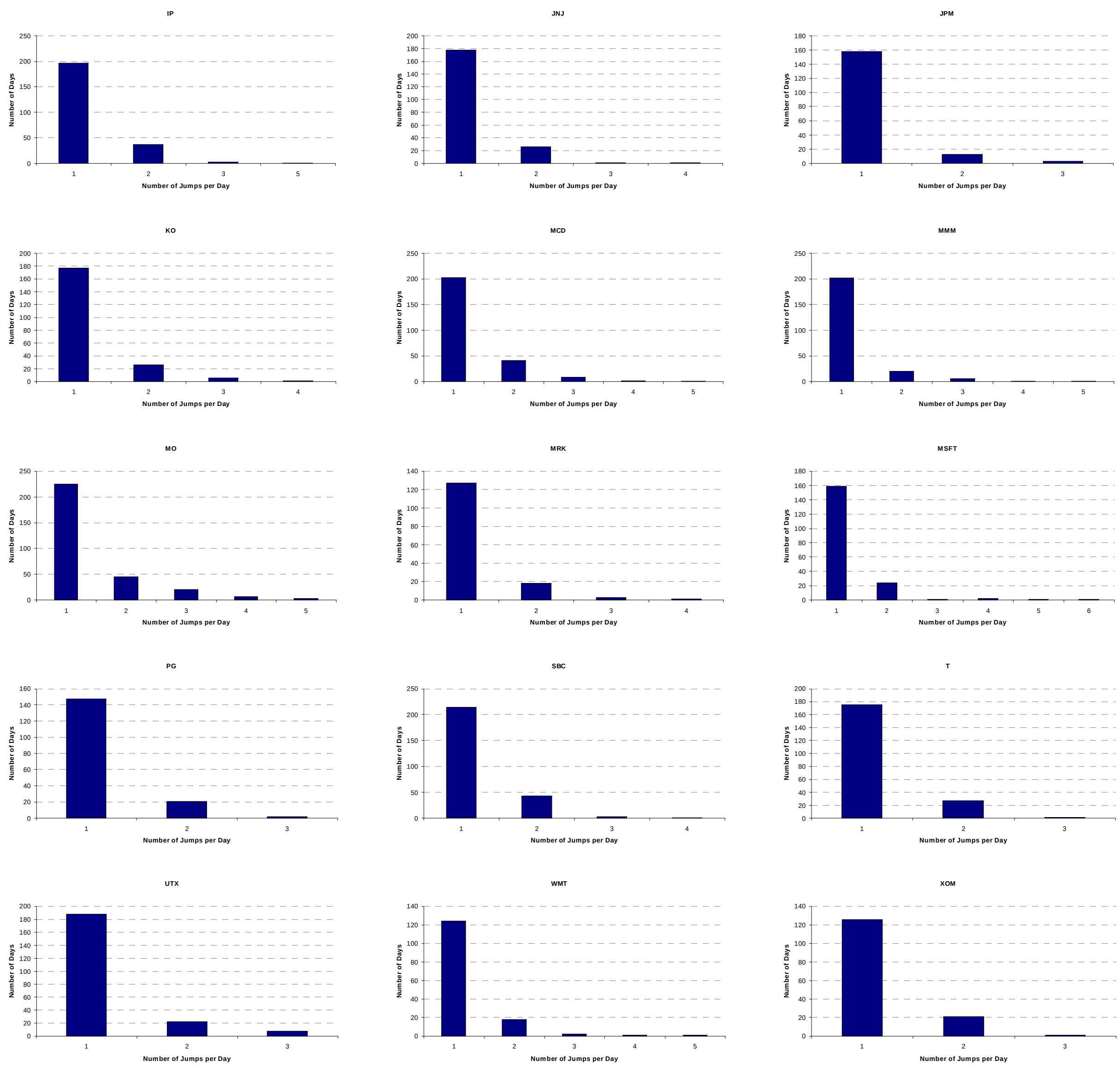


Figure A3: High-frequency leverage and volatility feedback effects, stocks AA-INTC

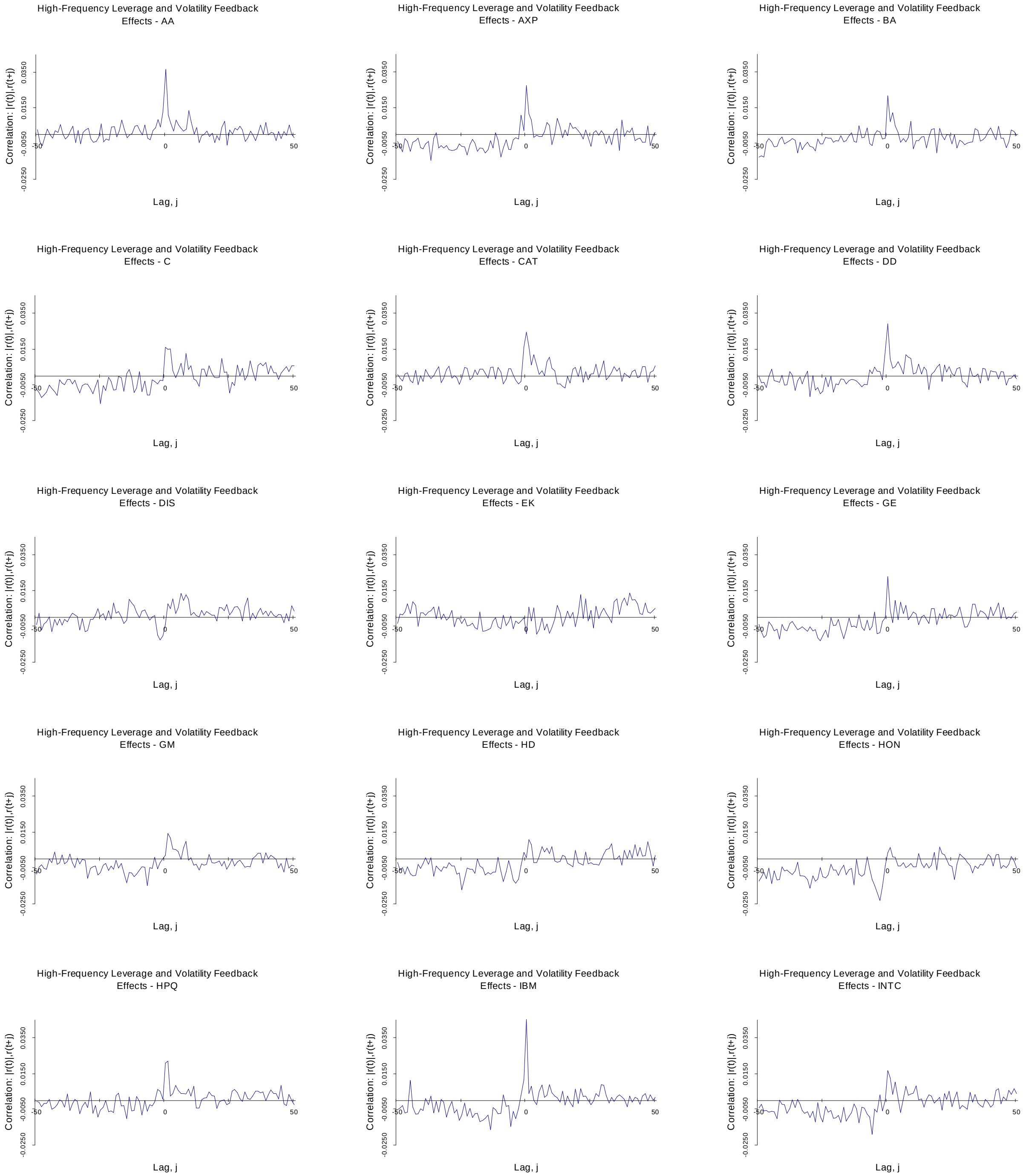


Figure A3 cont.: High-frequency leverage and volatility feedback effects, stocks IP-XOM

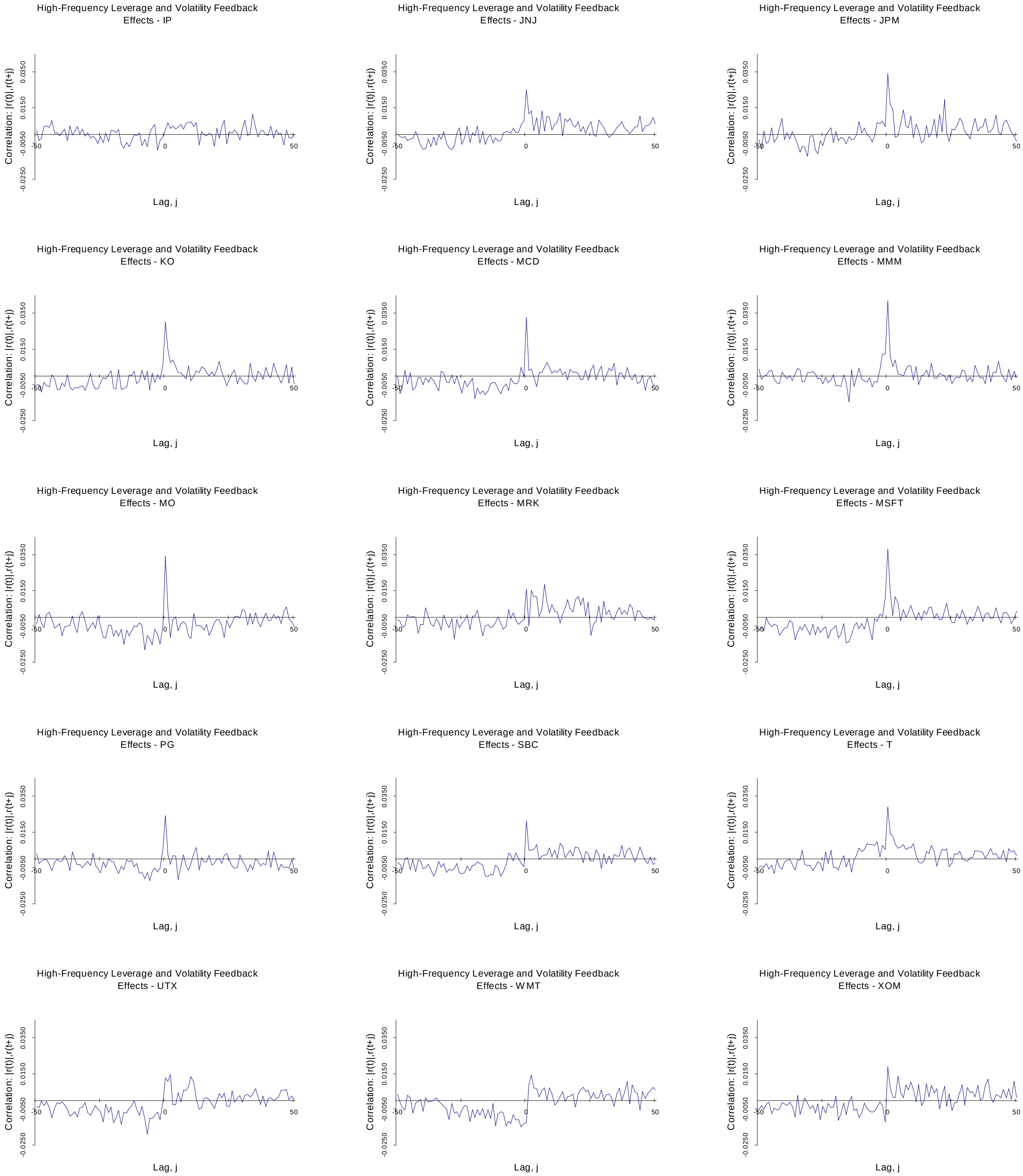


Figure A4: Density plots of daily returns for 30 DJIA stocks standardized by sample standard deviation

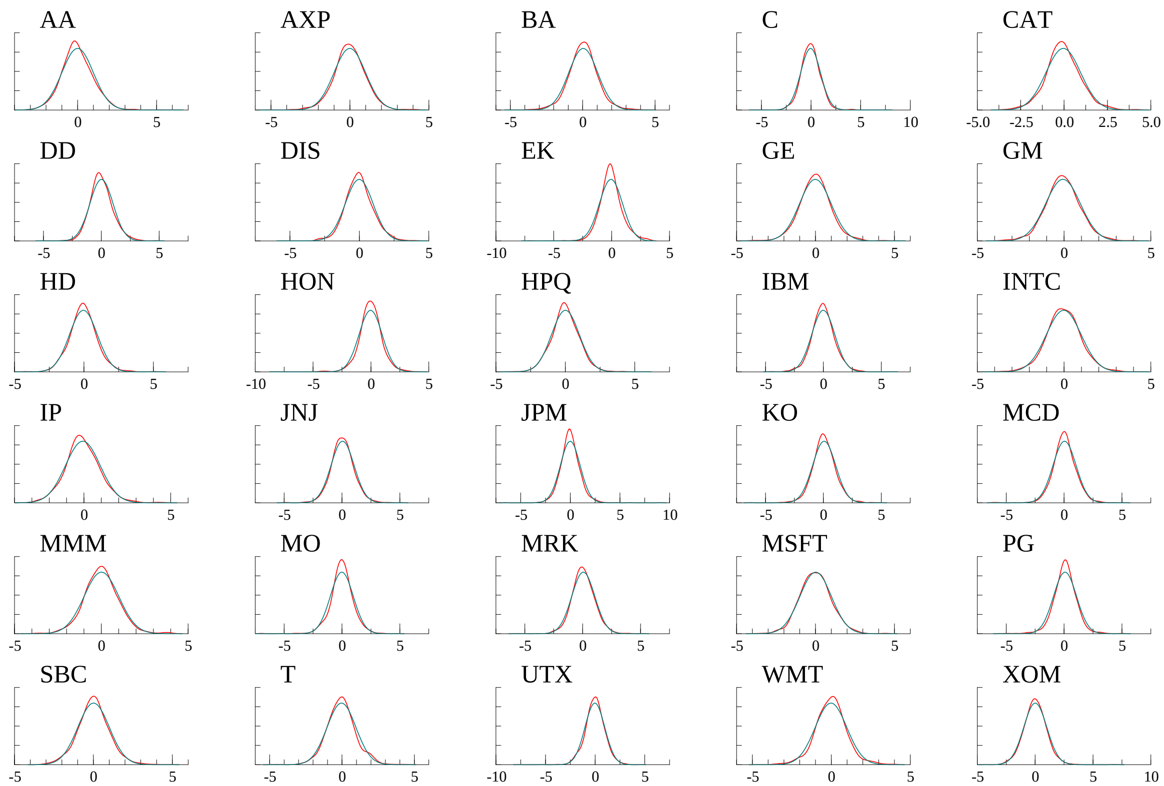


Figure A5: QQ plots of daily returns for 30 DJIA stocks standardized by sample standard deviation

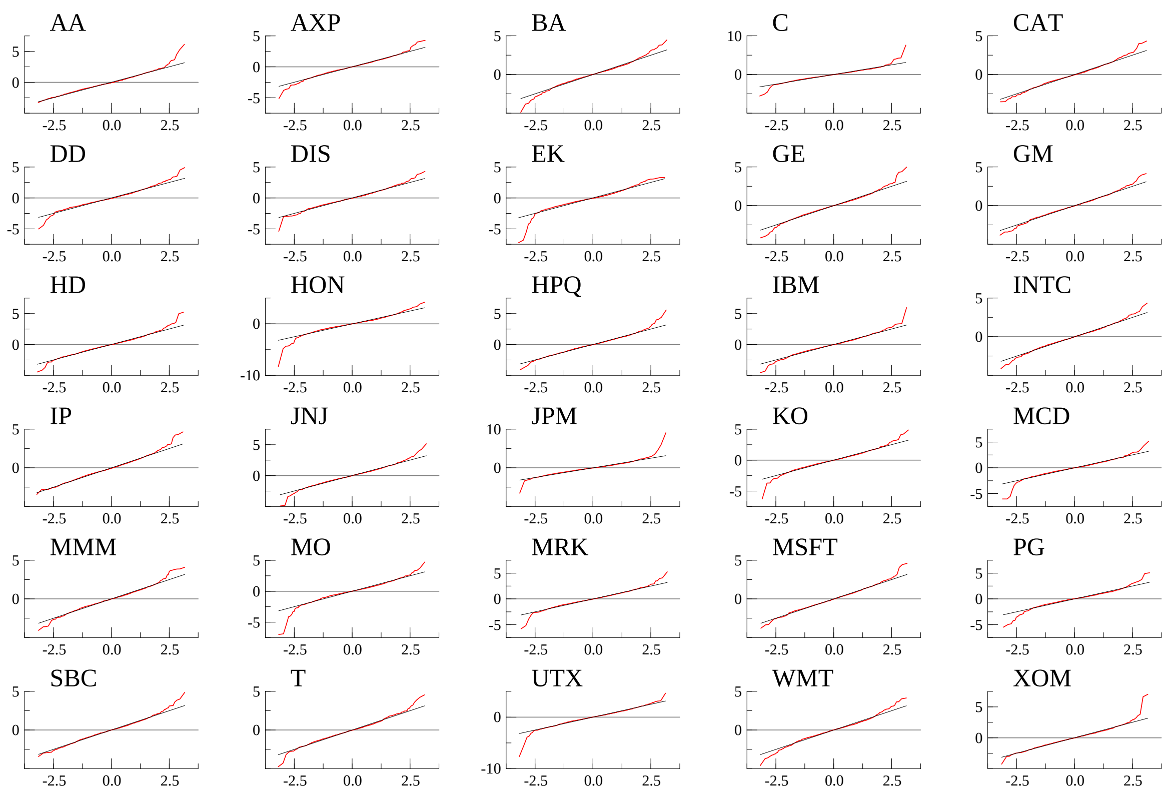


Figure A6: Density plots of daily returns for 30 DJIA stocks standardized by GARCH(1,1) standard errors

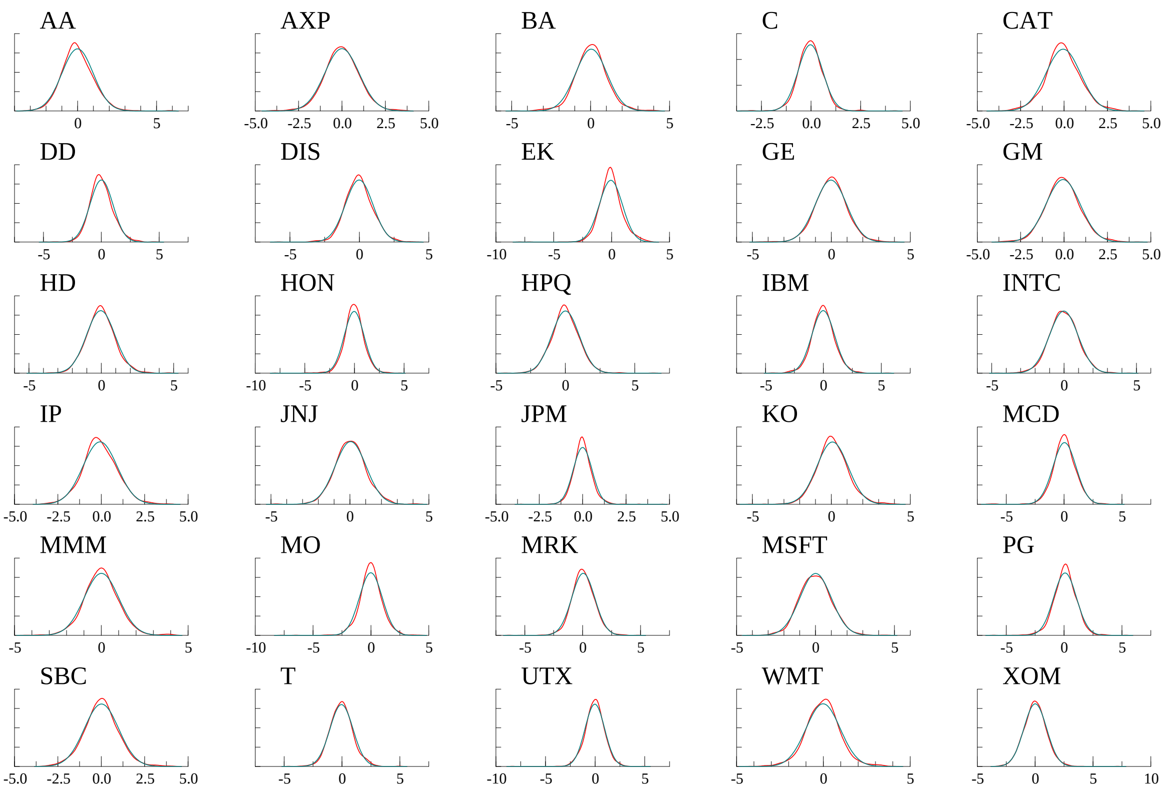


Figure A7: QQ plots of daily returns for 30 DJIA stocks standardized by GARCH(1,1) standard errors

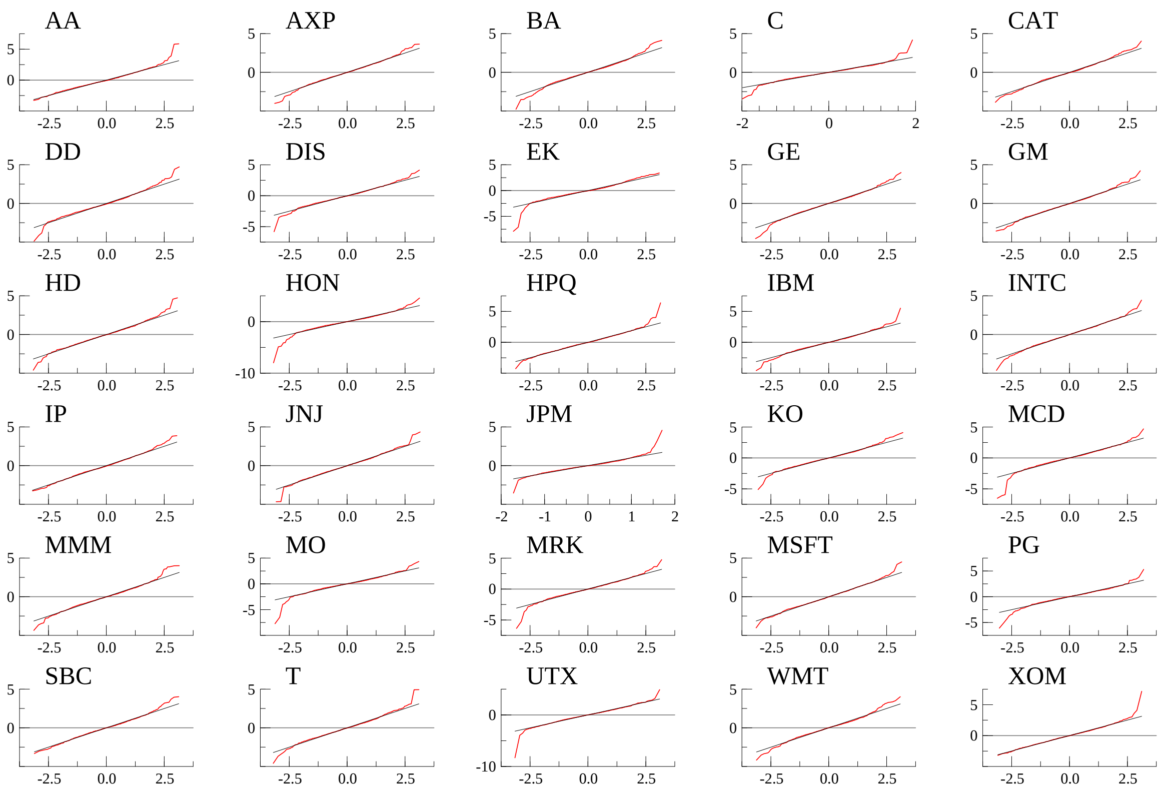


Figure A8: Density plots of daily returns for 30 DJIA stocks standardized by realized volatility

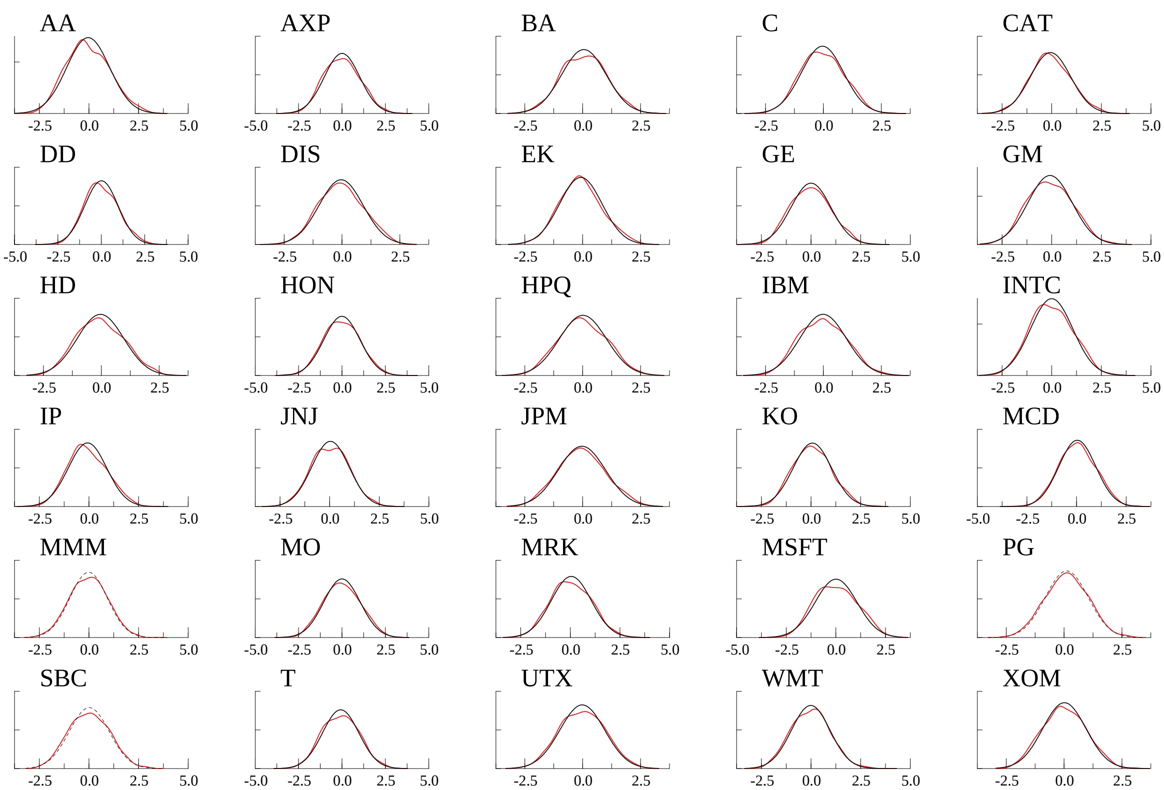


Figure A9: QQ plots of daily returns for 30 DJIA stocks standardized by realized volatility

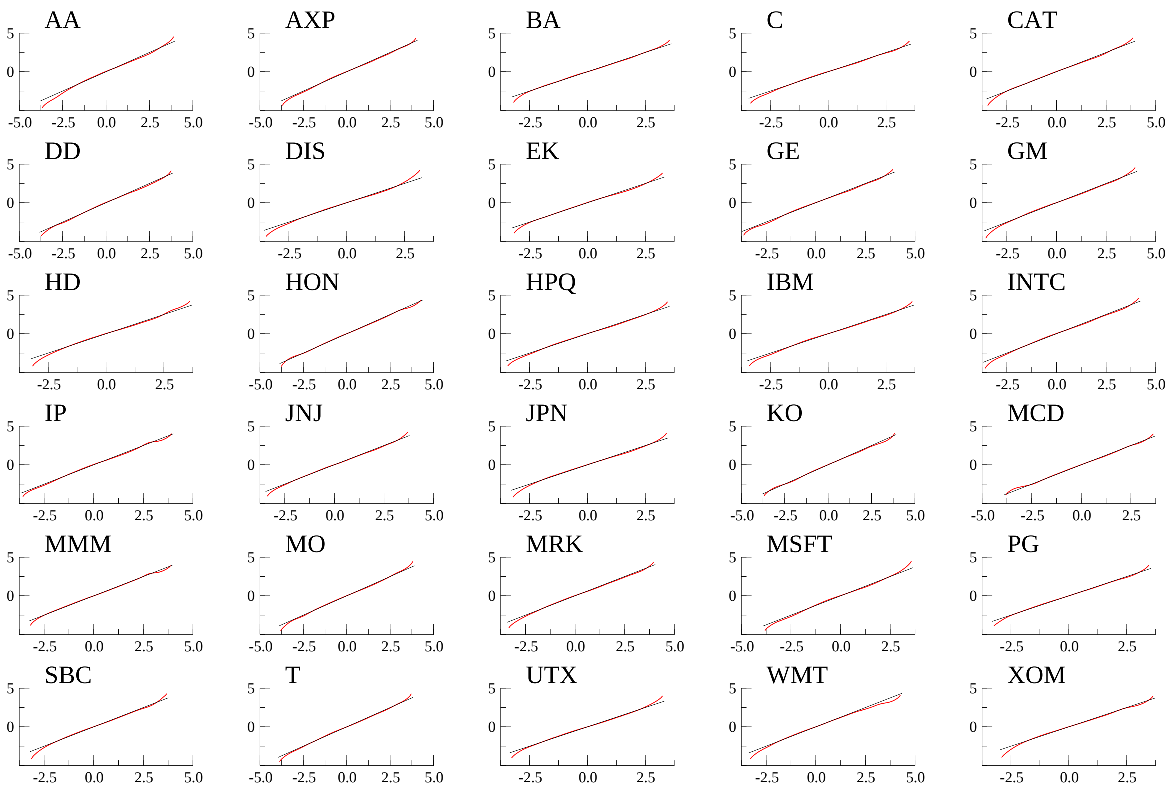


Figure A10: Density plots of jump-adjusted (simple method) daily returns for 30 DJIA stocks standardized by continuous component of realized volatility

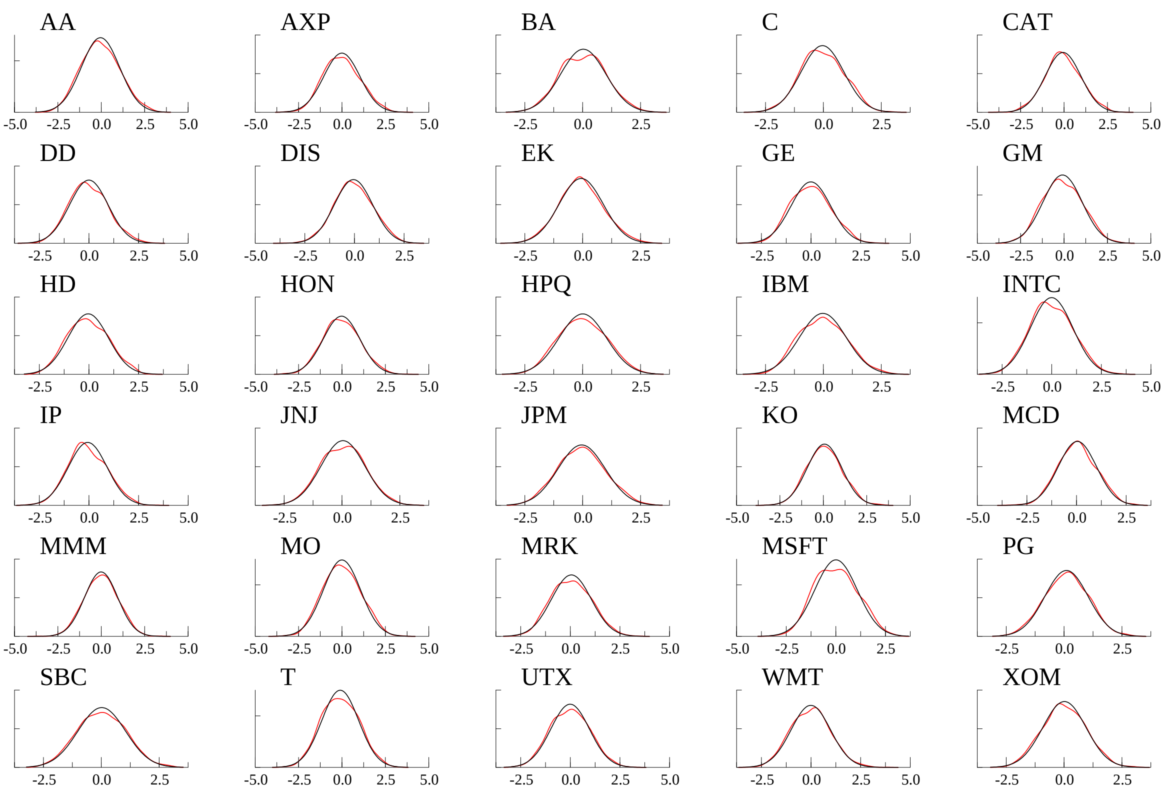


Figure A11: QQ plots of jump-adjusted (simple method) daily returns for 30 DJIA stocks standardized by continuous component of realized volatility

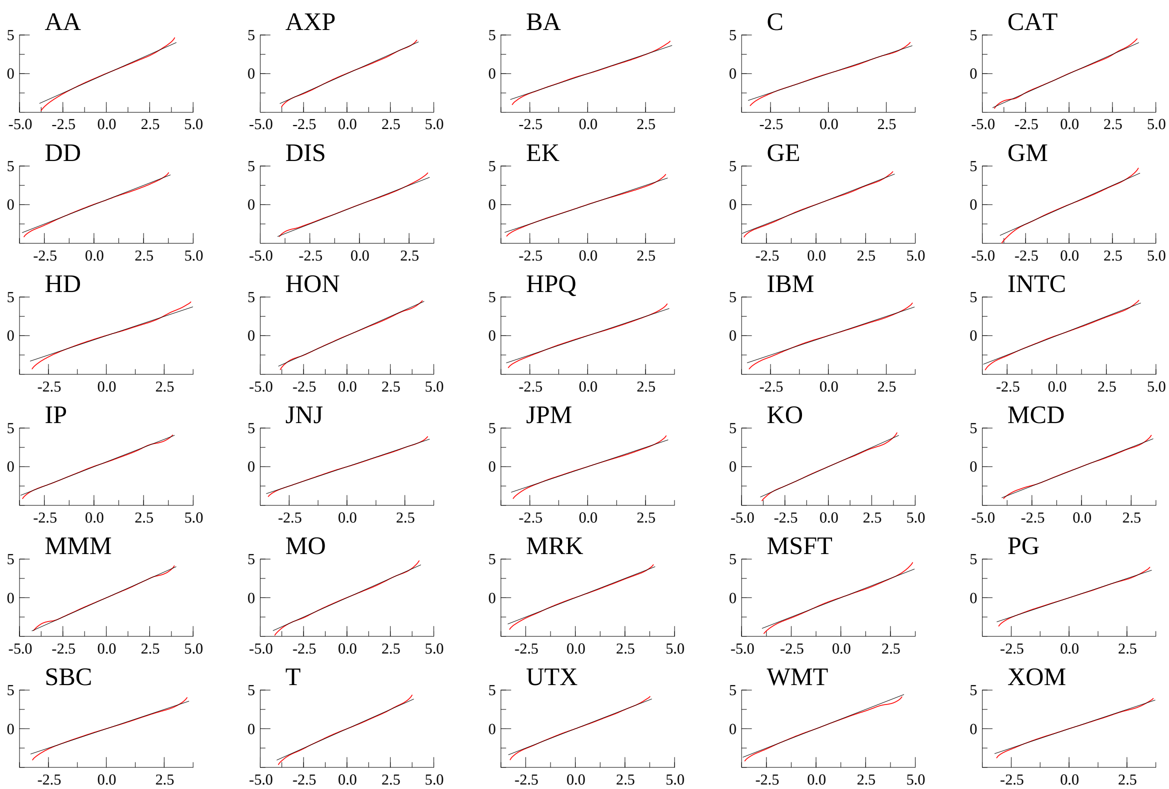


Figure A12: Density plots of jump-adjusted (sequential method) daily returns for 30 DJIA stocks standardized by continuous component of realized volatility

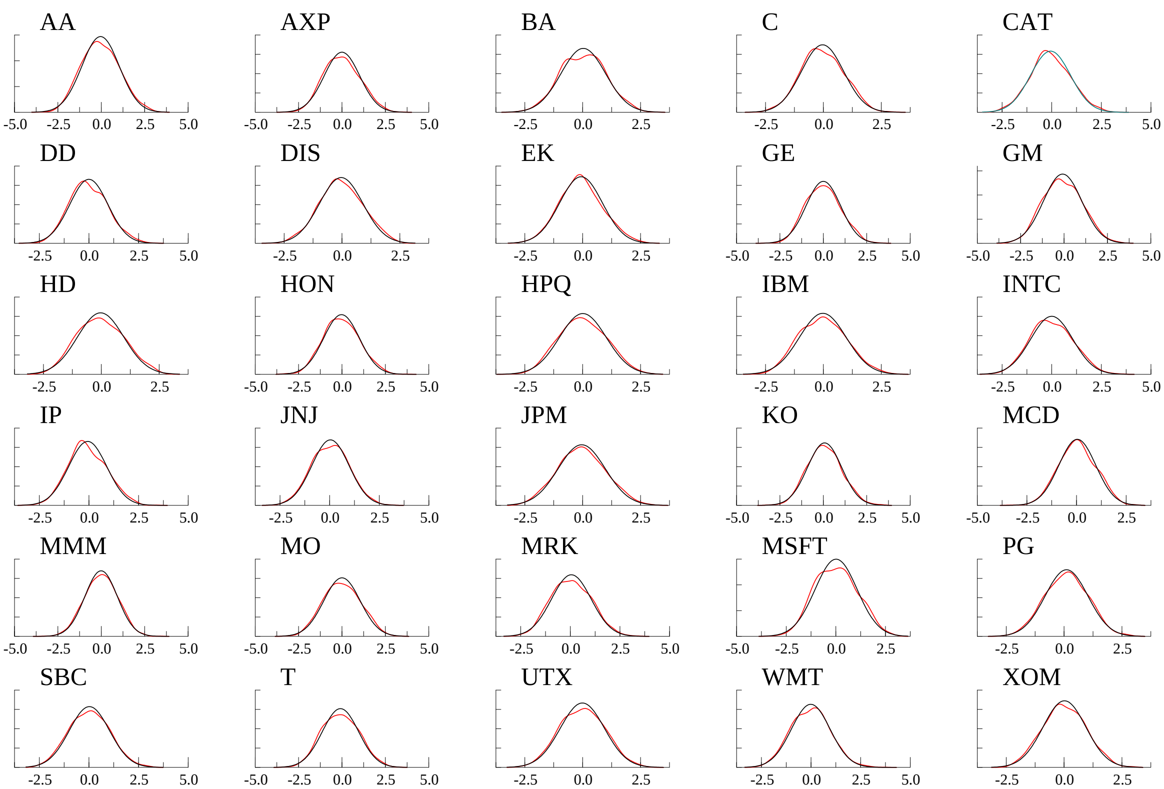


Figure A13: QQ plots of jump-adjusted (sequential method) daily returns for 30 DJIA stocks standardized by continuous component of realized volatility

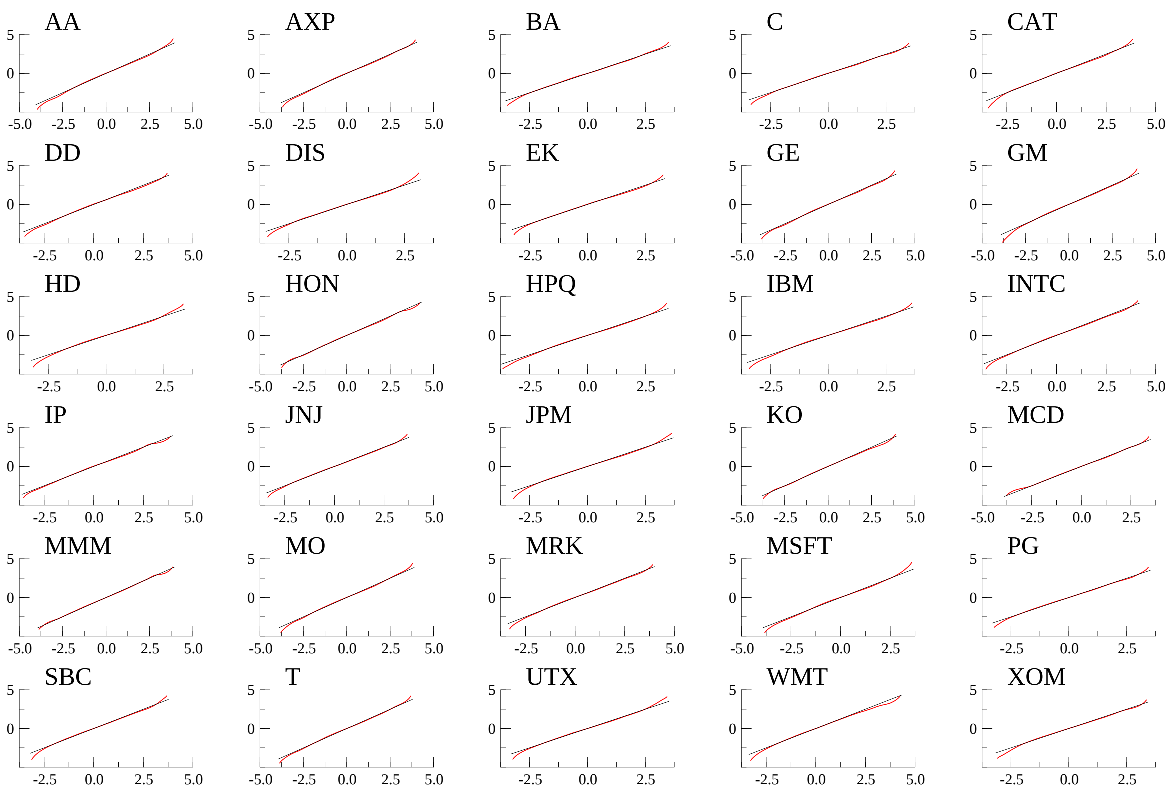


Figure A14: Density plots of financial-time daily returns for 30 DJIA stocks standardized by τ^*

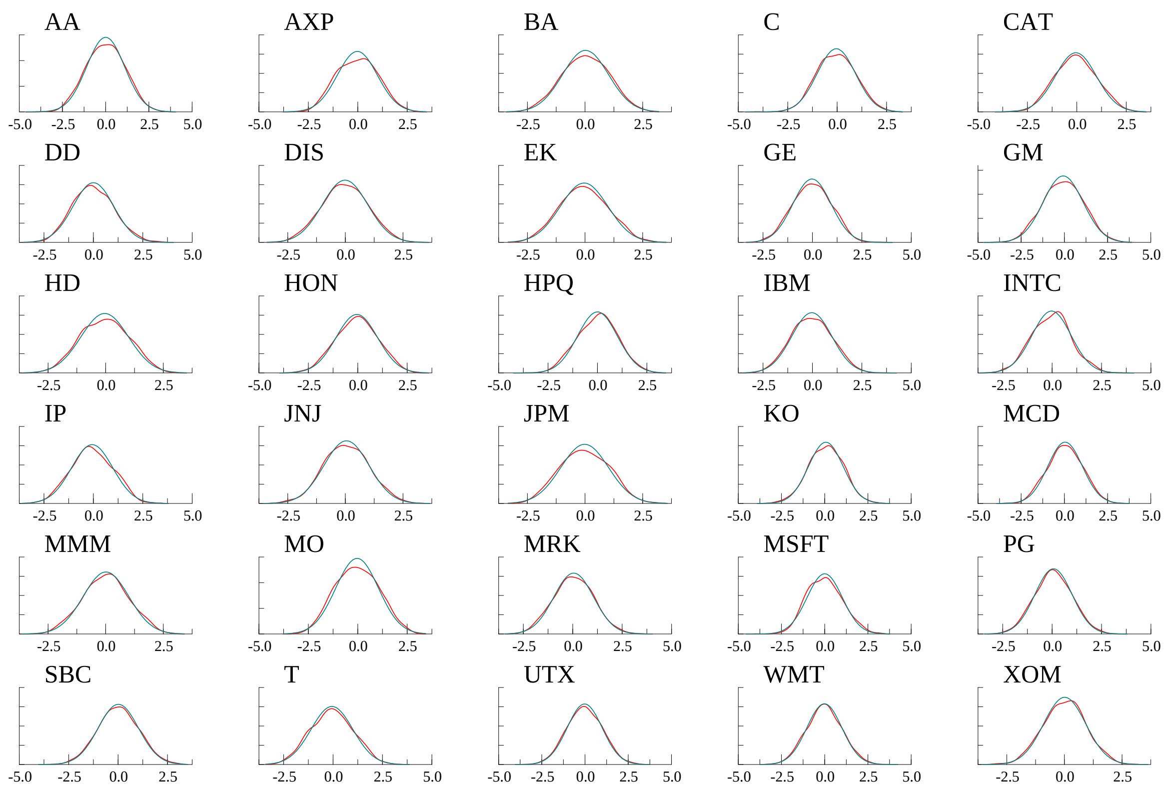
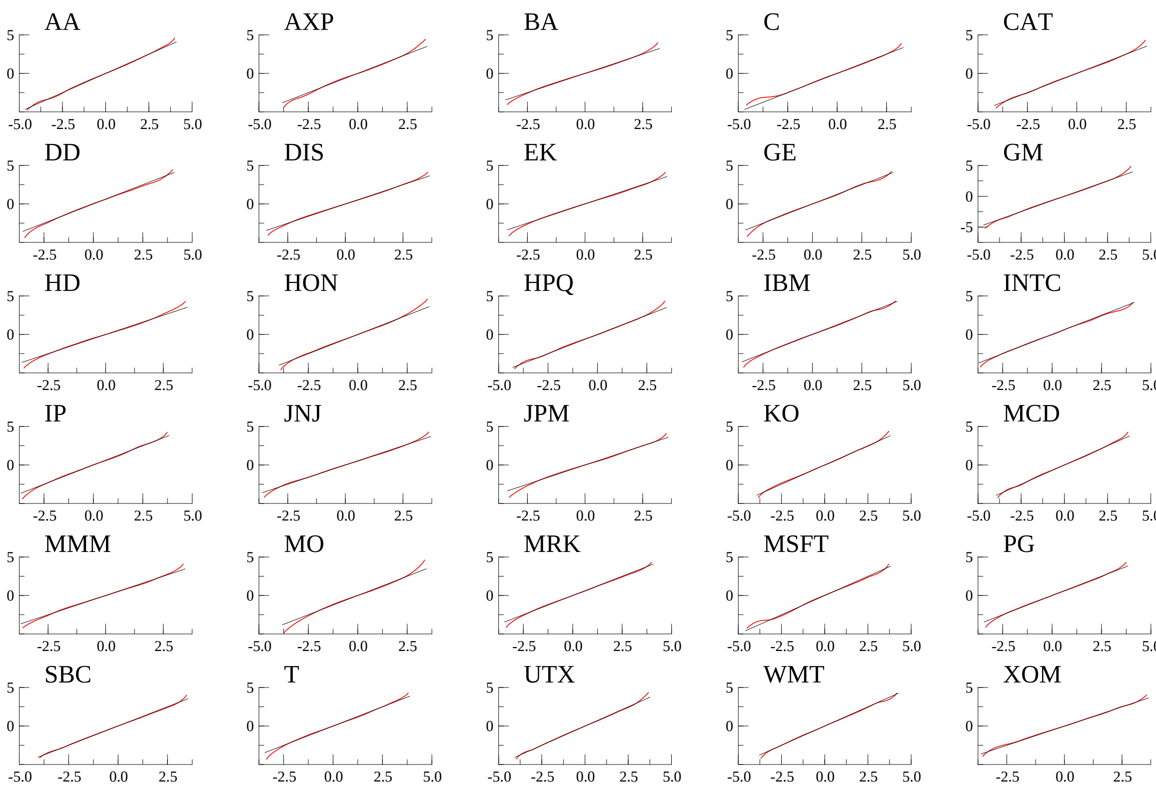


Figure A15: QQ plots of financial-time daily returns for 30 DJIA stocks standardized by τ^*



Appendix B: More Recent Data

The minimum tick size for trades and quotes on the NYSE was reduced from a sixteenth of a dollar to one cent on January 29, 2001. The results in Hansen & Lunde (2006) suggest that this finer tick size has been accompanied by a substantial reduction in the impact of the market microstructure noise for a variety of realized volatility measures. To investigate the robustness of our findings with respect to this change in market structure, we replicated the analysis with data spanning the shorter period from February 2001 through December 2004.

Suppressing details, preliminary data analysis along the lines of Section 5 indicates that the jump intensities and the relative importance of jumps are somewhat smaller over the more recent period, but that jumps remain an important part of the price process.[1] For instance, the average duration between jumps increased by about fifty percent relative to the earlier period, and the relative jump contribution and the number of days with multiple jumps fell by roughly half.

The diminished importance of jumps and the alleged decline in distortion arising from microstructure noise suggest that the calendar-time standardized returns may be more closely approximated by a normal distribution. This is indeed the case. Comparing the p-value plots in Figures B1 and 3, the numbers for the $R_t/\sqrt{RV_t}$, $\tilde{R}_t/\sqrt{CV_t}$, and $\hat{R}_t/\sqrt{CVS_t}$ standardized distributions over the more recent time period in Figure B1 are better dispersed than for the earlier period in Figure 3.[2] The closer coherence between the p-values for the RV_t, CV_t, and CVS_t standardizations and the p-values for the "daily" financial-time returns also indirectly suggests a diminished impact of the volatility asymmetry, or leverage effect. Still, with the exception of one or two stocks, all p-values for the former standardizations are less than one-half. On the other hand, the p-values for the financial-time returns, and the "weekly" returns in particular, are again fairly close to uniformly distributed.

As such, the broad conclusions for this recent time period mirror our more detailed empirical findings for the longer sample. Importantly, however, the smaller tick size and apparent reduction in confounding market microstructure effects produce an environment that is even more amenable to our realized volatility measures. Looking ahead, this suggests that the basic methodology and testing procedures developed here should provide even better guidance in future applications.

References

Hansen, P. R. & Lunde, A. (2006), 'Realized variance and market microstructure noise', *Journal of Business and Economic Statistics* **24**, 127–161.

[1]Complete results are available upon request.

[2]Of course, the slightly shorter sample period is likely to result in marginally lower powers of the different tests.

Figure B1: p-values for the 30 DJIA stocks, Feb. 2001 - Dec. 2004, 5-minute sampling