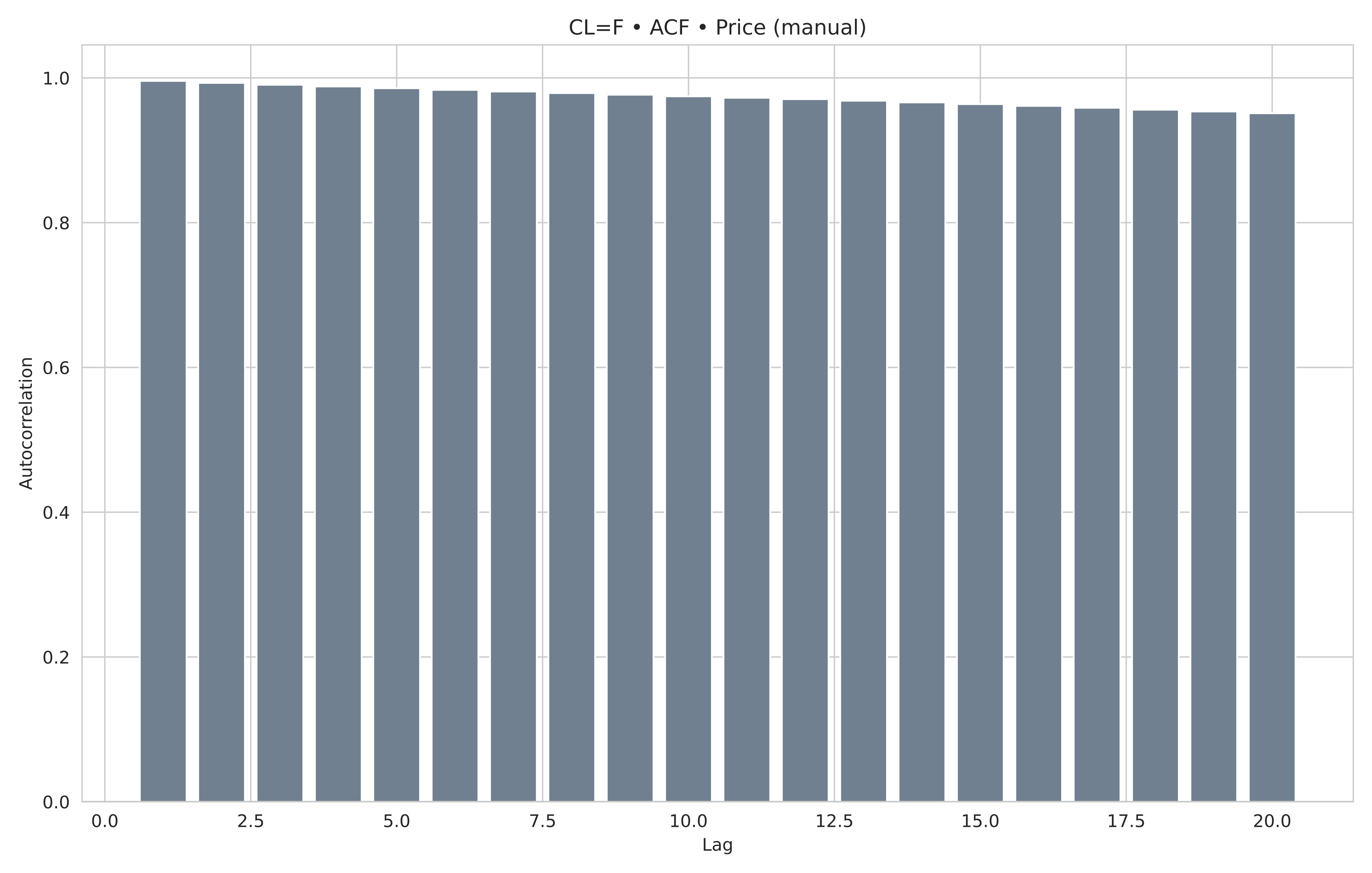
Refining Stock Report

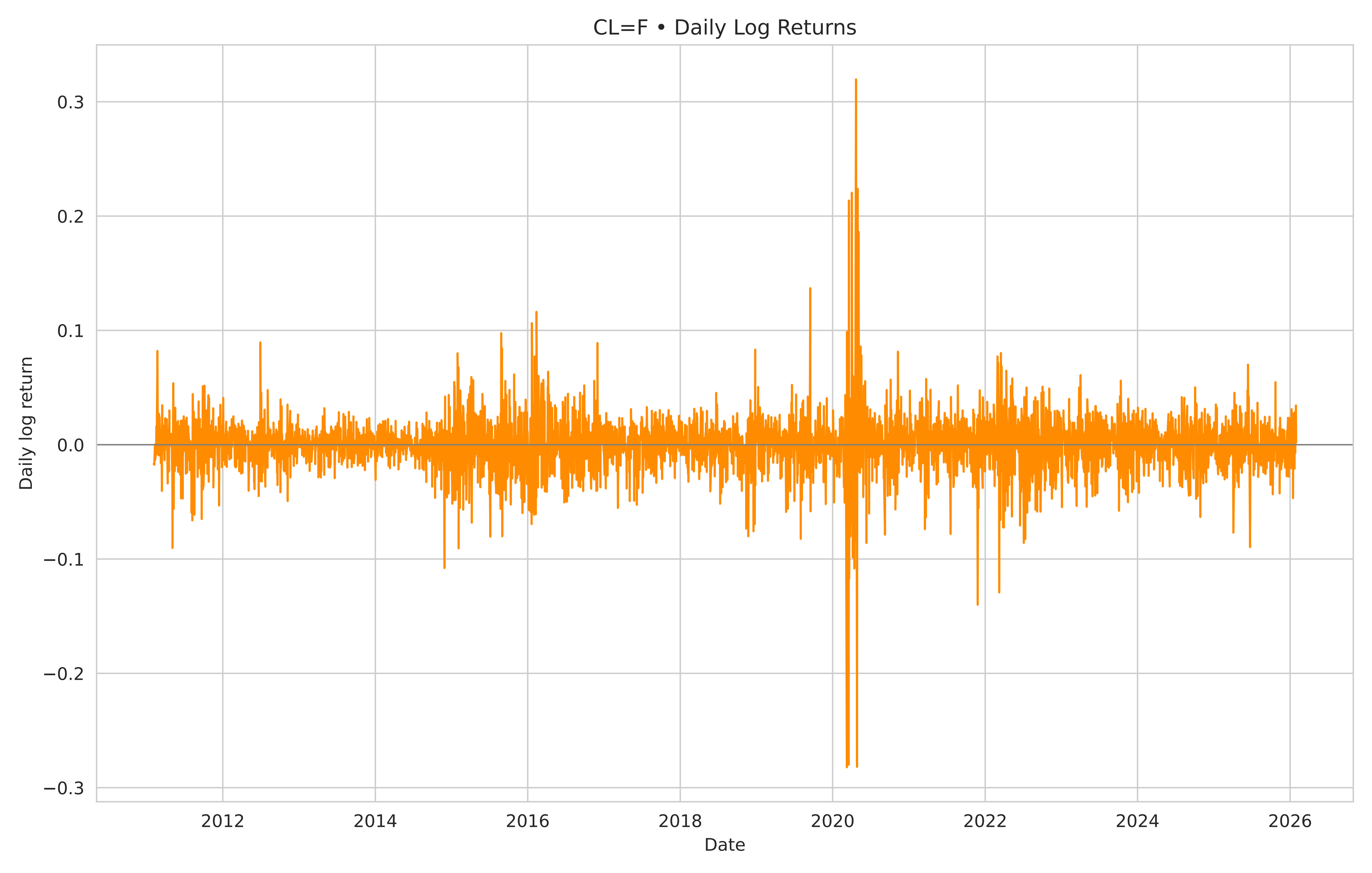
Tickers: CL=F, GC=F, MPC, PSX, VLO, ^GSPC, ^VIX

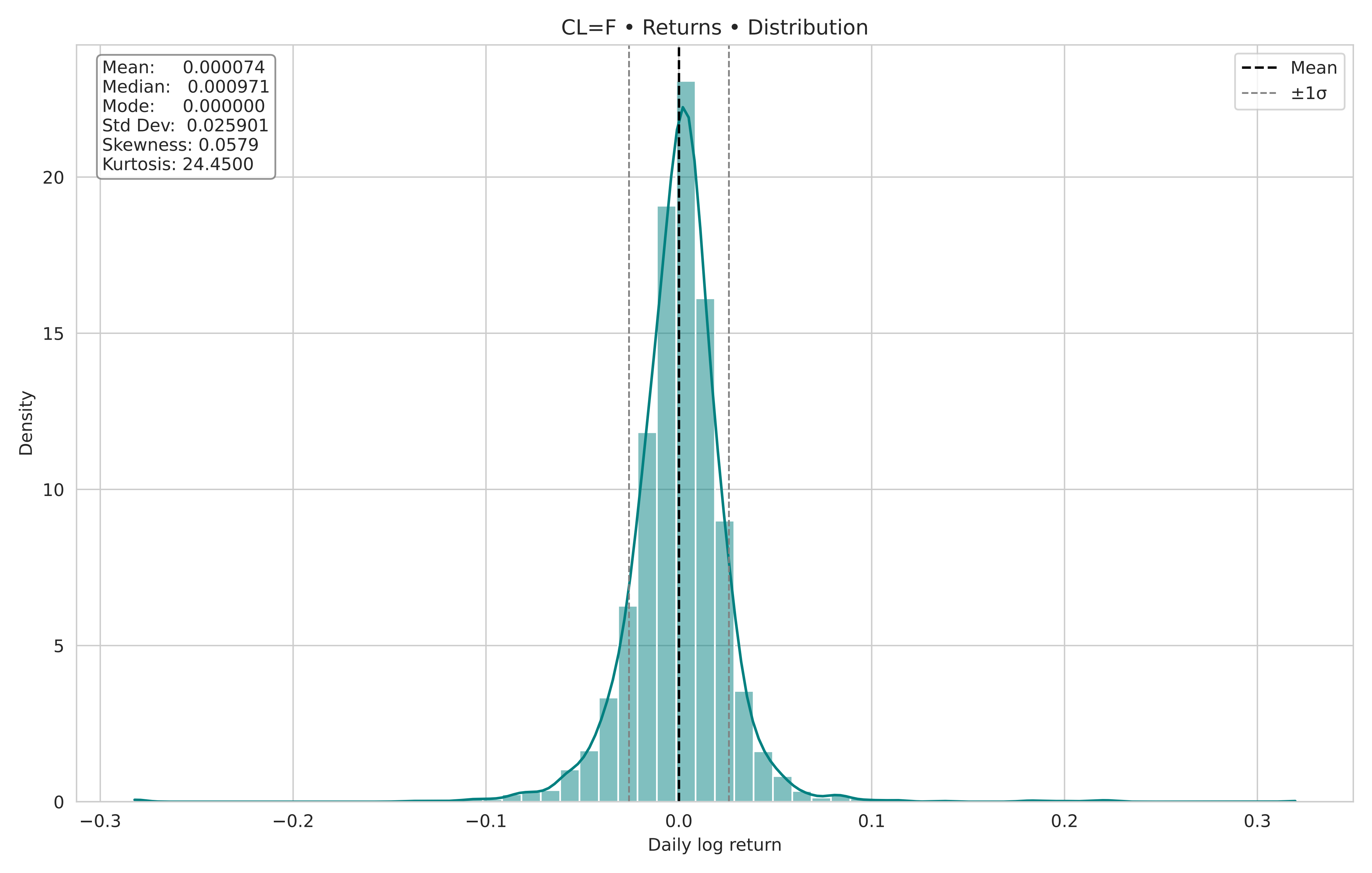
Contents:

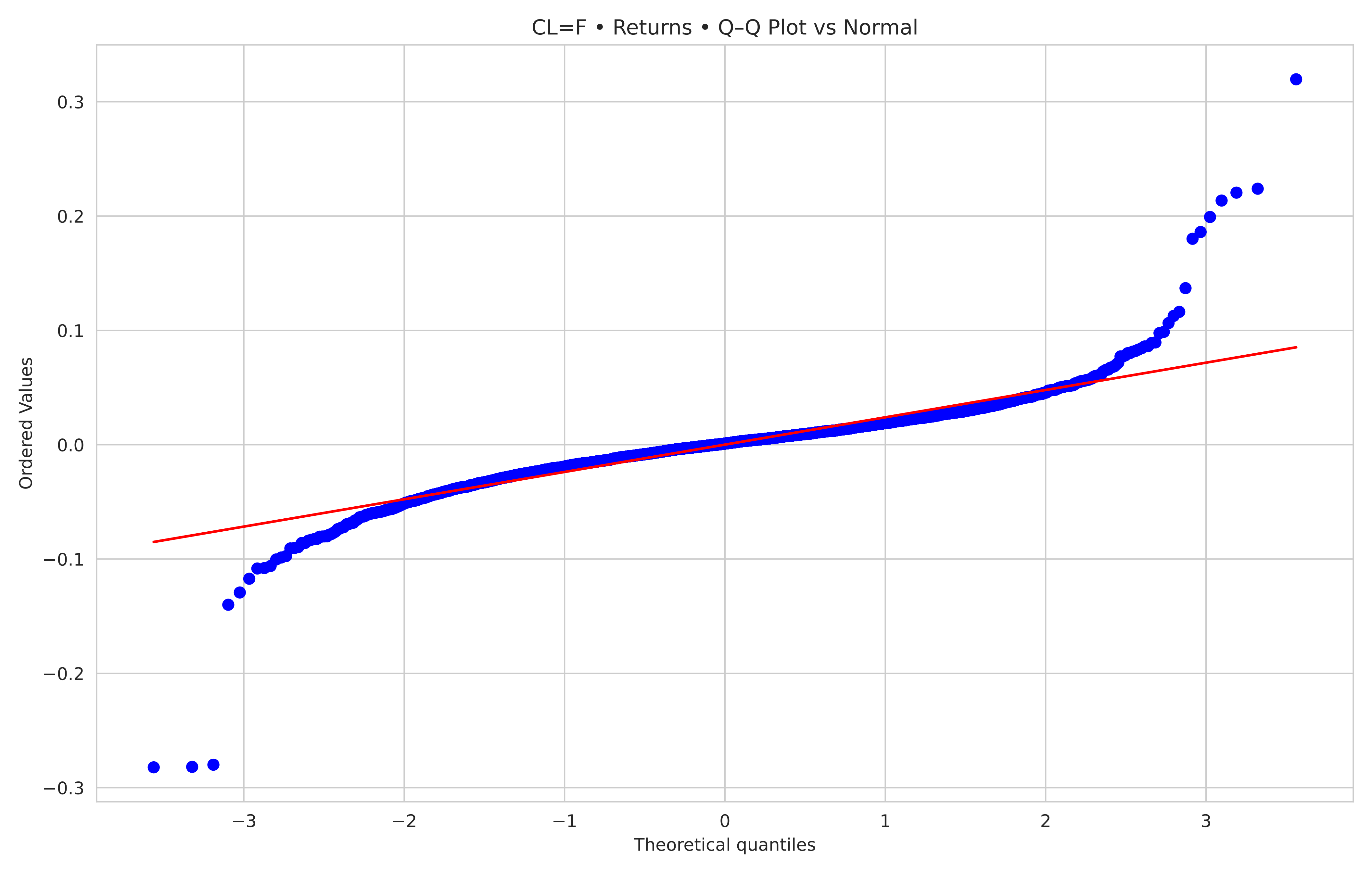
CL=F • Price
Adj/Close
Price (USD)
Date
120
100
80
60
40
20
0
−20
−40
2012
2014
2016
2018
2020
2022
2024
2026


CL=F • ACF • Price (manual)
Autocorrelation
Lag
0.0
0.2
0.4
0.6
0.8
1.0
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

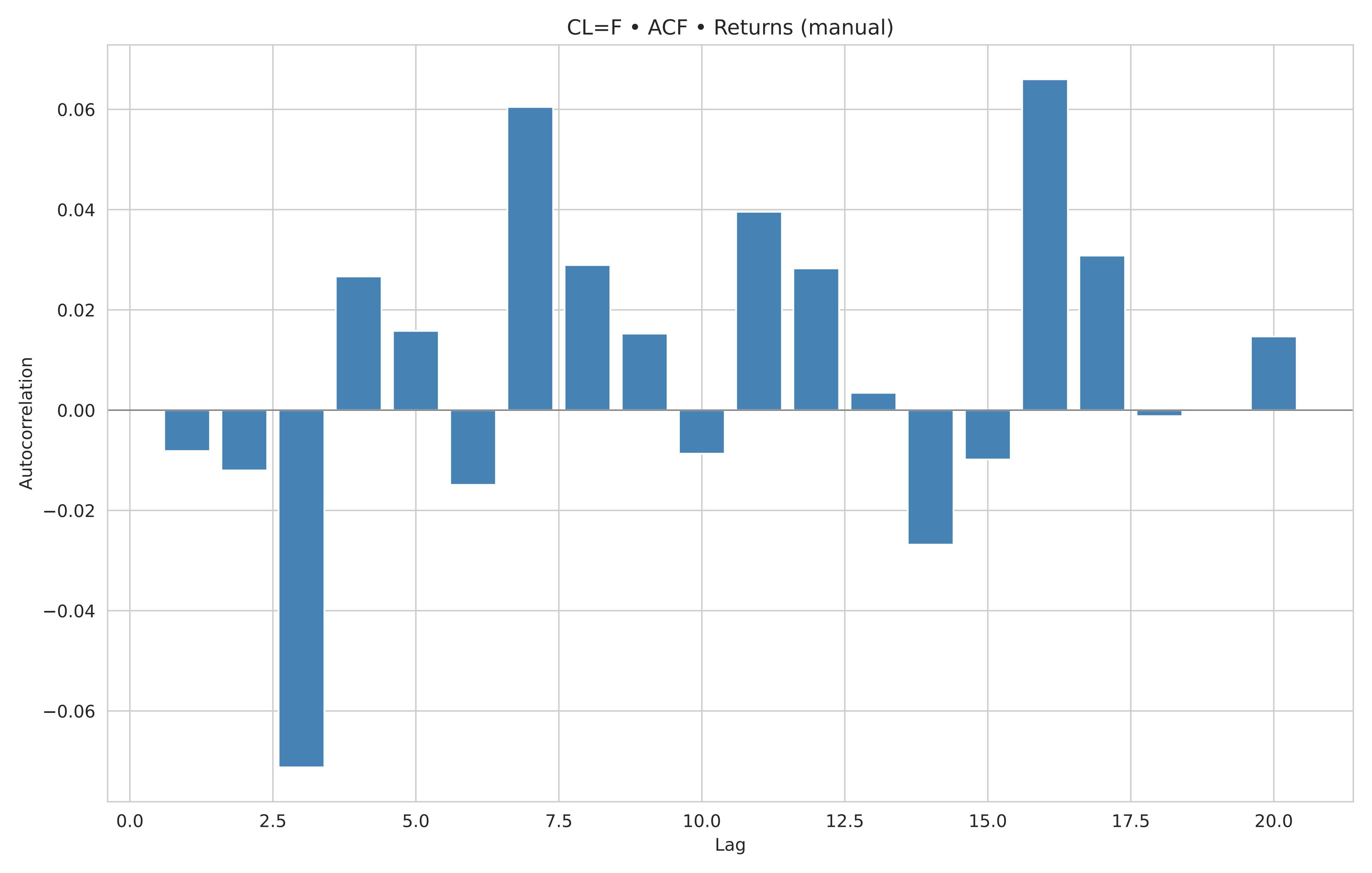

CL=F • Moving Averages (5/10/20)
Adj/Close
SMA 5
SMA 10
SMA 20
Price (USD)
Date
120
100
80
60
40
20
0
−20
−40
2012
2014
2016
2018
2020
2022
2024
2026

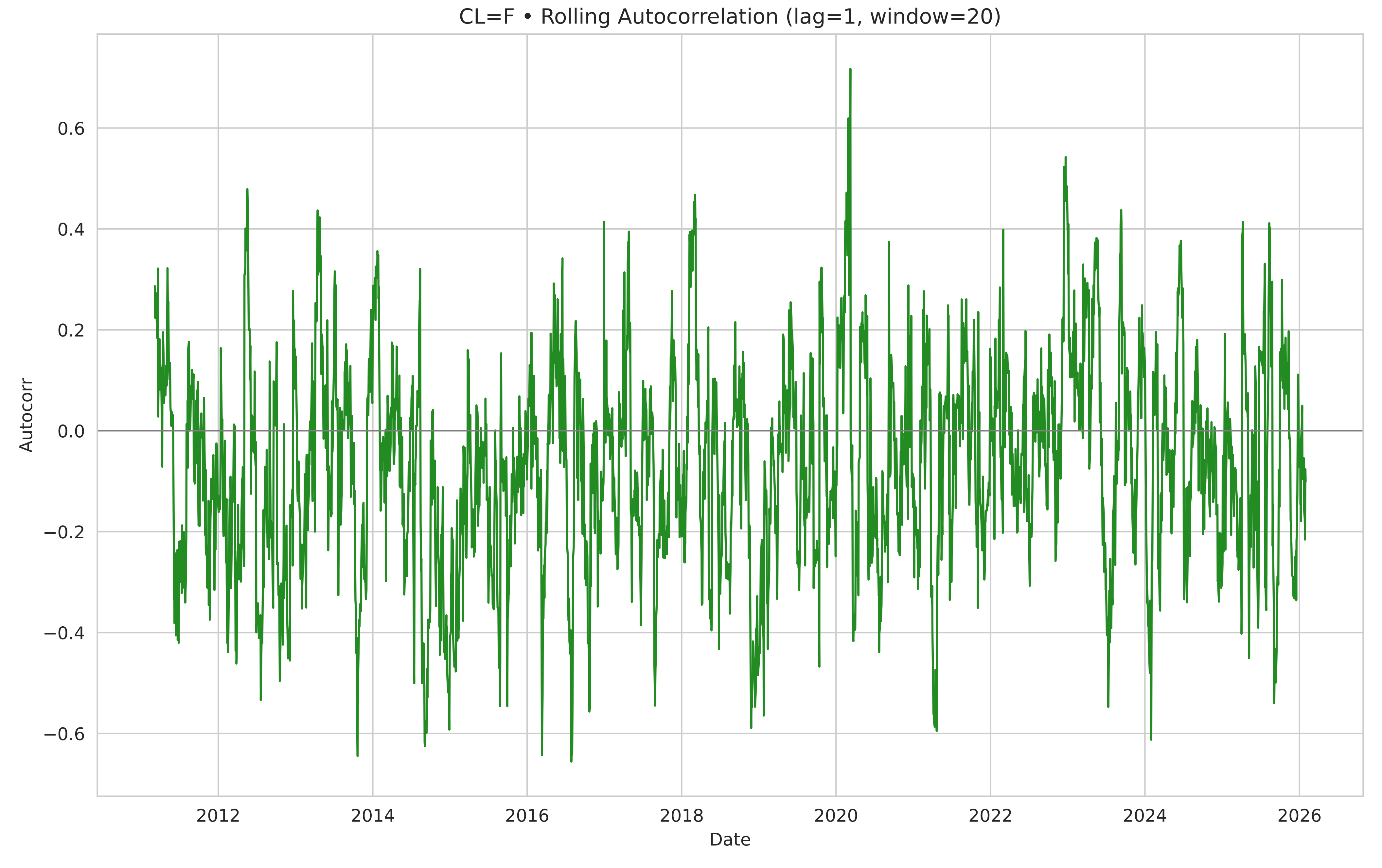

CL=F • Daily Log Returns
Daily log return
Date
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
2012
2014
2016
2018
2020
2022
2024
2026


CL=F • Returns • Distribution
Mean: 0.000074
Median: 0.000971
Mode: 0.000000
Std Dev: 0.025901
Skewness: 0.0579
Kurtosis: 24.4500
Mean
±1σ
Density
20
15
10
5
0
−0.3
−0.2
−0.1
0.0
0.1
0.2
0.3
Daily log return

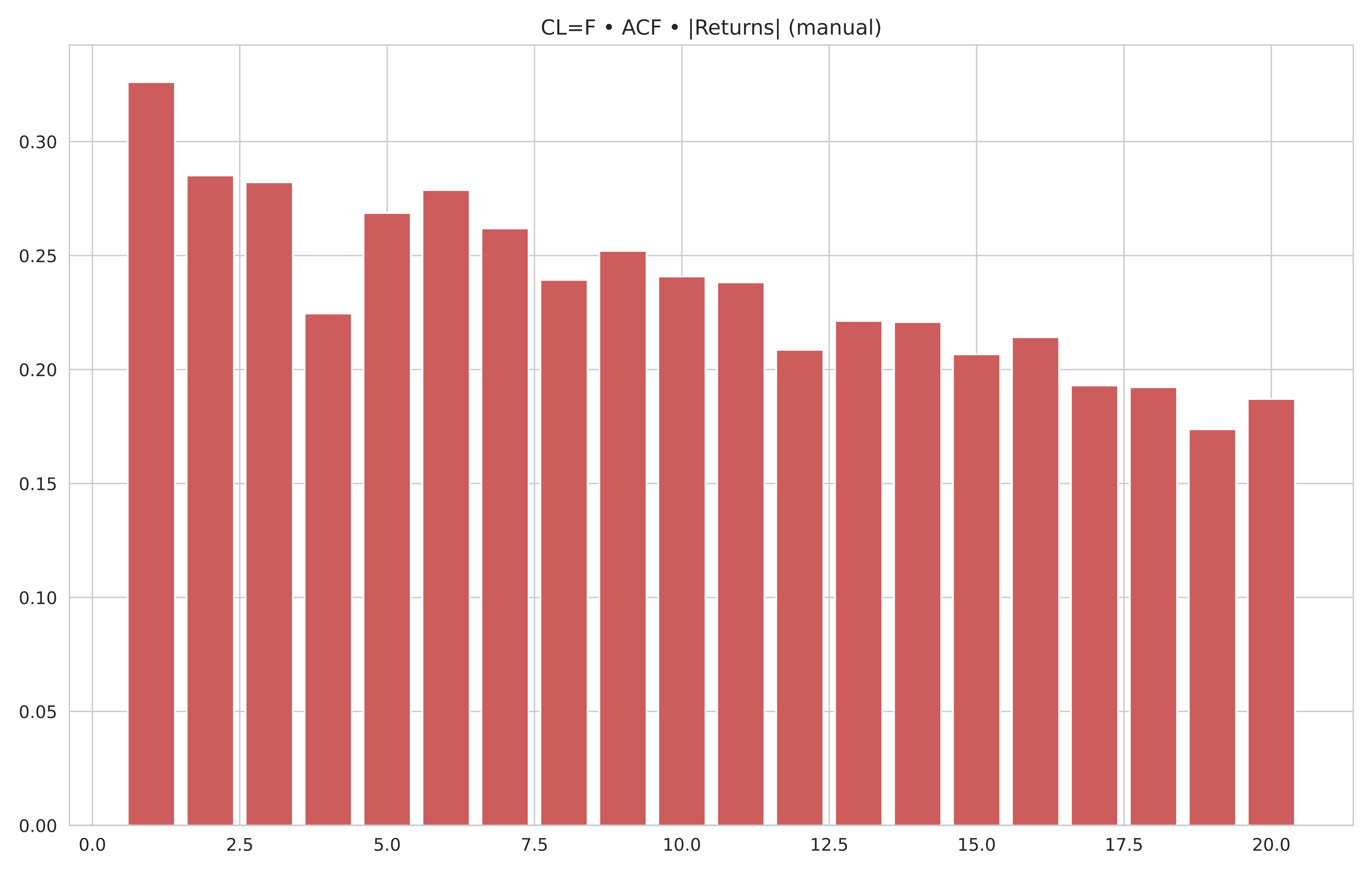


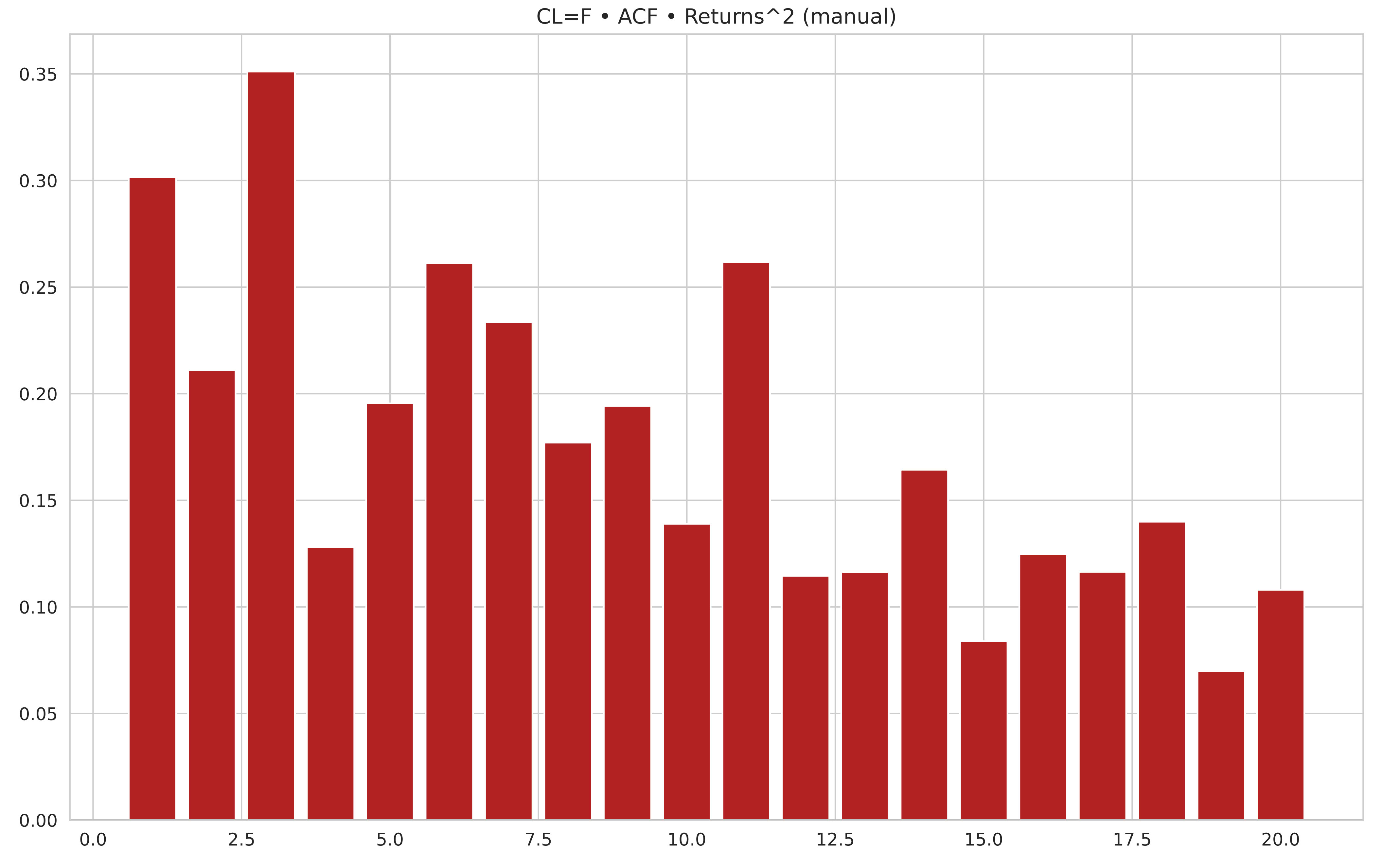
CL=F • Returns • Q–Q Plot vs Normal
Ordered Values
Theoretical quantiles
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
−3
−2
−1
0
1
2
3

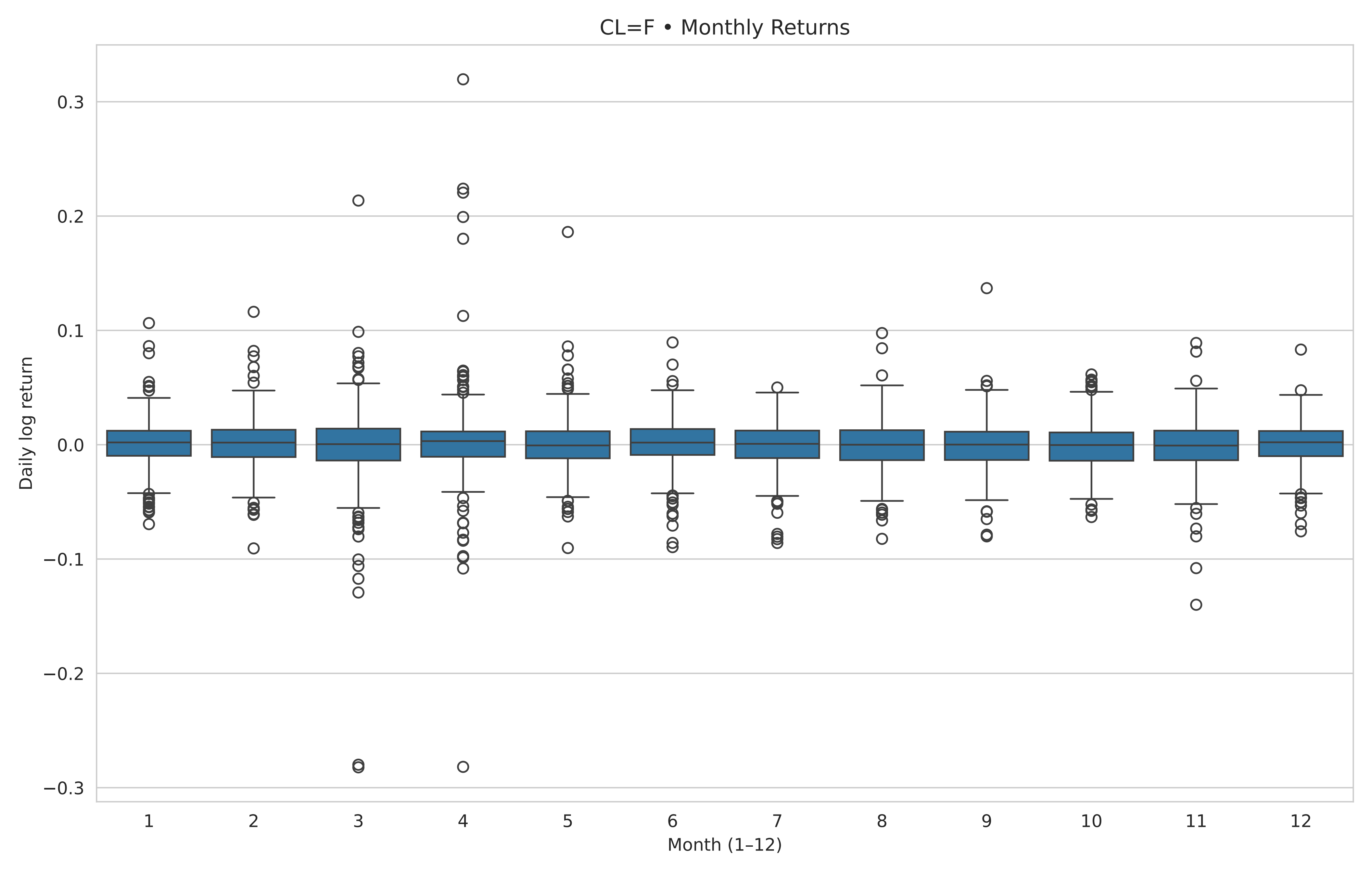

CL=F • ACF • Returns (manual)
Autocorrelation
Lag
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

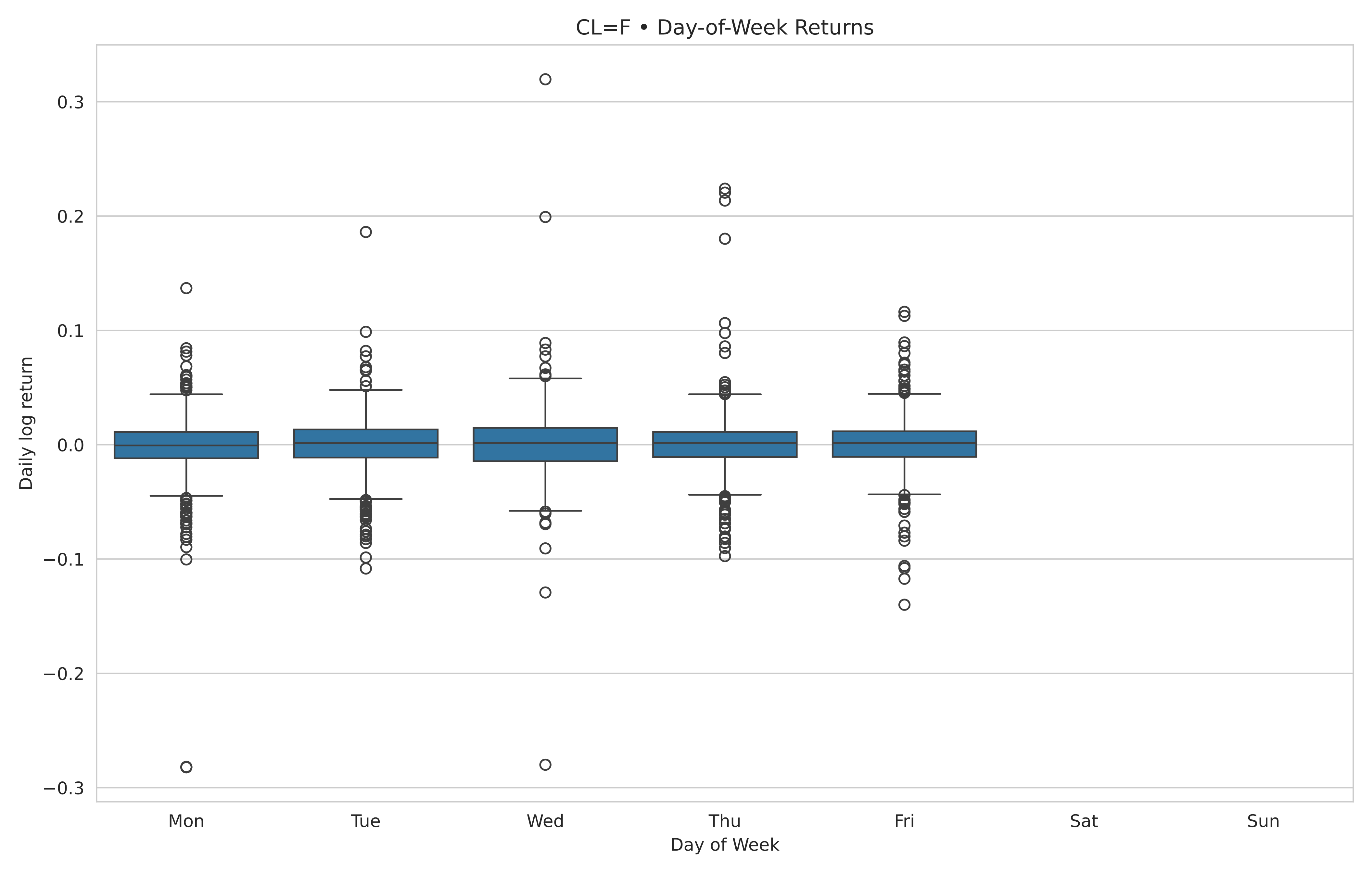


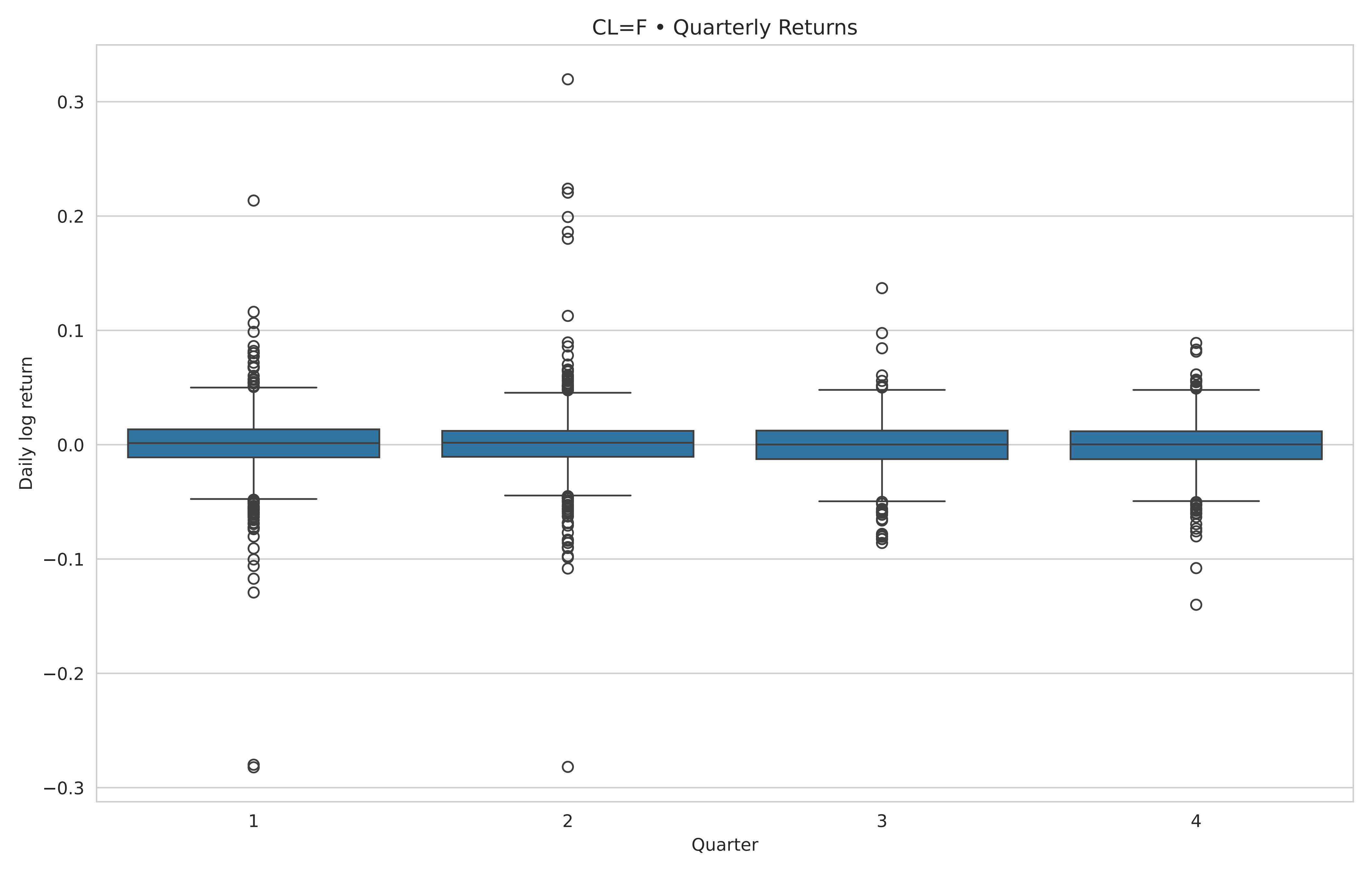
CL=F • Rolling Autocorrelation (lag=1, window=20)
Autocorr
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
2012
2014
2016
2018
2020
2022
2024
2026
Date

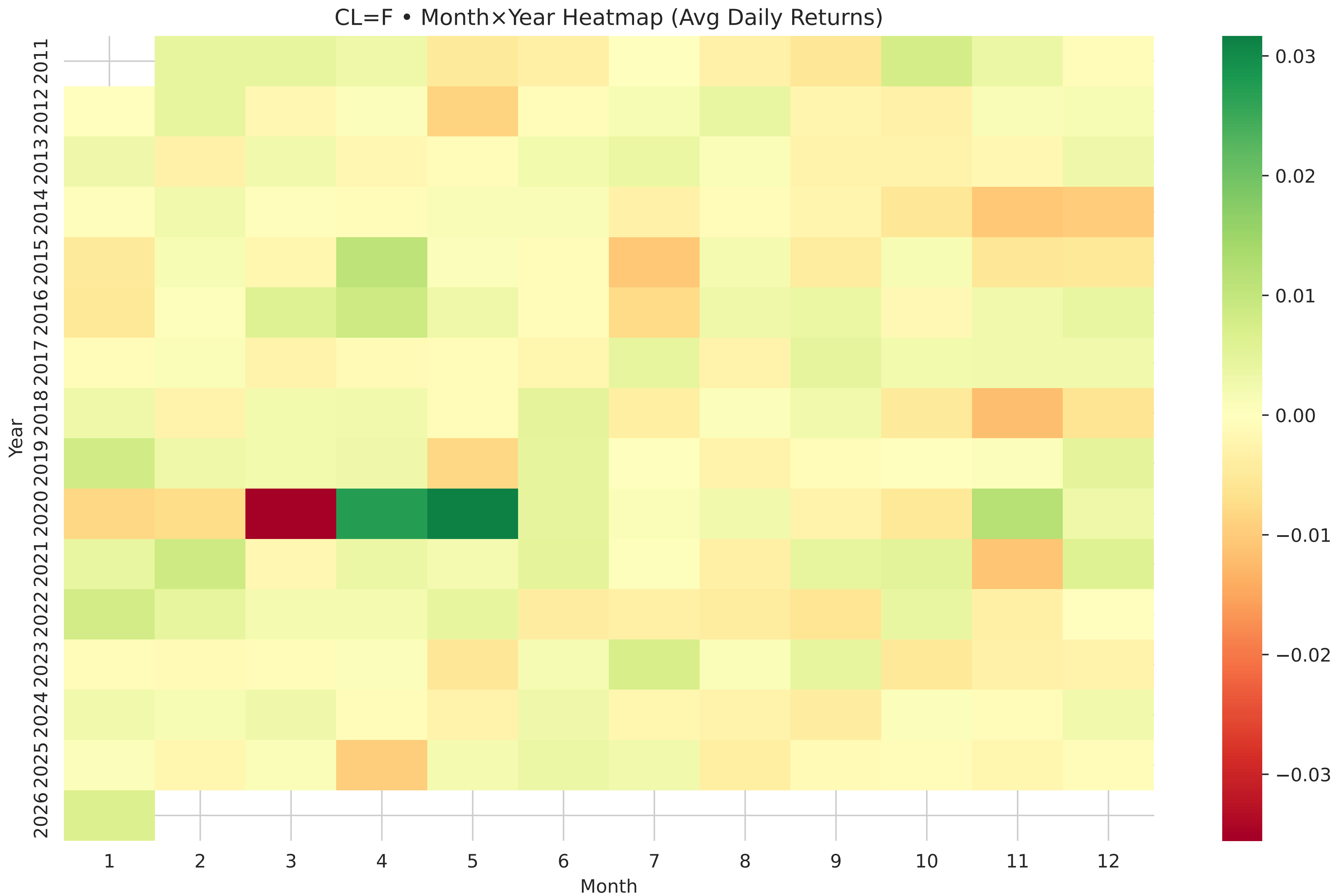

CL=F • ACF • |Returns| (manual)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

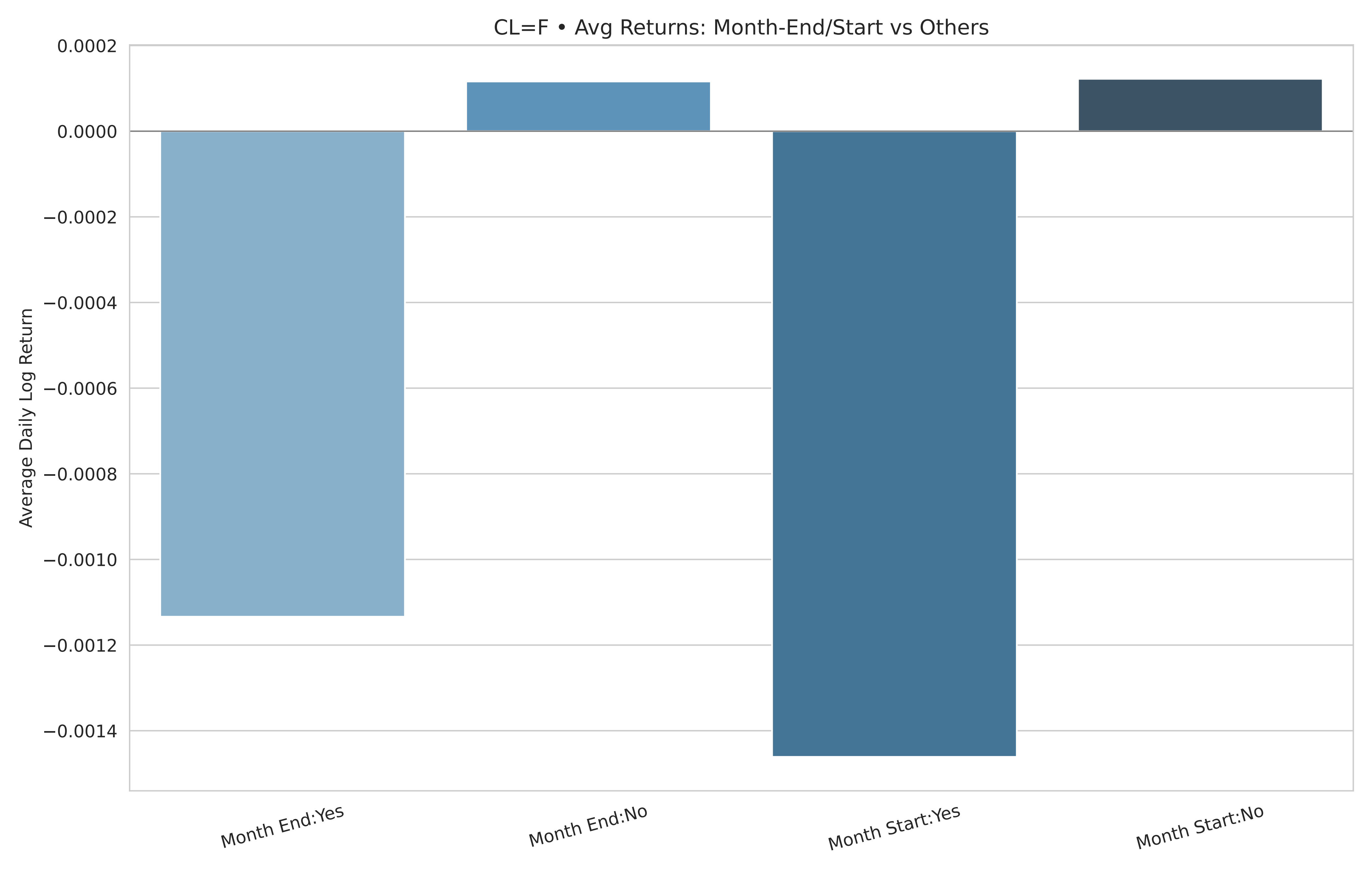

CL=F • ACF • Returns^2 (manual)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0


CL=F • Monthly Returns
Daily log return
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
1
2
3
4
5
6
7
8
9
10
11
12
Month (1–12)

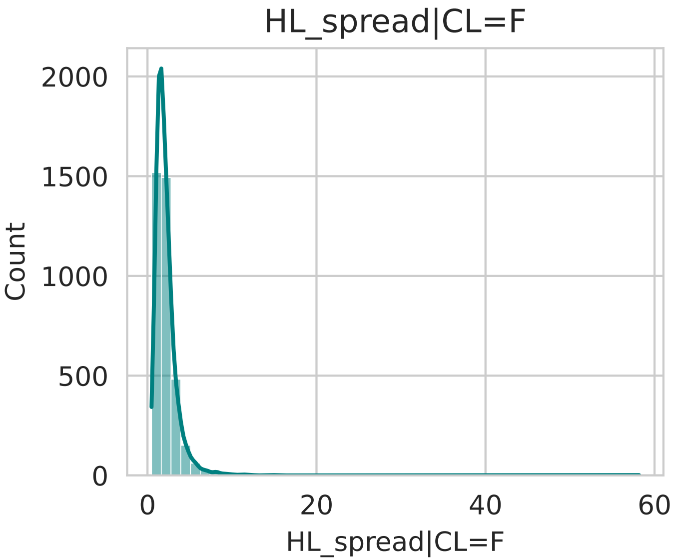

CL=F • Day-of-Week Returns
Daily log return
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Day of Week


CL=F • Quarterly Returns
Daily log return
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
1
2
3
4
Quarter

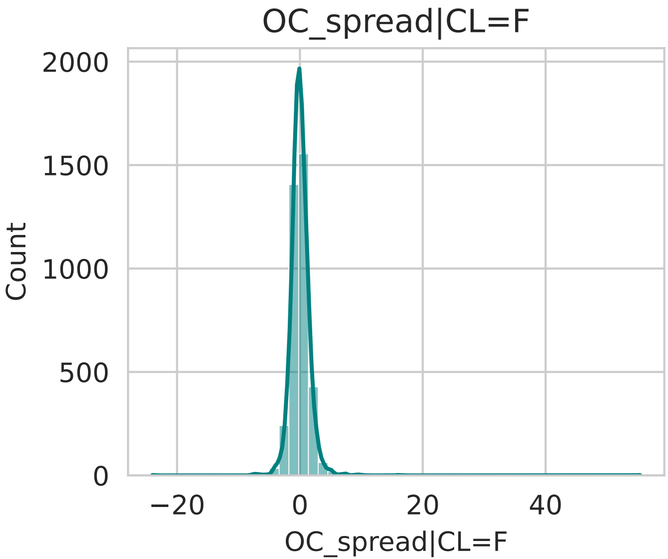

CL=F • Month×Year Heatmap (Avg Daily Returns)
Year
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Month
1
2
3
4
5
6
7
8
9
10
11
12
0.03
0.02
0.01
0.00
−0.01
−0.02
−0.03


CL=F • Avg Returns: Month-End/Start vs Others
Average Daily Log Return
0.0002
0.0000
−0.0002
−0.0004
−0.0006
−0.0008
−0.0010
−0.0012
−0.0014
Month End:Yes
Month End:No
Month Start:Yes
Month Start:No

CL=F • Spreads

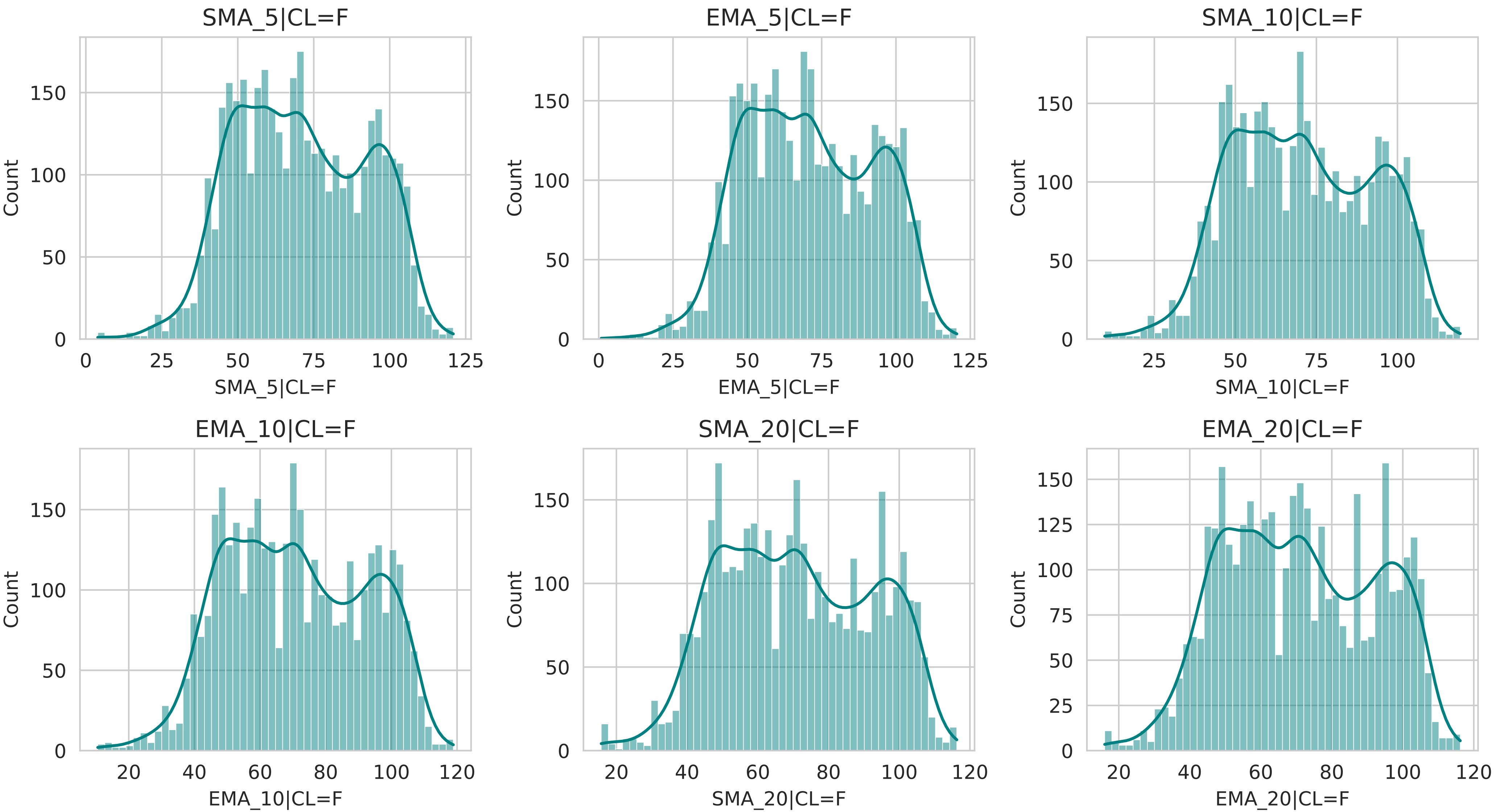


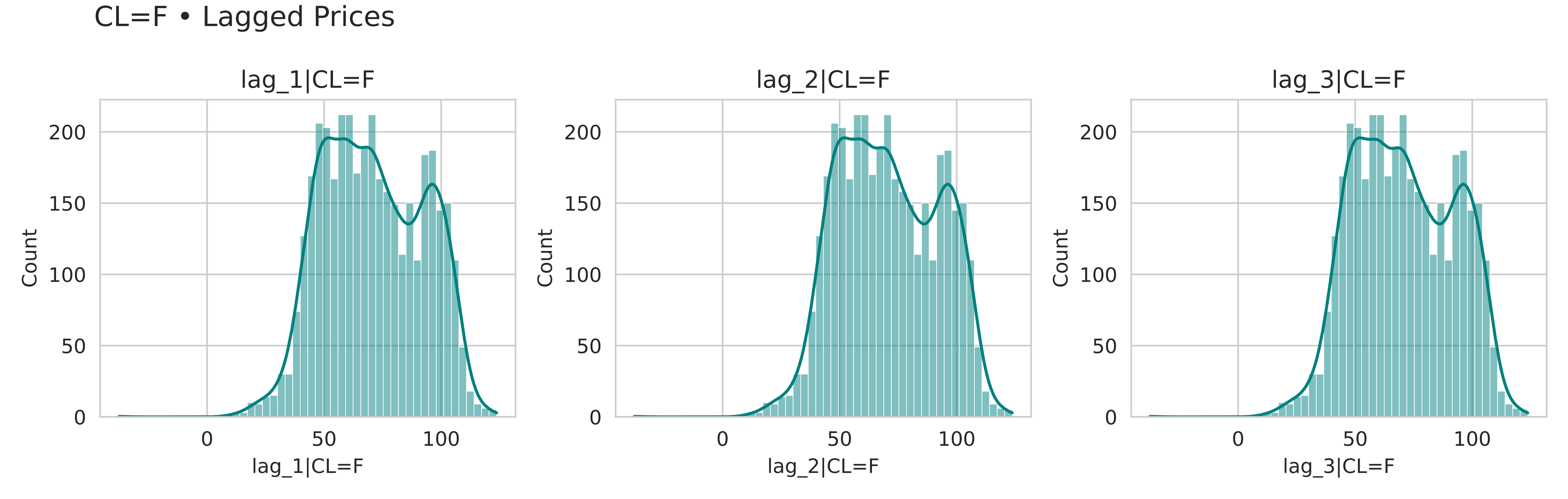
HL_spread|CL=F
Count
2000
1500
1000
500
0
0
20
40
60
HL_spread|CL=F



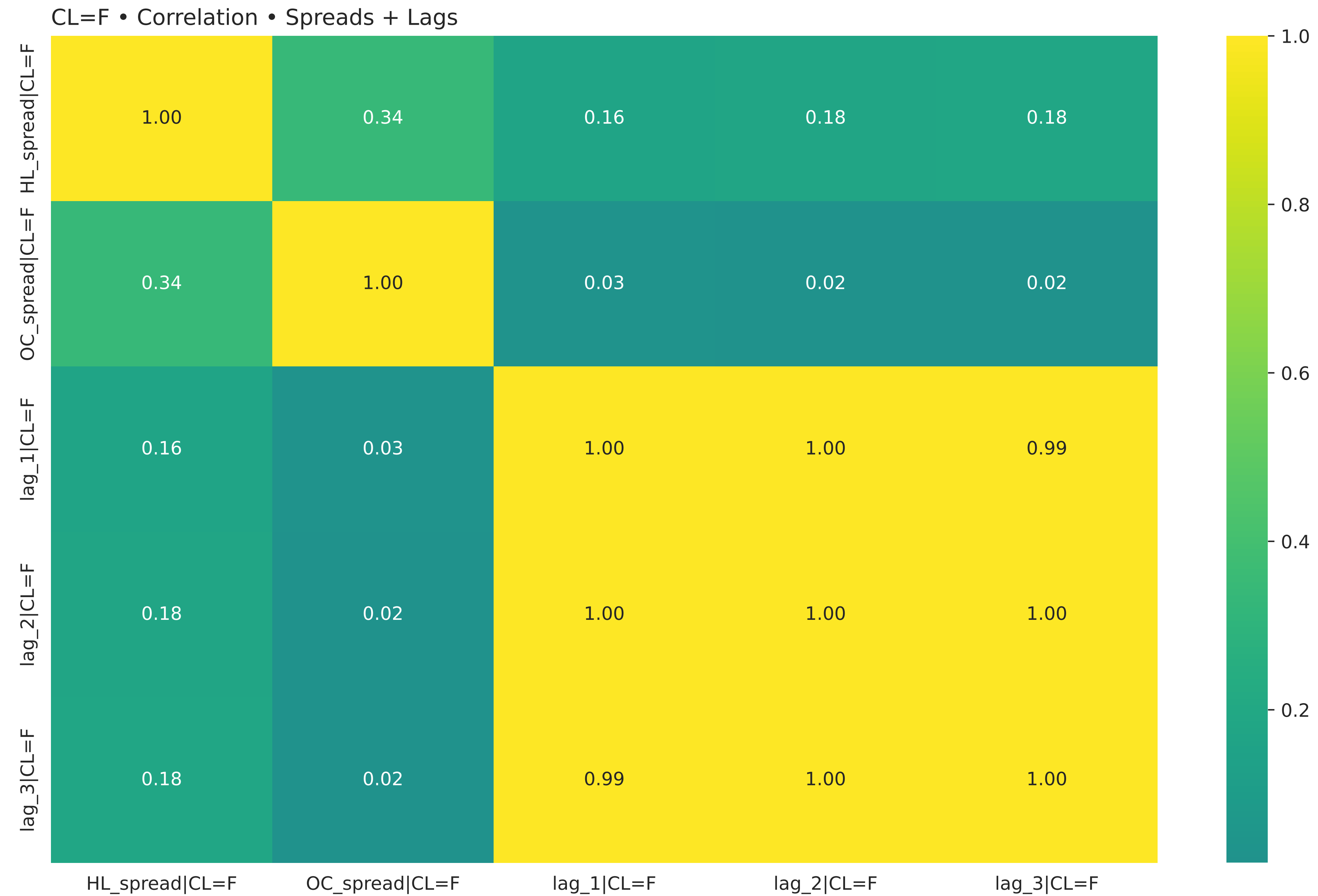
OC_spread|CL=F
Count
2000
1500
1000
500
0
−20
0
20
40
OC_spread|CL=F

CL=F • Moving Averages / EMAs

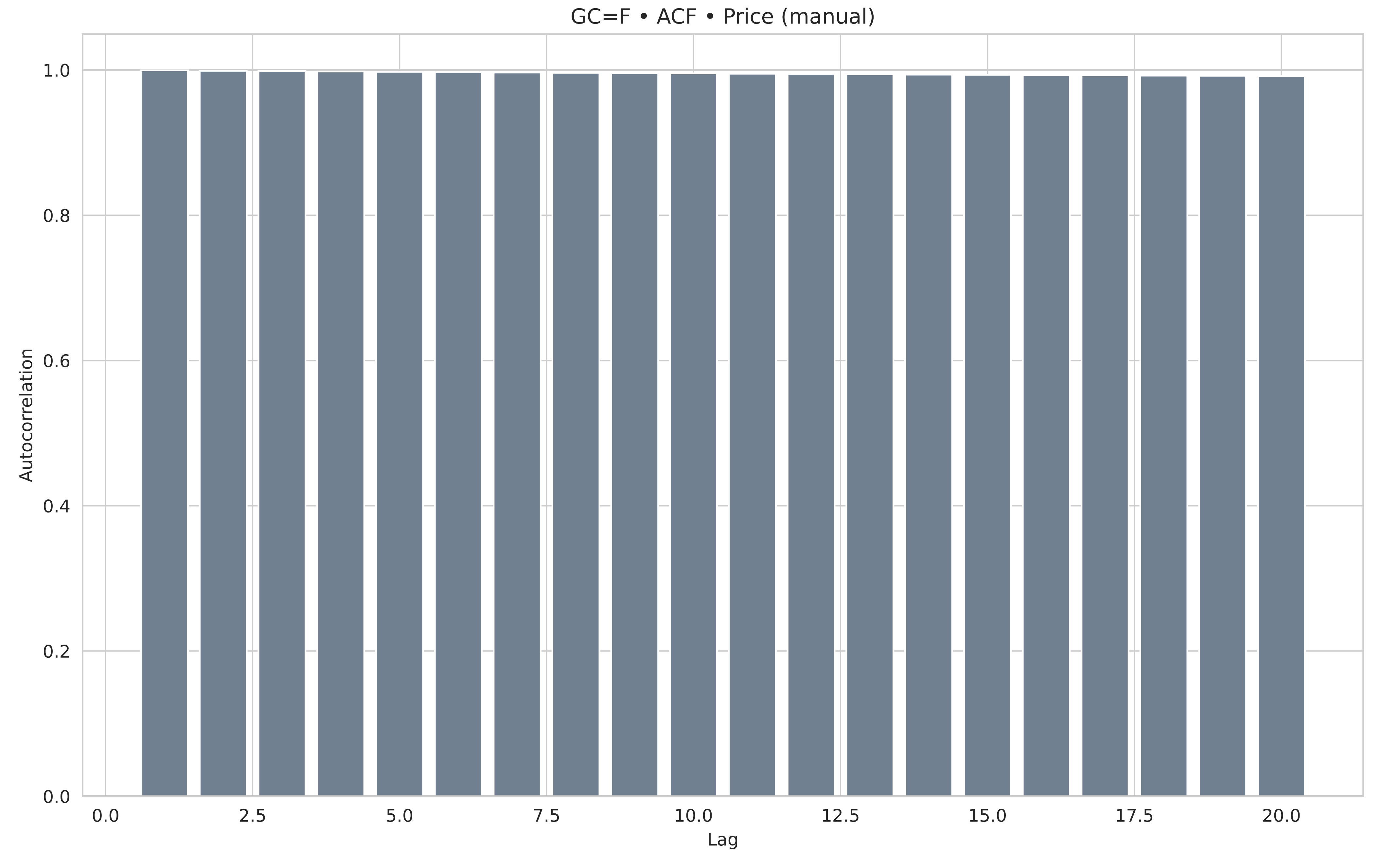


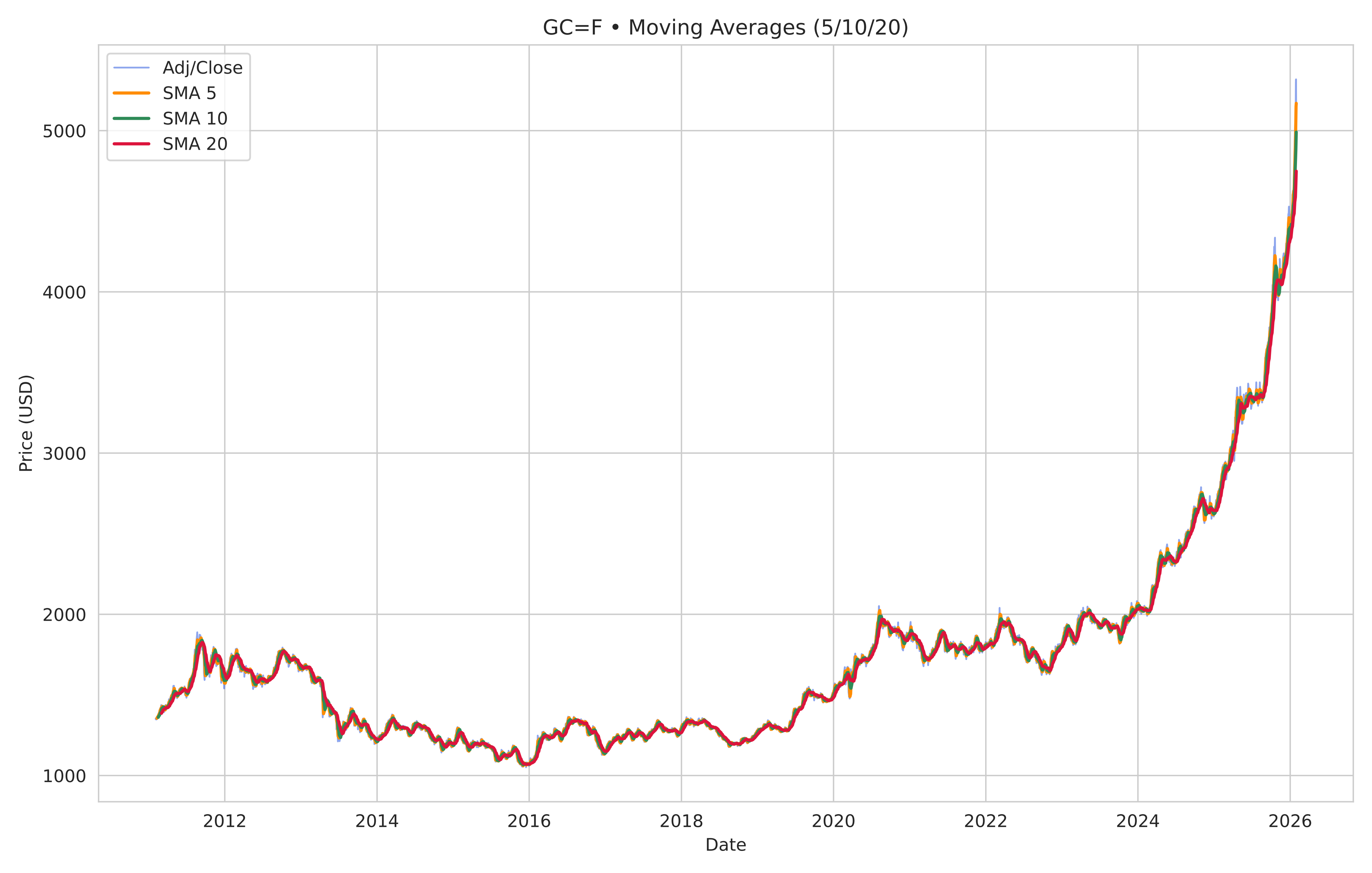

CL=F • Lagged Prices
lag_1|CL=F
lag_2|CL=F
lag_3|CL=F
Count
0
50
100
150
200
0
50
100
lag_1|CL=F
lag_2|CL=F
lag_3|CL=F

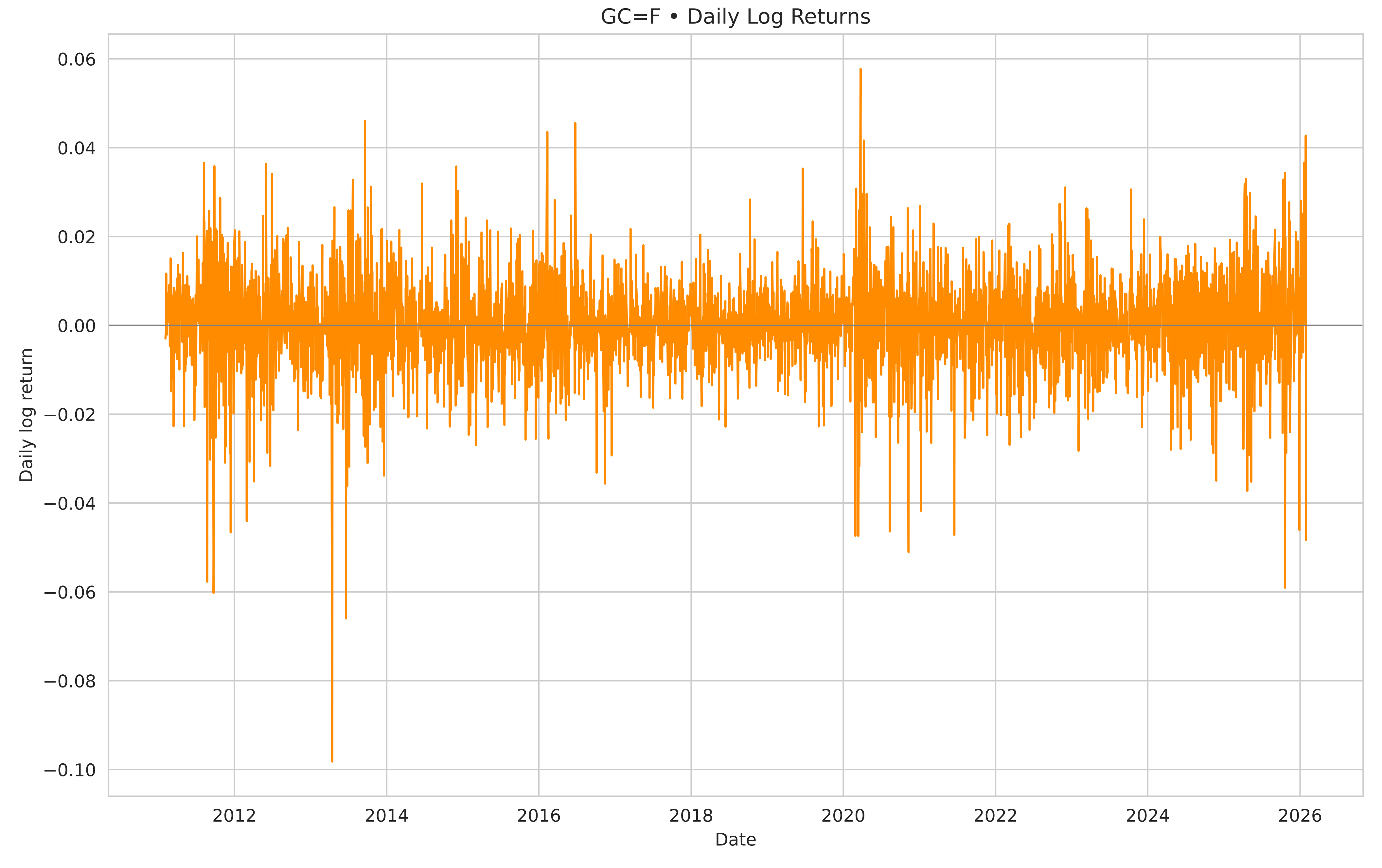

CL=F • Correlation • Moving Averages
SMA_5|CL=F
EMA_5|CL=F
SMA_10|CL=F
EMA_10|CL=F
SMA_20|CL=F
EMA_20|CL=F
1.00 1.00 1.00 1.00 0.99 0.99
1.00 1.00 1.00 1.00 0.99 0.99
1.00 1.00 1.00 1.00 1.00 1.00
1.00 1.00 1.00 1.00 1.00 1.00
0.99 0.99 1.00 1.00 1.00 1.00
0.99 0.99 1.00 1.00 1.00 1.00
1.000
0.999
0.998
0.997
0.996
0.995
0.994
0.993
0.992

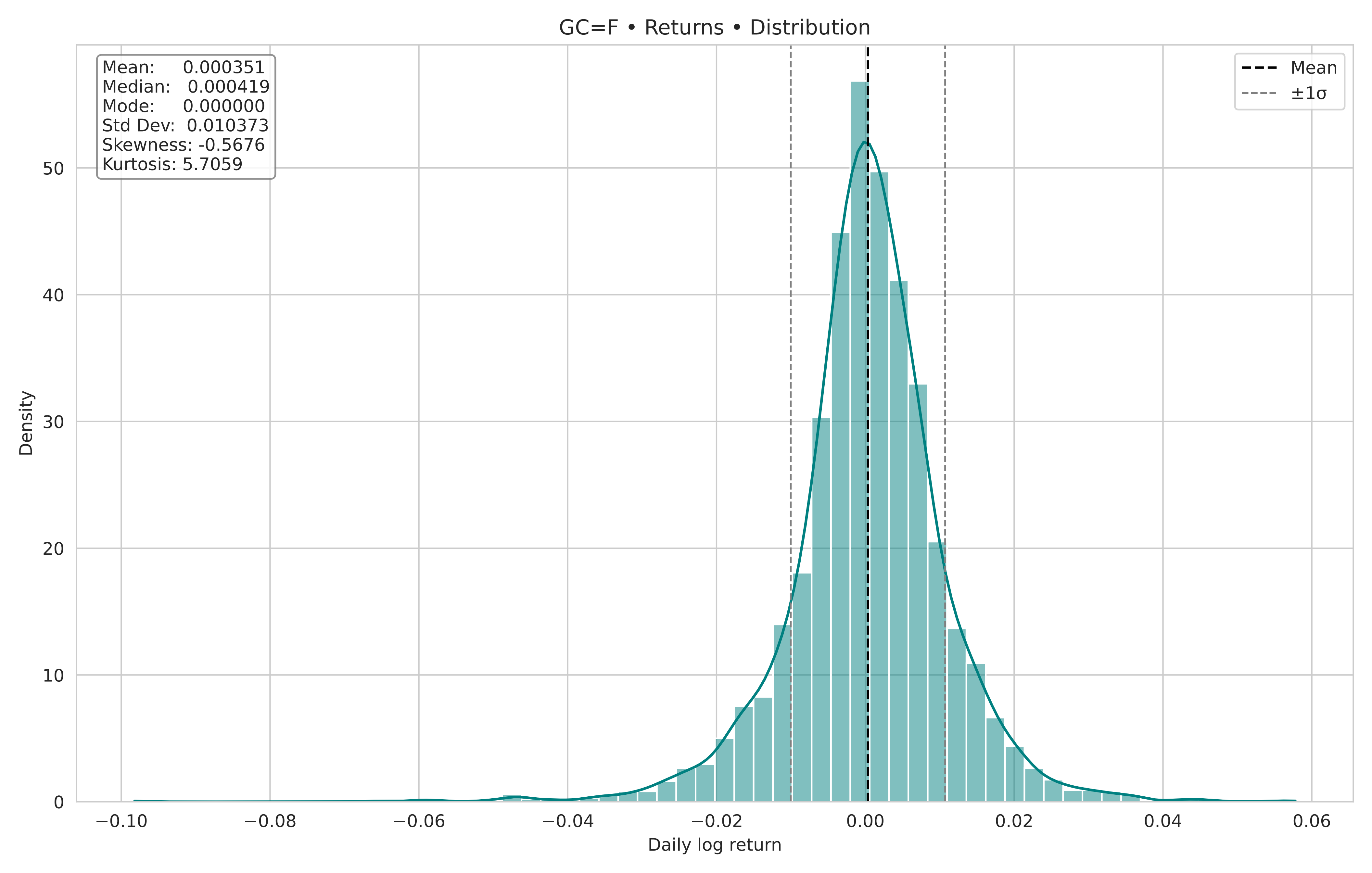

CL=F • Correlation • Spreads + Lags
HL_spread|CL=F
OC_spread|CL=F
lag_1|CL=F
lag_2|CL=F
lag_3|CL=F
1.00
0.34
0.16
0.18
0.18
0.34
1.00
0.03
0.02
0.02
0.16
0.03
1.00
1.00
0.99
0.18
0.02
1.00
1.00
1.00
0.18
0.02
0.99
1.00
1.00
1.0
0.8
0.6
0.4
0.2

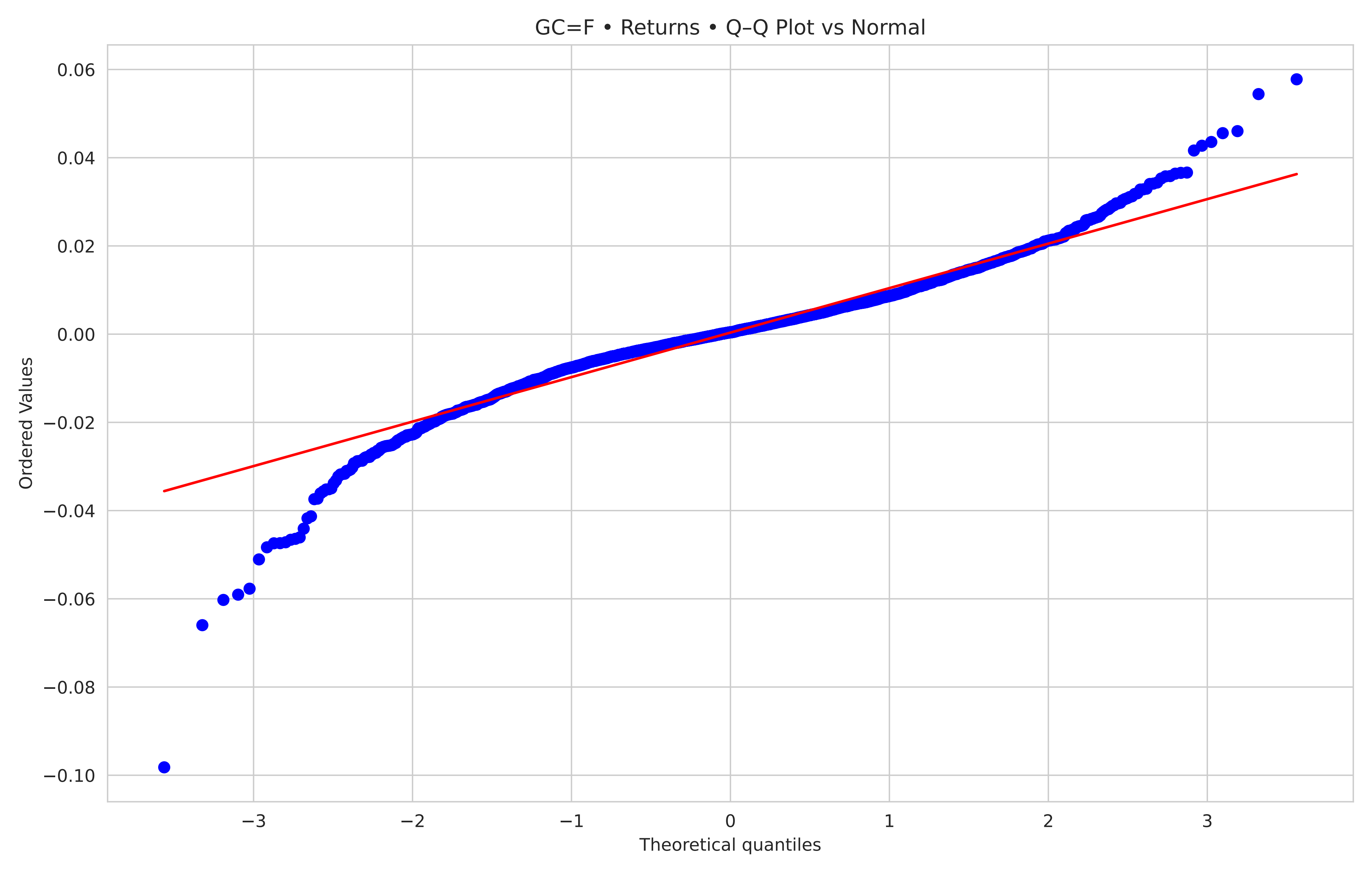

GC=F • Price
Adj/Close
Price (USD)
5000
4000
3000
2000
1000
2012
2014
2016
2018
2020
2022
2024
2026
Date


GC=F • ACF • Price (manual)
Autocorrelation
0.0
0.2
0.4
0.6
0.8
1.0
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Lag

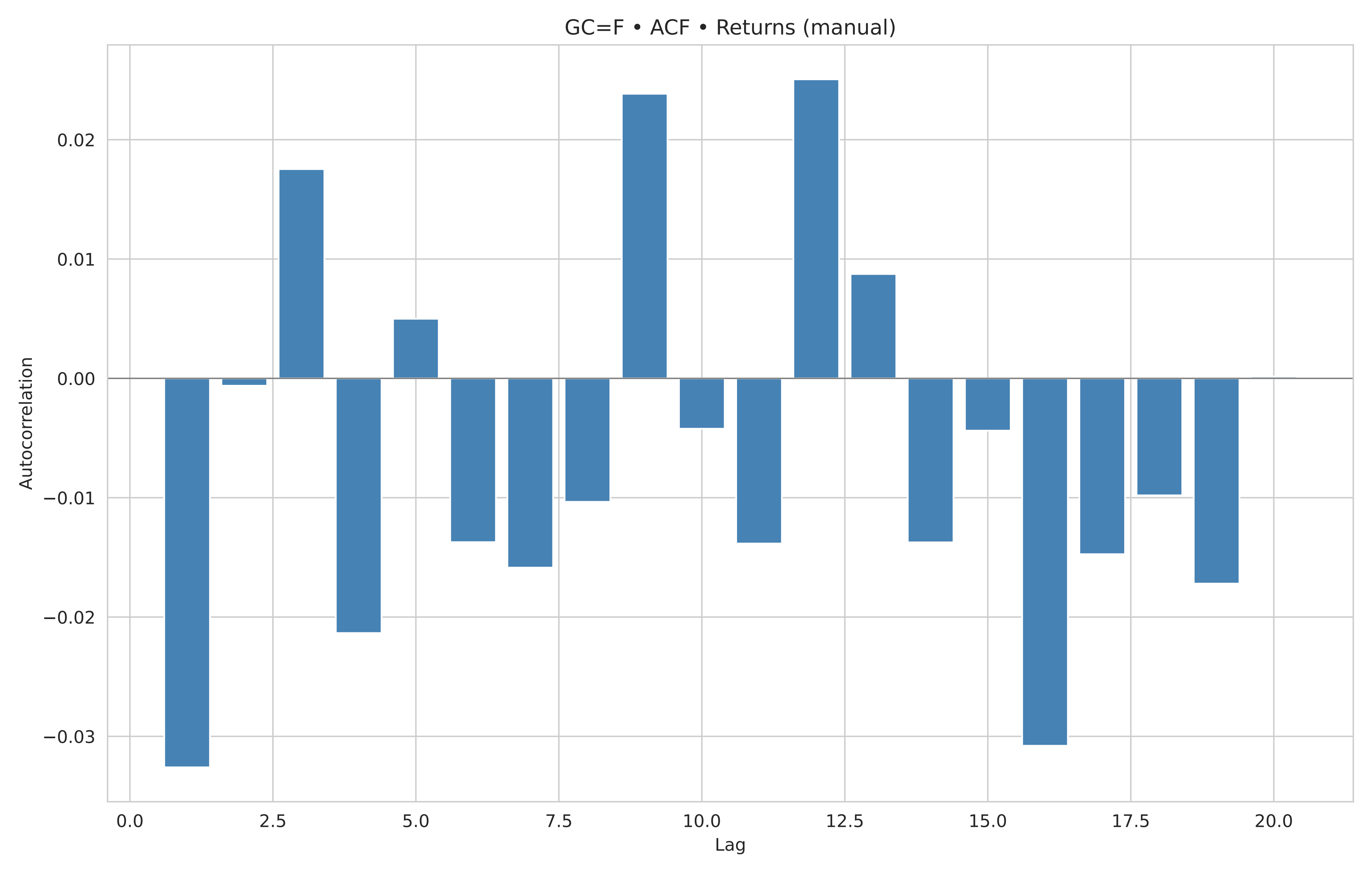

GC=F • Moving Averages (5/10/20)
Adj/Close
SMA 5
SMA 10
SMA 20
5000
4000
3000
2000
1000
Price (USD)
2012
2014
2016
2018
2020
2022
2024
2026
Date

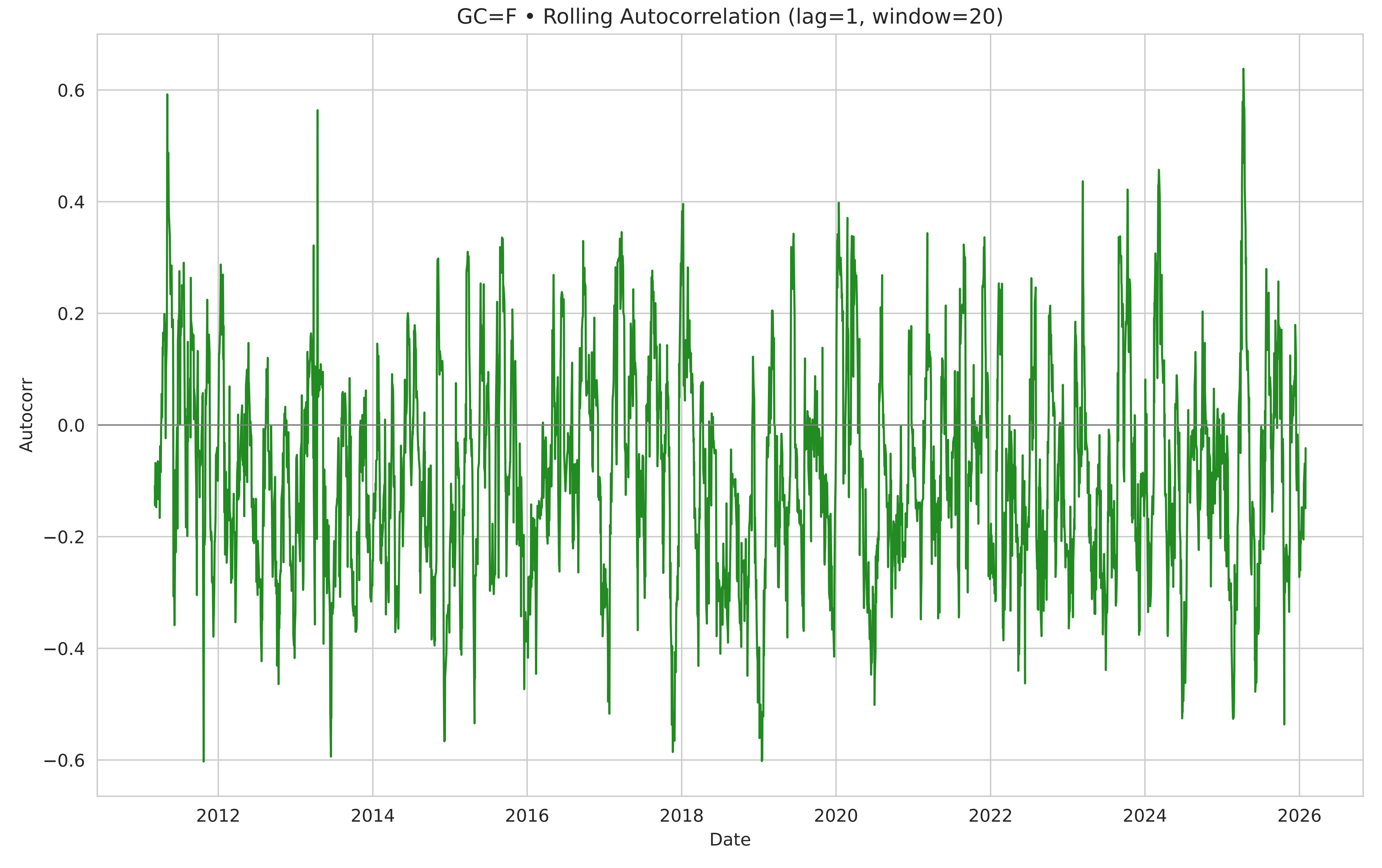

GC=F • Daily Log Returns
Daily log return
Date
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.08
−0.10
2012
2014
2016
2018
2020
2022
2024
2026

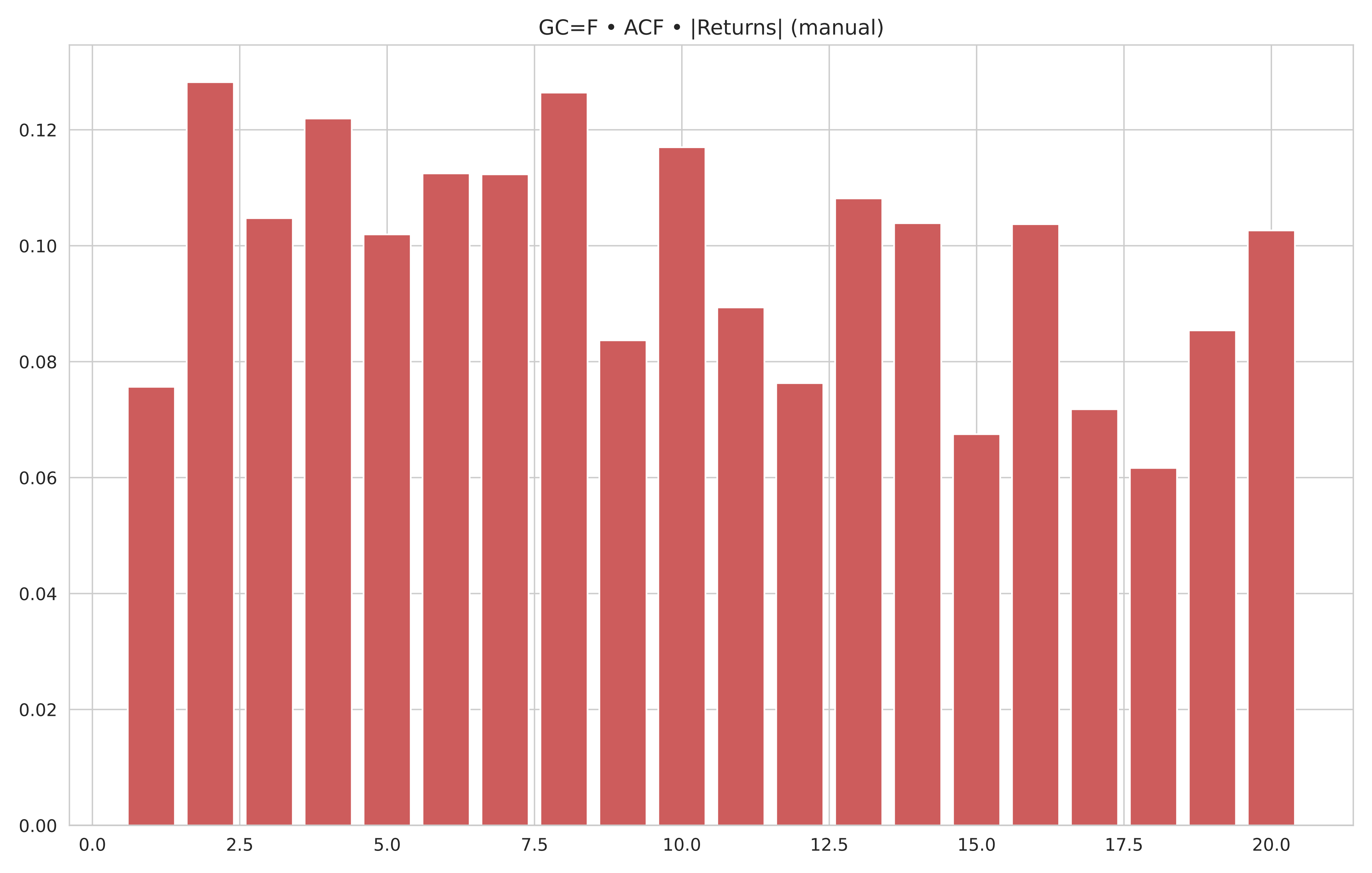

GC=F • Returns • Distribution
Mean: 0.000351
Median: 0.000419
Mode: 0.000000
Std Dev: 0.010373
Skewness: -0.5676
Kurtosis: 5.7059
Mean
±1σ
Density
Daily log return
0
10
20
30
40
50
−0.10
−0.08
−0.06
−0.04
−0.02
0.00
0.02
0.04
0.06

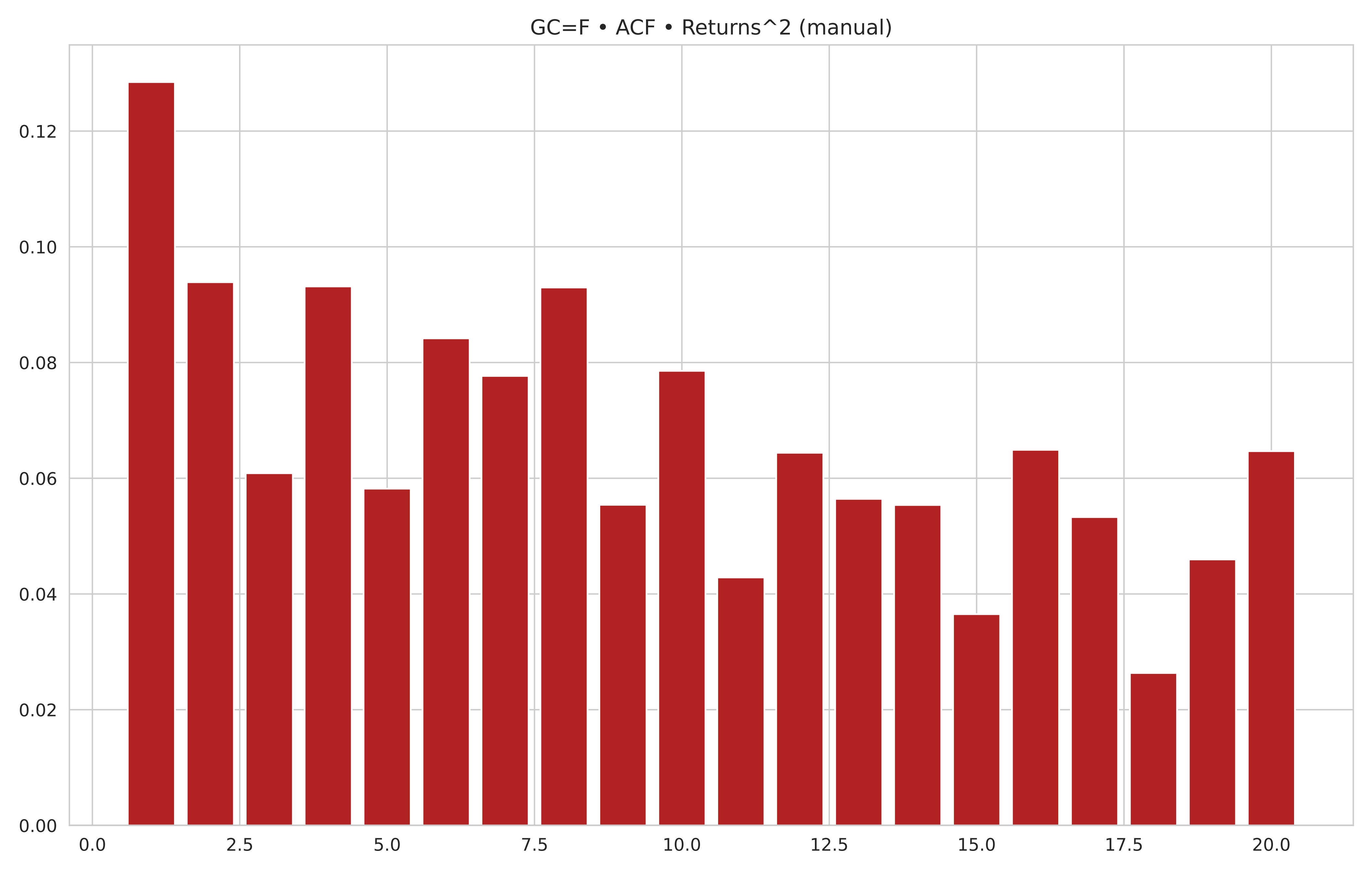


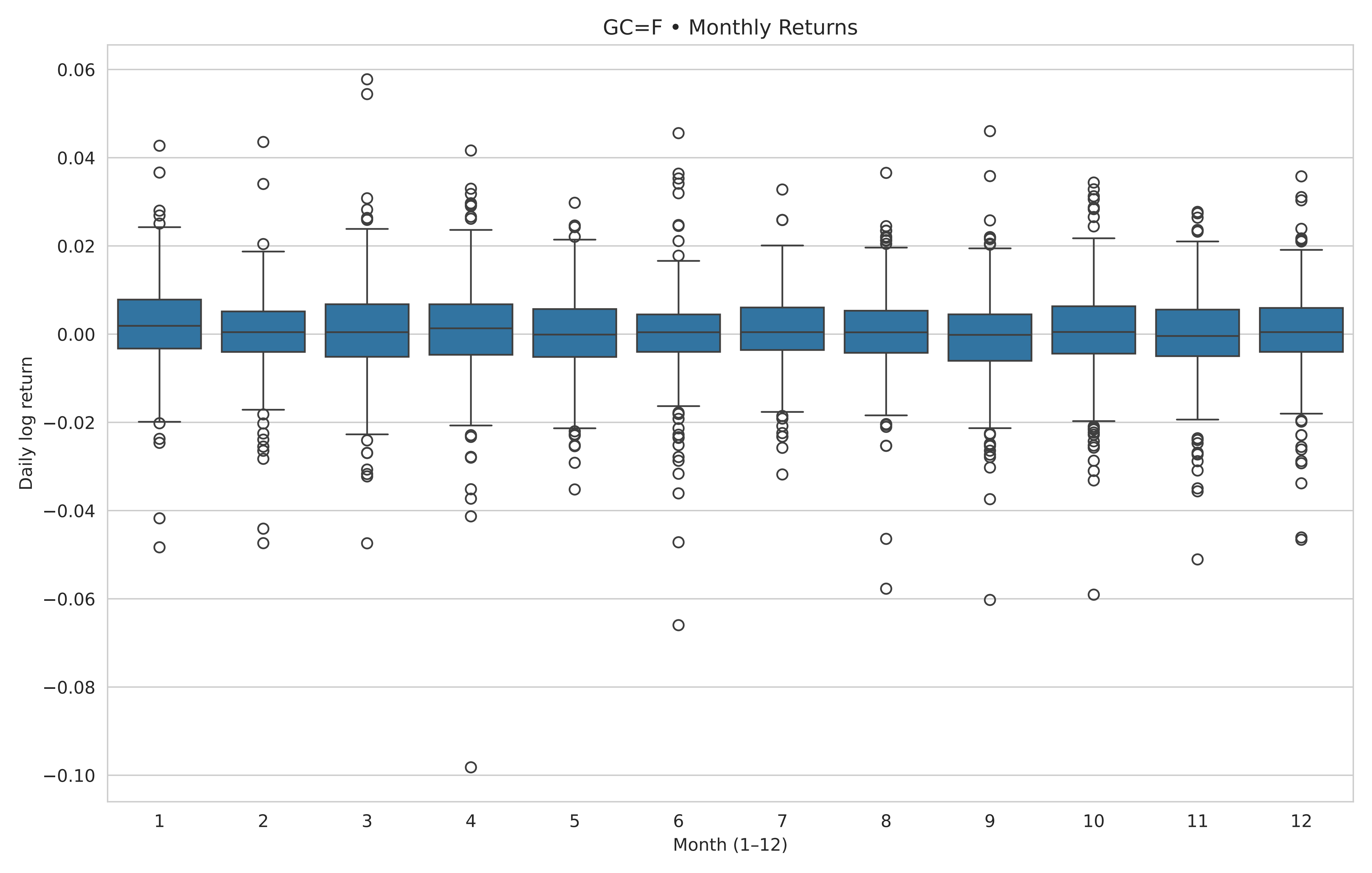
GC=F • Returns • Q–Q Plot vs Normal
Ordered Values
Theoretical quantiles
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.08
−0.10
−3
−2
−1
0
1
2
3

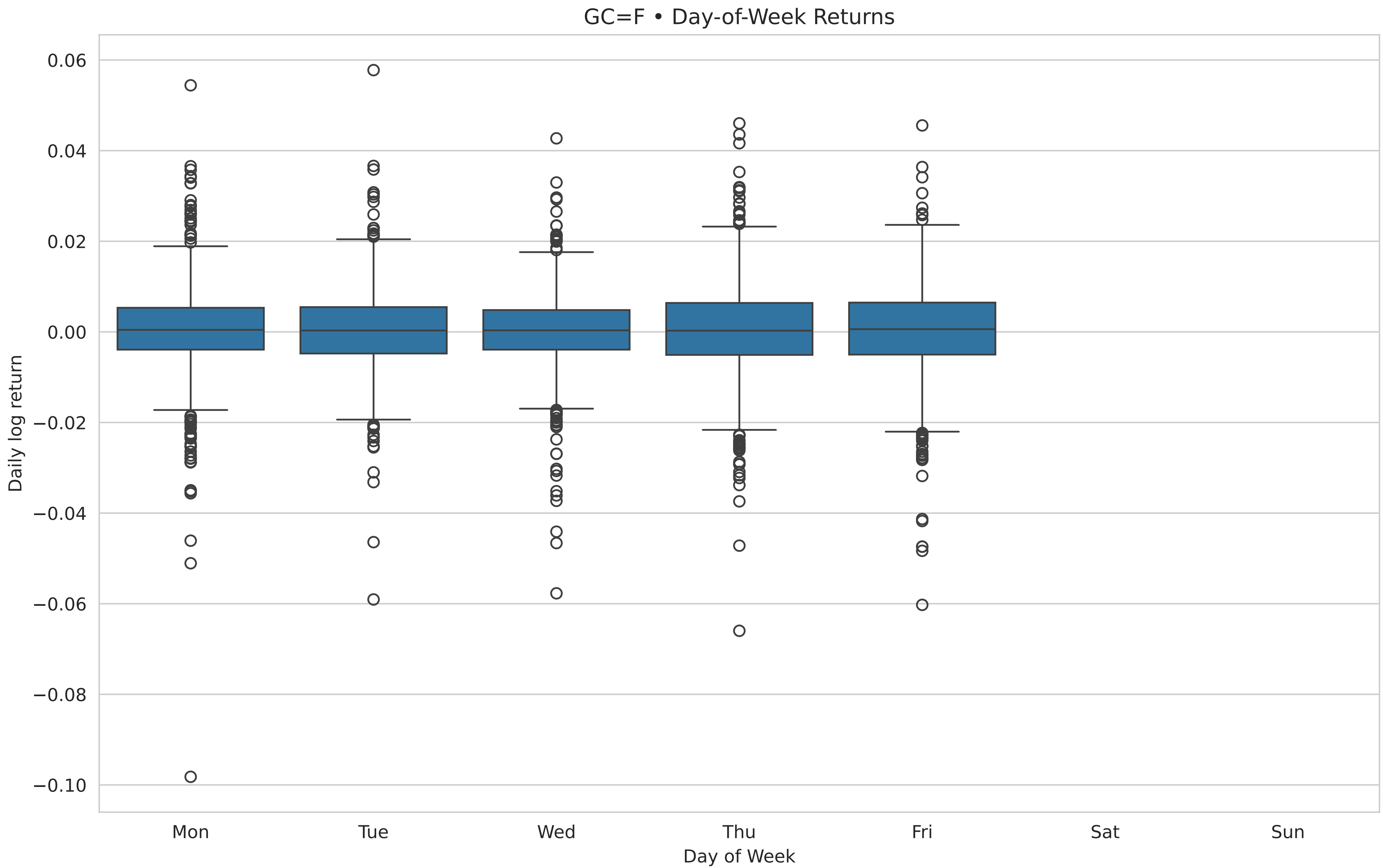

GC=F • ACF • Returns (manual)
Autocorrelation
Lag
0.02
0.01
0.00
−0.01
−0.02
−0.03
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

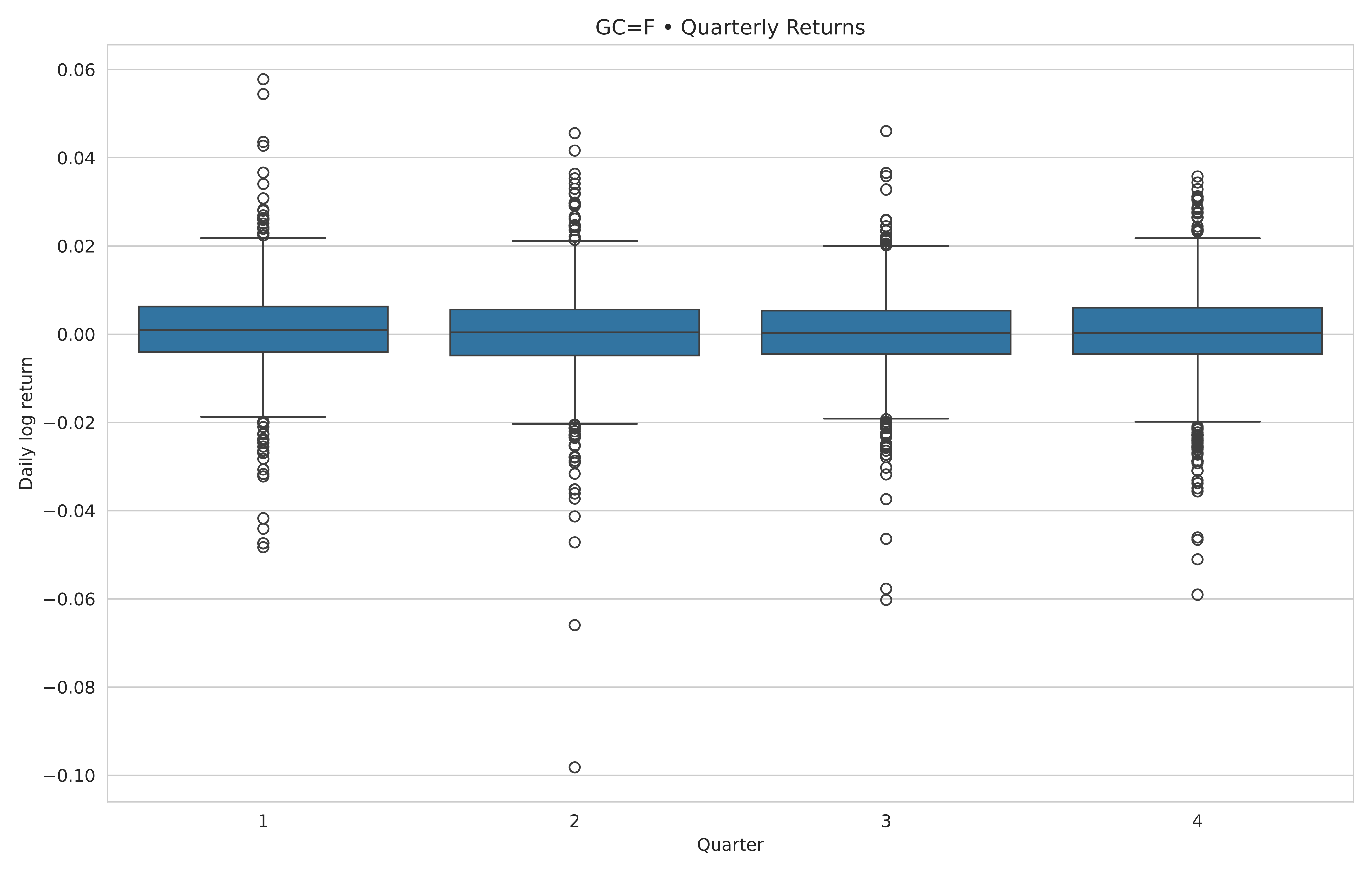

GC=F • Rolling Autocorrelation (lag=1, window=20)
Autocorr
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
2012
2014
2016
2018
2020
2022
2024
2026
Date

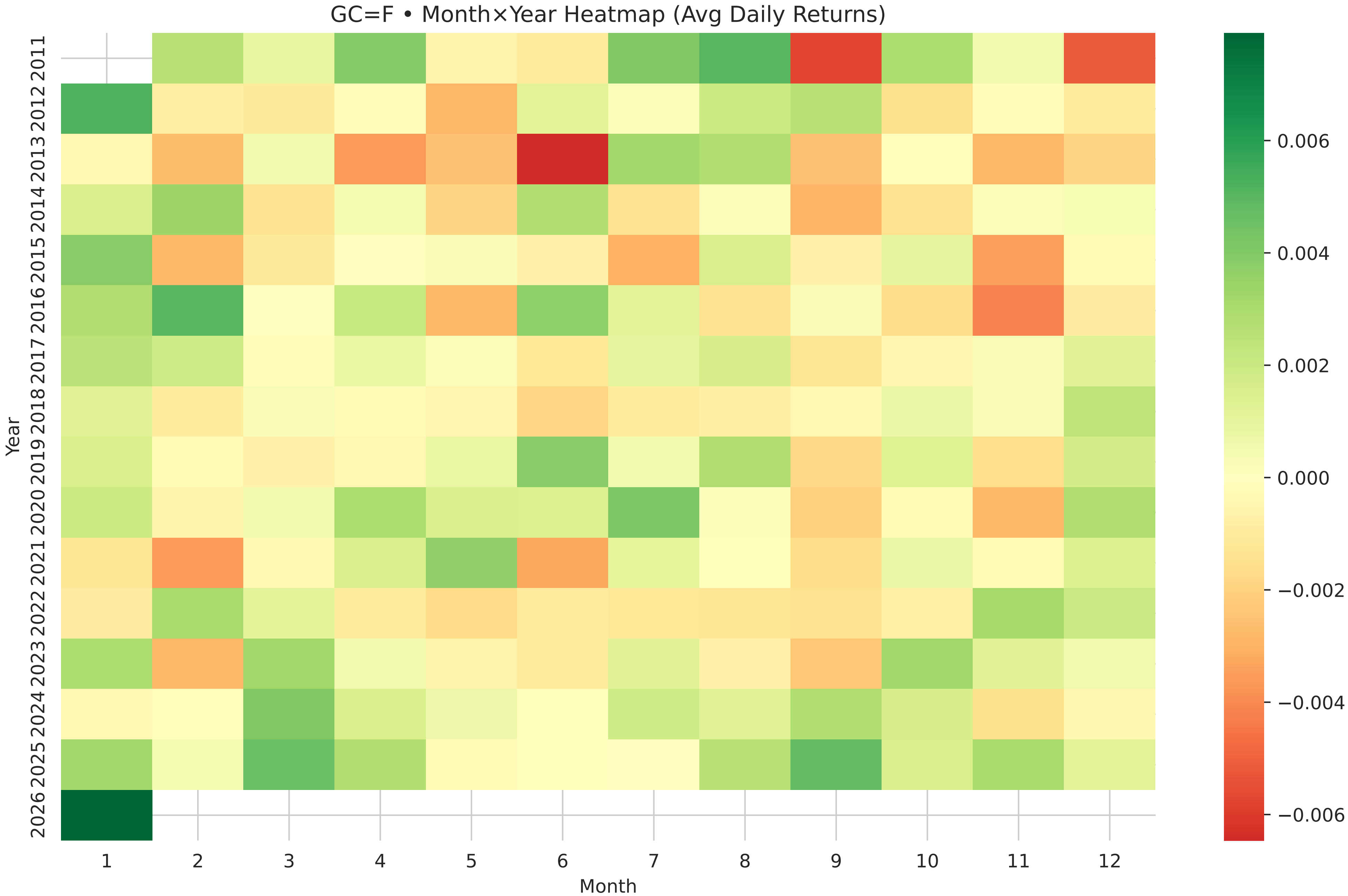

GC=F • ACF • |Returns| (manual)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0


GC=F • ACF • Returns^2 (manual)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

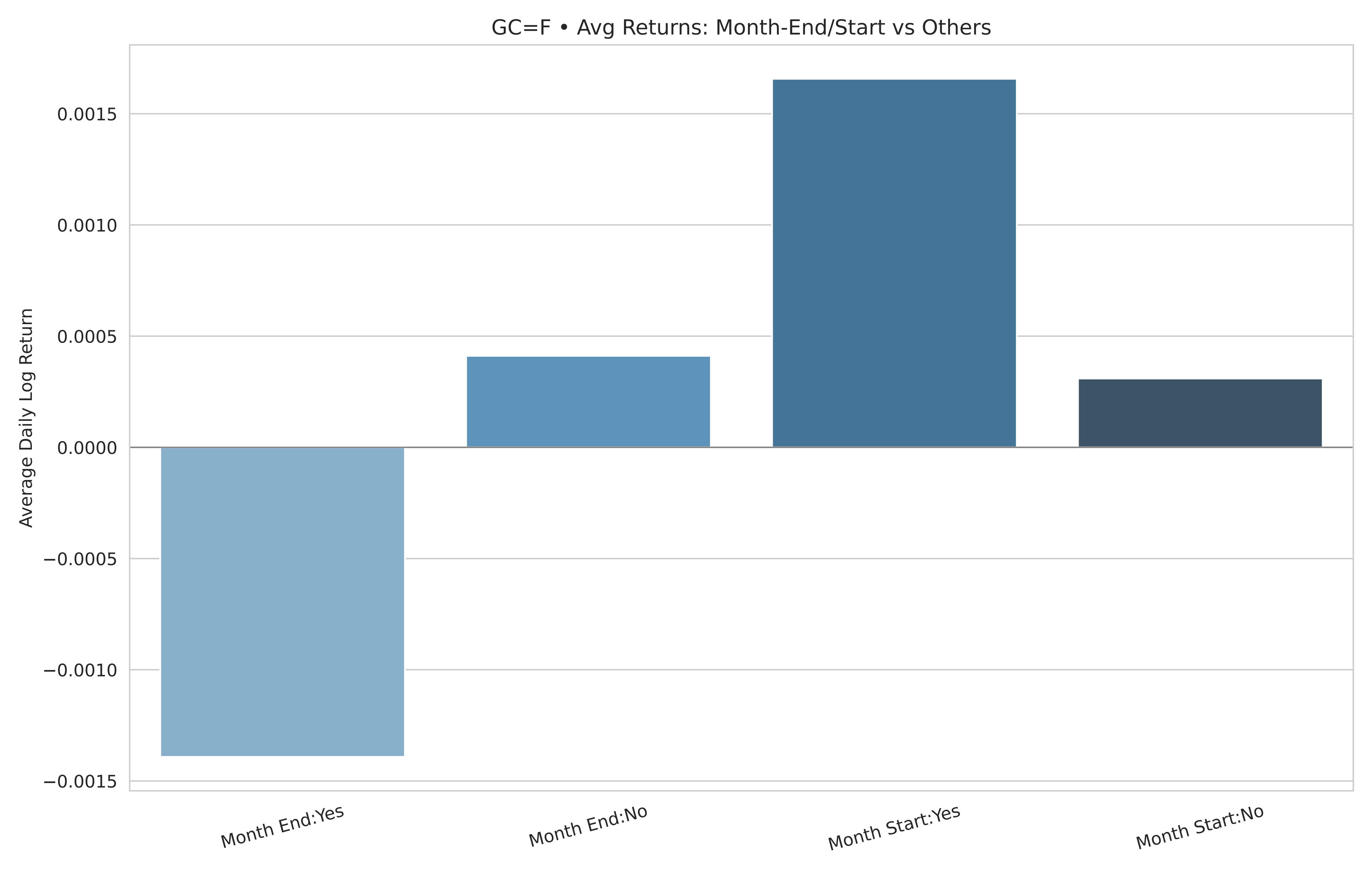

GC=F • Monthly Returns
Daily log return
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.08
−0.10
1
2
3
4
5
6
7
8
9
10
11
12
Month (1–12)


GC=F • Day-of-Week Returns
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.08
−0.10
Daily log return
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Day of Week

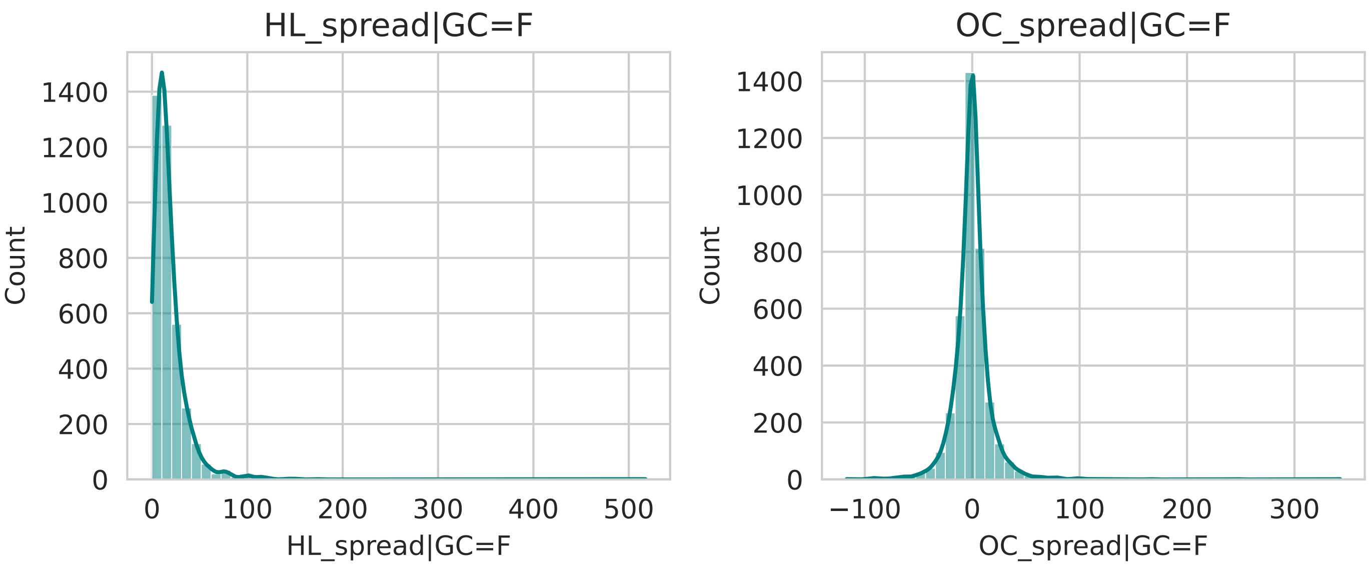

GC=F • Quarterly Returns
Daily log return
Quarter
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.08
−0.10
1
2
3
4



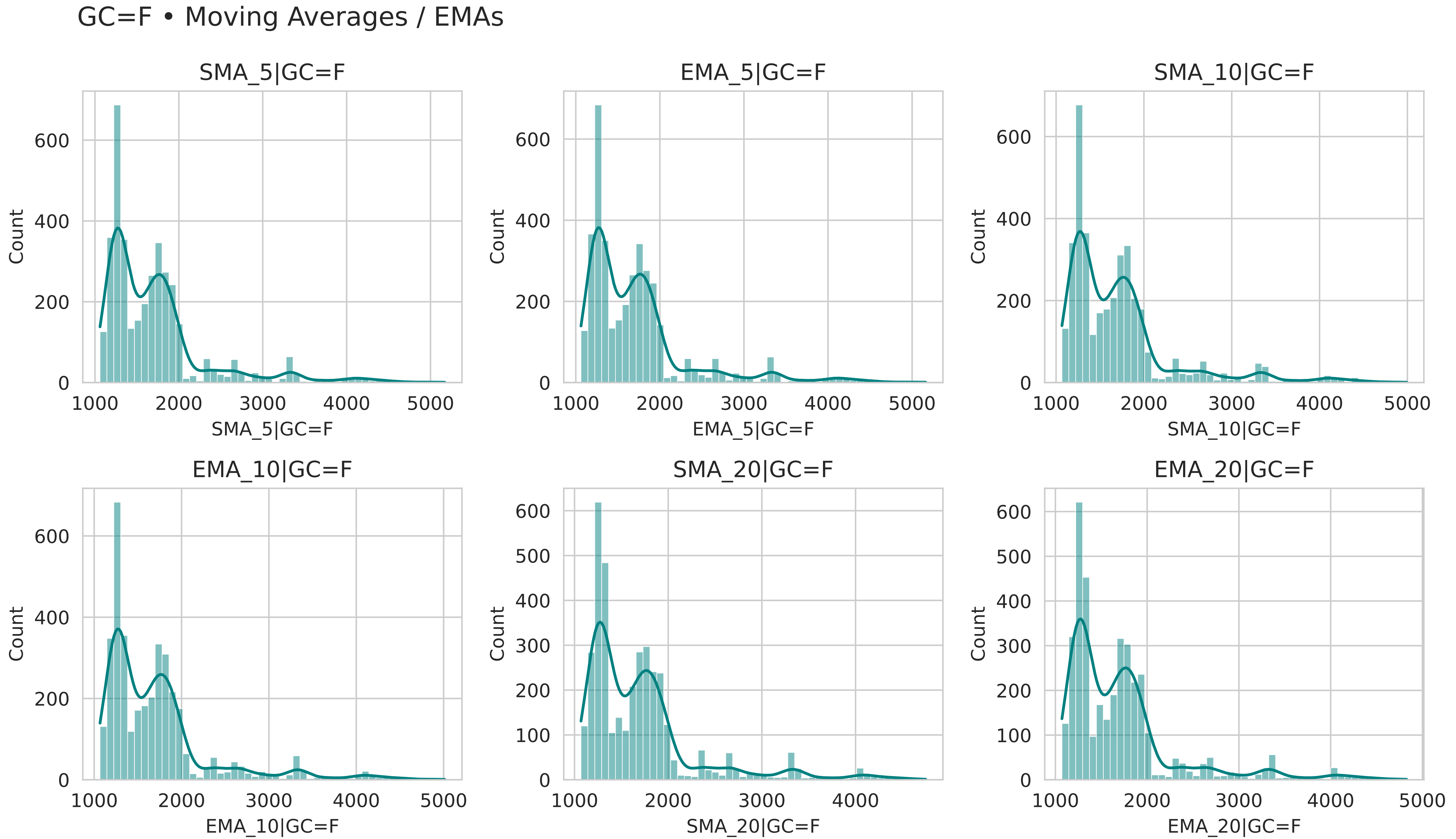
GC=F • Month×Year Heatmap (Avg Daily Returns)
Year
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Month
1
2
3
4
5
6
7
8
9
10
11
12
0.006
0.004
0.002
0.000
−0.002
−0.004
−0.006


GC=F • Avg Returns: Month-End/Start vs Others
Average Daily Log Return
0.0015
0.0010
0.0005
0.0000
−0.0005
−0.0010
−0.0015
Month End:Yes
Month End:No
Month Start:Yes
Month Start:No

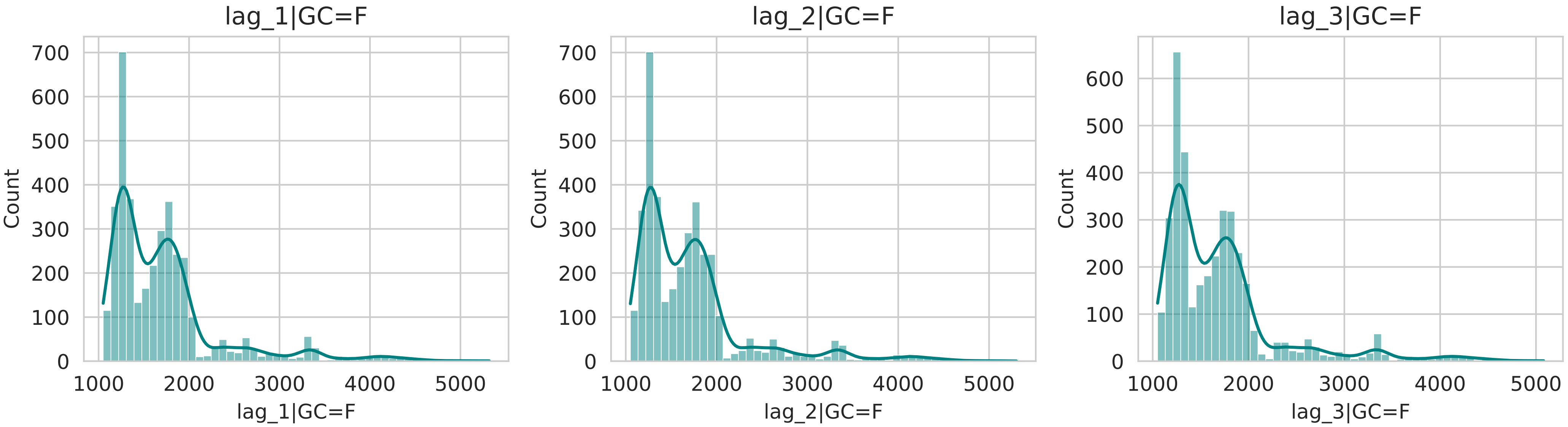
GC=F • Spreads

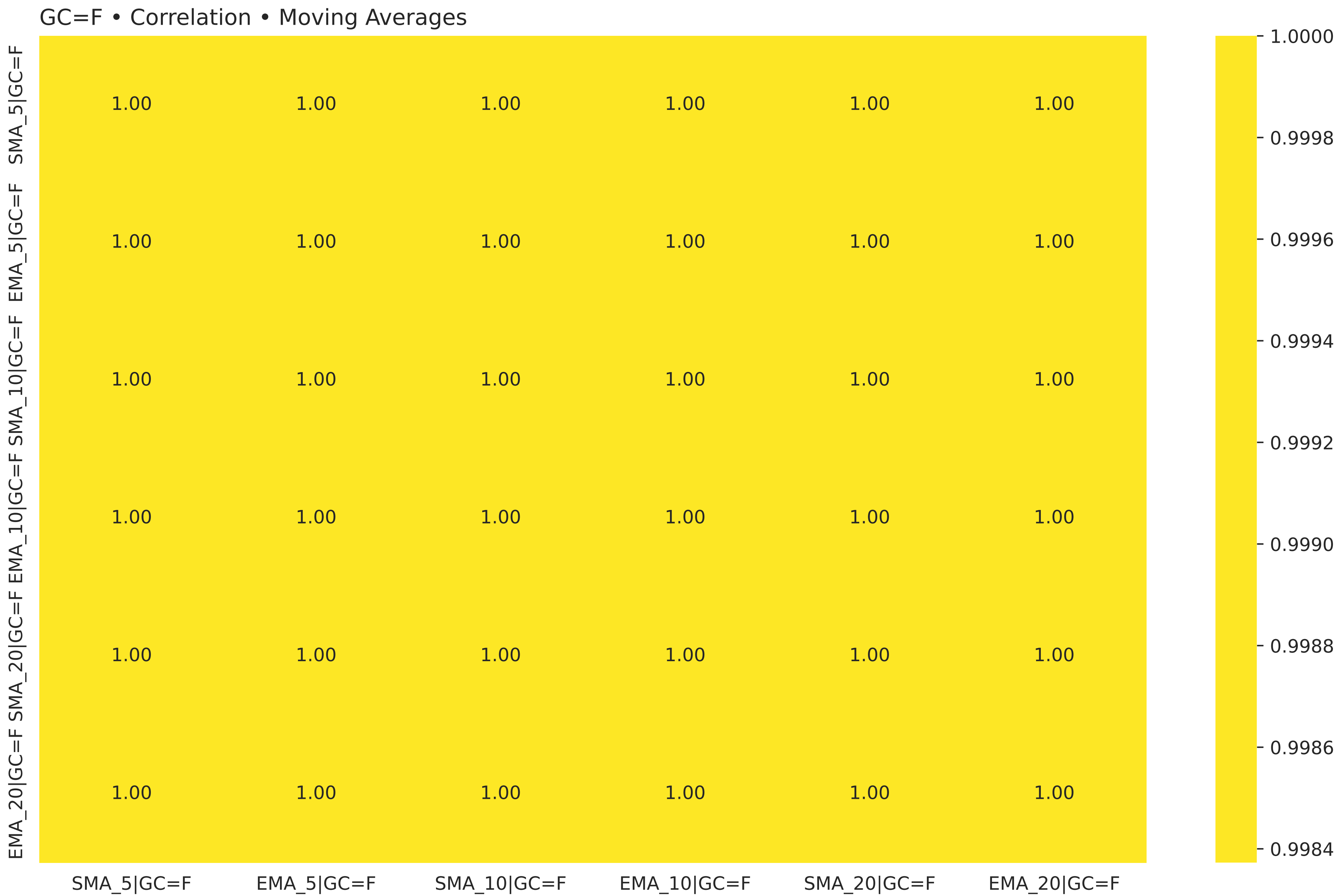


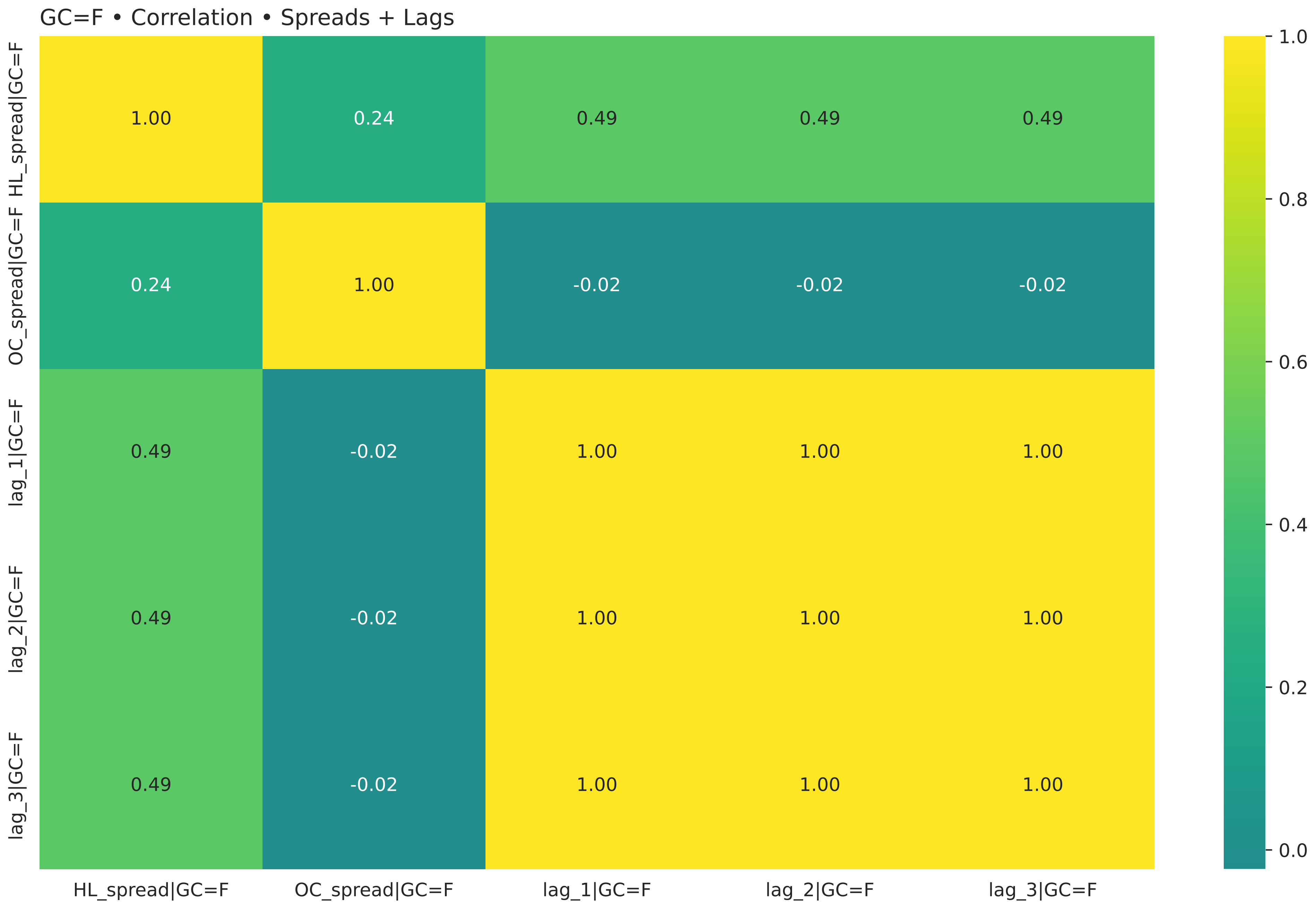
HL_spread|GC=F
Count
1400
1200
1000
800
600
400
200
0
0
100
200
300
400
500
HL_spread|GC=F
OC_spread|GC=F
Count
1400
1200
1000
800
600
400
200
0
−100
0
100
200
300
OC_spread|GC=F


GC=F • Moving Averages / EMAs
SMA_5|GC=F
EMA_5|GC=F
SMA_10|GC=F
EMA_10|GC=F
SMA_20|GC=F
EMA_20|GC=F
Count
0
200
400
600
100
300
500
1000
2000
3000
4000
5000

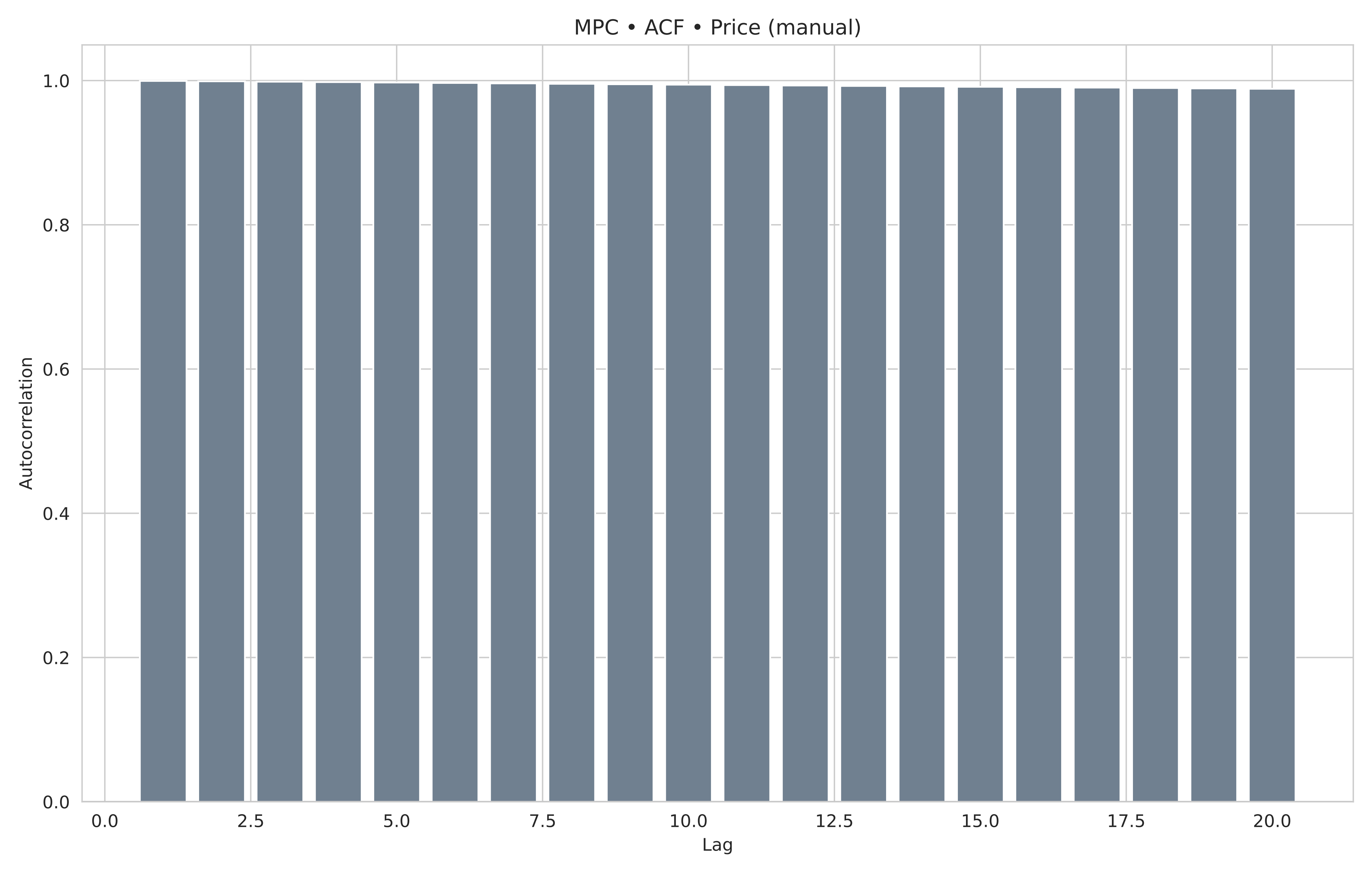
GC=F • Lagged Prices

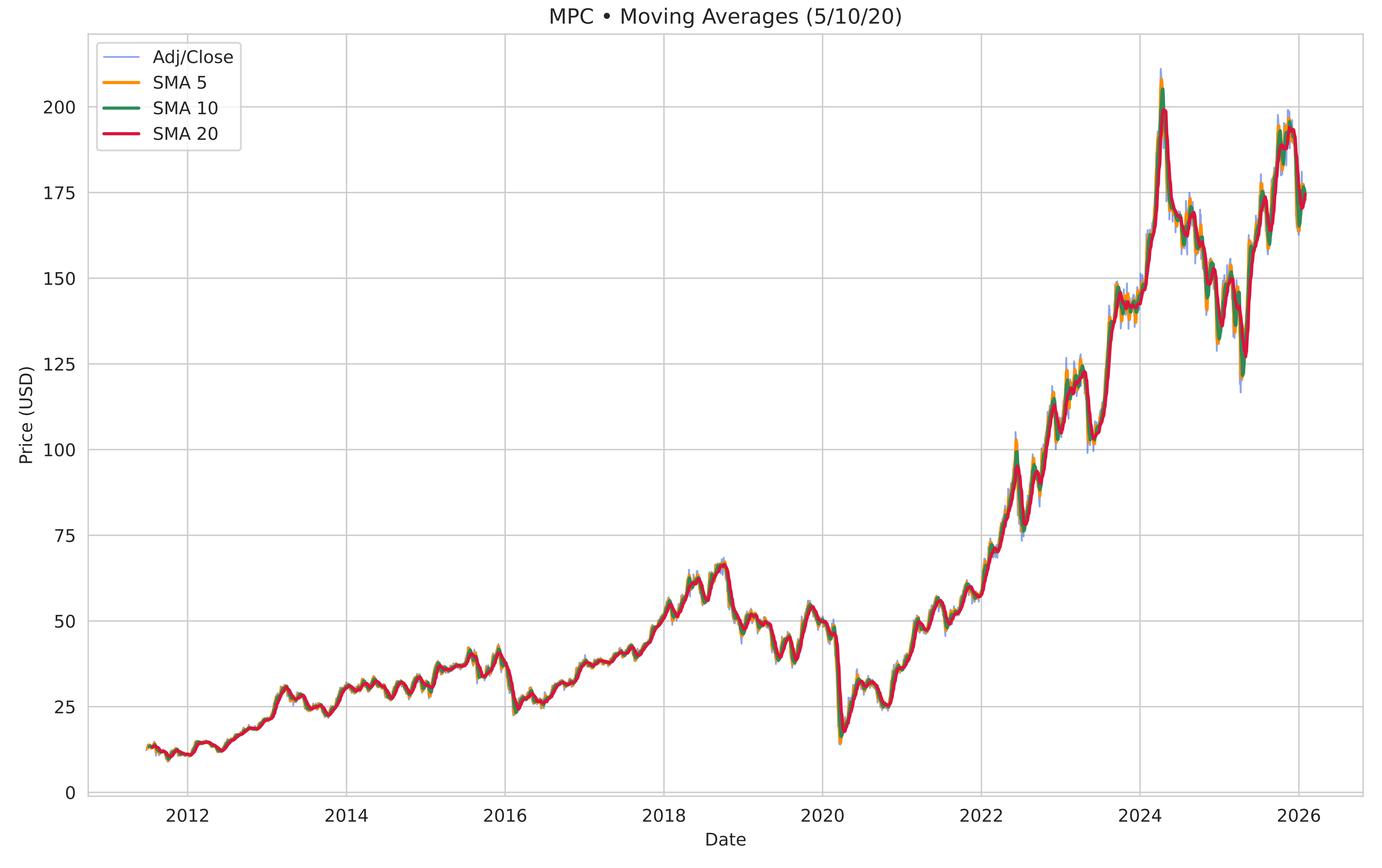



GC=F • Correlation • Moving Averages
SMA_5|GC=F
EMA_5|GC=F
SMA_10|GC=F
EMA_10|GC=F
SMA_20|GC=F
EMA_20|GC=F
1.00
1.0000
0.9998
0.9996
0.9994
0.9992
0.9990
0.9988
0.9986
0.9984

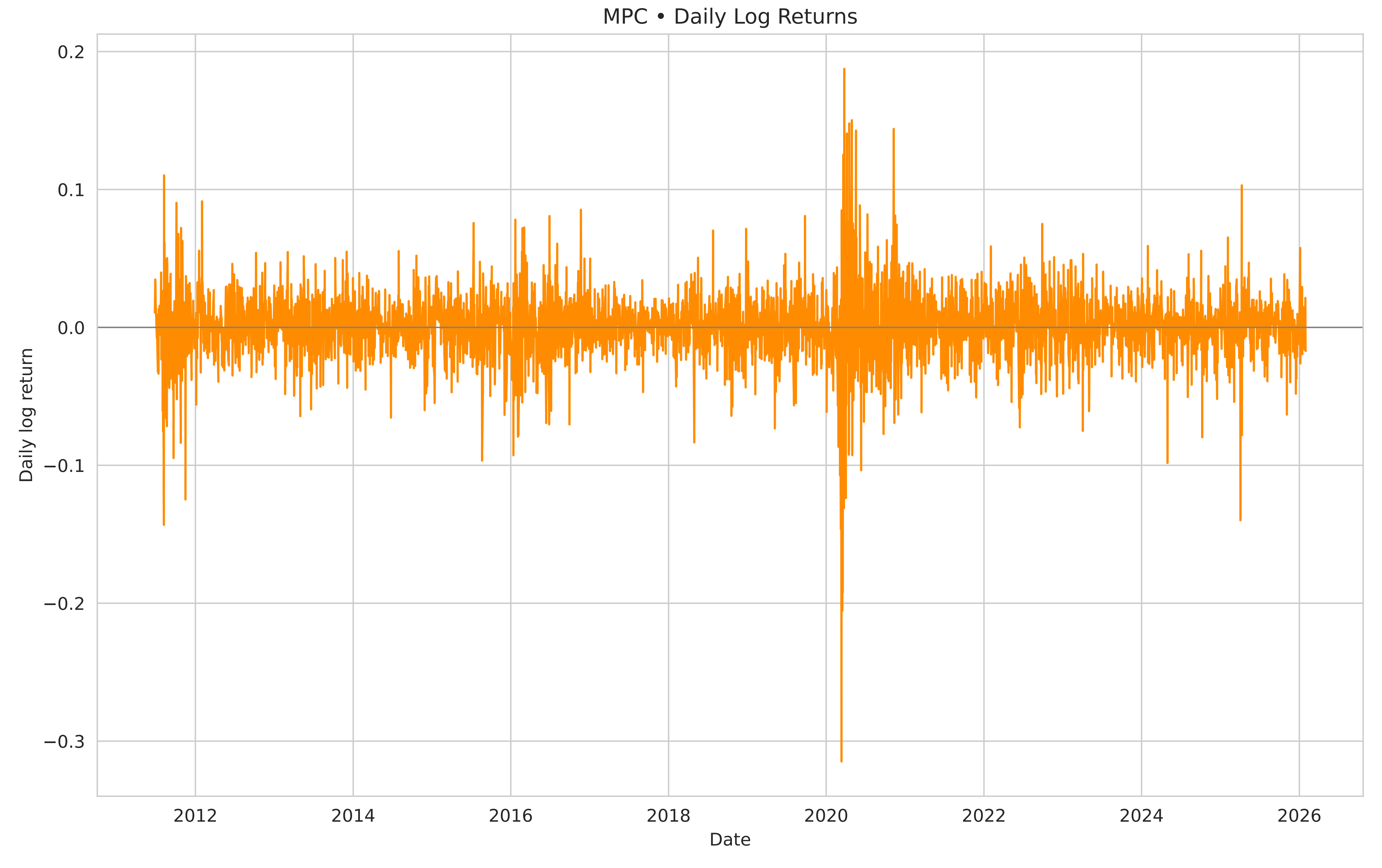

GC=F • Correlation • Spreads + Lags
HL_spread|GC=F
OC_spread|GC=F
lag_1|GC=F
lag_2|GC=F
lag_3|GC=F
1.00 0.24 0.49 0.49 0.49
0.24 1.00 -0.02 -0.02 -0.02
0.49 -0.02 1.00 1.00 1.00
0.49 -0.02 1.00 1.00 1.00
0.49 -0.02 1.00 1.00 1.00
1.0
0.8
0.6
0.4
0.2
0.0


MPC • Price
Adj/Close
Price (USD)
0
25
50
75
100
125
150
175
200
2012
2014
2016
2018
2020
2022
2024
2026
Date

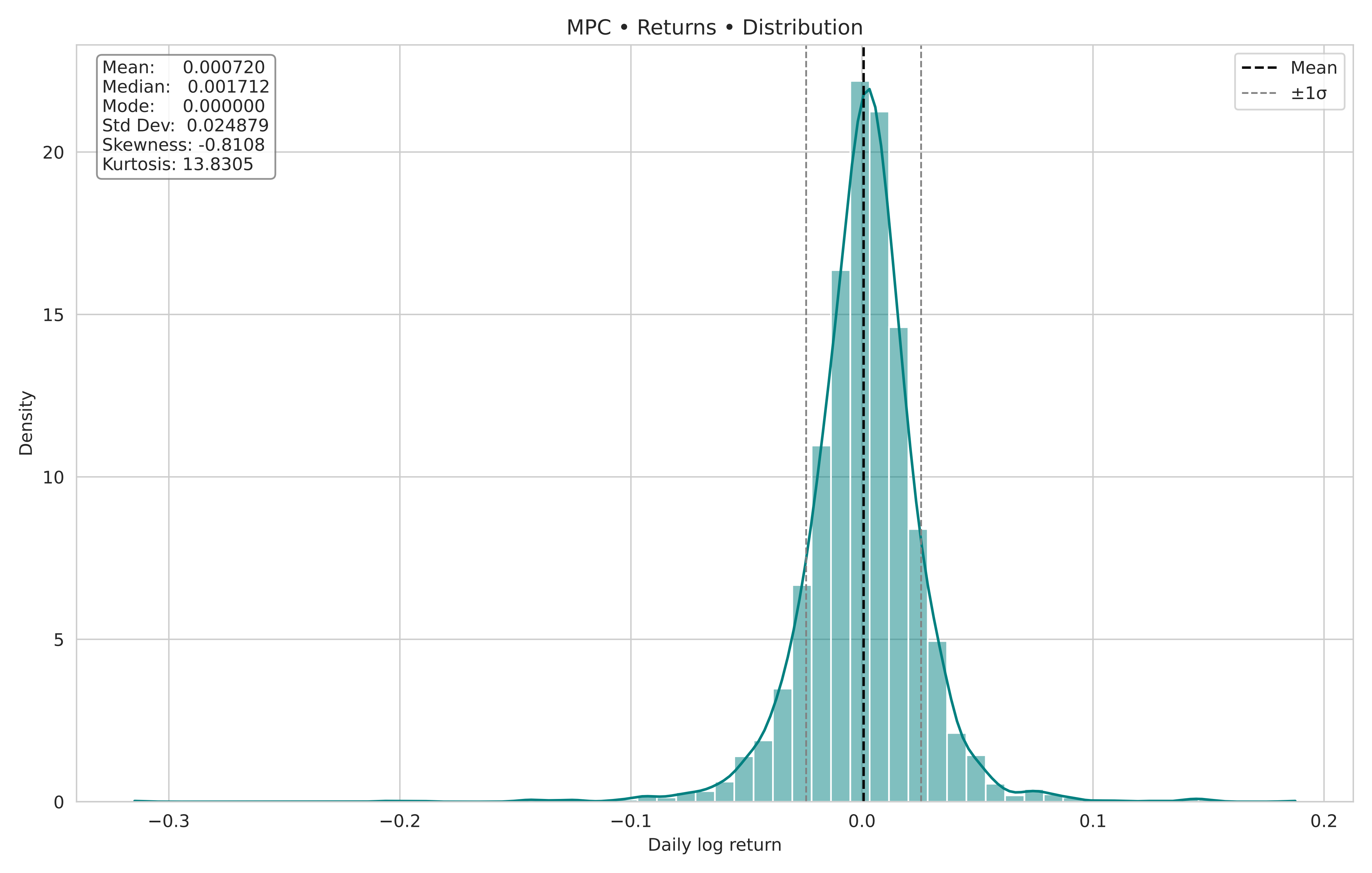

MPC • ACF • Price (manual)
Autocorrelation
Lag
0.0
0.2
0.4
0.6
0.8
1.0
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

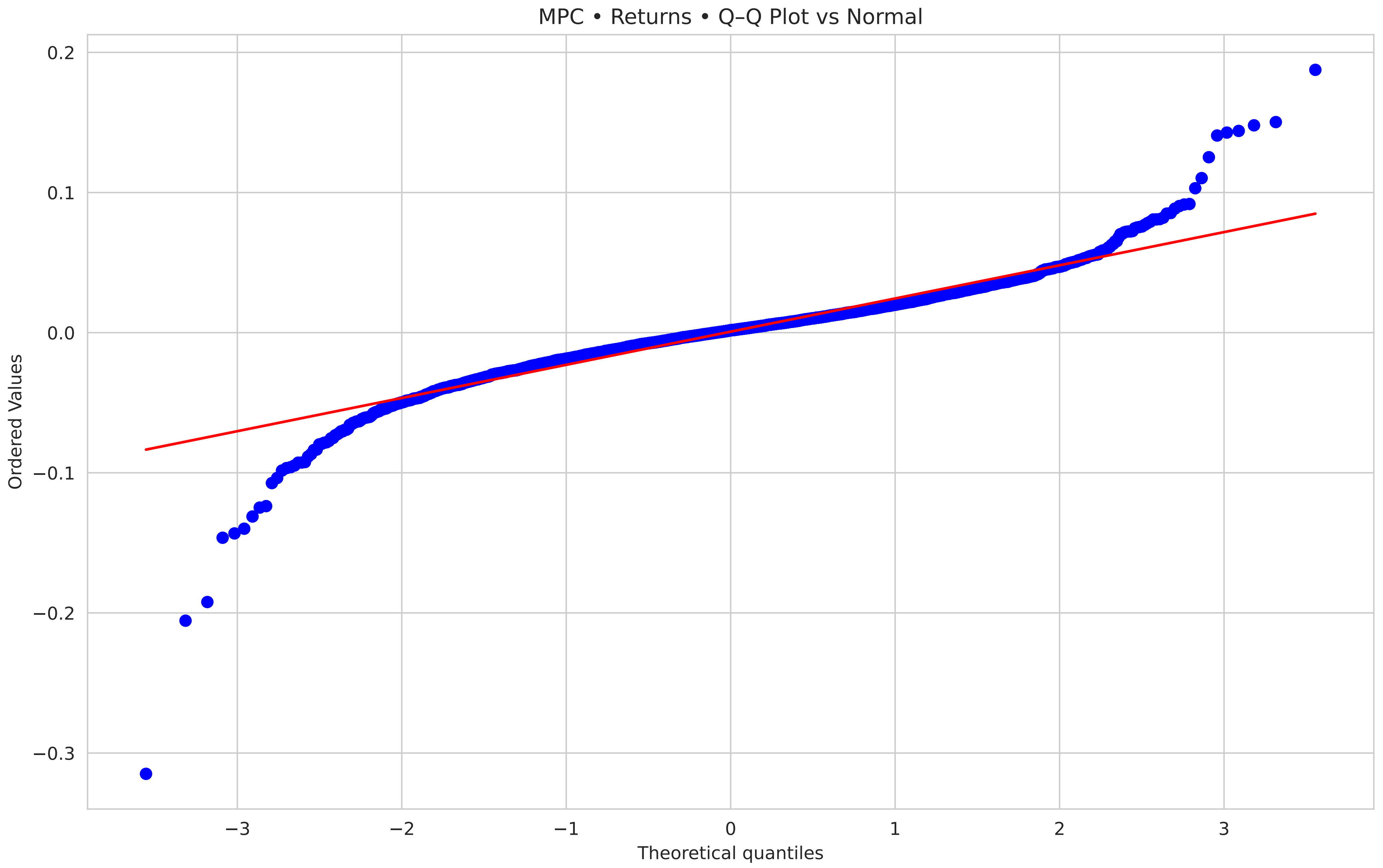


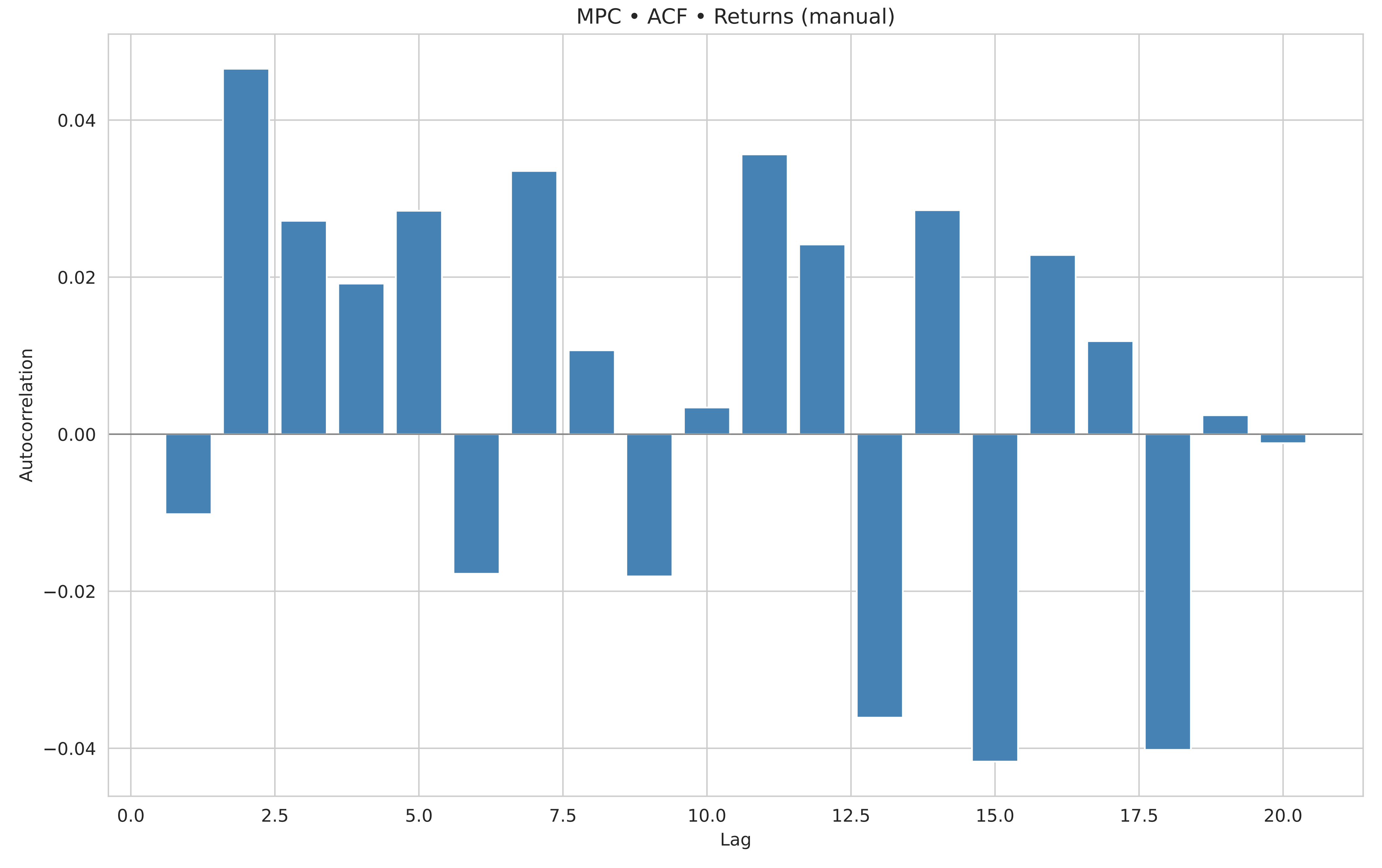
MPC • Moving Averages (5/10/20)
Adj/Close
SMA 5
SMA 10
SMA 20
Price (USD)
0
25
50
75
100
125
150
175
200
2012
2014
2016
2018
2020
2022
2024
2026
Date

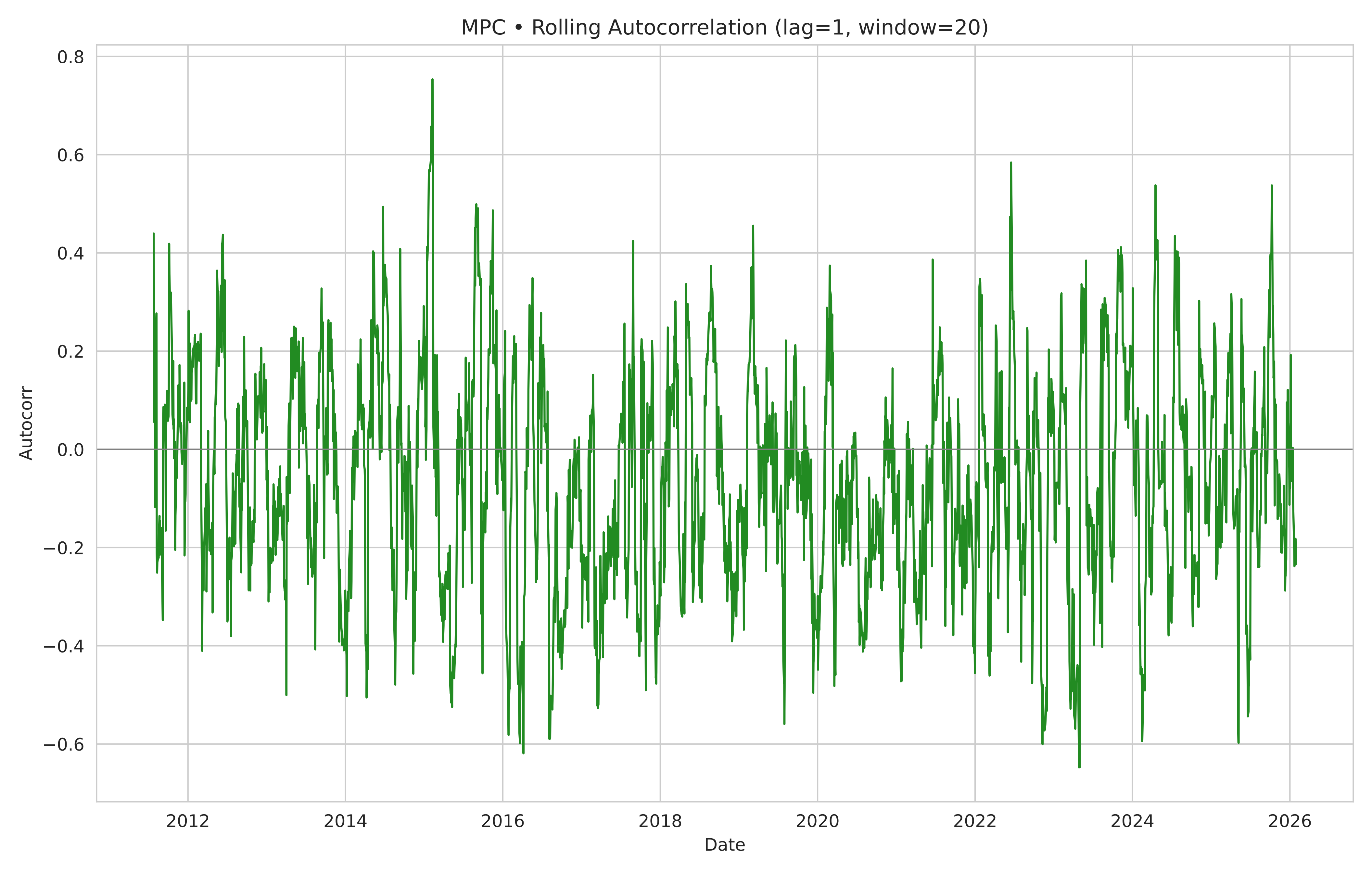


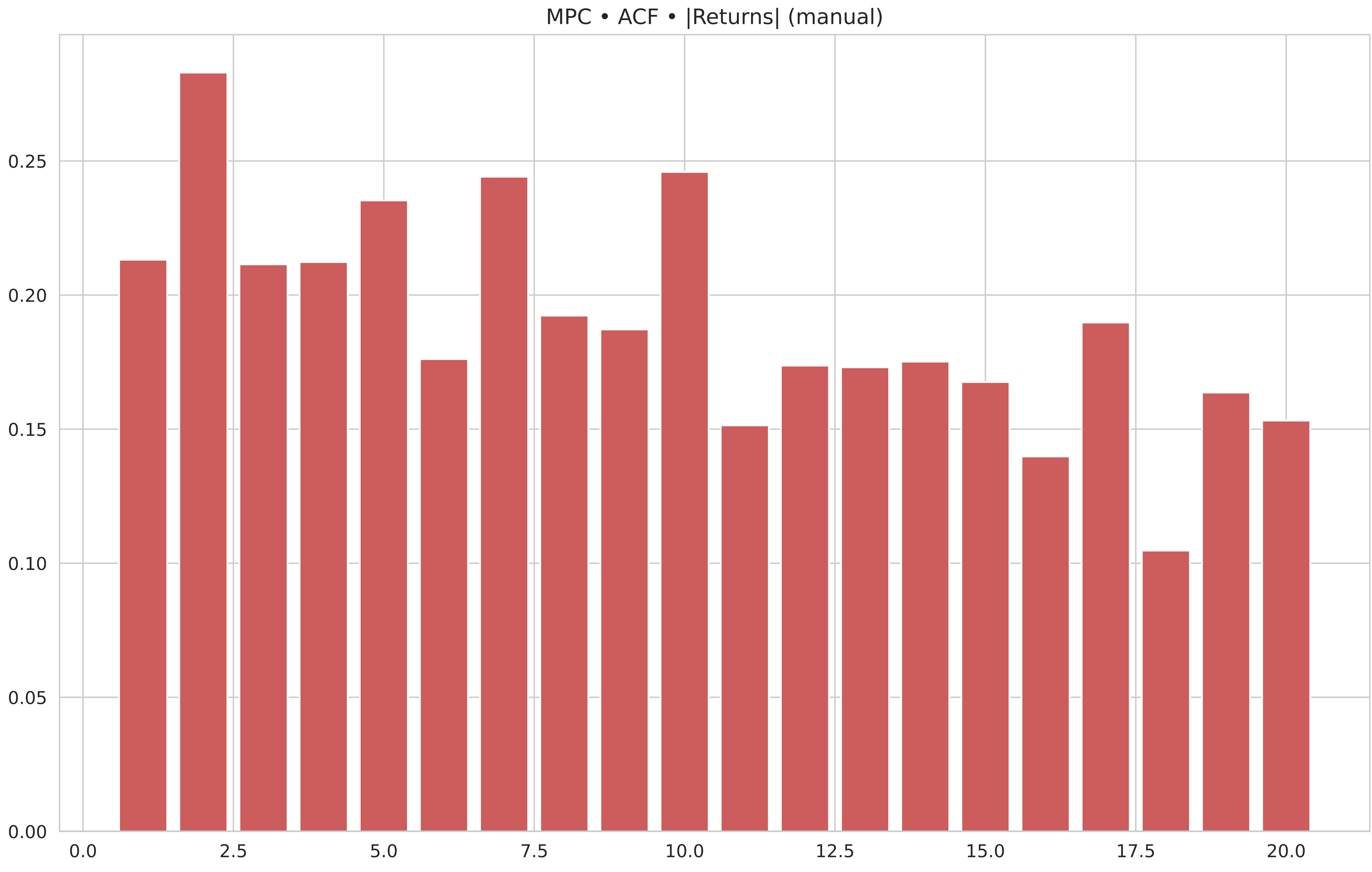
MPC • Daily Log Returns
Daily log return
Date
0.2
0.1
0.0
−0.1
−0.2
−0.3
2012
2014
2016
2018
2020
2022
2024
2026

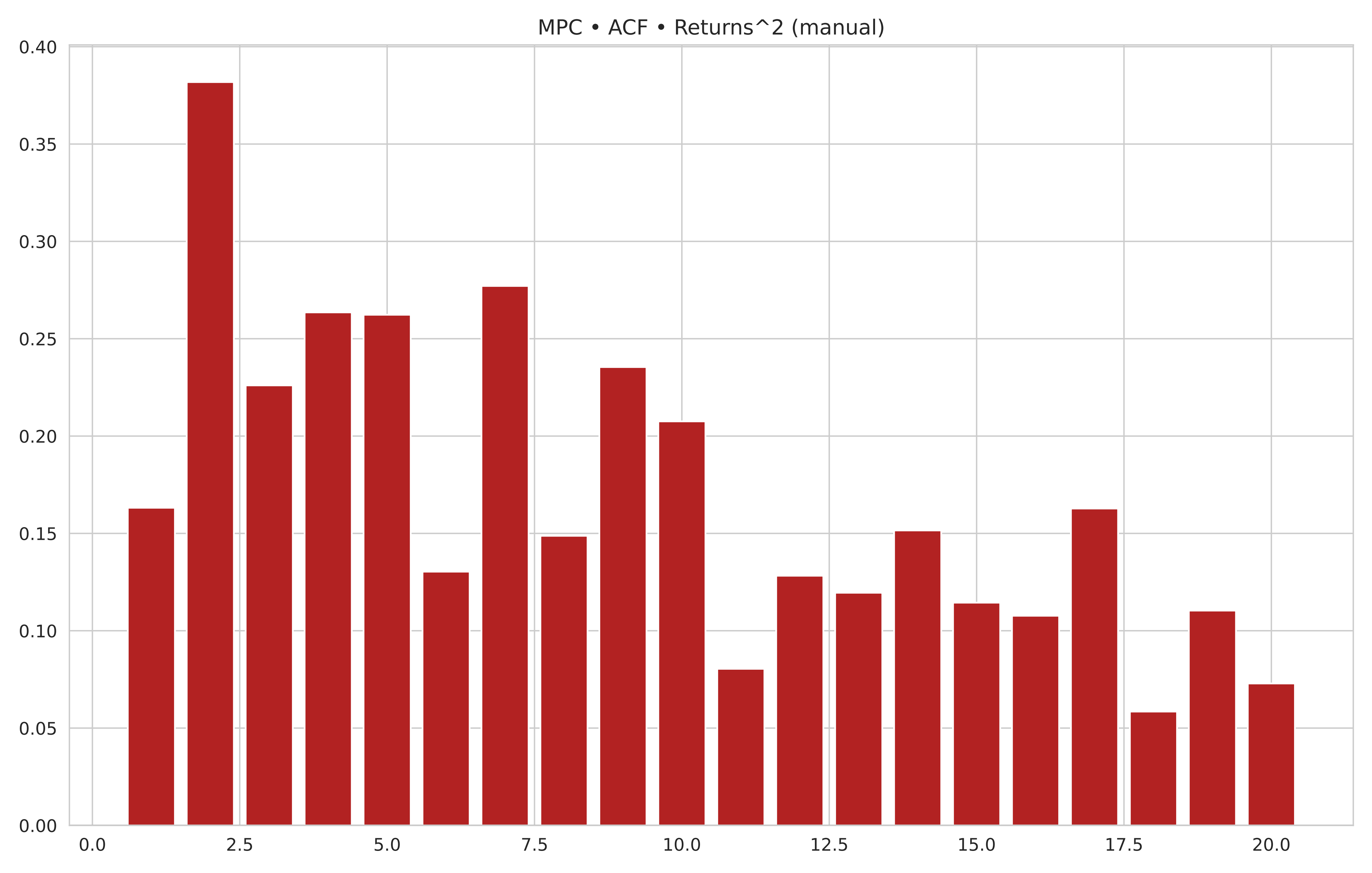

MPC • Returns • Distribution
Mean: 0.000720
Median: 0.001712
Mode: 0.000000
Std Dev: 0.024879
Skewness: -0.8108
Kurtosis: 13.8305
Mean
±1σ
Density
0
5
10
15
20
−0.3
−0.2
−0.1
0.0
0.1
0.2
Daily log return

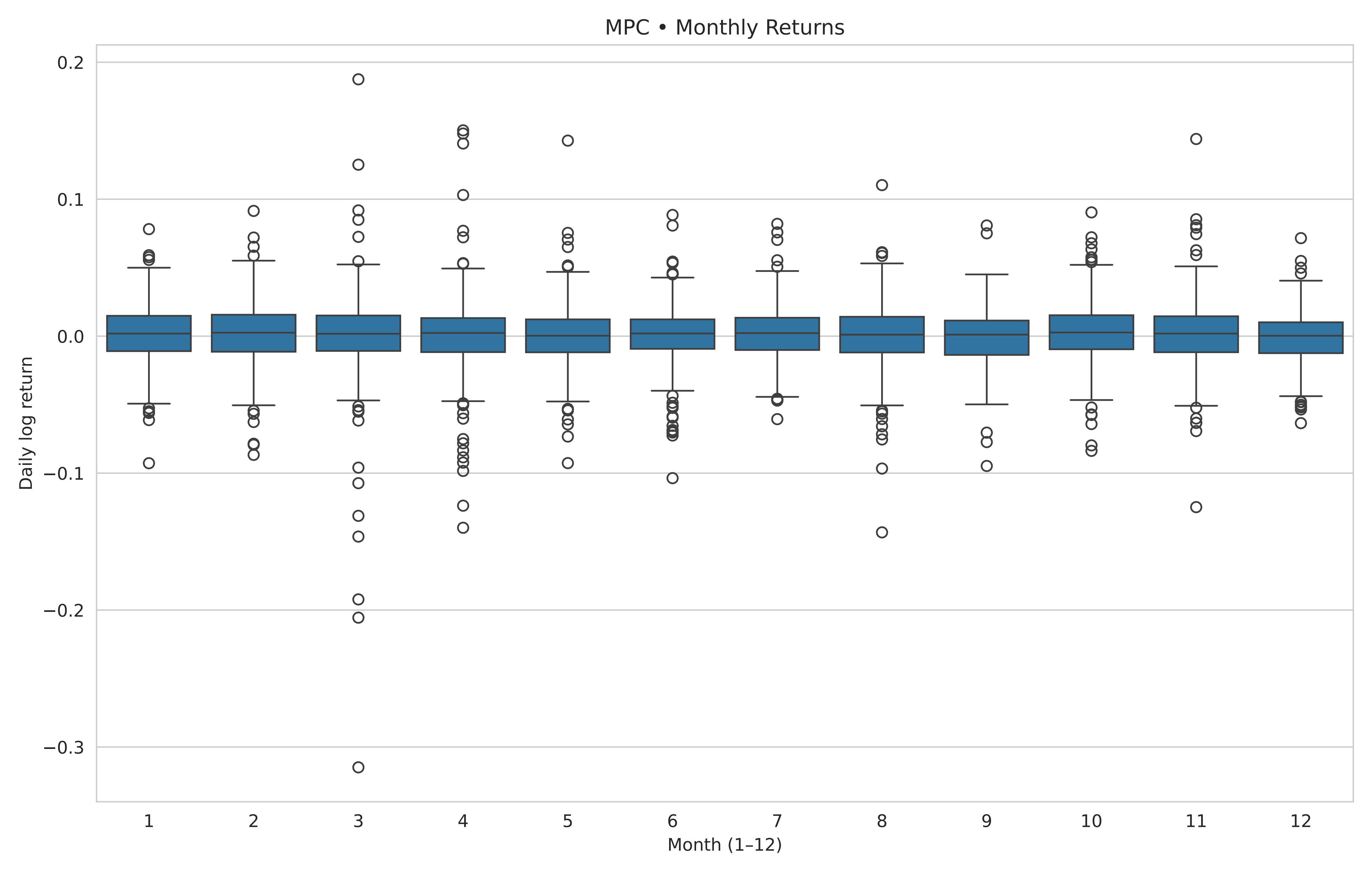

MPC • Returns • Q–Q Plot vs Normal
Ordered Values
Theoretical quantiles
0.2
0.1
0.0
−0.1
−0.2
−0.3
−3
−2
−1
0
1
2
3


MPC • ACF • Returns (manual)
Autocorrelation
0.04
0.02
0.00
−0.02
−0.04
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Lag

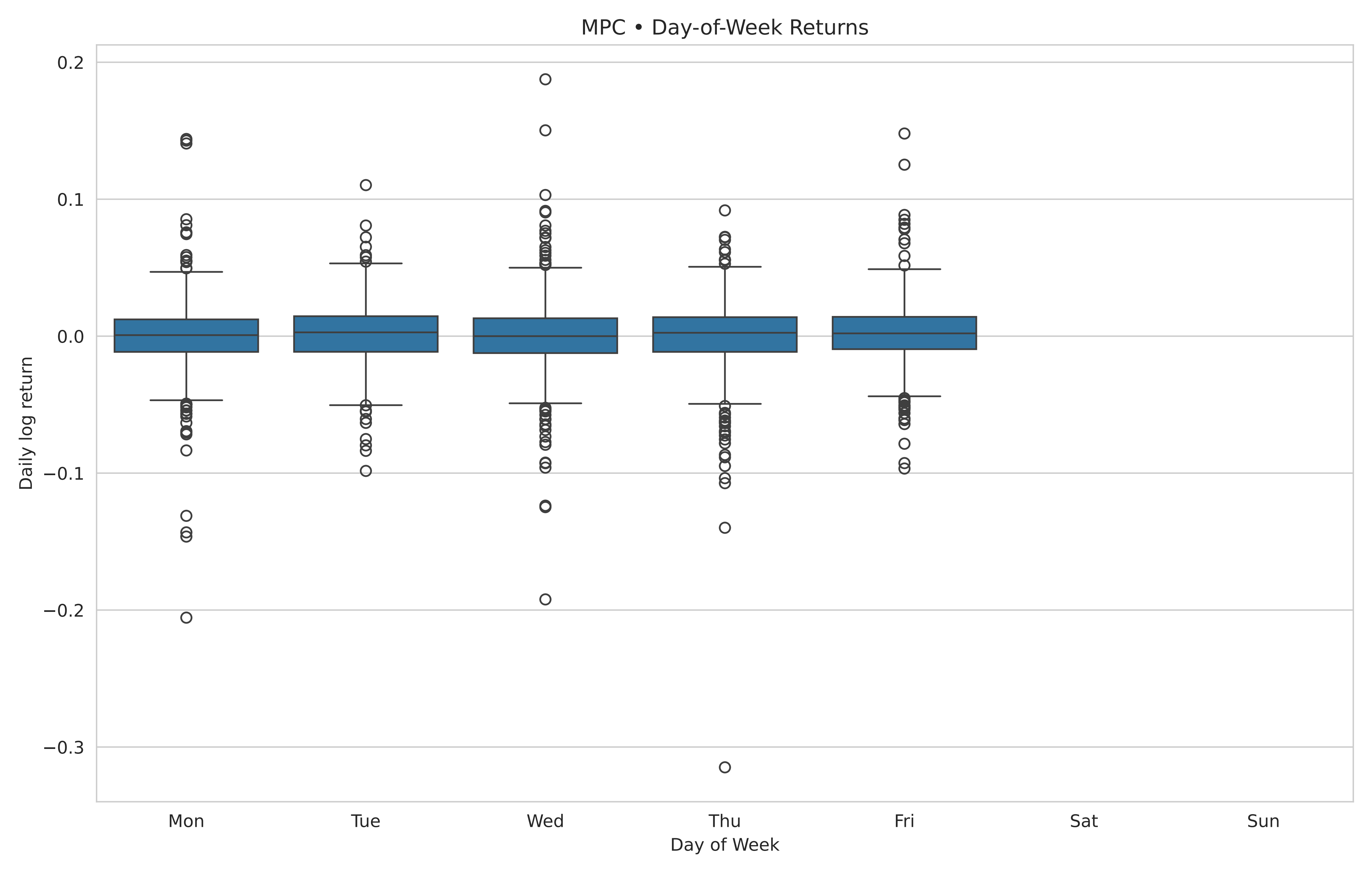

MPC • Rolling Autocorrelation (lag=1, window=20)
Autocorr
Date
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
2012
2014
2016
2018
2020
2022
2024
2026

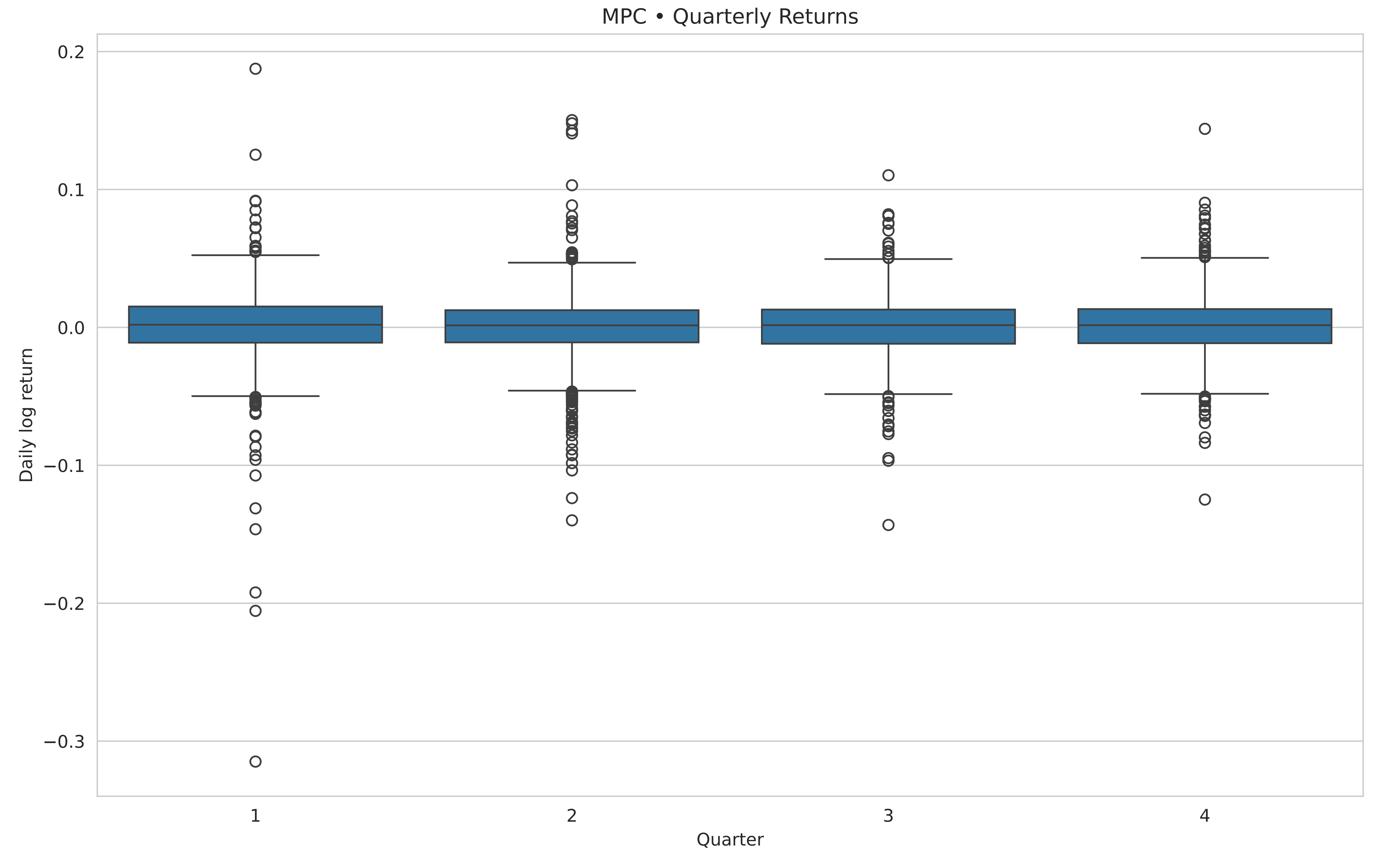

MPC • ACF • |Returns| (manual)
0.00
0.05
0.10
0.15
0.20
0.25
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

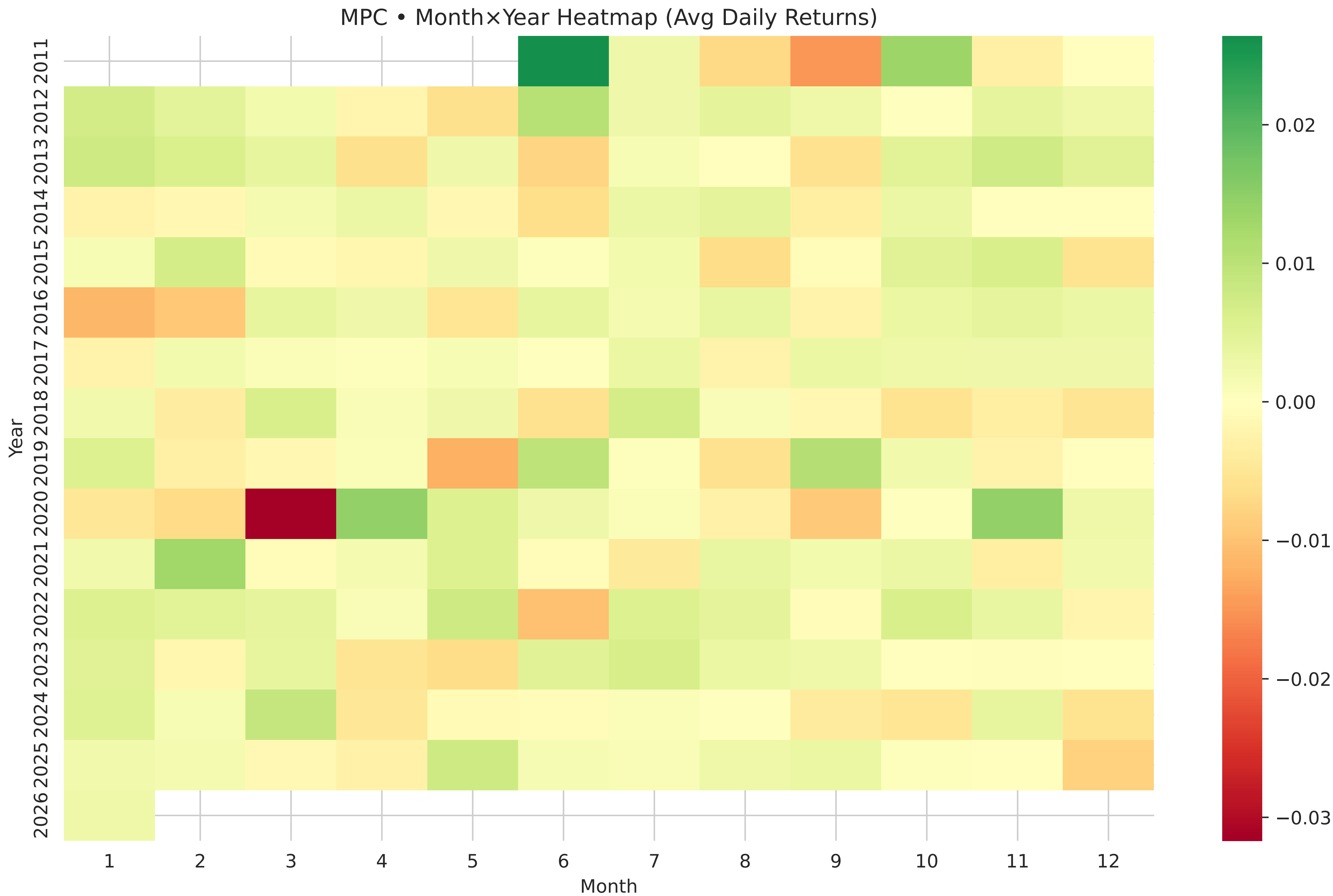

MPC • ACF • Returns^2 (manual)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0



MPC • Monthly Returns
0.2
0.1
0.0
−0.1
−0.2
−0.3
Daily log return
1
2
3
4
5
6
7
8
9
10
11
12
Month (1–12)

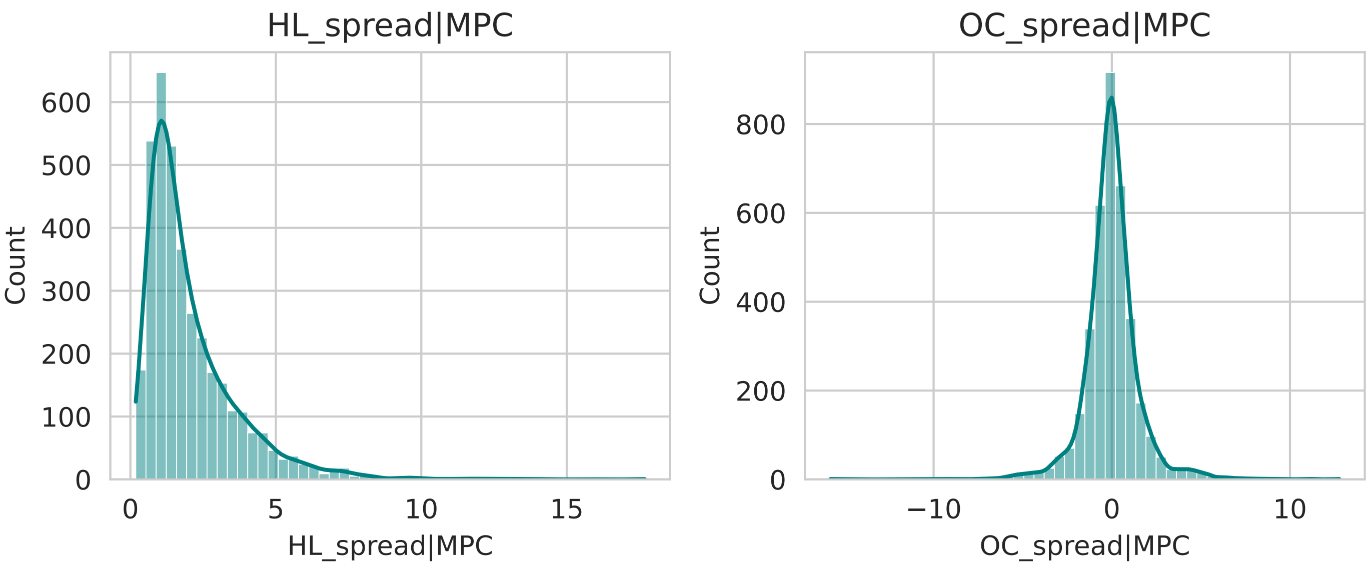

MPC • Day-of-Week Returns
Daily log return
0.2
0.1
0.0
−0.1
−0.2
−0.3
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Day of Week


MPC • Quarterly Returns
Daily log return
0.2
0.1
0.0
−0.1
−0.2
−0.3
Quarter
1
2
3
4

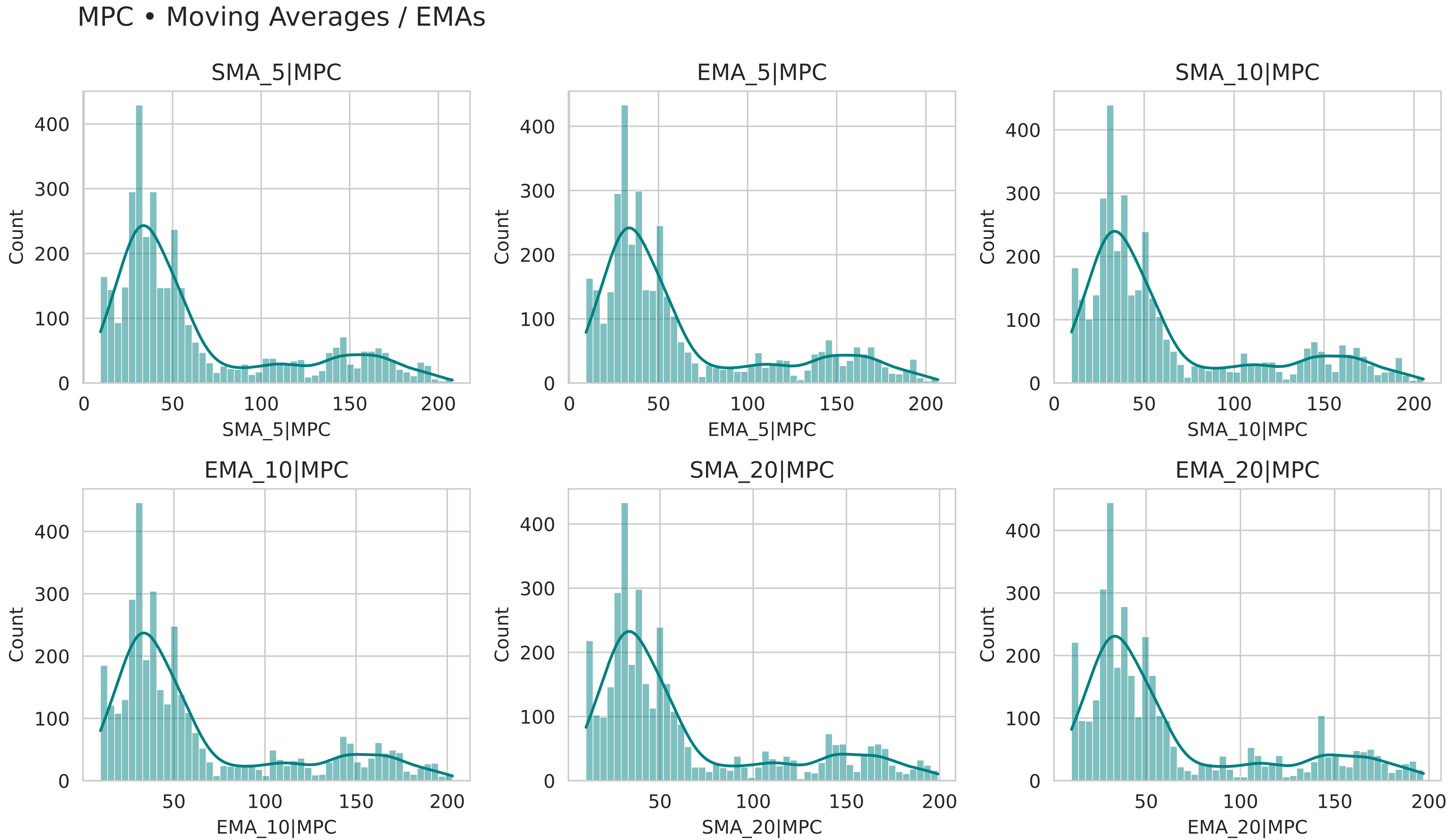

MPC • Month×Year Heatmap (Avg Daily Returns)
Year
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Month
1
2
3
4
5
6
7
8
9
10
11
12
0.02
0.01
0.00
−0.01
−0.02
−0.03


MPC • Avg Returns: Month-End/Start vs Others
0.004
0.003
0.002
0.001
0.000
−0.001
−0.002
Average Daily Log Return
Month End:Yes
Month End:No
Month Start:Yes
Month Start:No

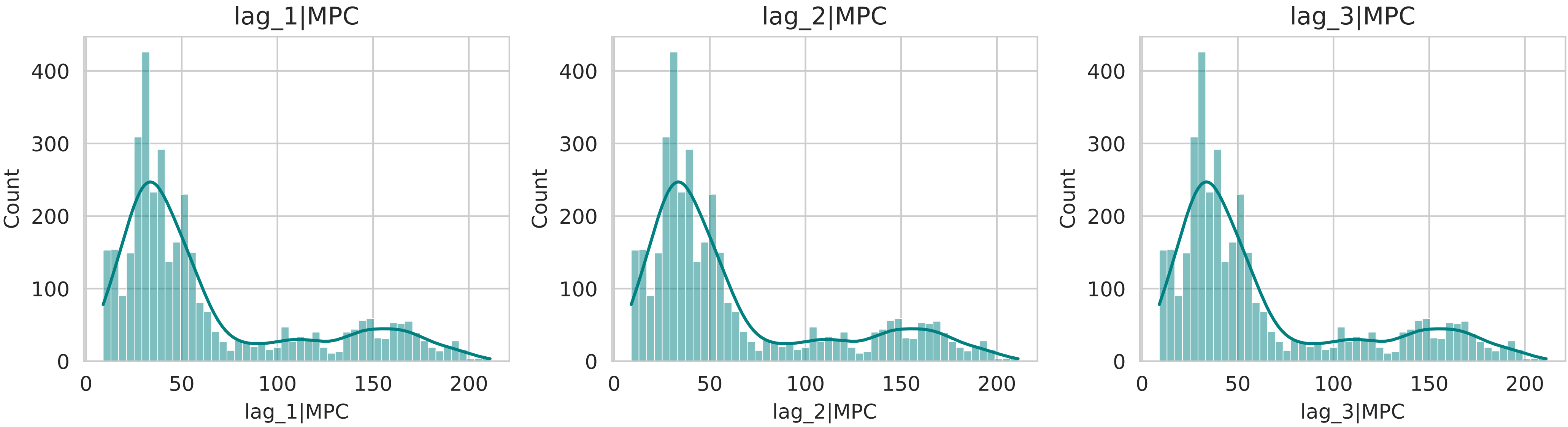
MPC • Spreads



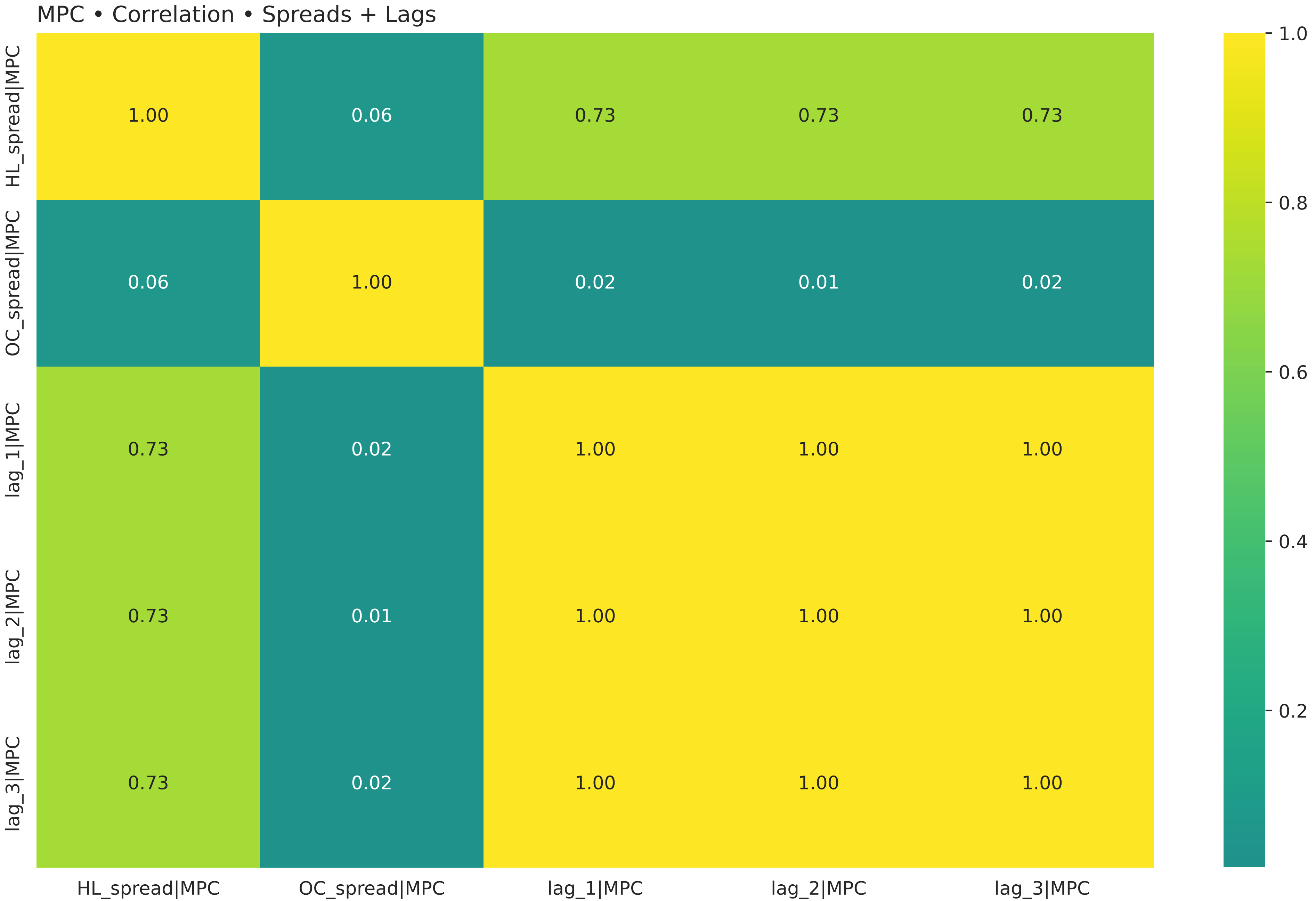
HL_spread|MPC
OC_spread|MPC
Count
600
500
400
300
200
100
0
0
5
10
15
HL_spread|MPC
Count
800
600
400
200
0
−10
0
10
OC_spread|MPC


MPC • Moving Averages / EMAs
SMA_5|MPC
EMA_5|MPC
SMA_10|MPC
EMA_10|MPC
SMA_20|MPC
EMA_20|MPC
Count
0
100
200
300
400
50
150
200

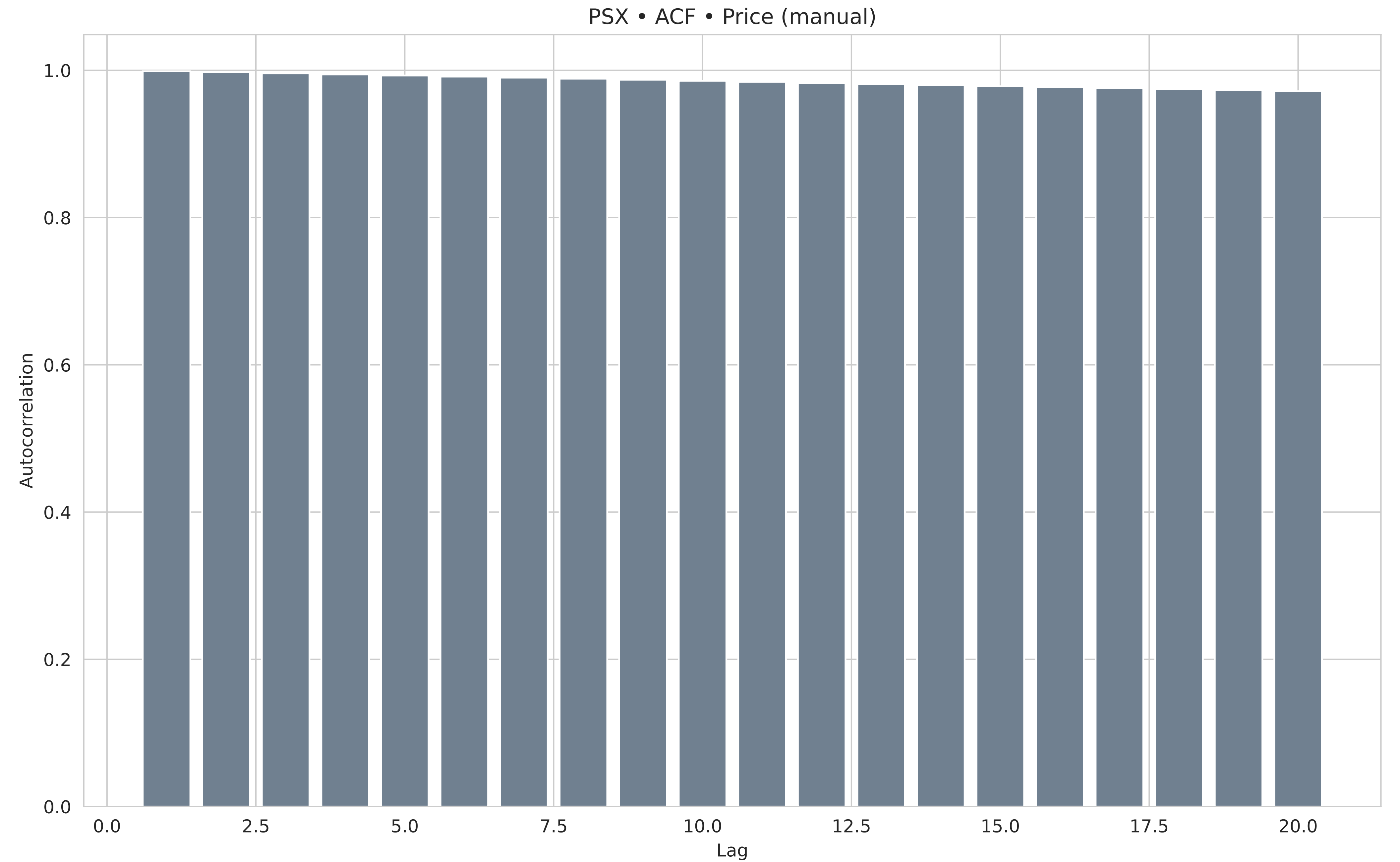
MPC • Lagged Prices



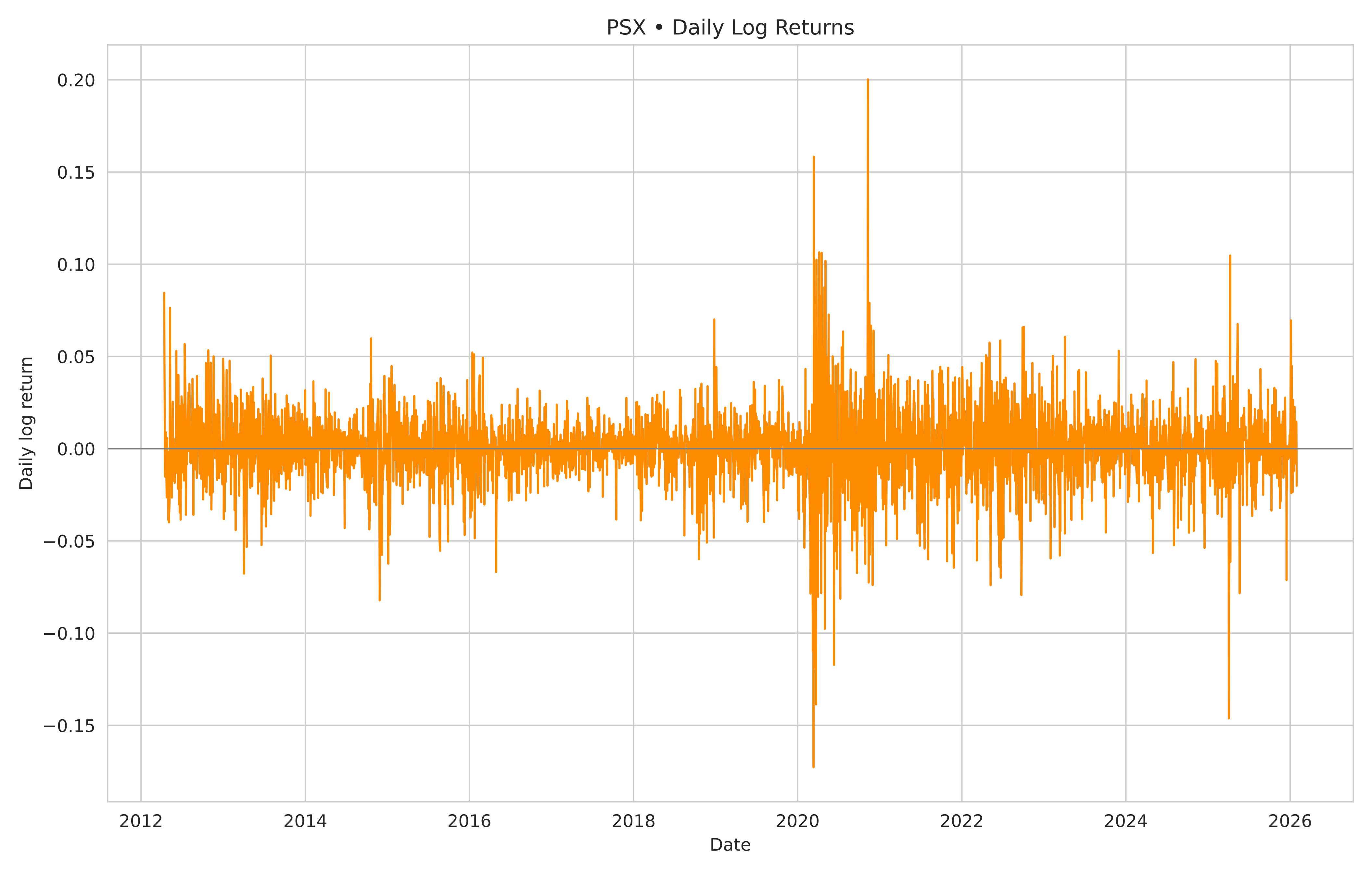

MPC • Correlation • Moving Averages
SMA_5|MPC
EMA_5|MPC
SMA_10|MPC
EMA_10|MPC
SMA_20|MPC
EMA_20|MPC
1.00
1.00000
0.99975
0.99950
0.99925
0.99900
0.99875
0.99850
0.99825
0.99800

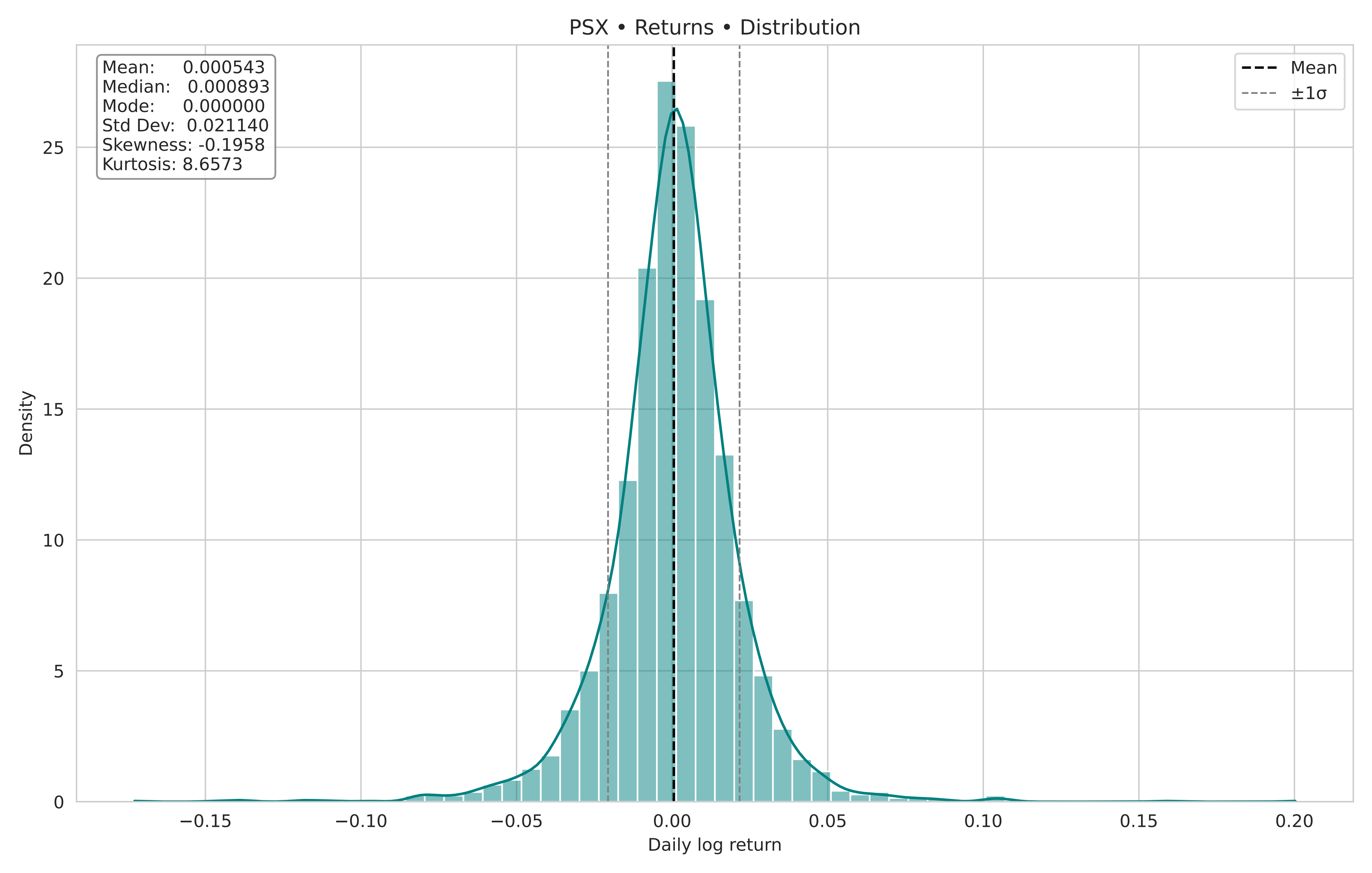

MPC • Correlation • Spreads + Lags
HL_spread|MPC
OC_spread|MPC
lag_1|MPC
lag_2|MPC
lag_3|MPC
1.00
0.06
0.73
0.73
0.73
0.06
1.00
0.02
0.01
0.02
0.73
0.02
1.00
1.00
1.00
0.73
0.01
1.00
1.00
1.00
0.73
0.02
1.00
1.00
1.00
HL_spread|MPC
OC_spread|MPC
lag_1|MPC
lag_2|MPC
lag_3|MPC
1.0
0.8
0.6
0.4
0.2

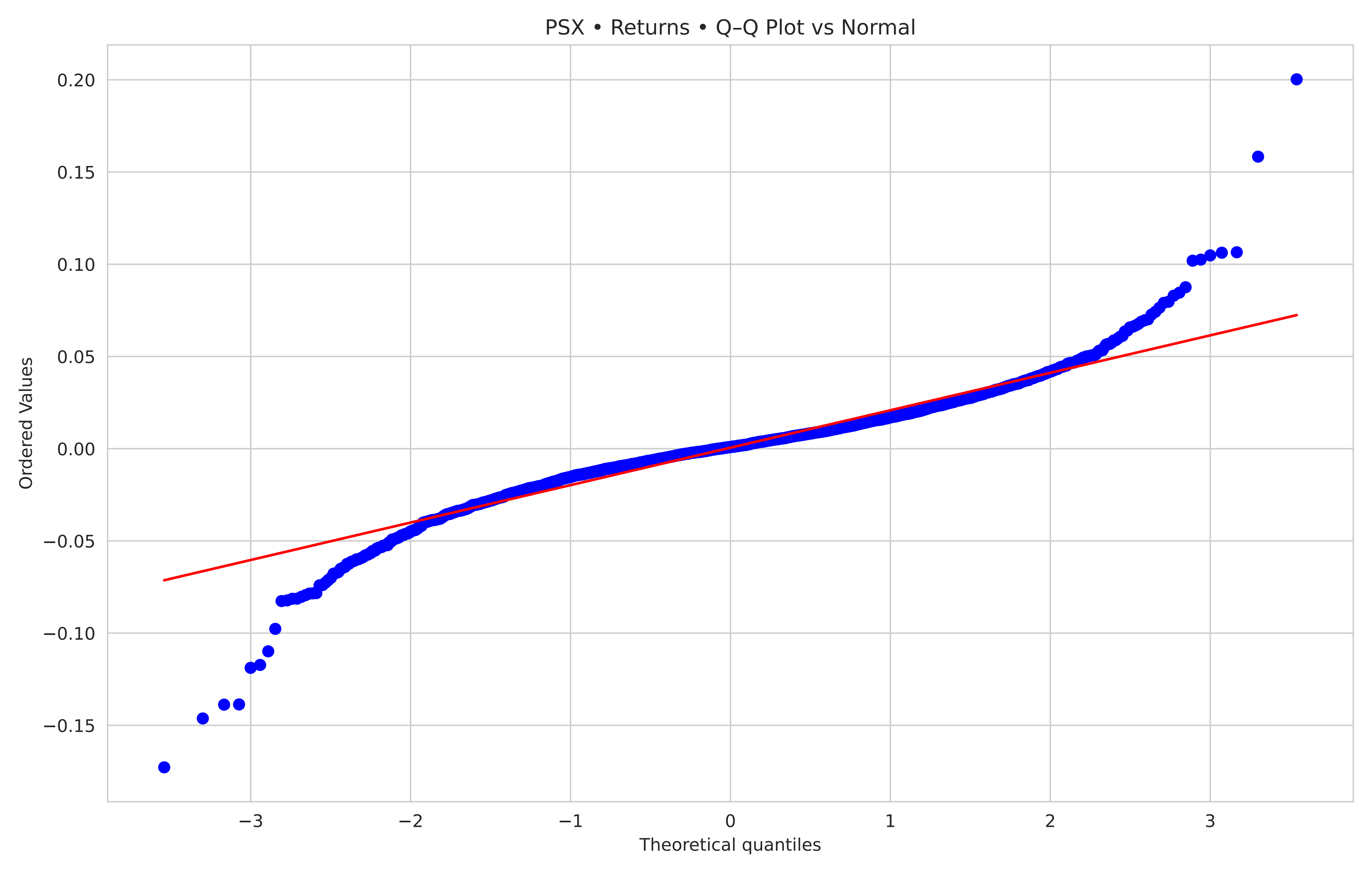

PSX • Price
Adj/Close
Price (USD)
160
140
120
100
80
60
40
20
2012
2014
2016
2018
2020
2022
2024
2026
Date

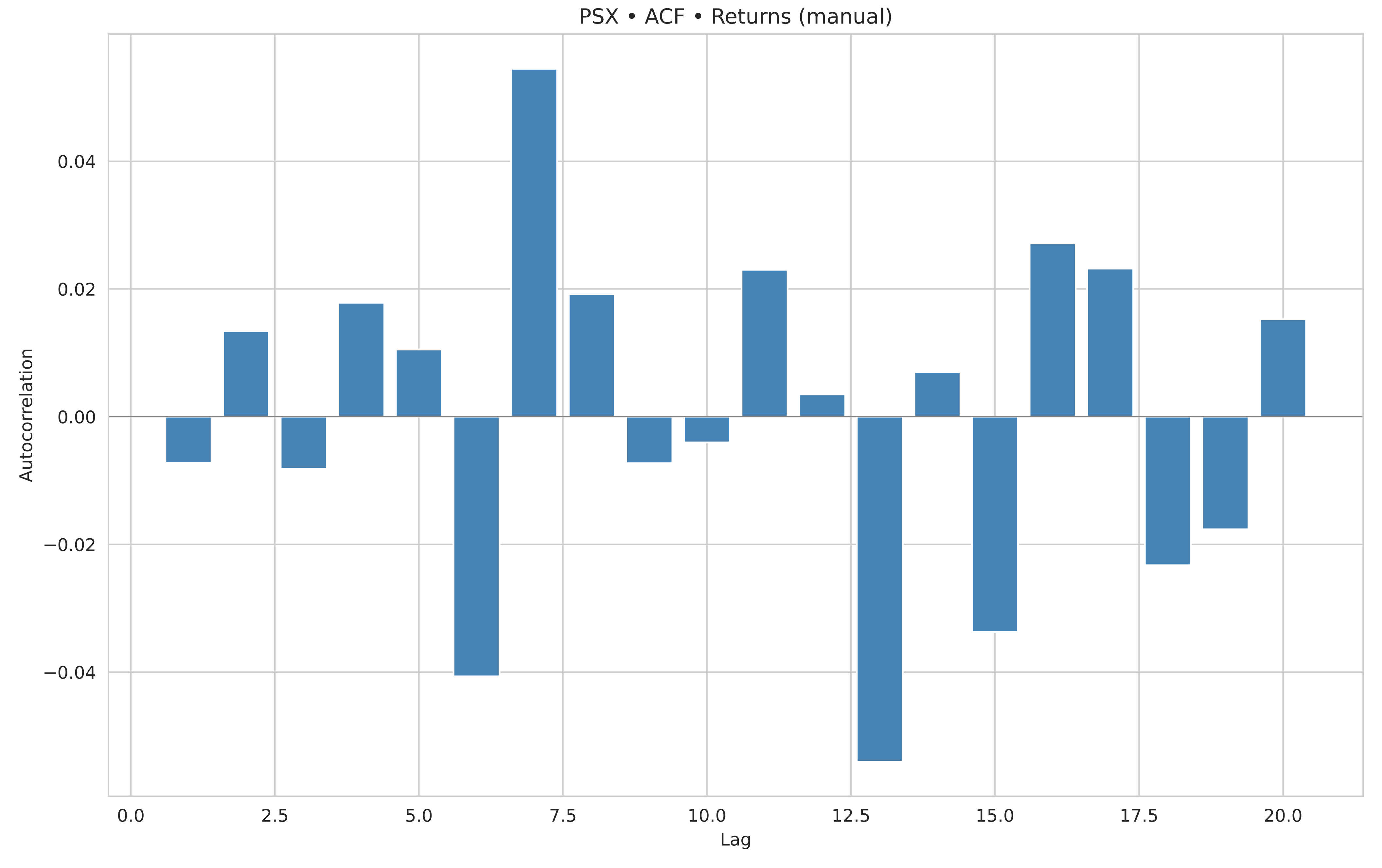

PSX • ACF • Price (manual)
Autocorrelation
Lag
0.0
0.2
0.4
0.6
0.8
1.0
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

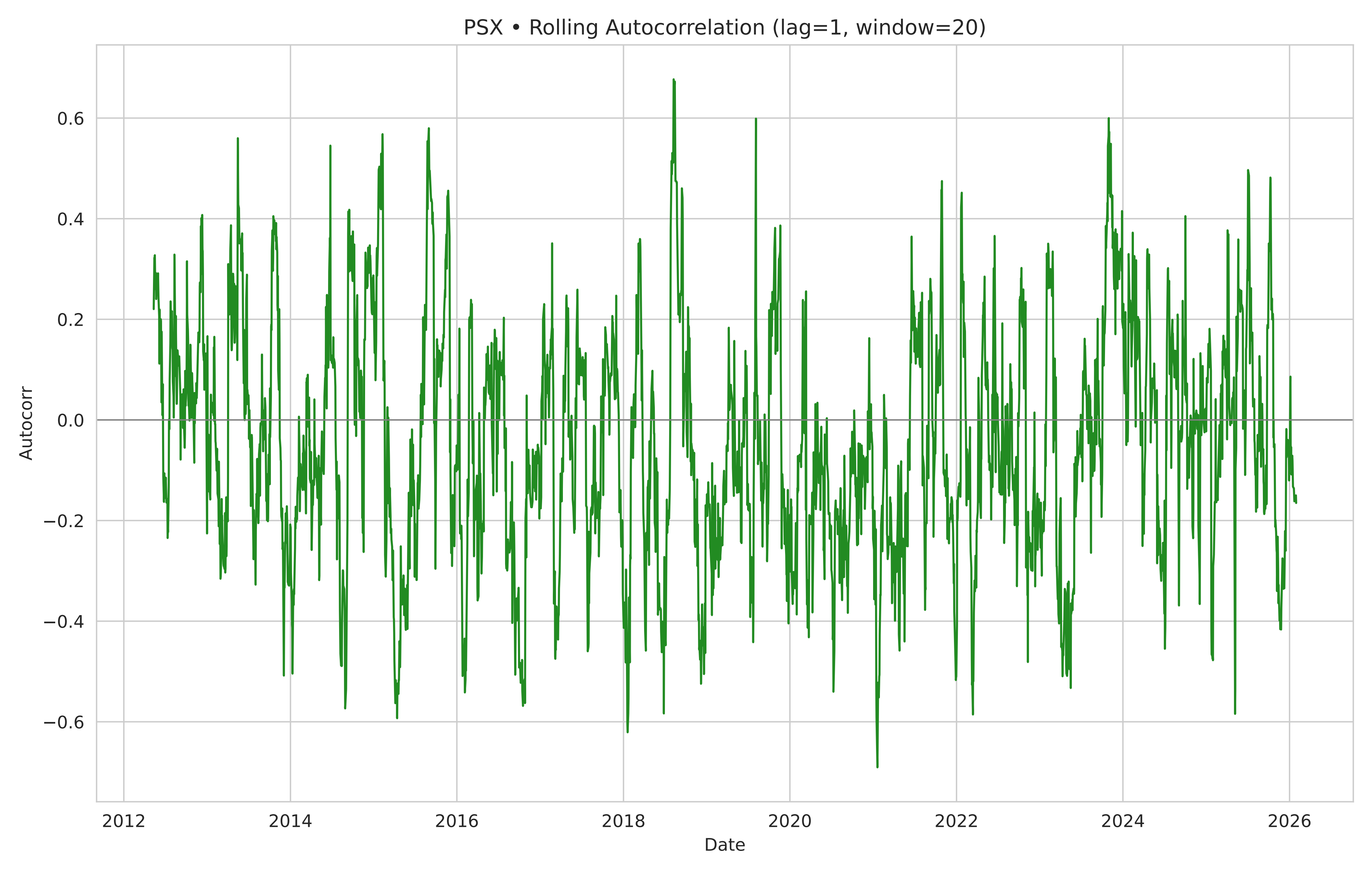
PSX • Moving Averages (5/10/20)
Adj/Close
SMA 5
SMA 10
SMA 20
Price (USD)
160
140
120
100
80
60
40
20
Date
2012
2014
2016
2018
2020
2022
2024
2026

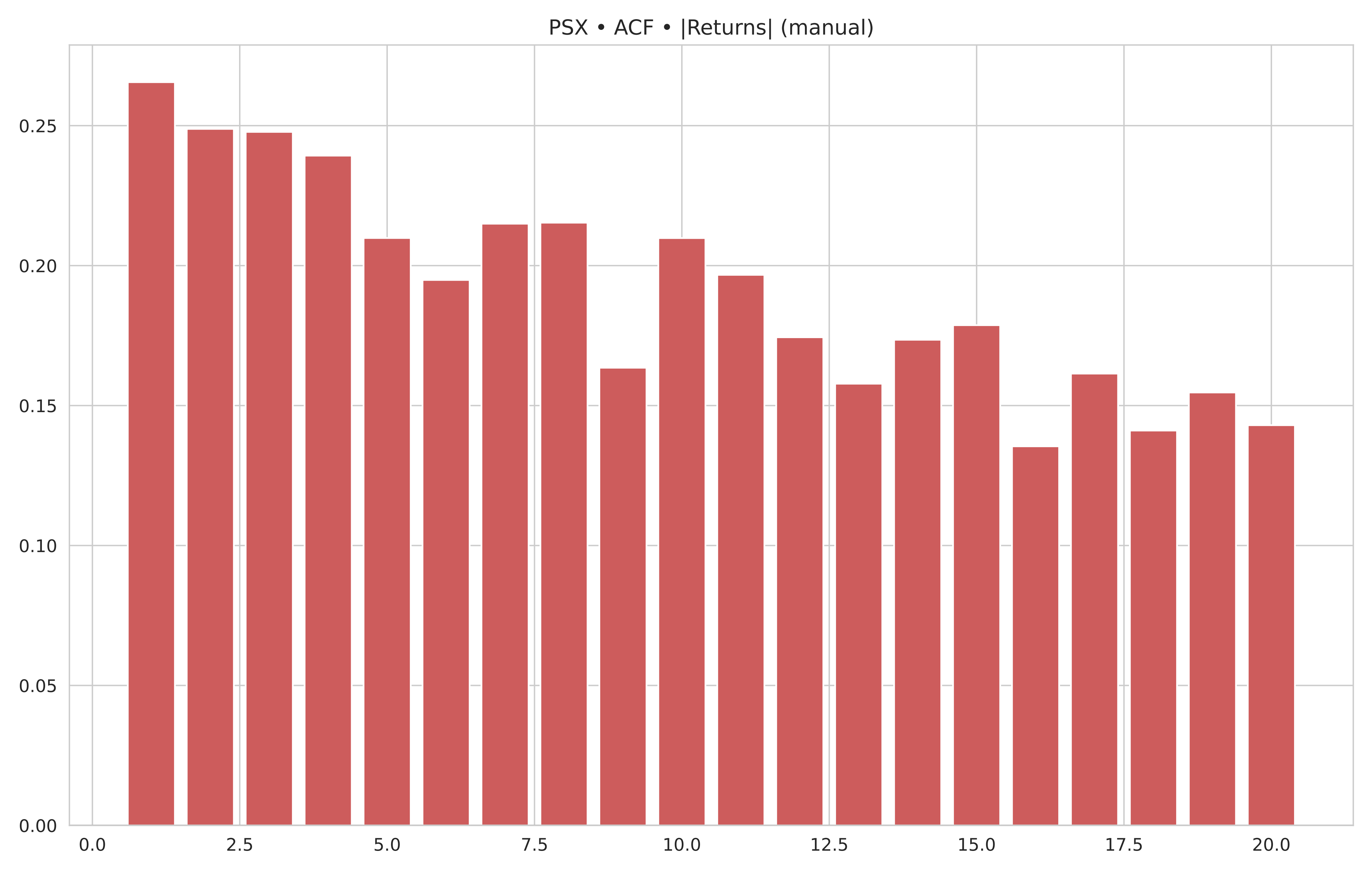

PSX • Daily Log Returns
0.20
0.15
0.10
0.05
0.00
−0.05
−0.10
−0.15
Daily log return
2012
2014
2016
2018
2020
2022
2024
2026
Date

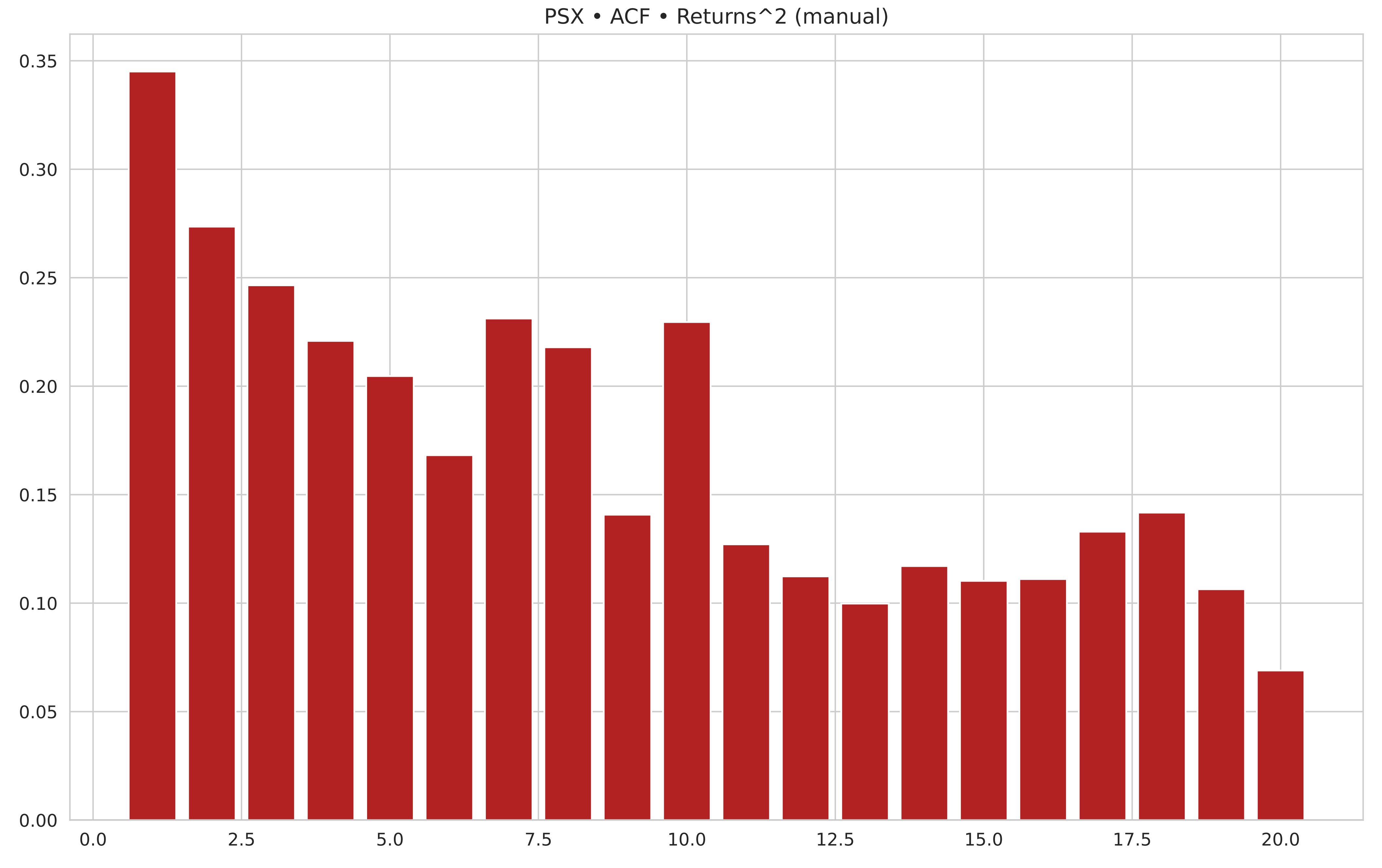

PSX • Returns • Distribution
Mean: 0.000543
Median: 0.000893
Mode: 0.000000
Std Dev: 0.021140
Skewness: -0.1958
Kurtosis: 8.6573
Mean
±1σ
Density
Daily log return
0
5
10
15
20
25
−0.15
−0.10
−0.05
0.00
0.05
0.10
0.15
0.20

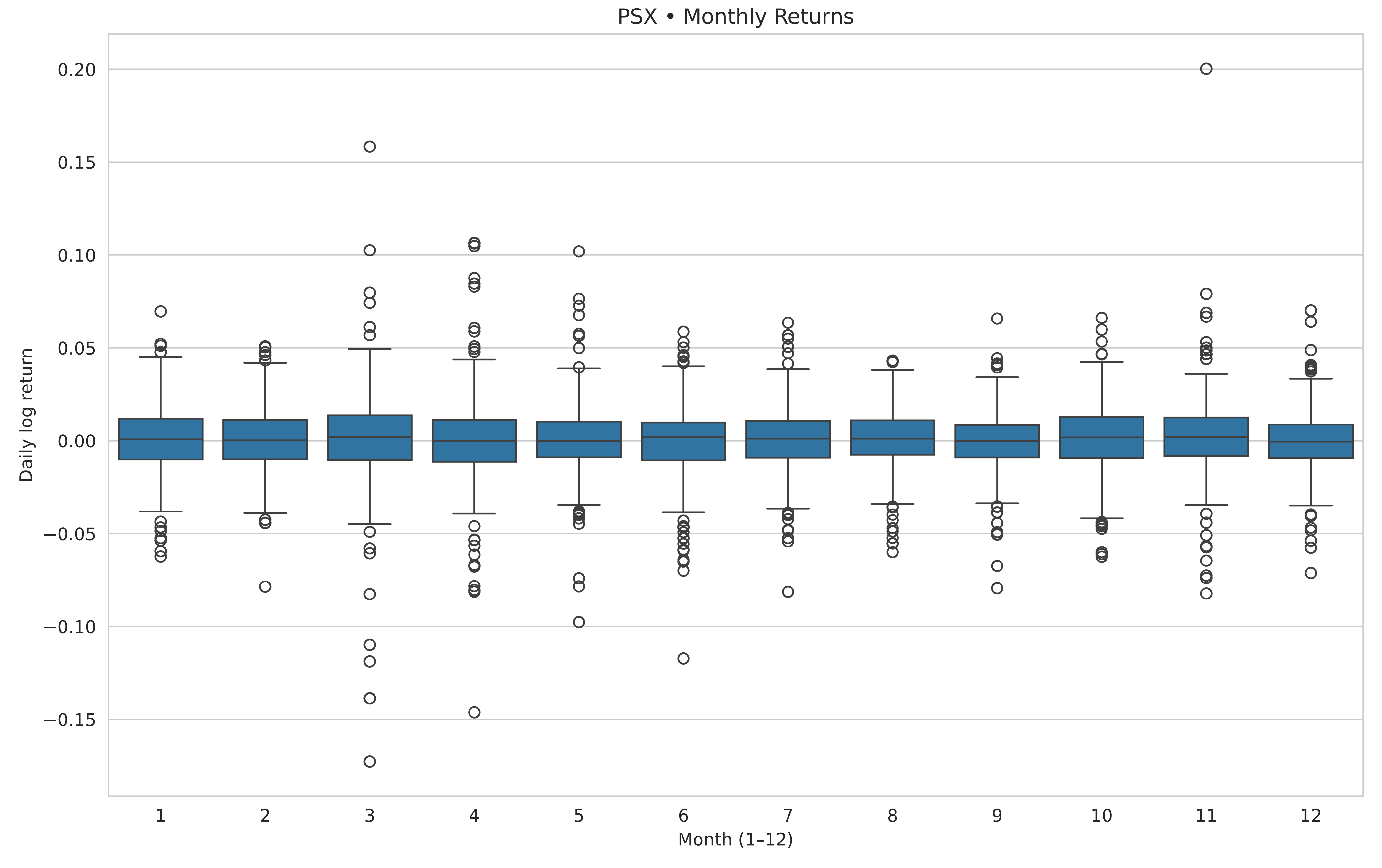

PSX • Returns • Q–Q Plot vs Normal
Ordered Values
Theoretical quantiles
0.20
0.15
0.10
0.05
0.00
−0.05
−0.10
−0.15
−3
−2
−1
0
1
2
3

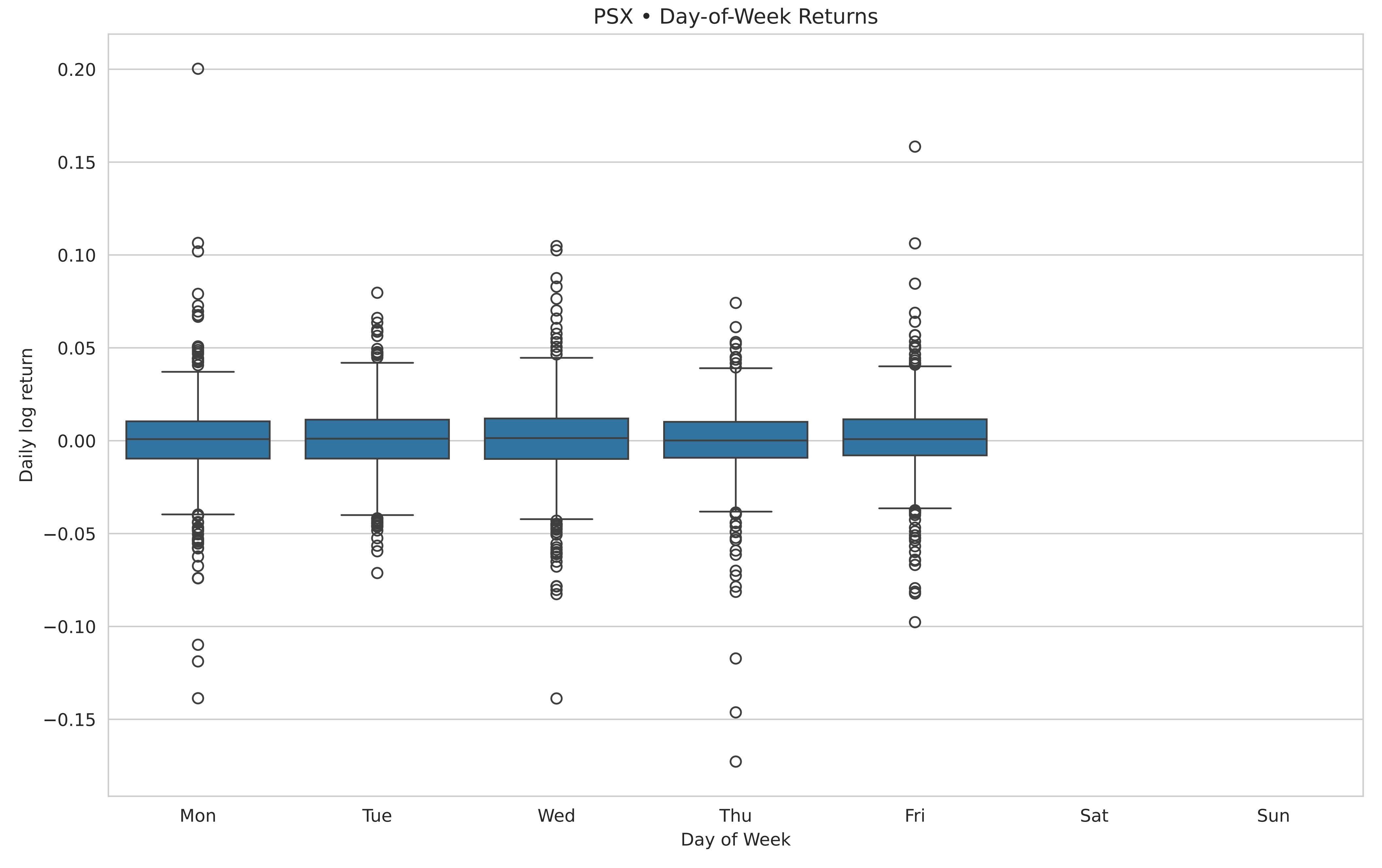

PSX • ACF • Returns (manual)
Autocorrelation
Lag
0.04
0.02
0.00
−0.02
−0.04
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

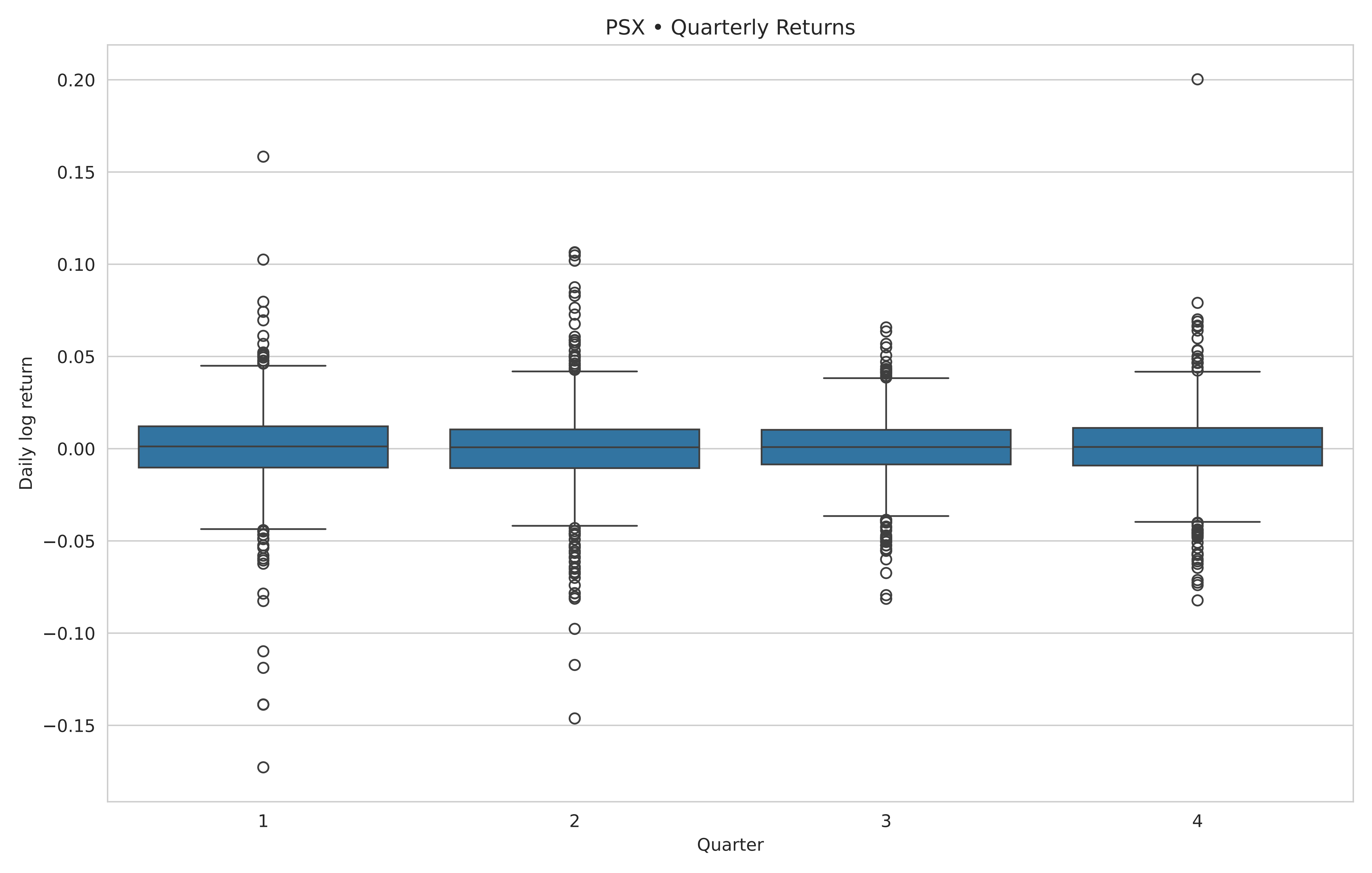

PSX • Rolling Autocorrelation (lag=1, window=20)
Autocorr
Date
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
2012
2014
2016
2018
2020
2022
2024
2026

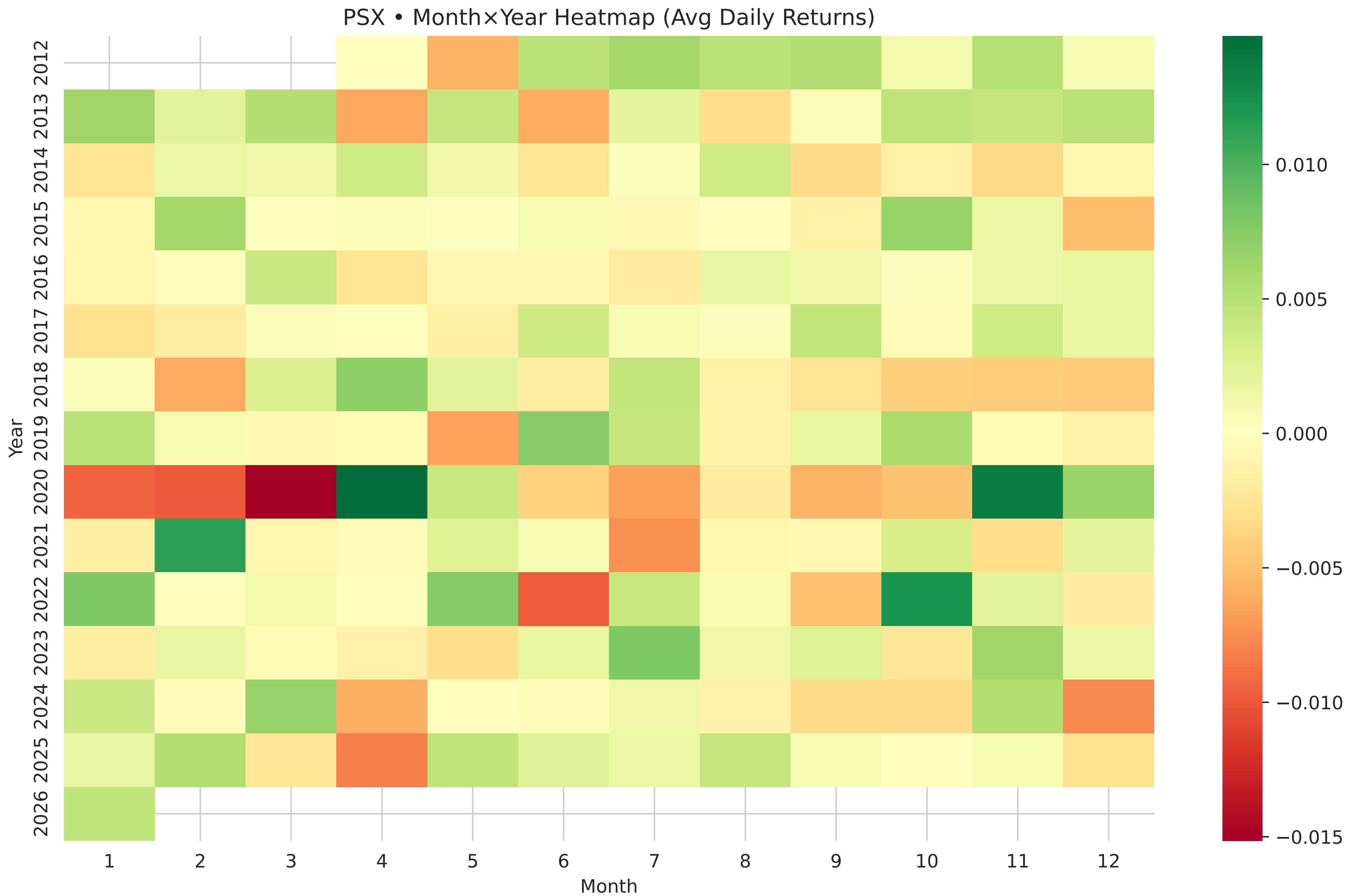

PSX • ACF • |Returns| (manual)
0.25
0.20
0.15
0.10
0.05
0.00
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

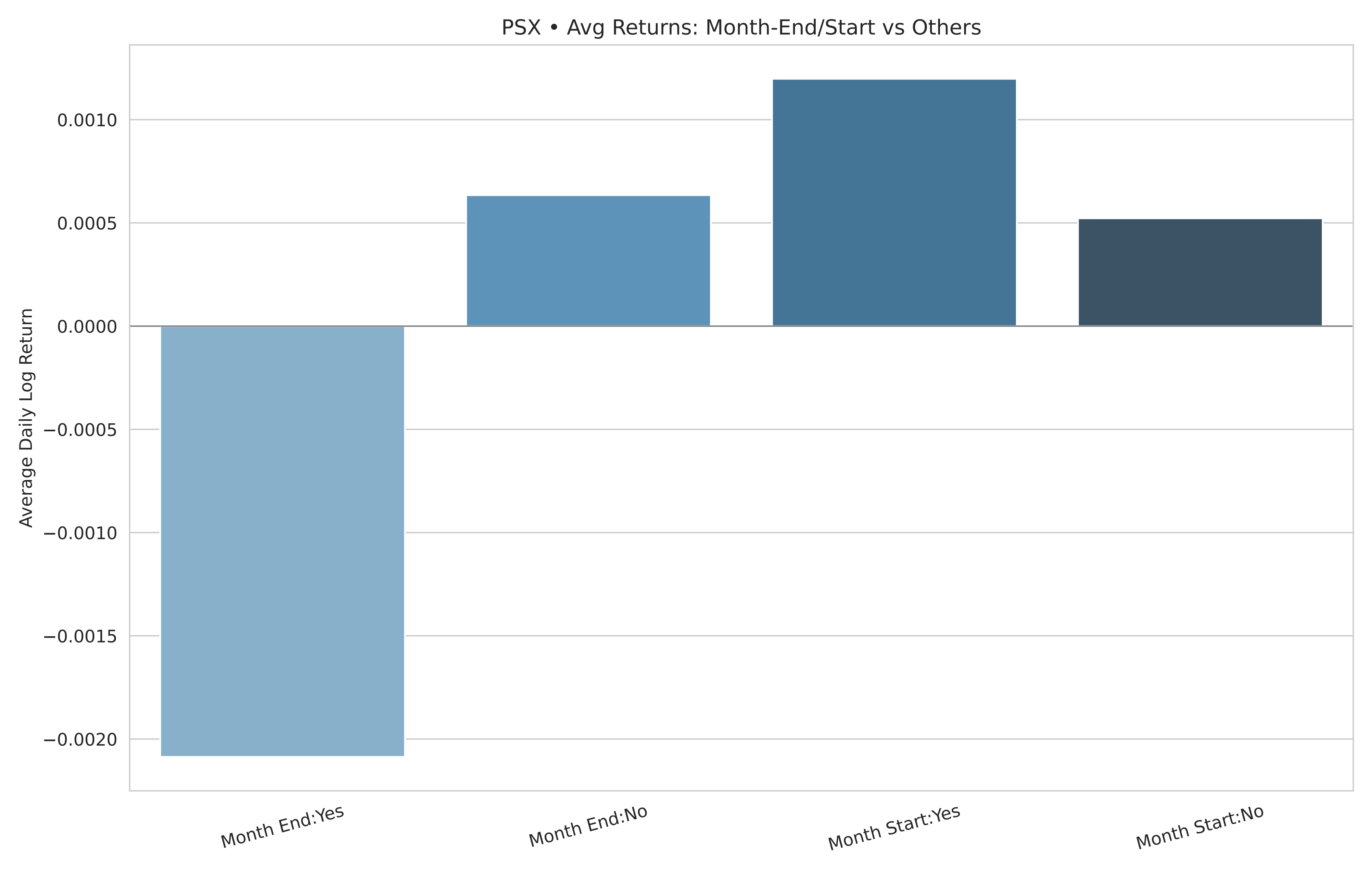

PSX • ACF • Returns^2 (manual)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0


PSX • Monthly Returns
Daily log return
0.20
0.15
0.10
0.05
0.00
−0.05
−0.10
−0.15
1
2
3
4
5
6
7
8
9
10
11
12
Month (1–12)

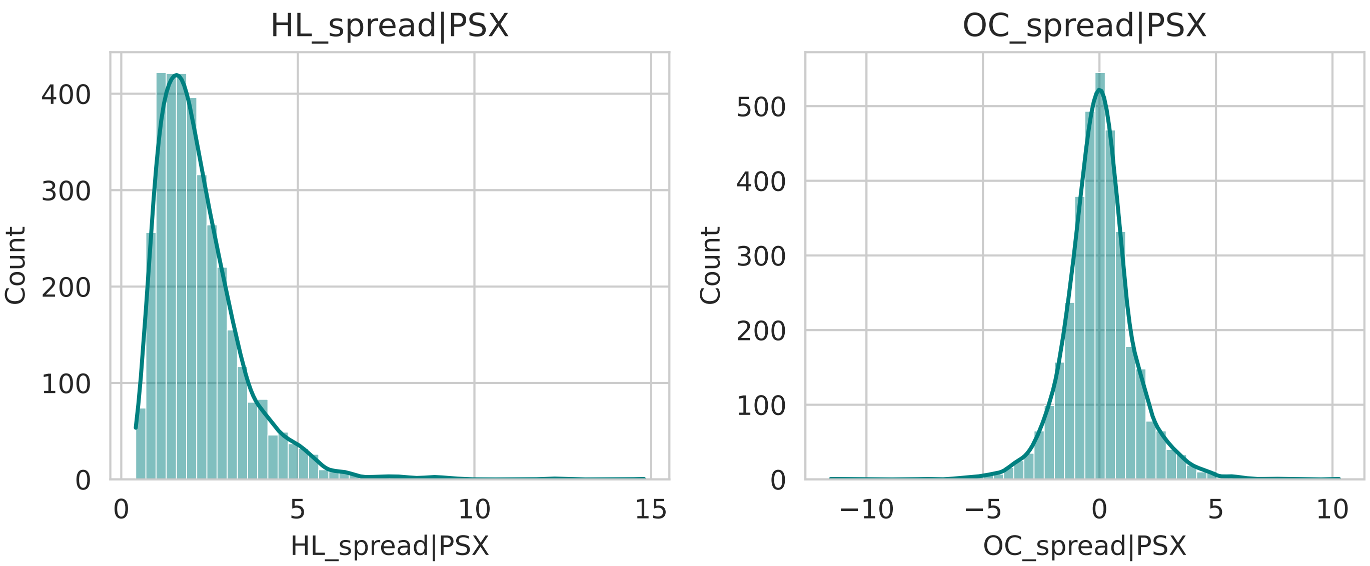

PSX • Day-of-Week Returns
Daily log return
0.20
0.15
0.10
0.05
0.00
−0.05
−0.10
−0.15
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Day of Week


PSX • Quarterly Returns
Daily log return
0.20
0.15
0.10
0.05
0.00
−0.05
−0.10
−0.15
1
2
3
4
Quarter


PSX • Month×Year Heatmap (Avg Daily Returns)
Year
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Month
1
2
3
4
5
6
7
8
9
10
11
12
0.010
0.005
0.000
−0.005
−0.010
−0.015

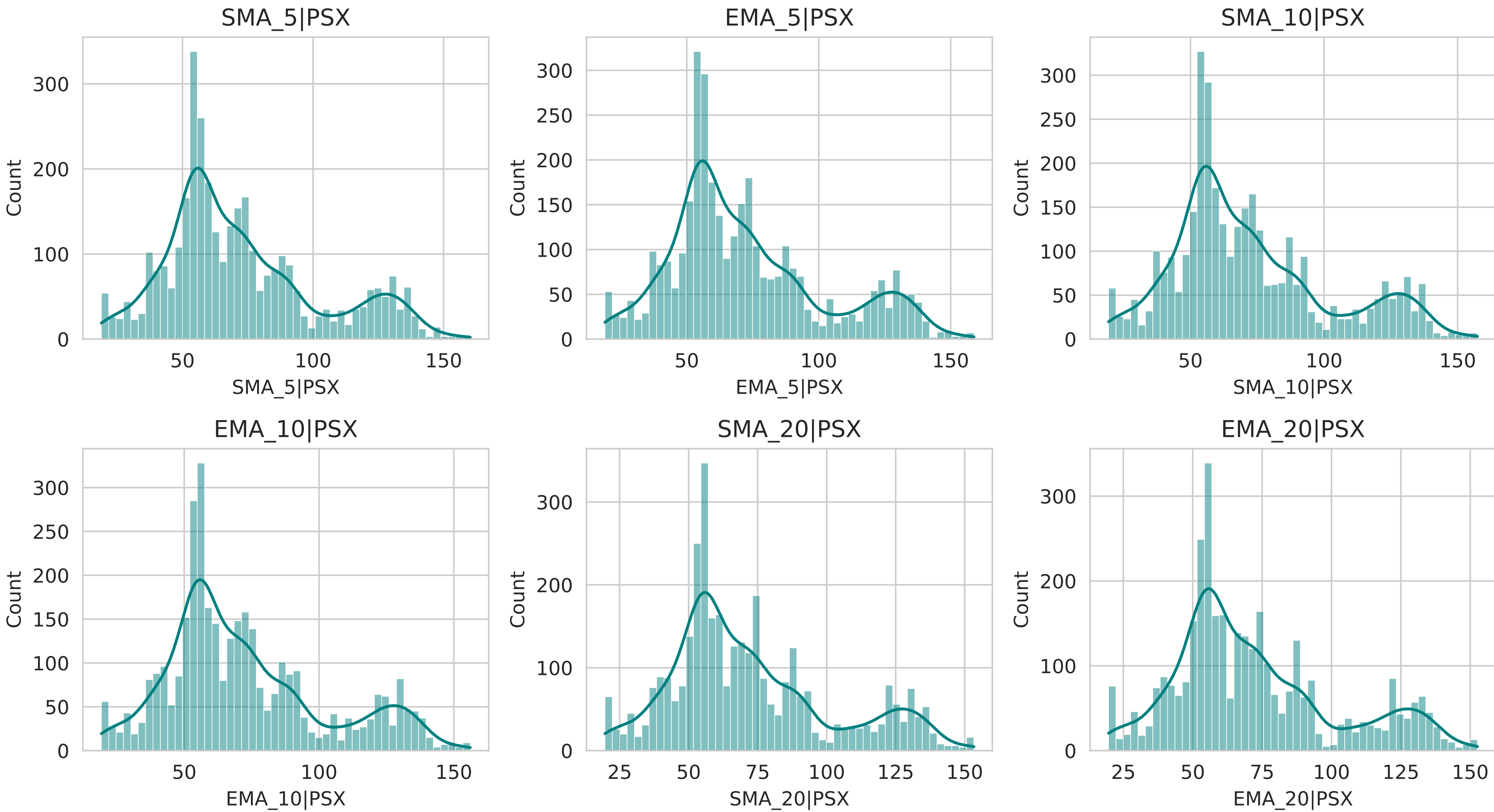

PSX • Avg Returns: Month-End/Start vs Others
Average Daily Log Return
0.0010
0.0005
0.0000
−0.0005
−0.0010
−0.0015
−0.0020
Month End:Yes
Month End:No
Month Start:Yes
Month Start:No

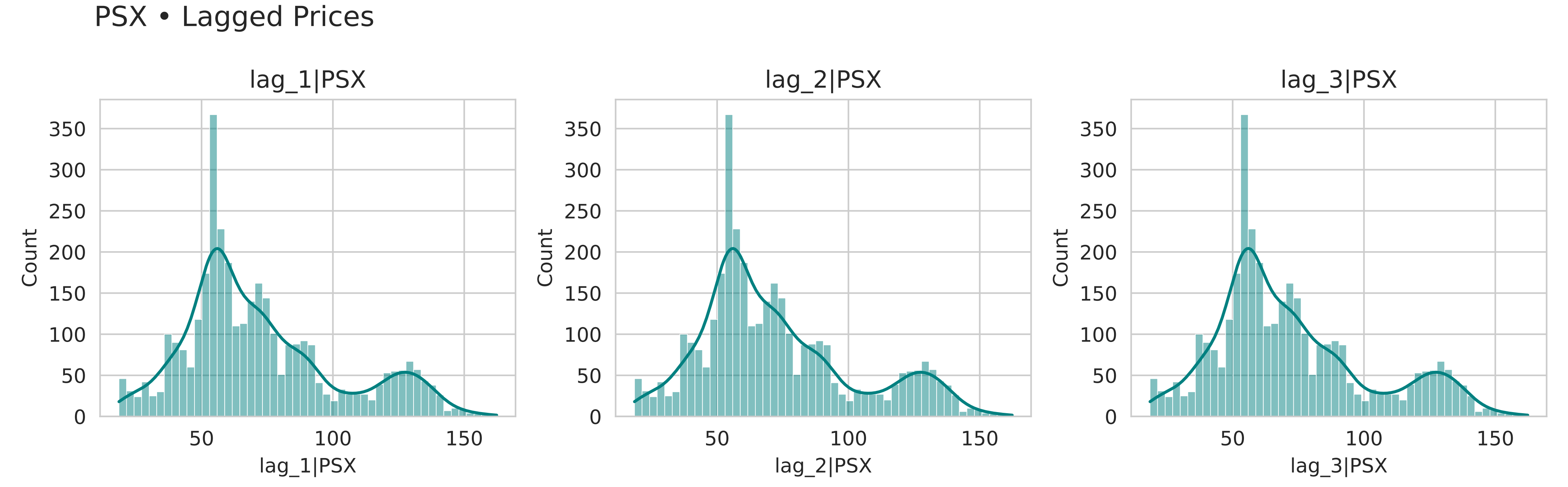
PSX • Spreads



HL_spread|PSX
400
300
200
100
0
Count
0
5
10
15
HL_spread|PSX
OC_spread|PSX
500
400
300
200
100
0
Count
−10
−5
0
5
10
OC_spread|PSX

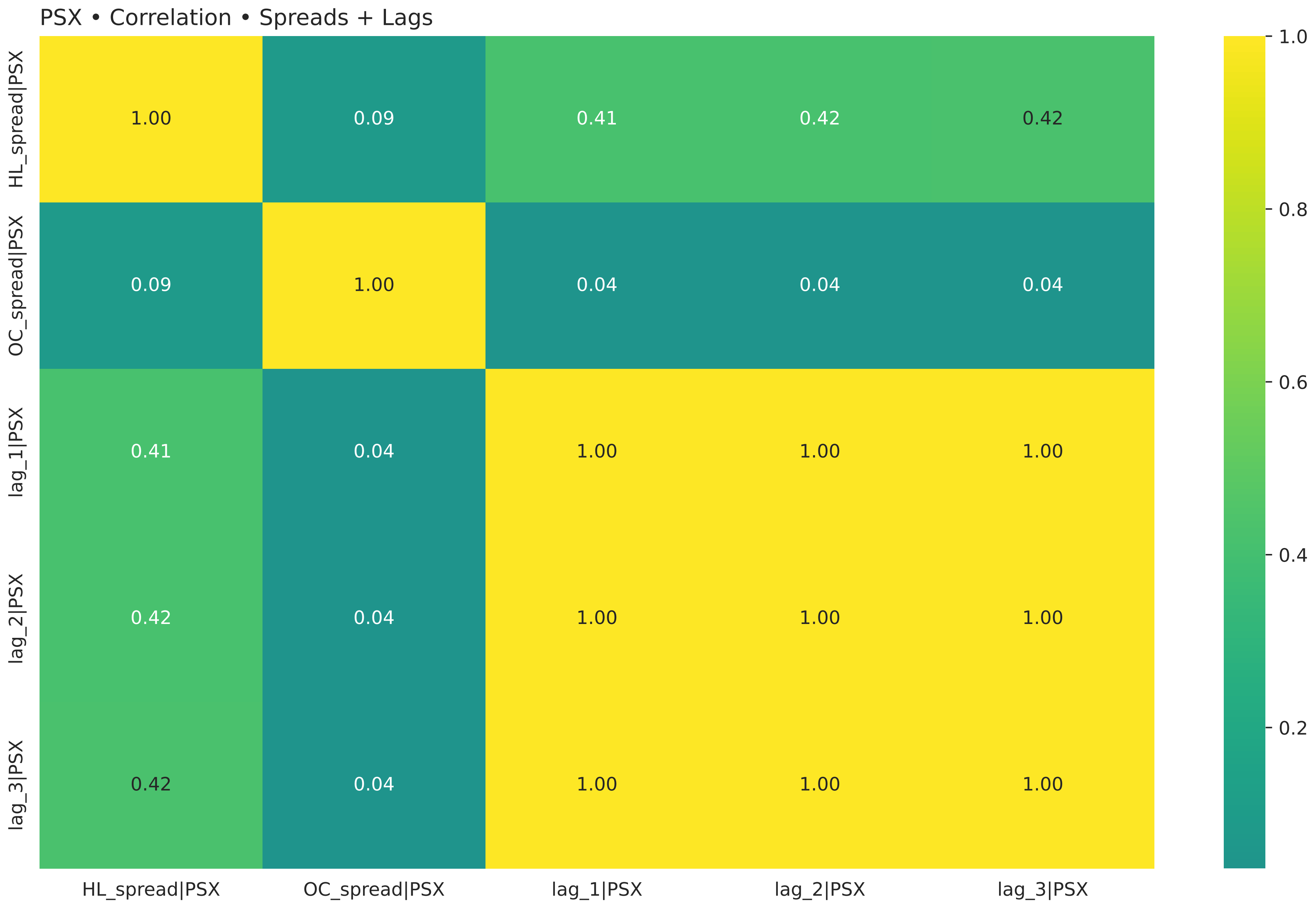
PSX • Moving Averages / EMAs



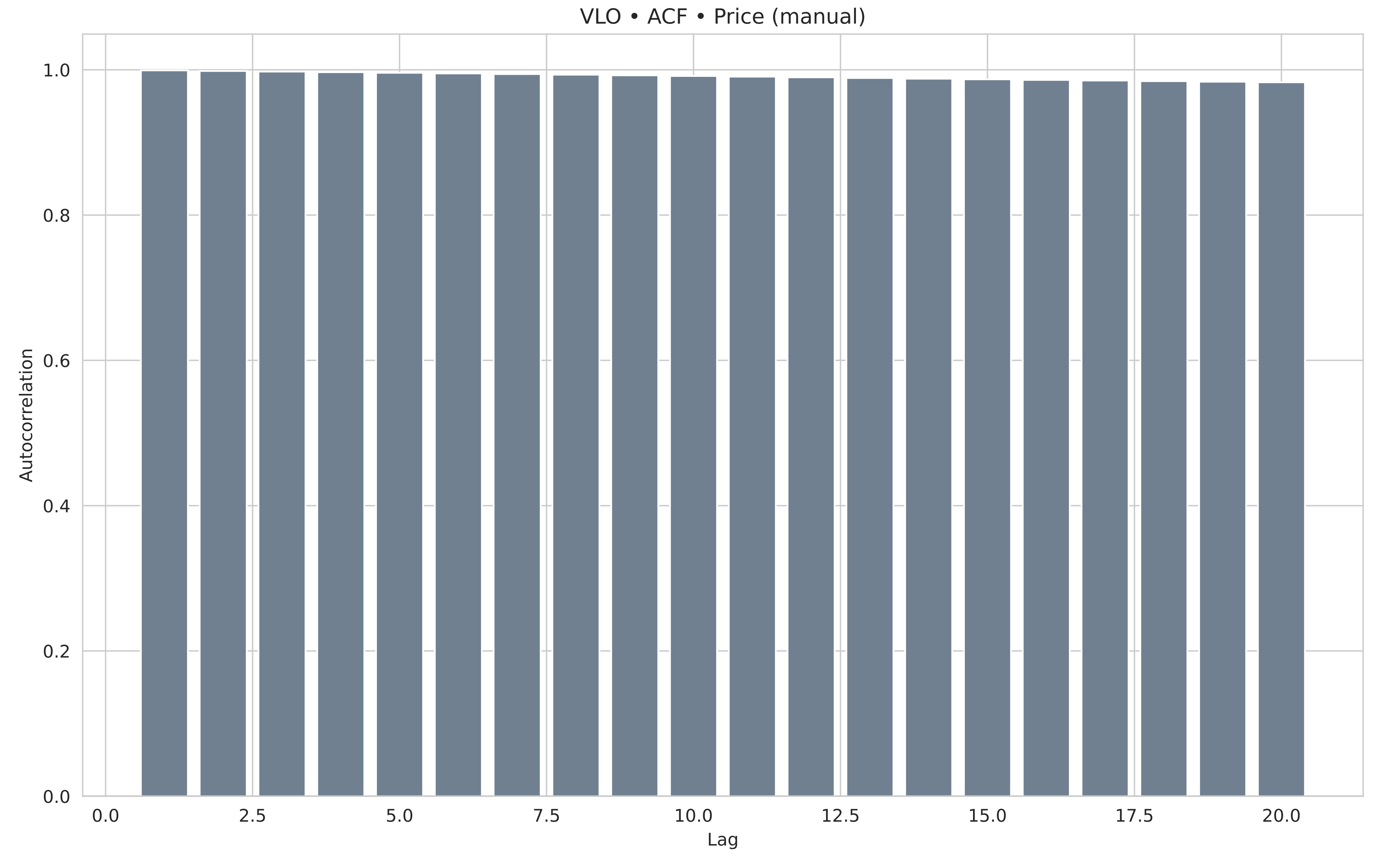


PSX • Lagged Prices
lag_1|PSX
lag_2|PSX
lag_3|PSX
Count
0
50
100
150
200
250
300
350
50
100
150

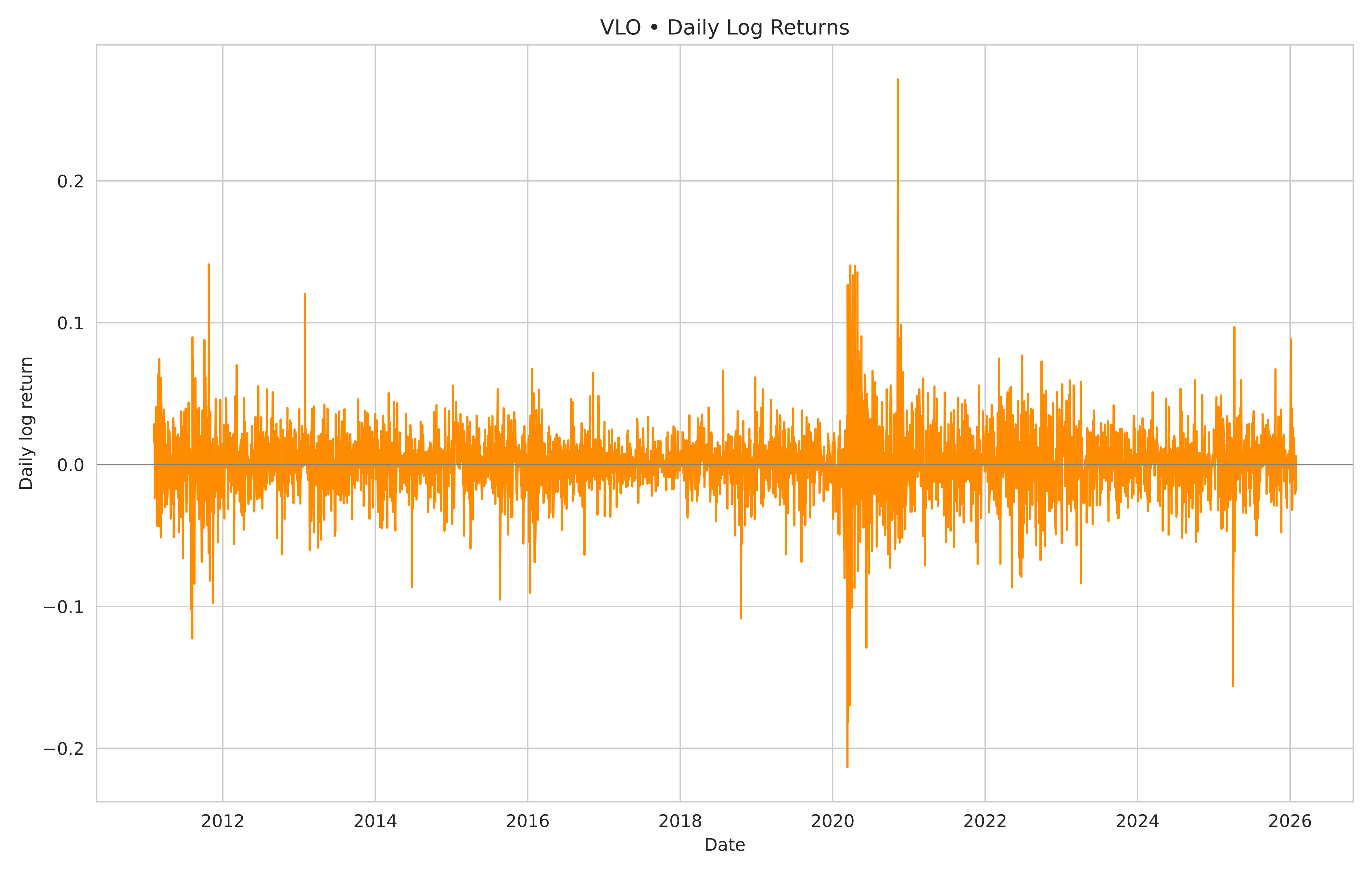

PSX • Correlation • Moving Averages
SMA_5|PSX
EMA_5|PSX
SMA_10|PSX
EMA_10|PSX
SMA_20|PSX
EMA_20|PSX
1.00 1.00 1.00 1.00 0.99 1.00
1.00 1.00 1.00 1.00 0.99 1.00
1.00 1.00 1.00 1.00 1.00 1.00
1.00 1.00 1.00 1.00 1.00 1.00
0.99 0.99 1.00 1.00 1.00 1.00
1.00 1.00 1.00 1.00 1.00 1.00
SMA_5|PSX
EMA_5|PSX
SMA_10|PSX
EMA_10|PSX
SMA_20|PSX
EMA_20|PSX
1.000
0.999
0.998
0.997
0.996
0.995

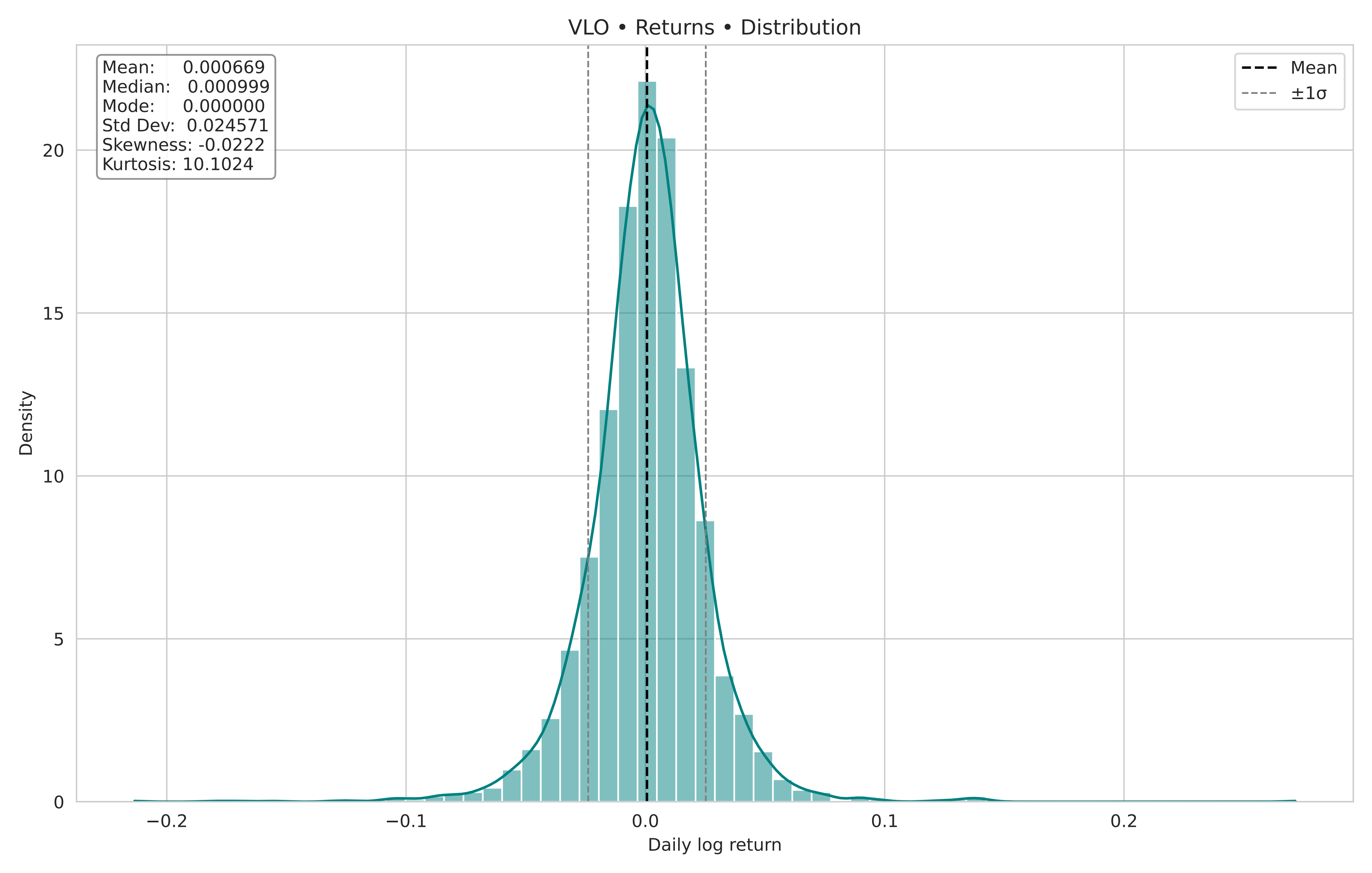

PSX • Correlation • Spreads + Lags
HL_spread|PSX
OC_spread|PSX
lag_1|PSX
lag_2|PSX
lag_3|PSX
1.00
0.09
0.41
0.42
0.42
0.09
1.00
0.04
0.04
0.04
0.41
0.04
1.00
1.00
1.00
0.42
0.04
1.00
1.00
1.00
0.42
0.04
1.00
1.00
1.00
1.0
0.8
0.6
0.4
0.2

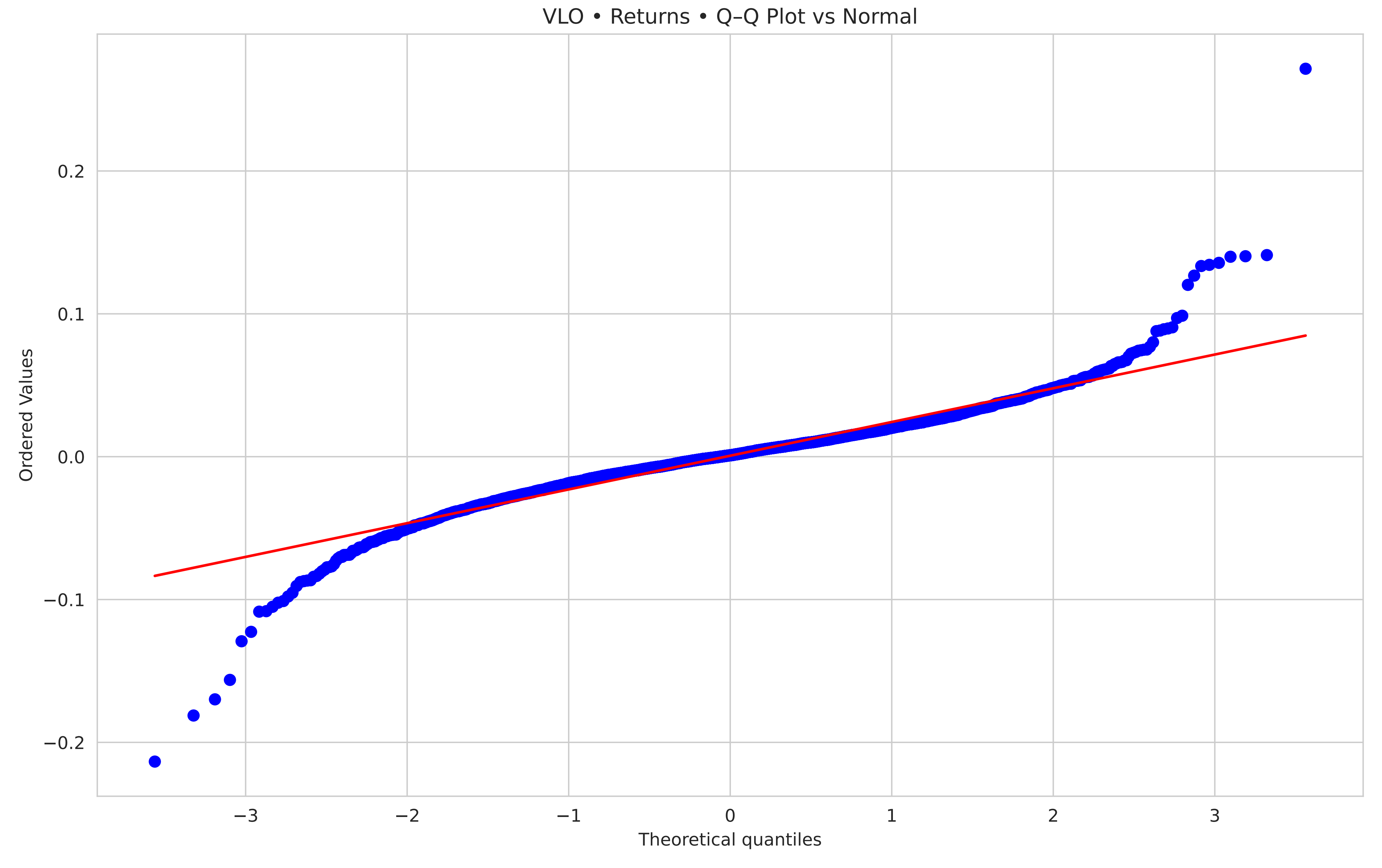

VLO • Price
Adj/Close
Price (USD)
200
175
150
125
100
75
50
25
2012
2014
2016
2018
2020
2022
2024
2026
Date


VLO • ACF • Price (manual)
Autocorrelation
Lag
0.0
0.2
0.4
0.6
0.8
1.0
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

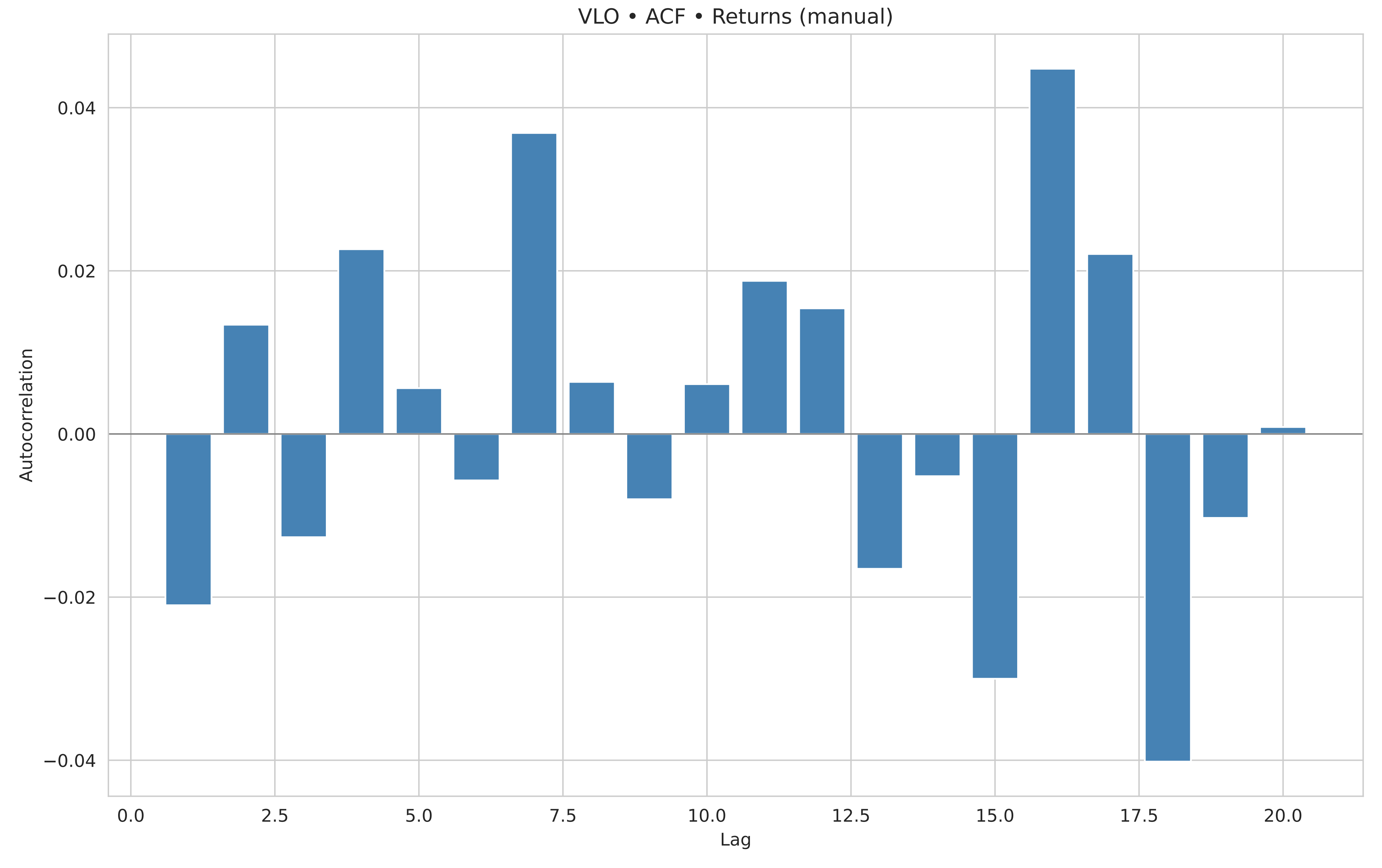
VLO • Moving Averages (5/10/20)
Adj/Close
SMA 5
SMA 10
SMA 20
Price (USD)
Date
200
175
150
125
100
75
50
25
2012
2014
2016
2018
2020
2022
2024
2026


VLO • Daily Log Returns
Daily log return
0.2
0.1
0.0
−0.1
−0.2
2012
2014
2016
2018
2020
2022
2024
2026
Date

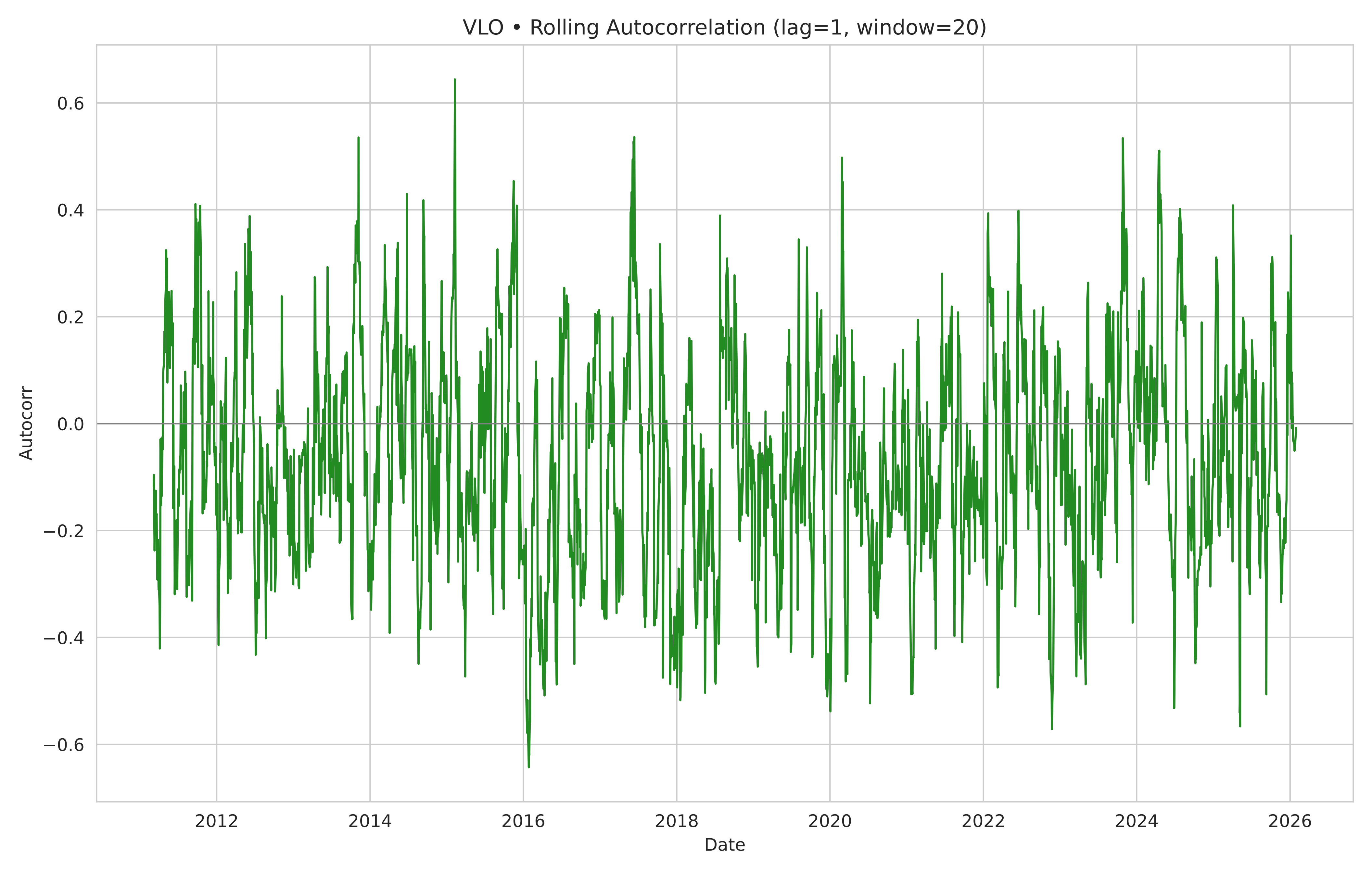

VLO • Returns • Distribution
Mean: 0.000669
Median: 0.000999
Mode: 0.000000
Std Dev: 0.024571
Skewness: -0.0222
Kurtosis: 10.1024
Mean
±1σ
Density
0
5
10
15
20
−0.2
−0.1
0.0
0.1
0.2
Daily log return

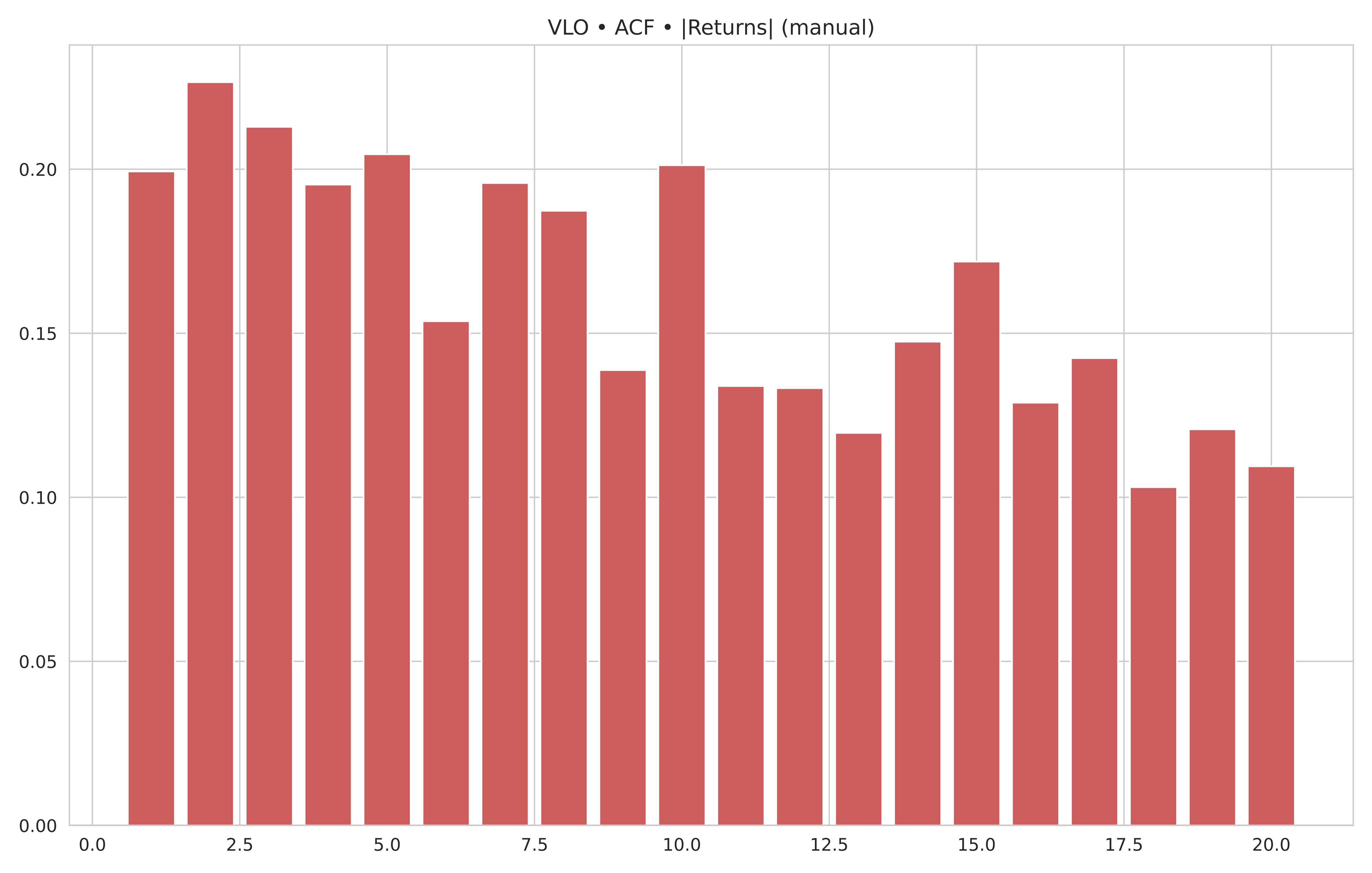


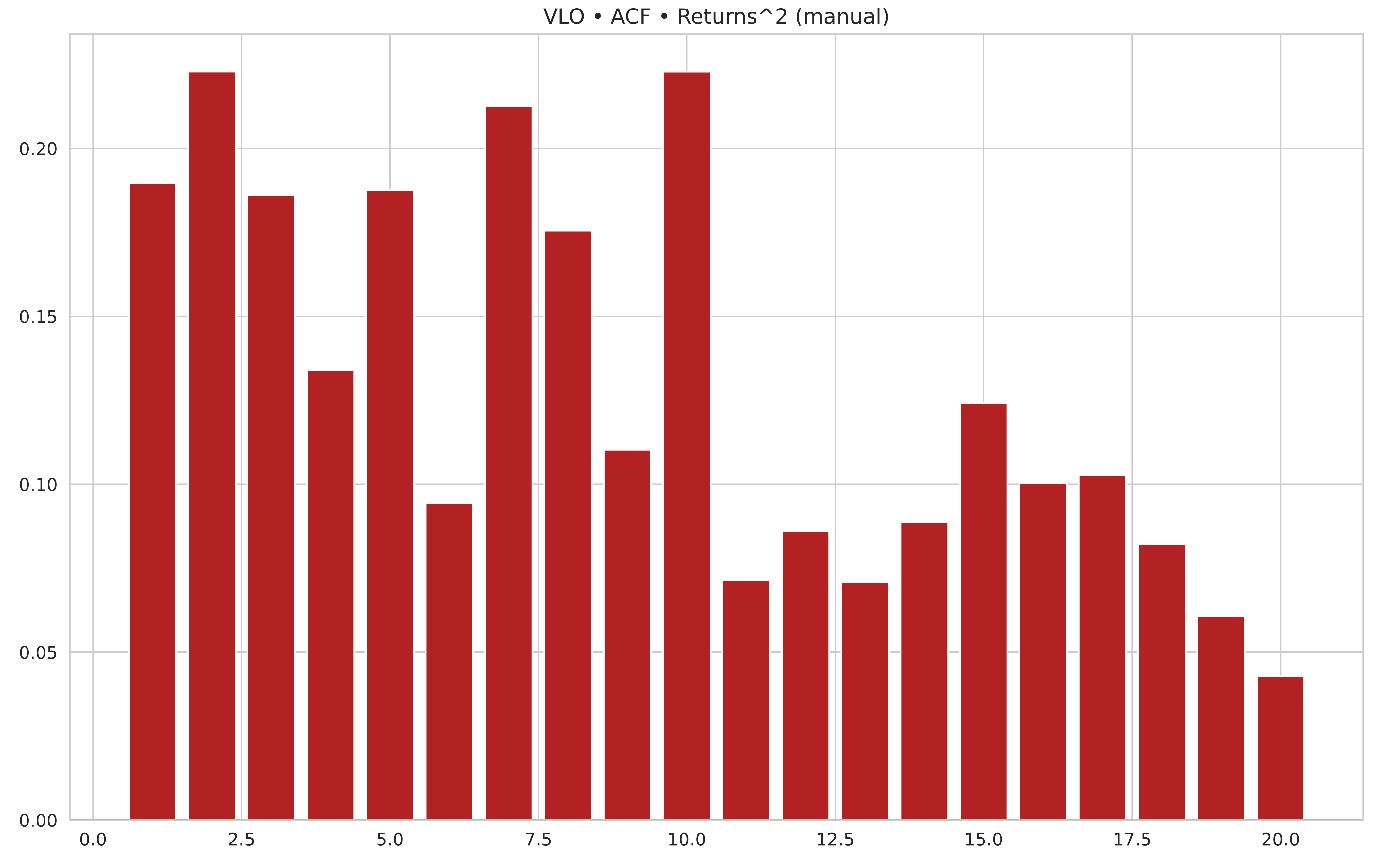
VLO • Returns • Q–Q Plot vs Normal
Ordered Values
Theoretical quantiles
0.2
0.1
0.0
−0.1
−0.2
−3
−2
−1
0
1
2
3



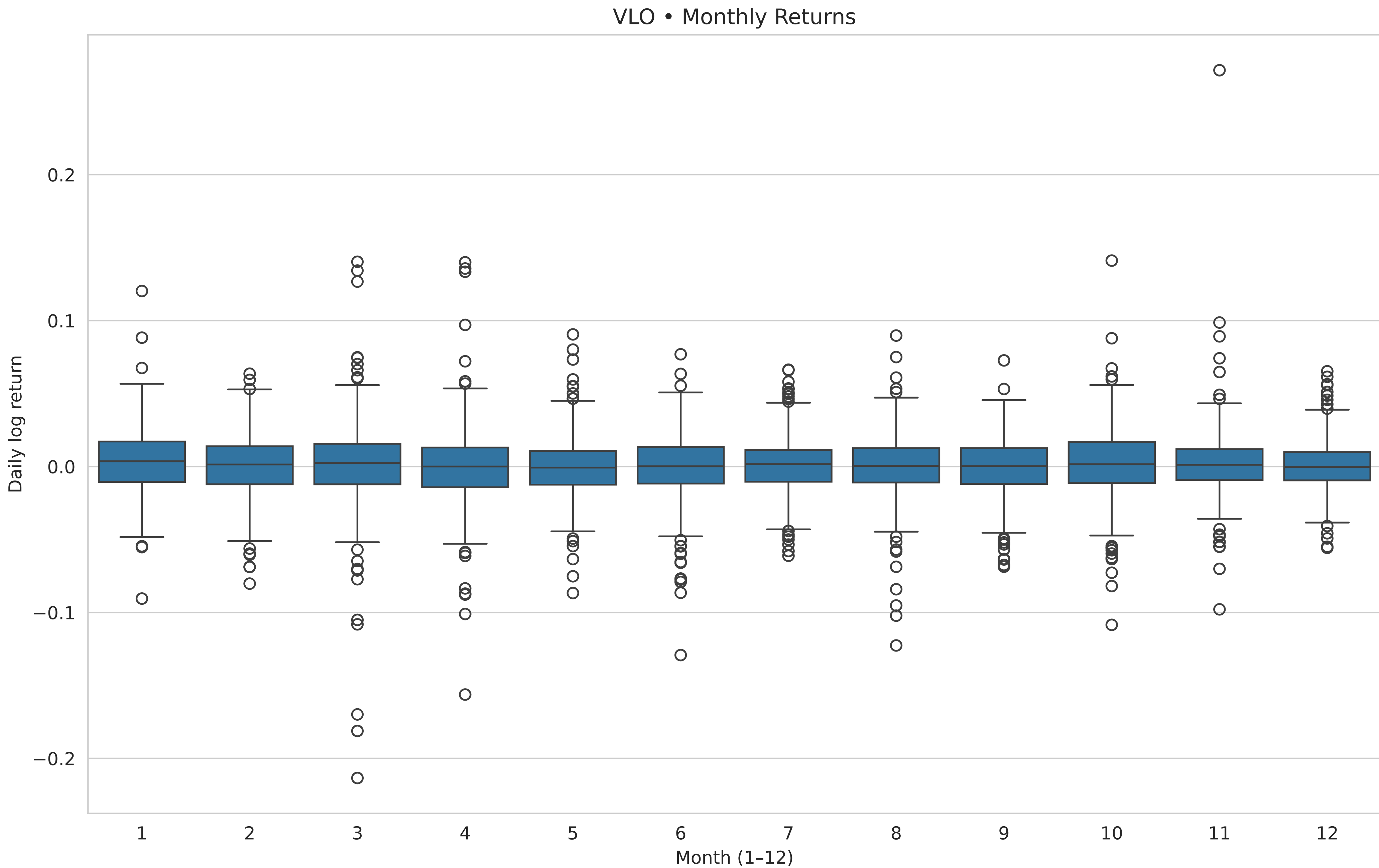
VLO • ACF • Returns (manual)
Autocorrelation
Lag
0.04
0.02
0.00
−0.02
−0.04
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0


VLO • Rolling Autocorrelation (lag=1, window=20)
Autocorr
Date
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
2012
2014
2016
2018
2020
2022
2024
2026

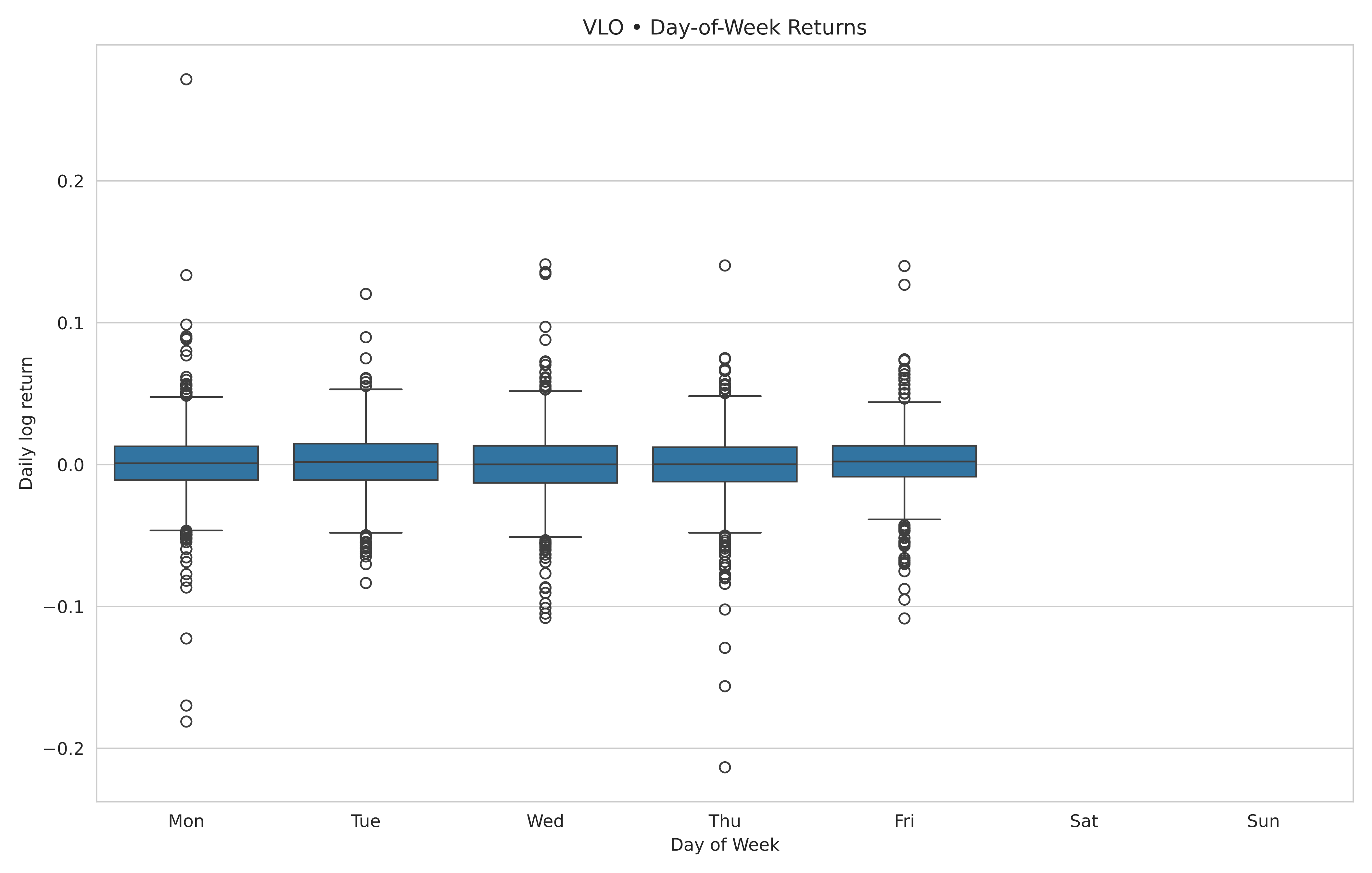

VLO • ACF • |Returns| (manual)
0.00
0.05
0.10
0.15
0.20
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

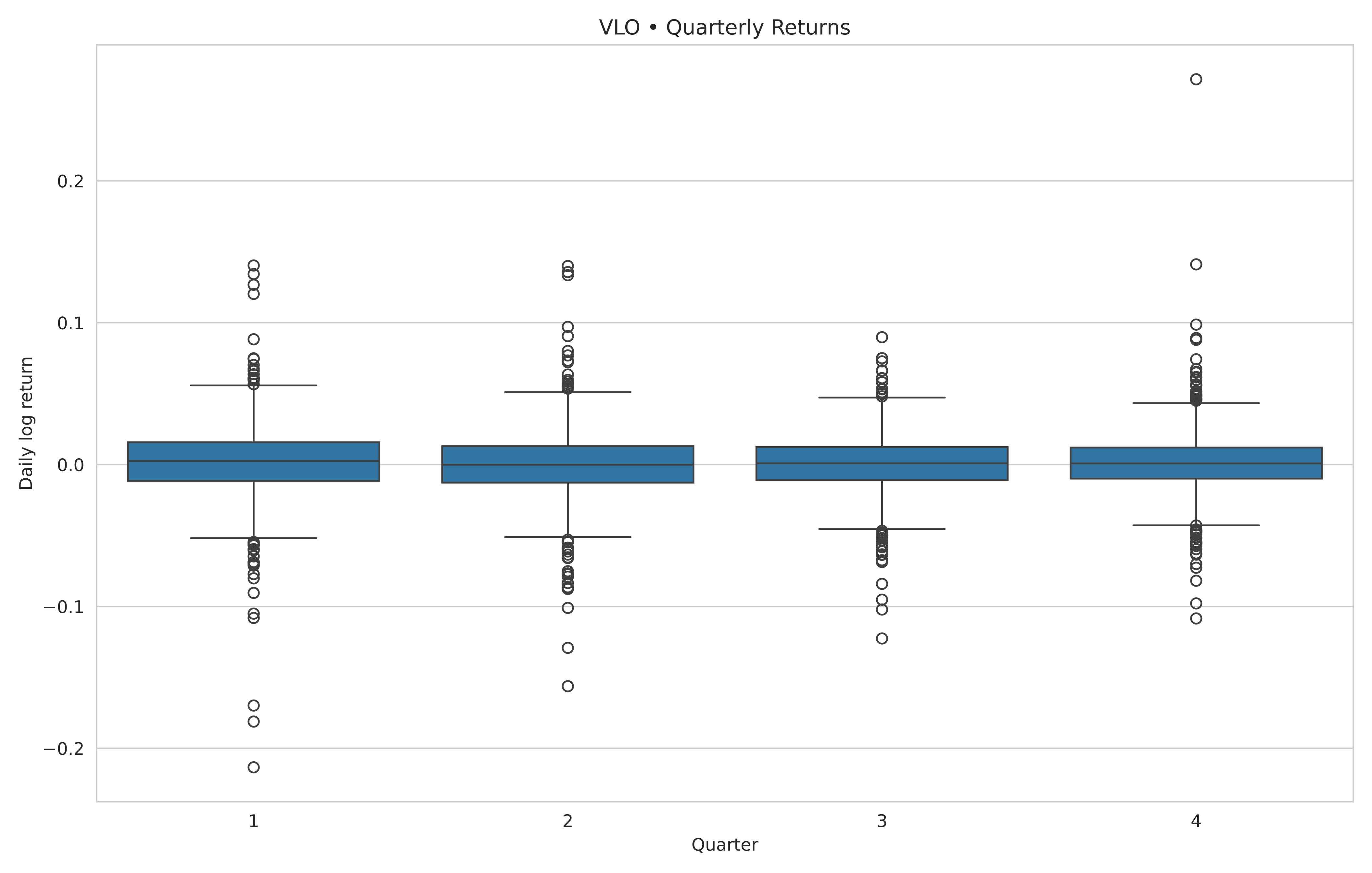


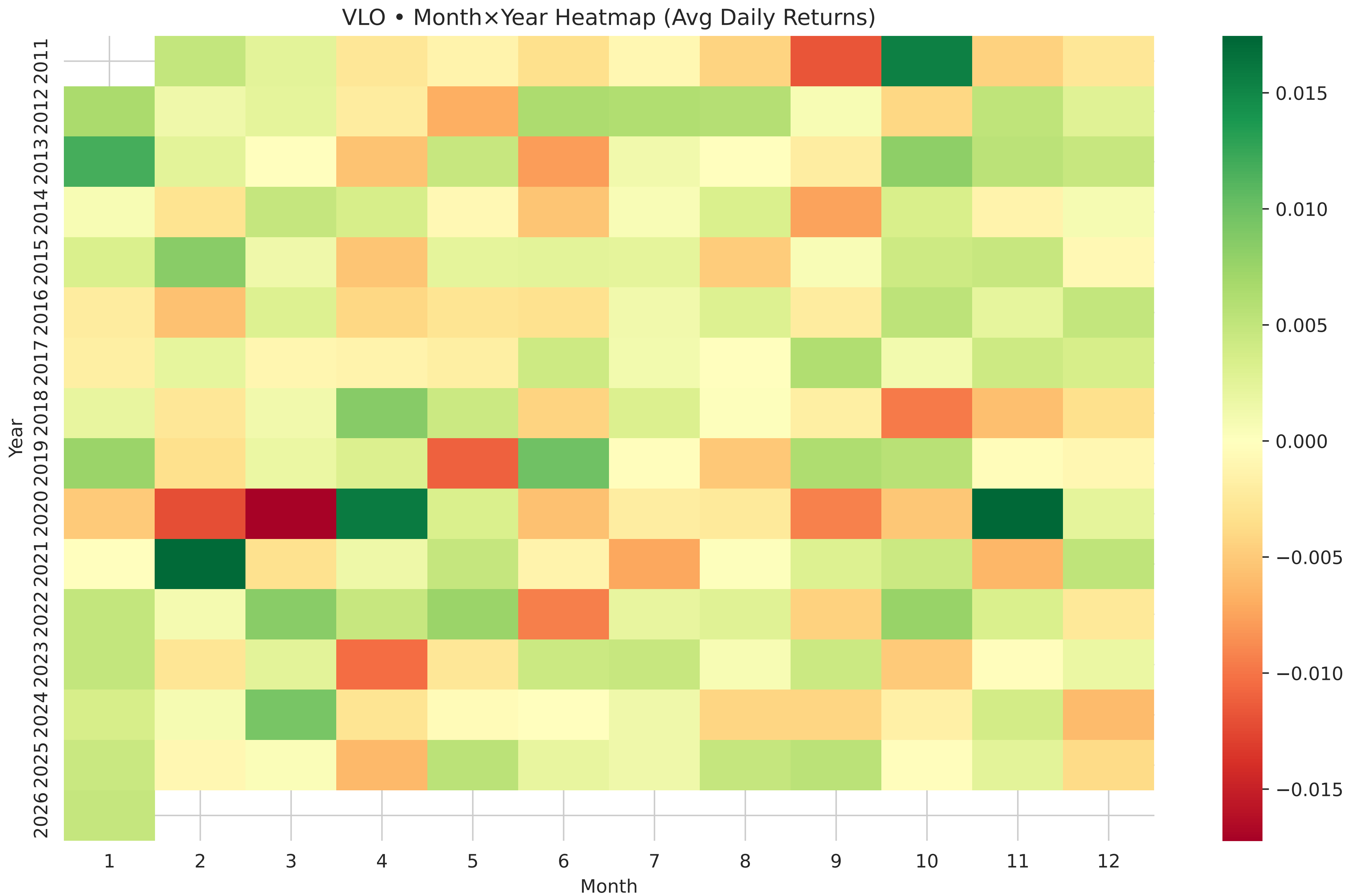
VLO • ACF • Returns^2 (manual)
0.00
0.05
0.10
0.15
0.20
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0



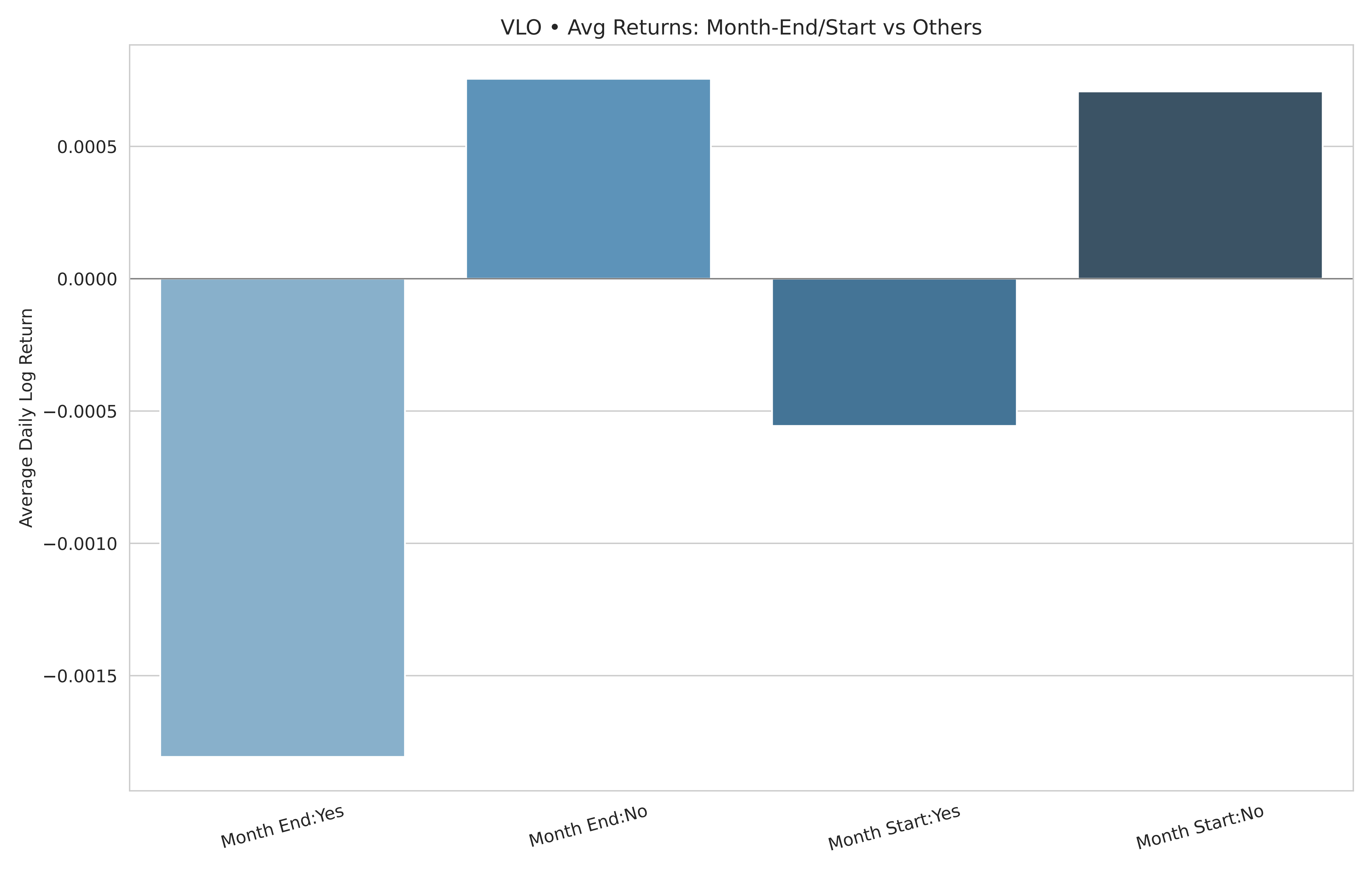
VLO • Monthly Returns
Daily log return
0.2
0.1
0.0
−0.1
−0.2
1
2
3
4
5
6
7
8
9
10
11
12
Month (1–12)


VLO • Day-of-Week Returns
Daily log return
0.2
0.1
0.0
−0.1
−0.2
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Day of Week


VLO • Quarterly Returns
0.2
0.1
0.0
−0.1
−0.2
Daily log return
1
2
3
4
Quarter

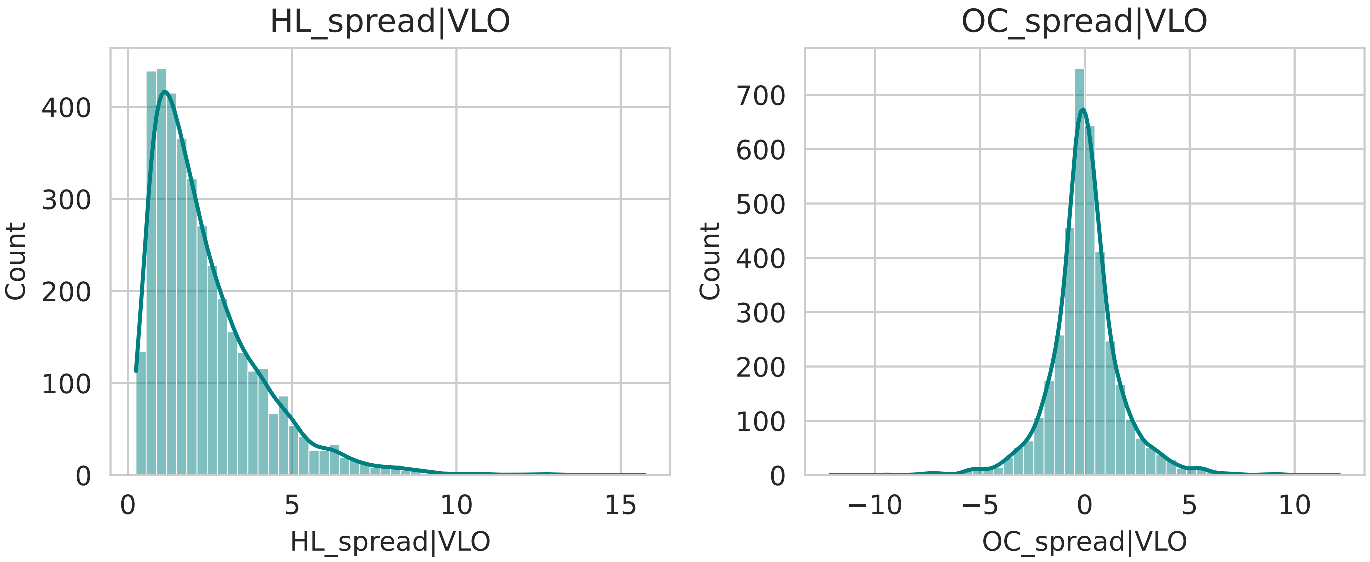


VLO • Month×Year Heatmap (Avg Daily Returns)
Year
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Month
1
2
3
4
5
6
7
8
9
10
11
12
0.015
0.010
0.005
0.000
−0.005
−0.010
−0.015

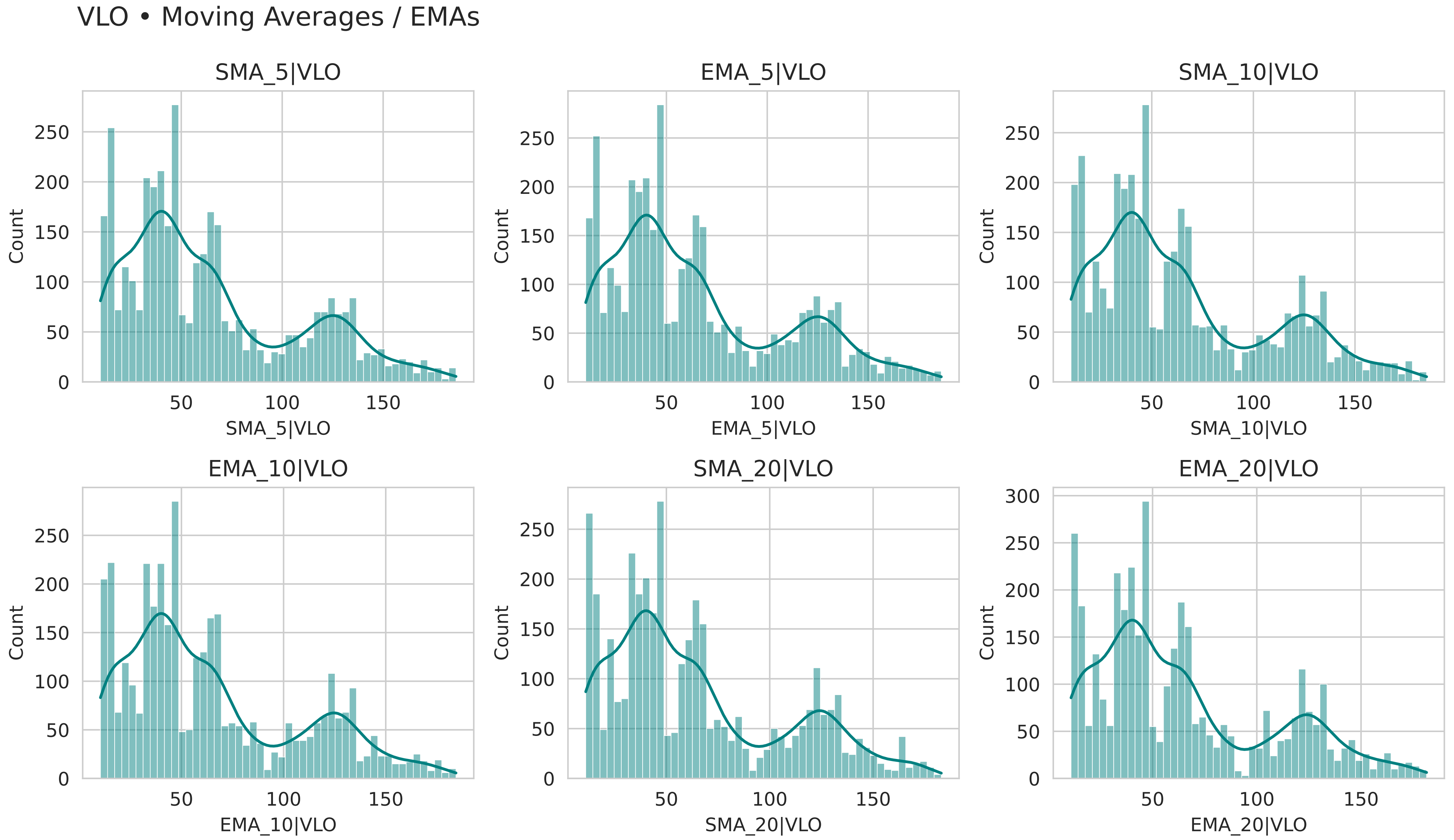


VLO • Avg Returns: Month-End/Start vs Others
Average Daily Log Return
0.0005
0.0000
−0.0005
−0.0010
−0.0015
Month End:Yes
Month End:No
Month Start:Yes
Month Start:No

VLO • Spreads

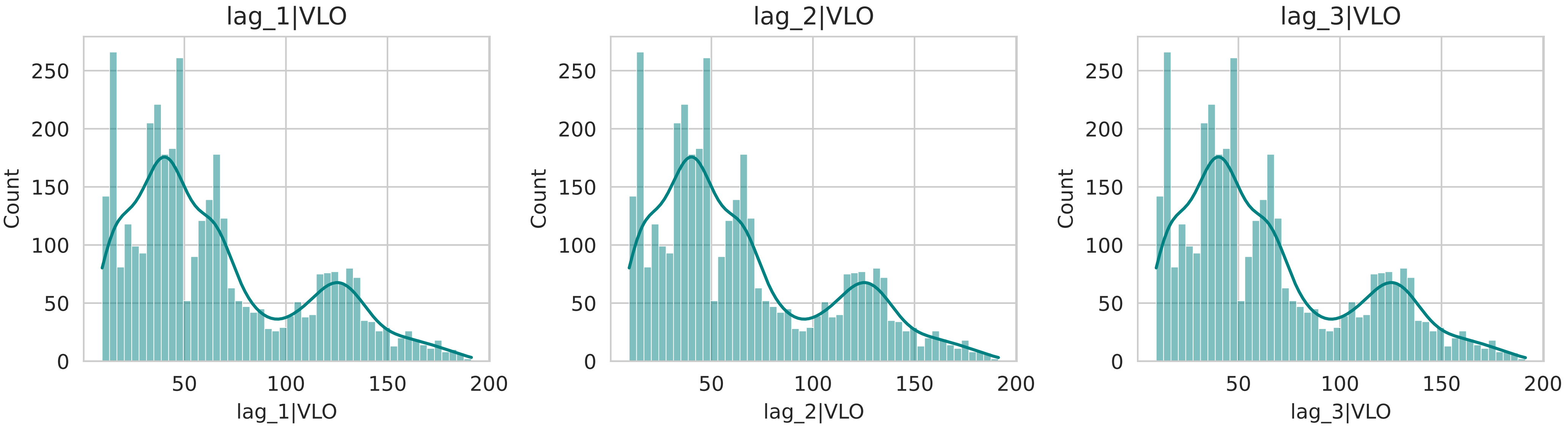


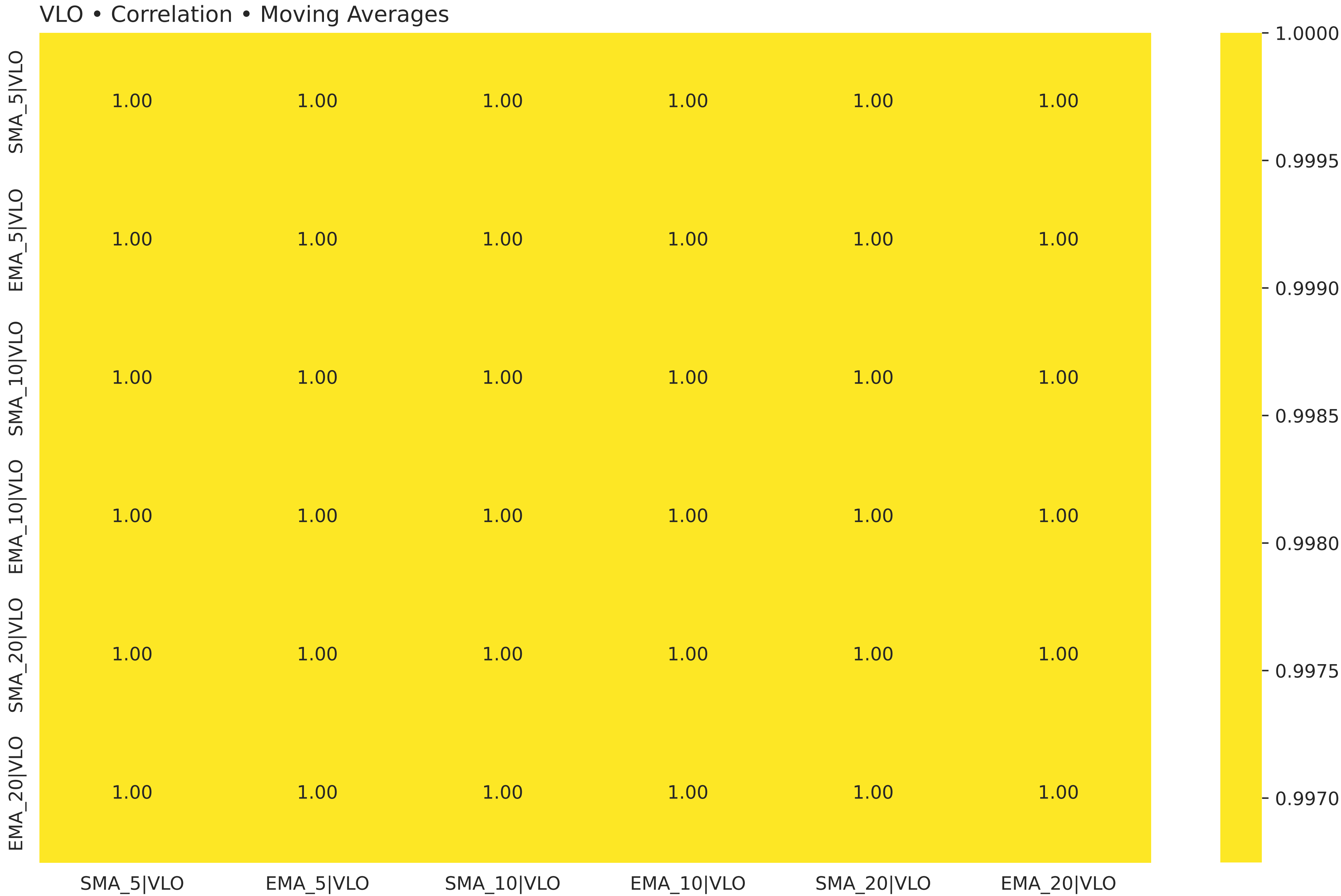
HL_spread|VLO
Count
400
300
200
100
0
0
5
10
15
HL_spread|VLO
OC_spread|VLO
Count
700
600
500
400
300
200
100
0
−10
−5
0
5
10
OC_spread|VLO

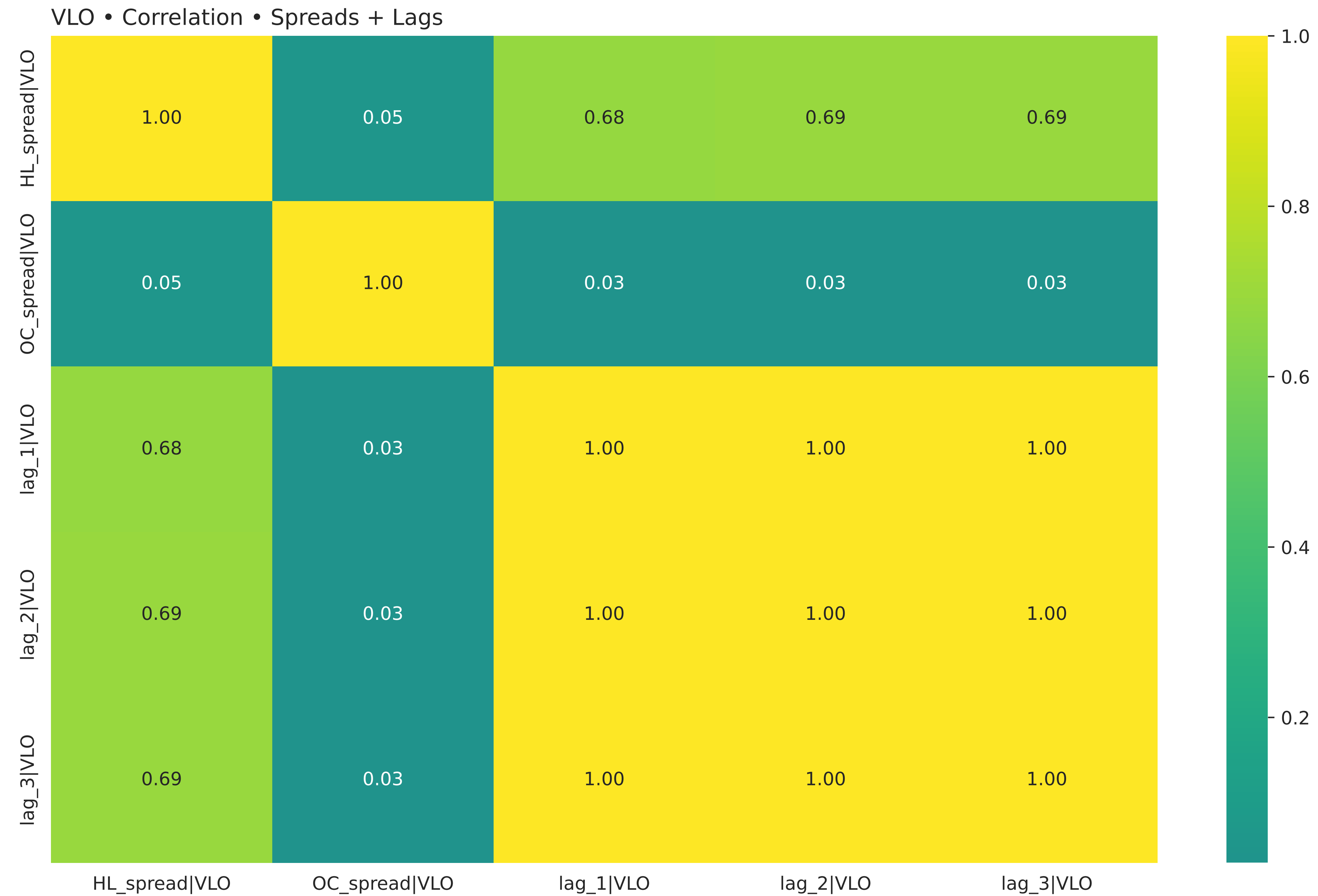


VLO • Moving Averages / EMAs
SMA_5|VLO
EMA_5|VLO
SMA_10|VLO
EMA_10|VLO
SMA_20|VLO
EMA_20|VLO
Count

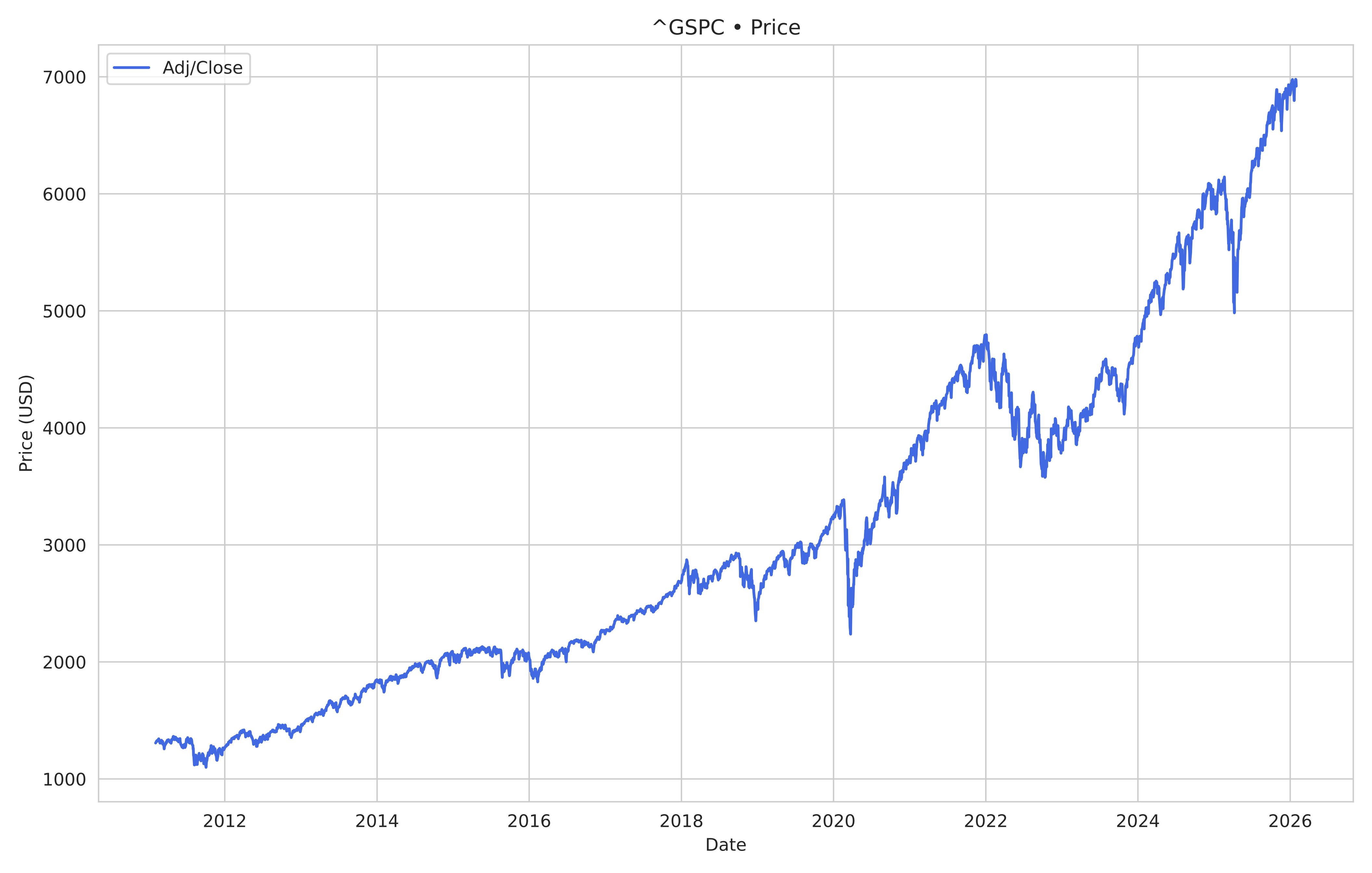
VLO • Lagged Prices

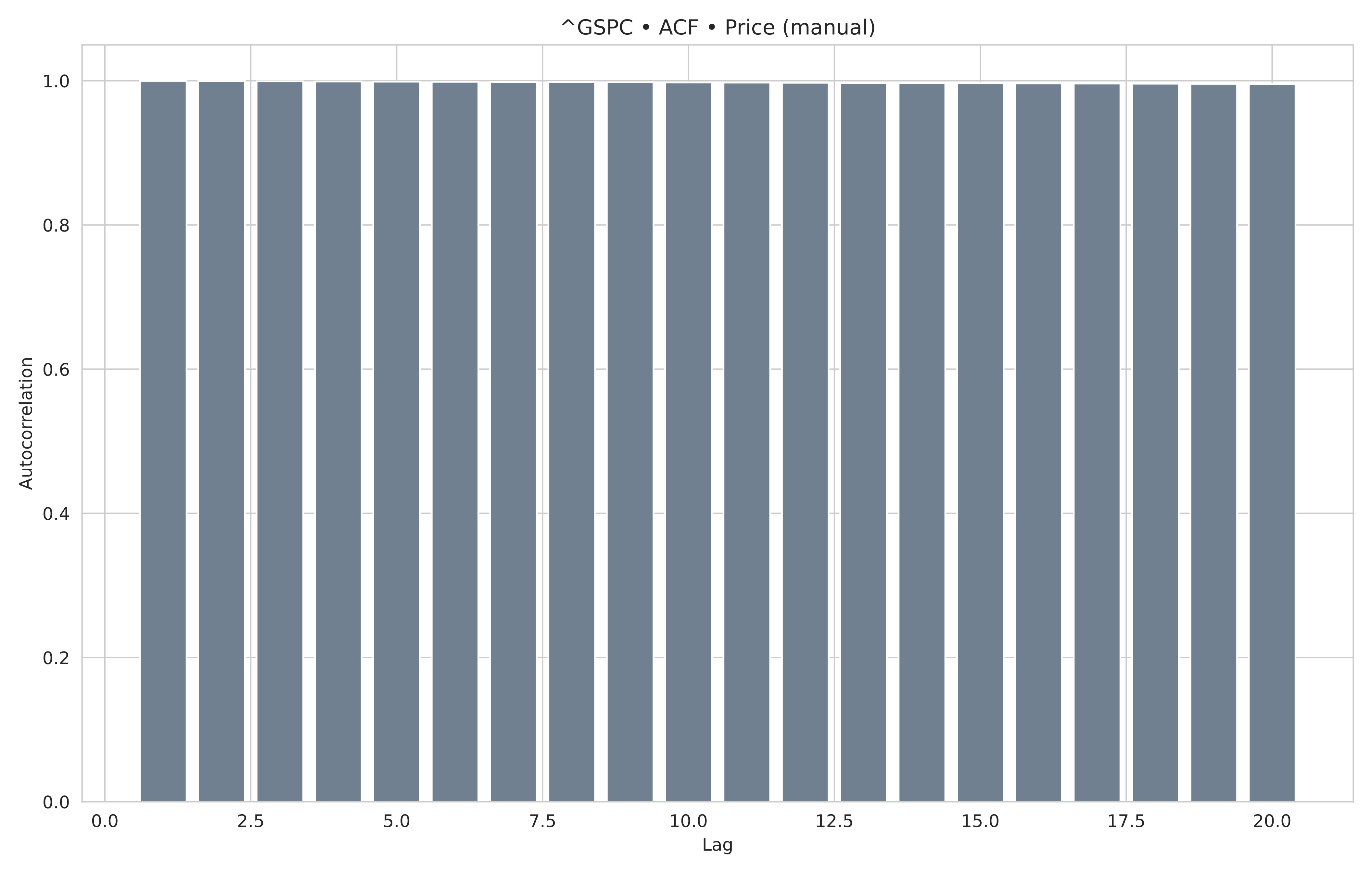


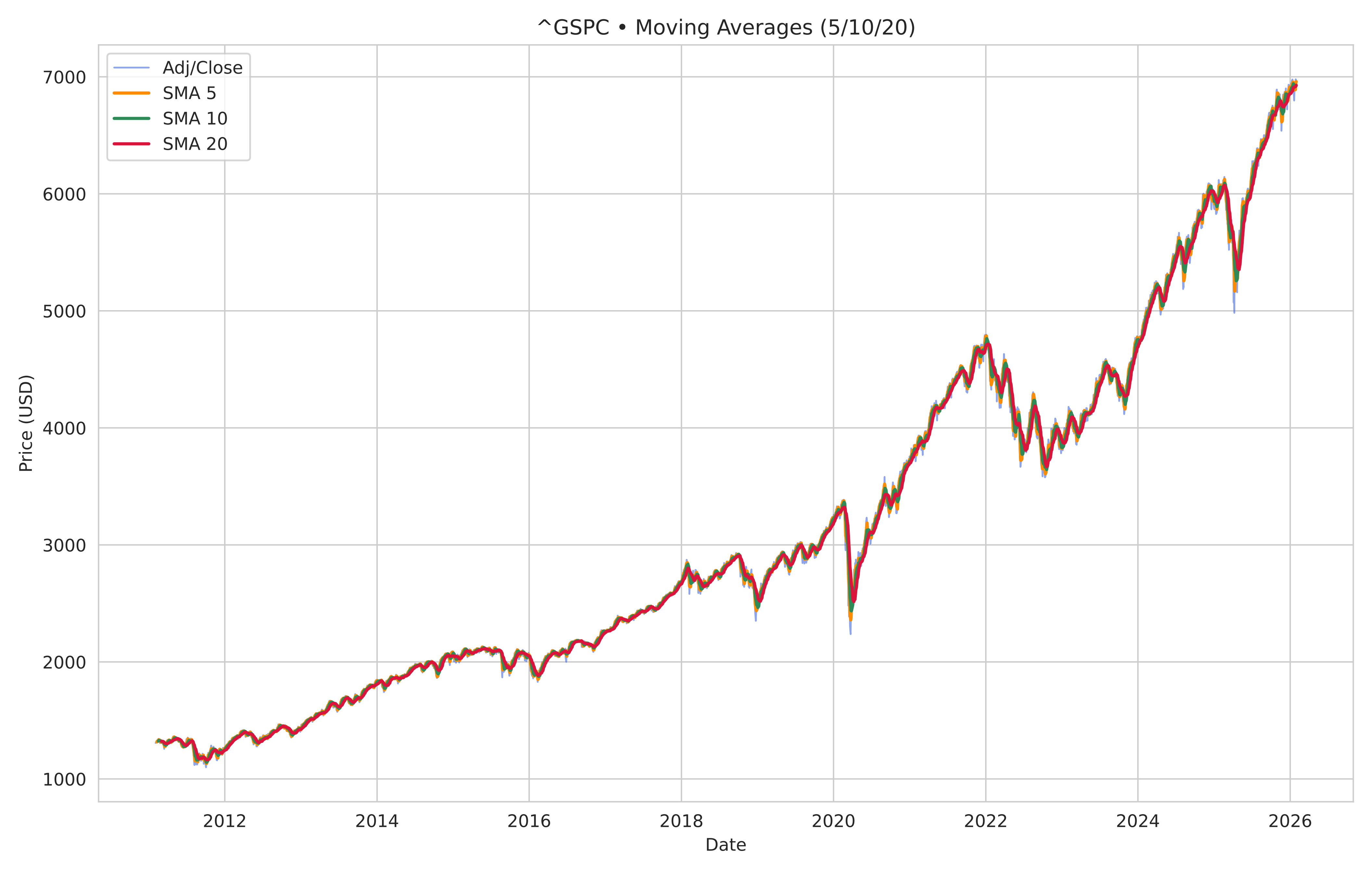

VLO • Correlation • Moving Averages
SMA_5|VLO
EMA_5|VLO
SMA_10|VLO
EMA_10|VLO
SMA_20|VLO
EMA_20|VLO
1.00
1.0000
0.9995
0.9990
0.9985
0.9980
0.9975
0.9970

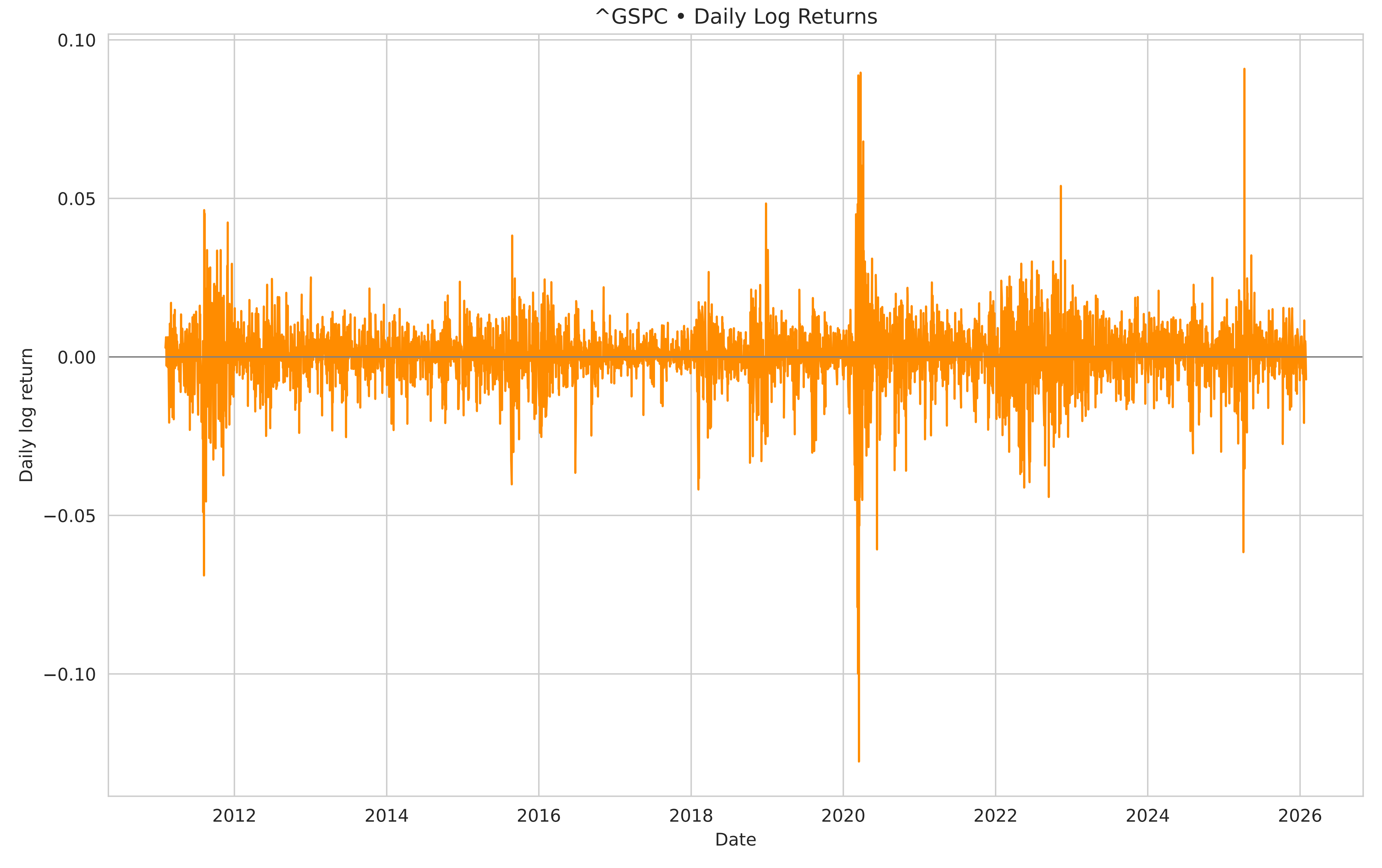


VLO • Correlation • Spreads + Lags
HL_spread|VLO
OC_spread|VLO
lag_1|VLO
lag_2|VLO
lag_3|VLO
1.00
0.05
0.68
0.69
0.69
0.05
1.00
0.03
0.03
0.03
0.68
0.03
1.00
1.00
1.00
0.69
0.03
1.00
1.00
1.00
0.69
0.03
1.00
1.00
1.00
HL_spread|VLO
OC_spread|VLO
lag_1|VLO
lag_2|VLO
lag_3|VLO
1.0
0.8
0.6
0.4
0.2

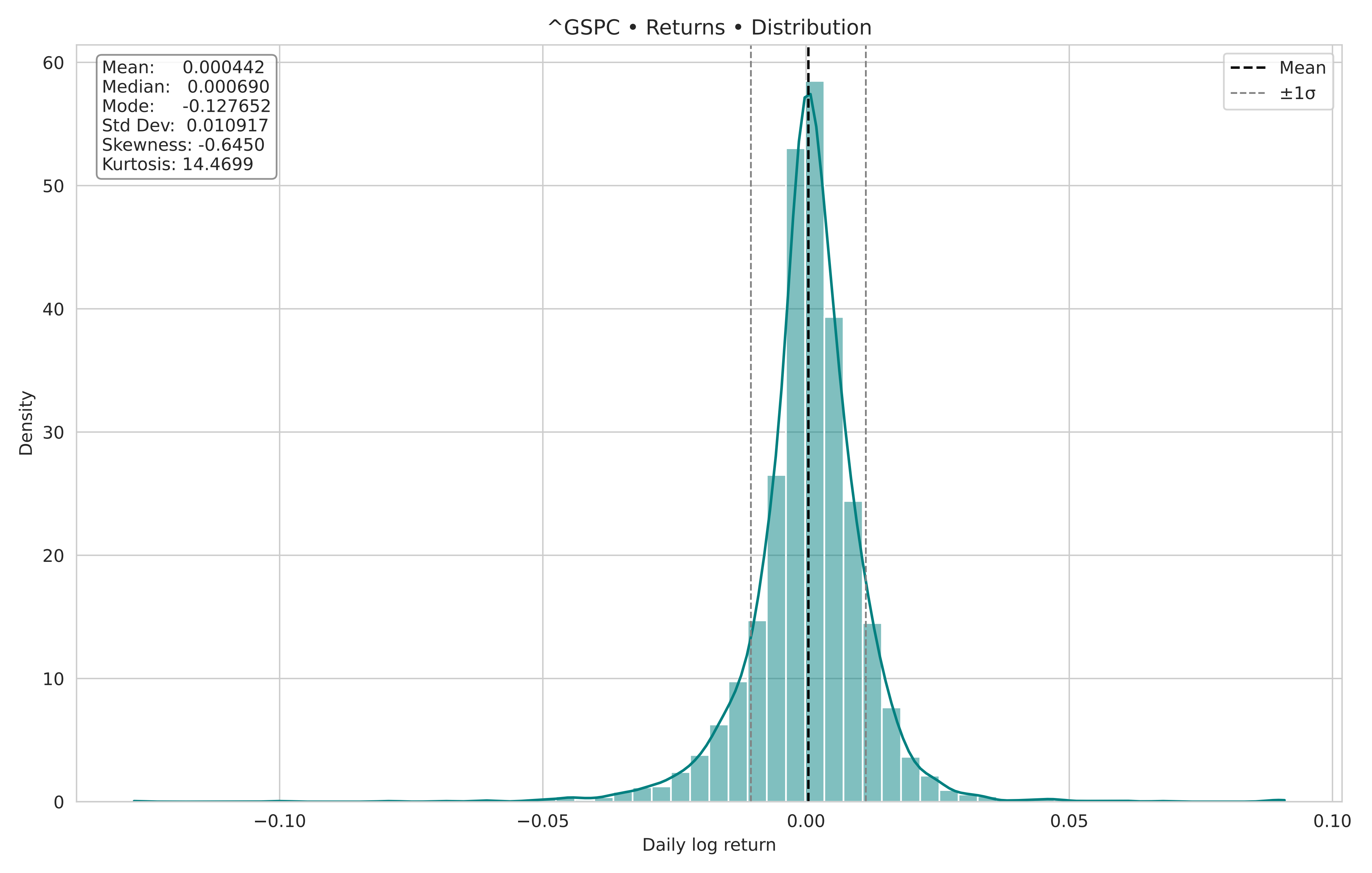

^GSPC • Price
Adj/Close
7000
6000
5000
4000
3000
2000
1000
Price (USD)
2012
2014
2016
2018
2020
2022
2024
2026
Date

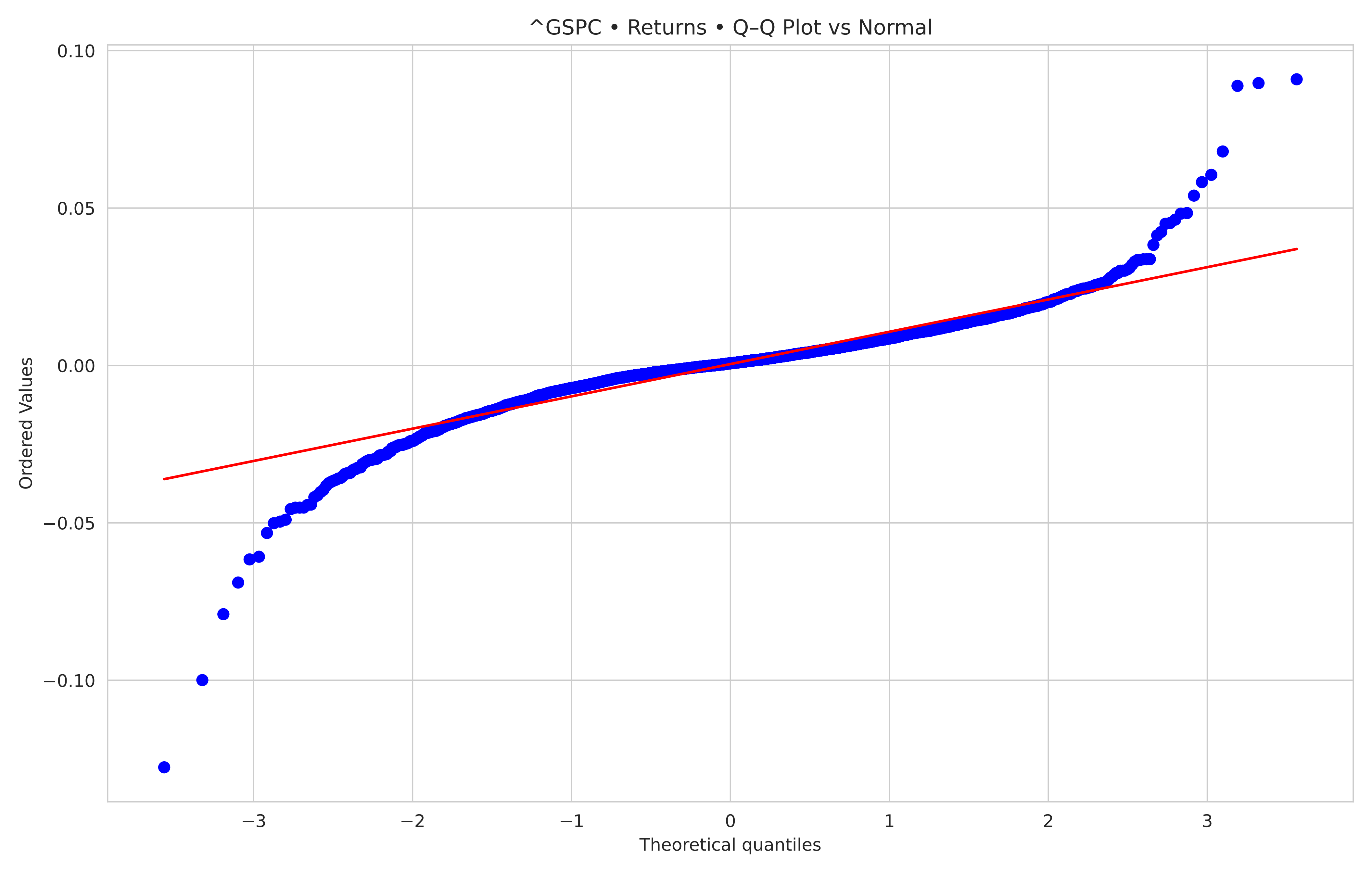

^GSPC • ACF • Price (manual)
Autocorrelation
Lag
0.0
0.2
0.4
0.6
0.8
1.0
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

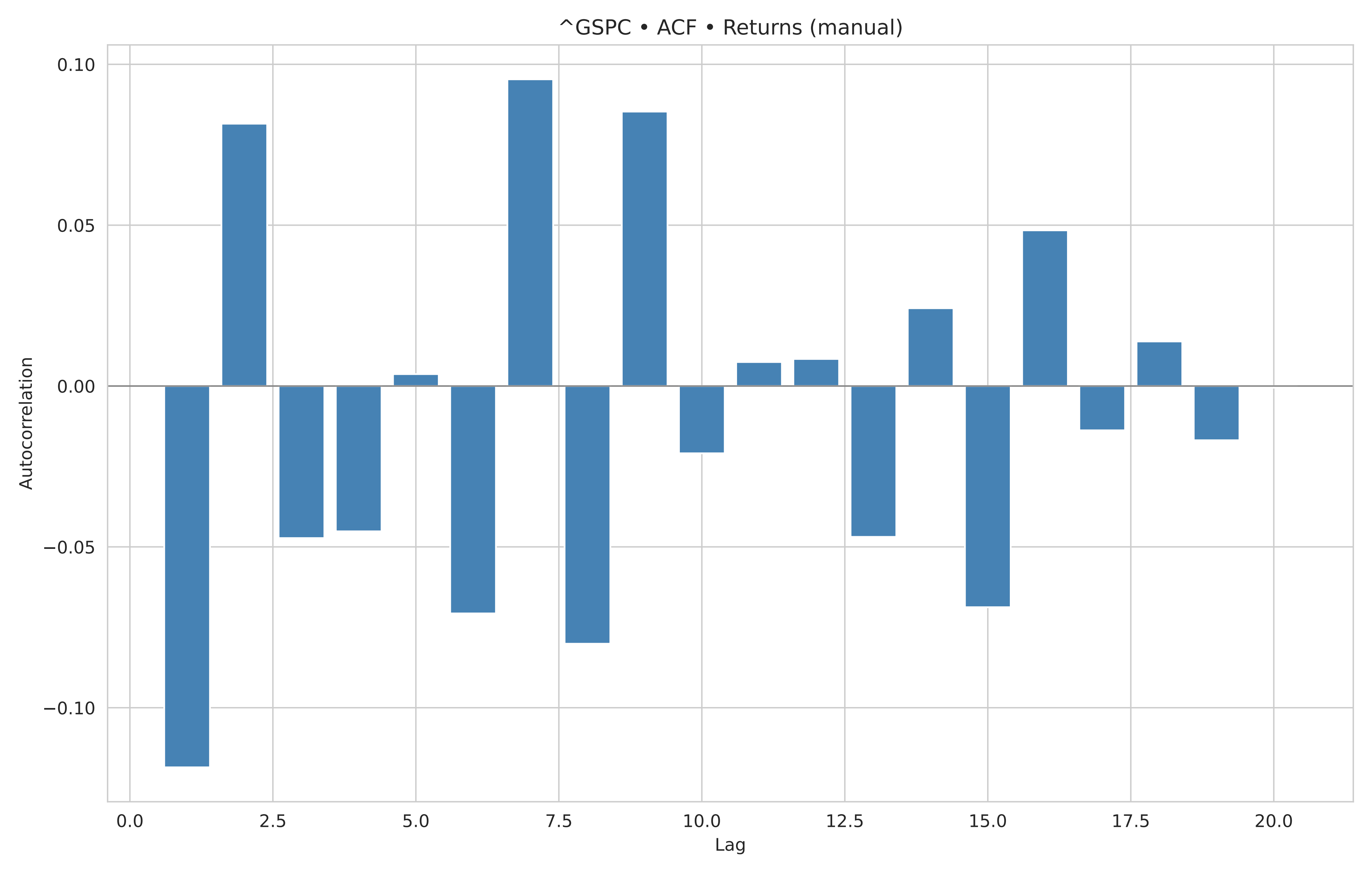

^GSPC • Moving Averages (5/10/20)
Adj/Close
SMA 5
SMA 10
SMA 20
7000
6000
5000
4000
3000
2000
1000
Price (USD)
2012
2014
2016
2018
2020
2022
2024
2026
Date



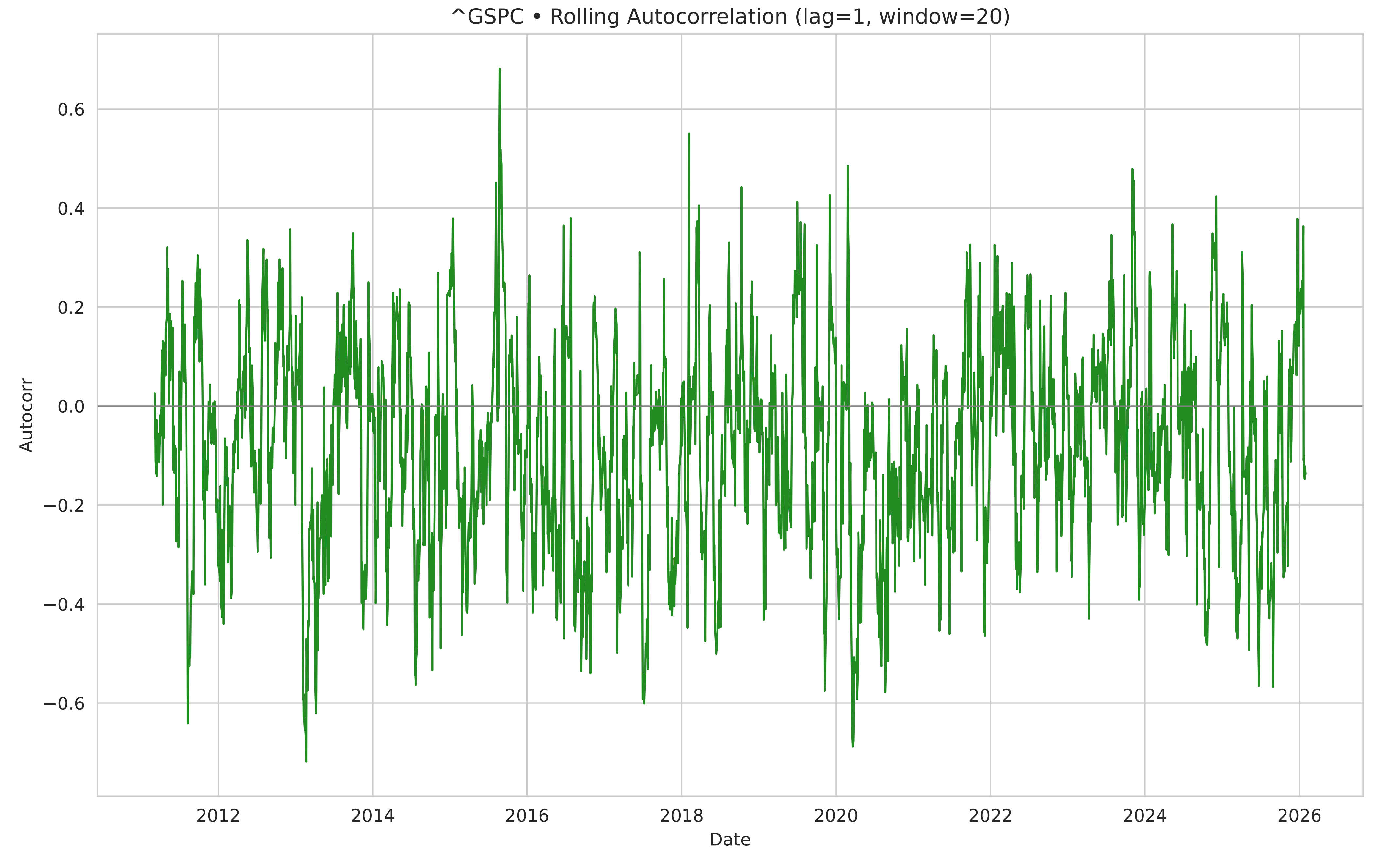
^GSPC • Daily Log Returns
0.10
0.05
0.00
−0.05
−0.10
Daily log return
2012
2014
2016
2018
2020
2022
2024
2026
Date

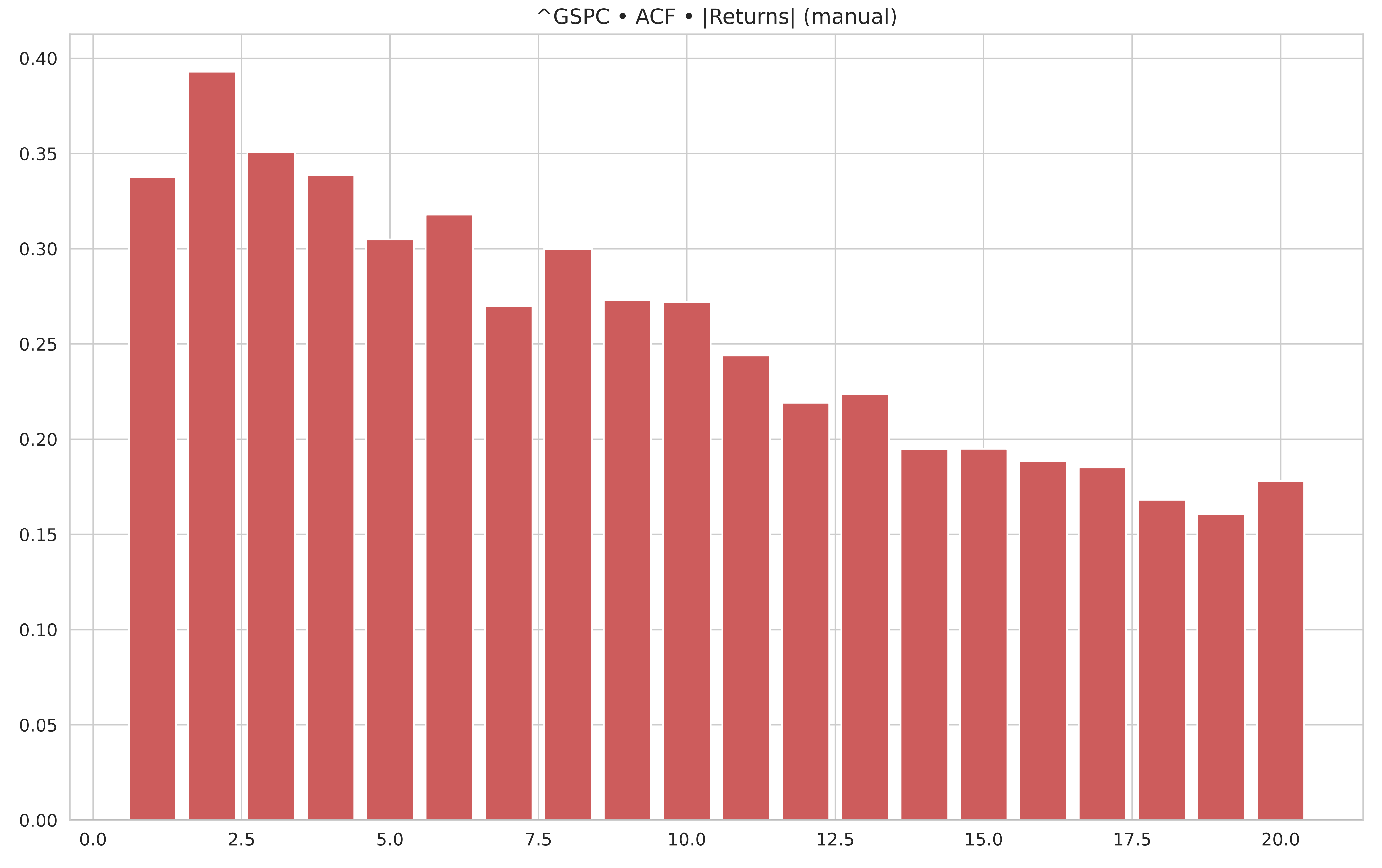

^GSPC • Returns • Distribution
Mean: 0.000442
Median: 0.000690
Mode: -0.127652
Std Dev: 0.010917
Skewness: -0.6450
Kurtosis: 14.4699
Mean
±1σ
Density
Daily log return
0
10
20
30
40
50
60
−0.10
−0.05
0.00
0.05
0.10

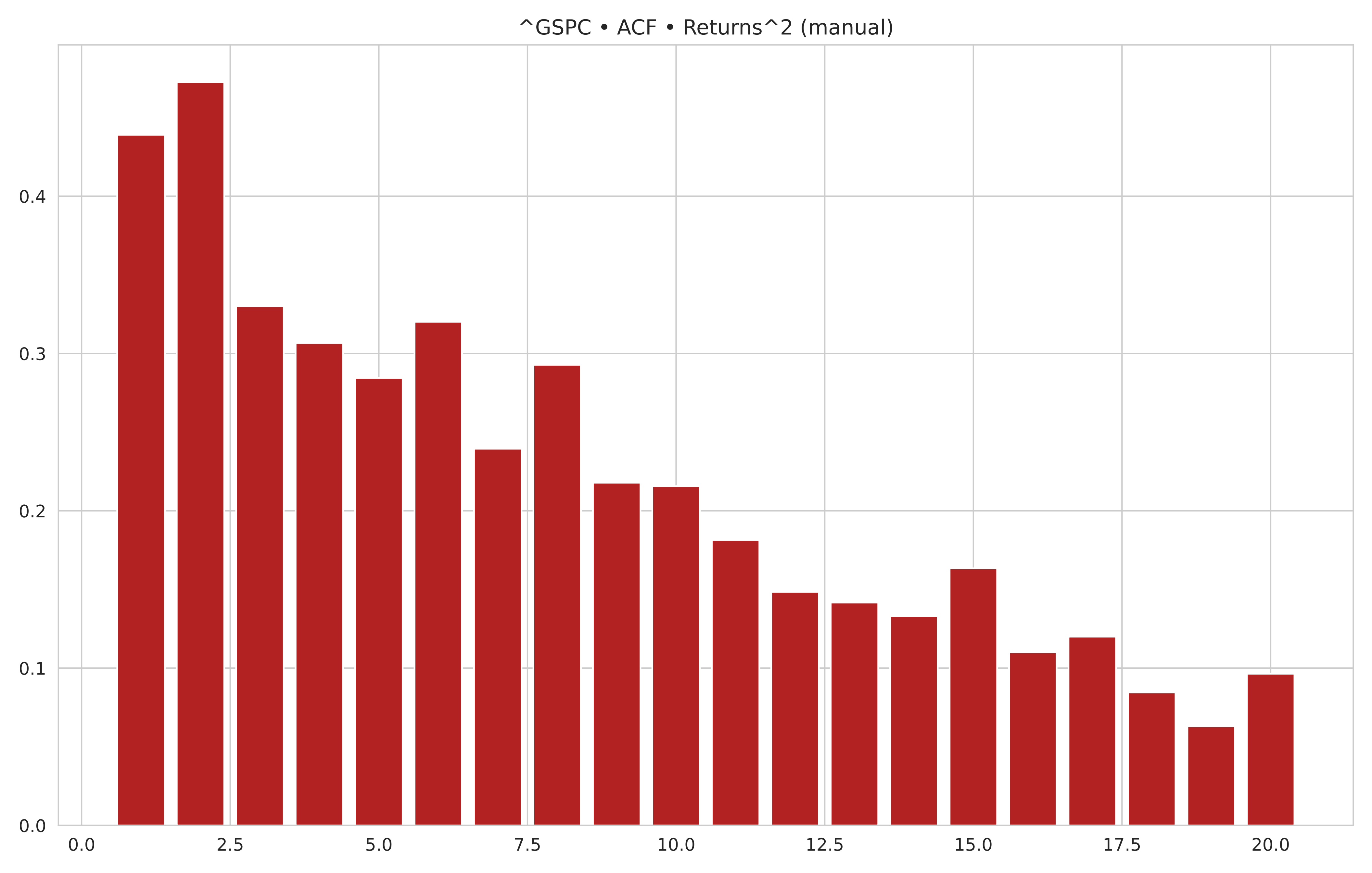

^GSPC • Returns • Q–Q Plot vs Normal
Ordered Values
Theoretical quantiles
0.10
0.05
0.00
−0.05
−0.10
−3
−2
−1
0
1
2
3

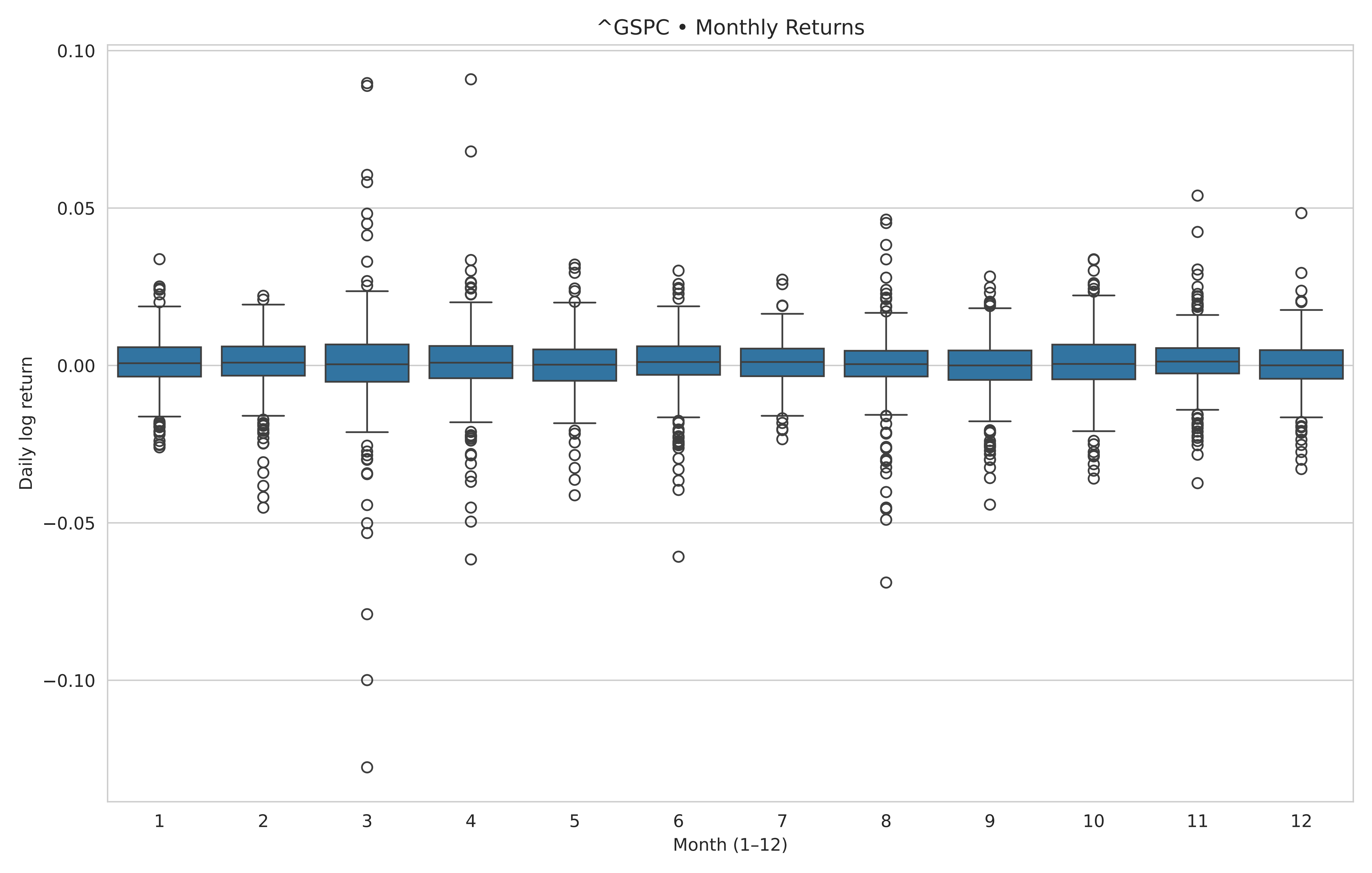


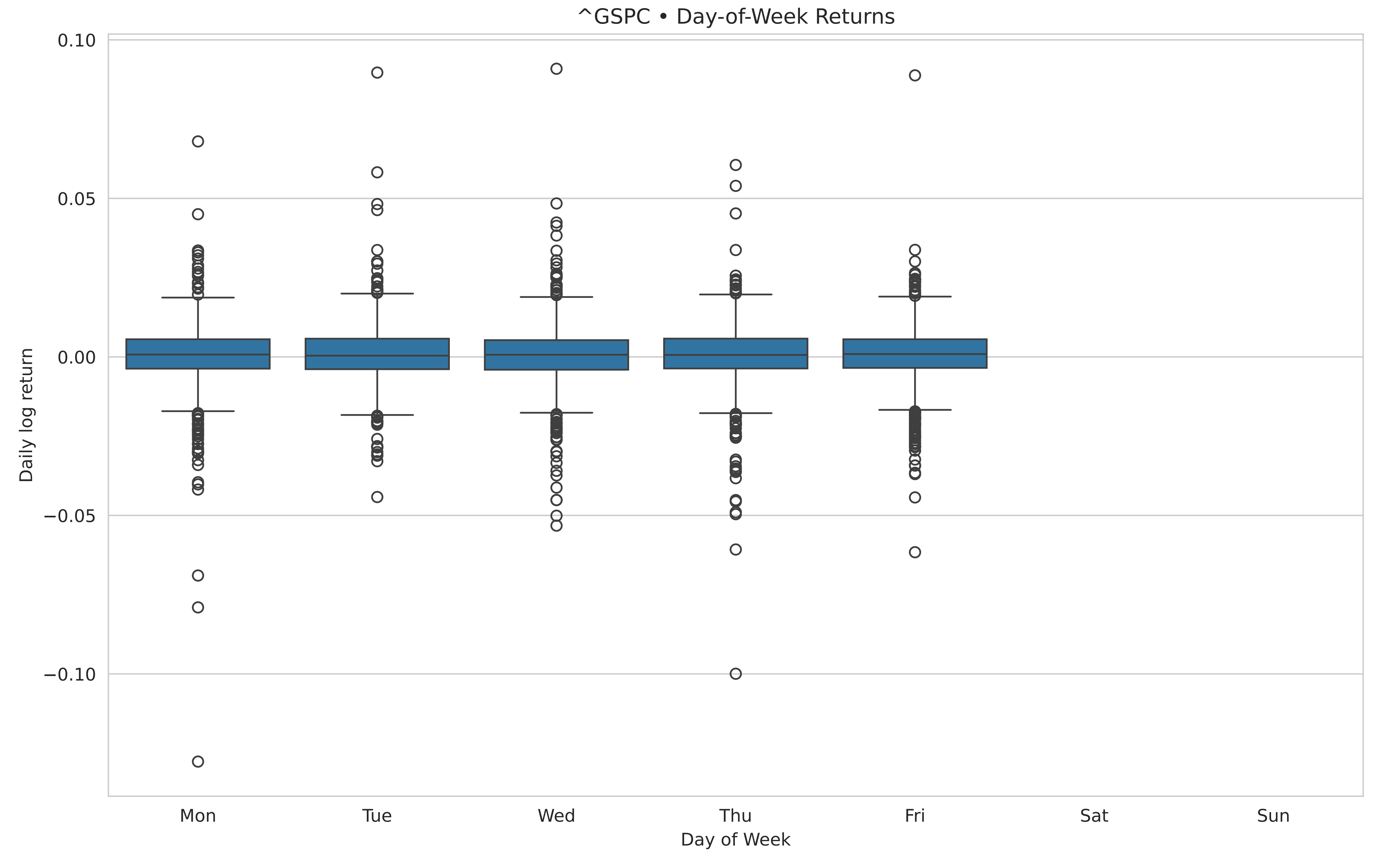
^GSPC • ACF • Returns (manual)
0.10
0.05
0.00
−0.05
−0.10
Autocorrelation
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Lag

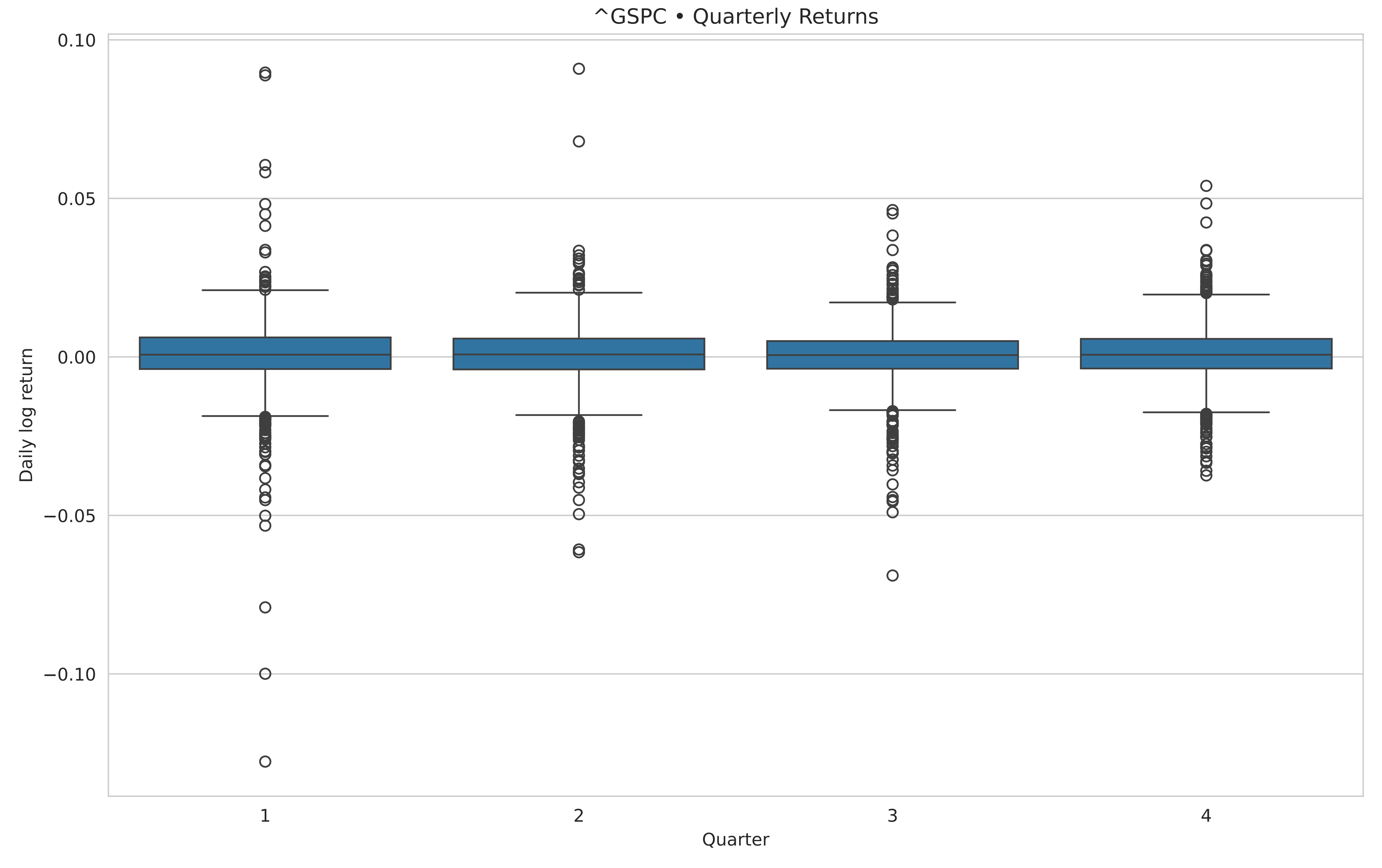

^GSPC • Rolling Autocorrelation (lag=1, window=20)
Autocorr
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
2012
2014
2016
2018
2020
2022
2024
2026
Date

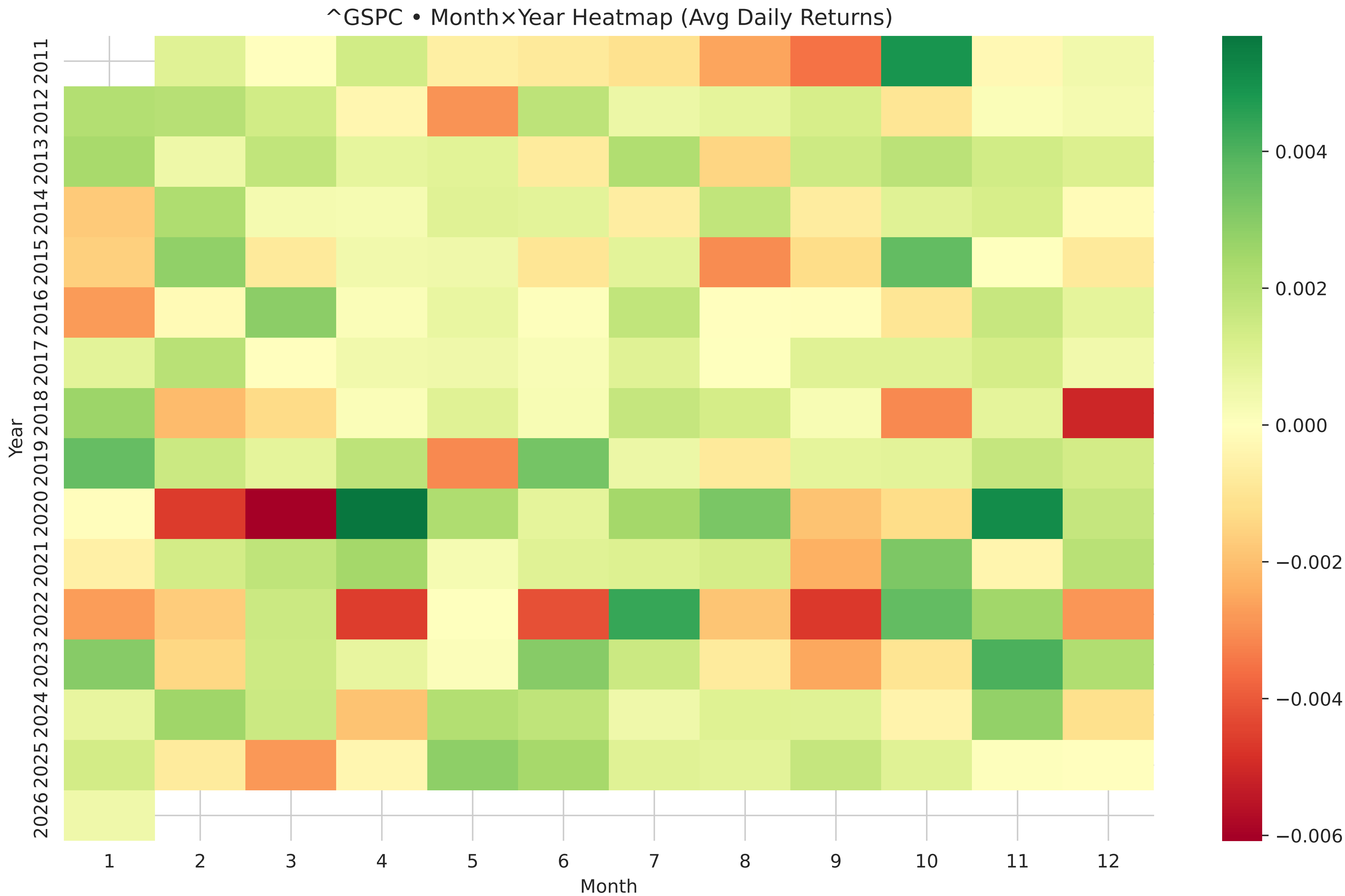

^GSPC • ACF • |Returns| (manual)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

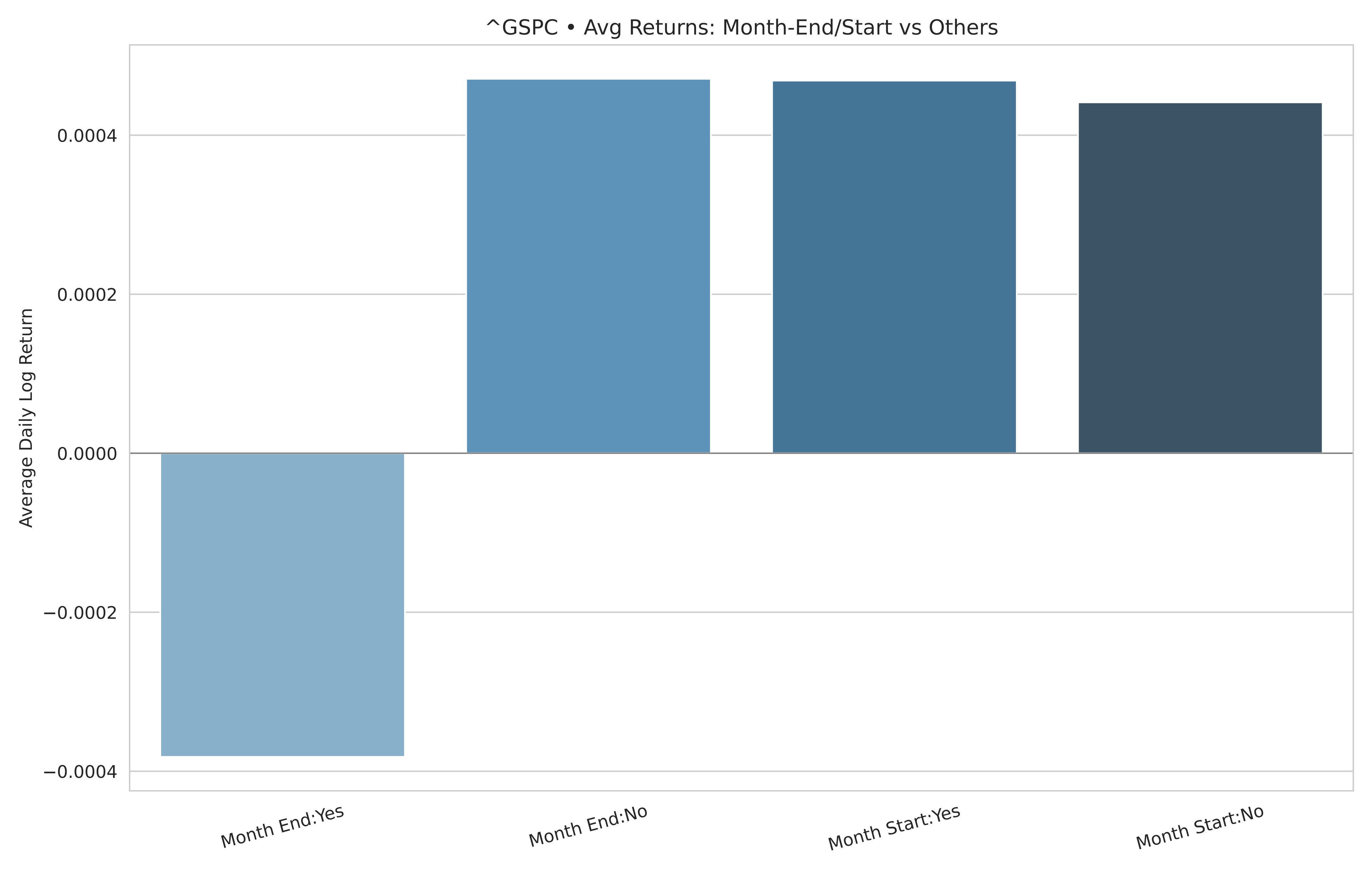

^GSPC • ACF • Returns^2 (manual)
0.0
0.1
0.2
0.3
0.4
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0


^GSPC • Monthly Returns
Daily log return
Month (1–12)
0.10
0.05
0.00
−0.05
−0.10
1
2
3
4
5
6
7
8
9
10
11
12

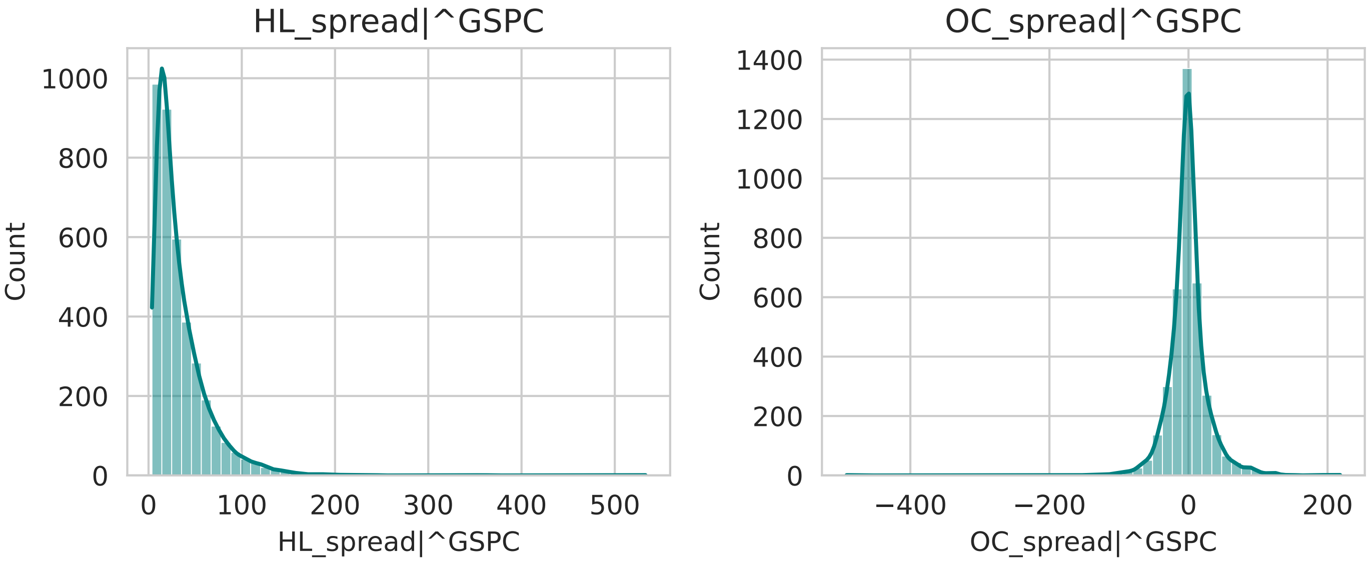

^GSPC • Day-of-Week Returns
0.10
0.05
0.00
−0.05
−0.10
Daily log return
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Day of Week


^GSPC • Quarterly Returns
0.10
0.05
0.00
−0.05
−0.10
Daily log return
1
2
3
4
Quarter

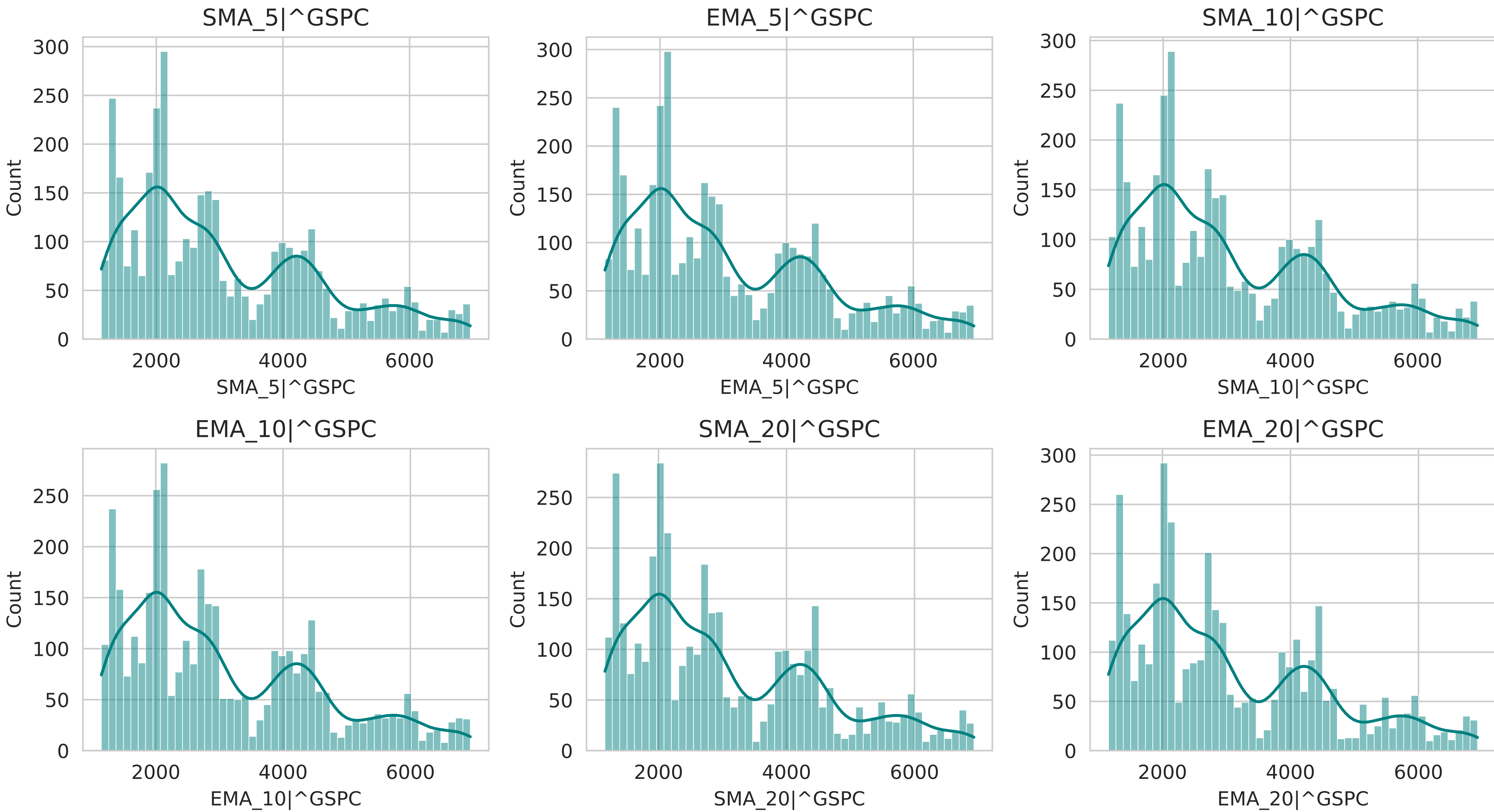

^GSPC • Month×Year Heatmap (Avg Daily Returns)
Year
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Month
1
2
3
4
5
6
7
8
9
10
11
12
0.004
0.002
0.000
−0.002
−0.004
−0.006

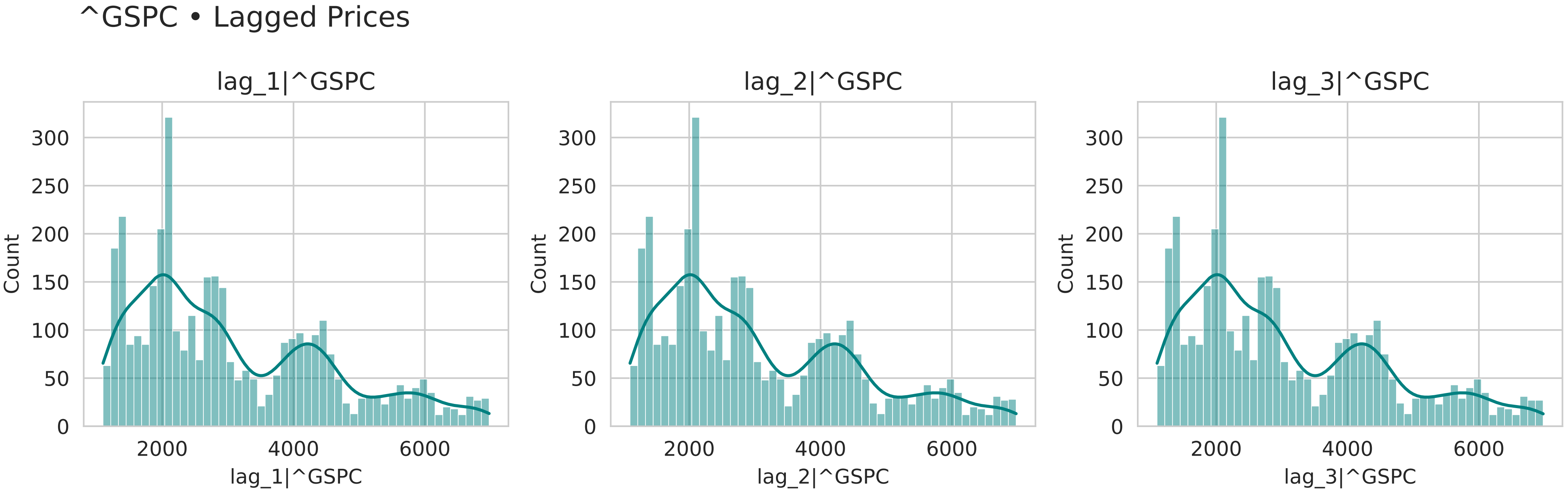

^GSPC • Avg Returns: Month-End/Start vs Others
Average Daily Log Return
0.0004
0.0002
0.0000
−0.0002
−0.0004
Month End:Yes
Month End:No
Month Start:Yes
Month Start:No

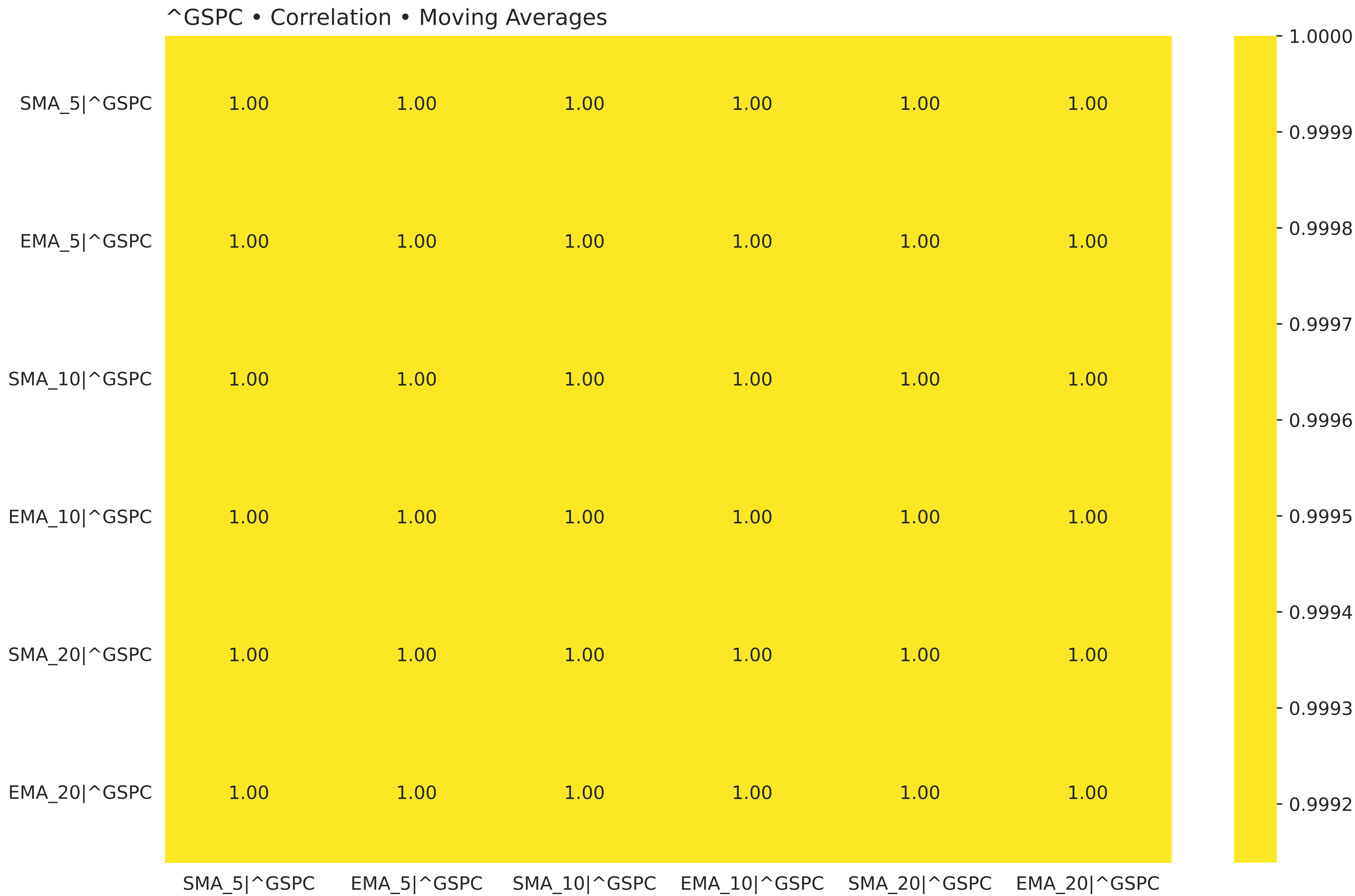
^GSPC • Spreads

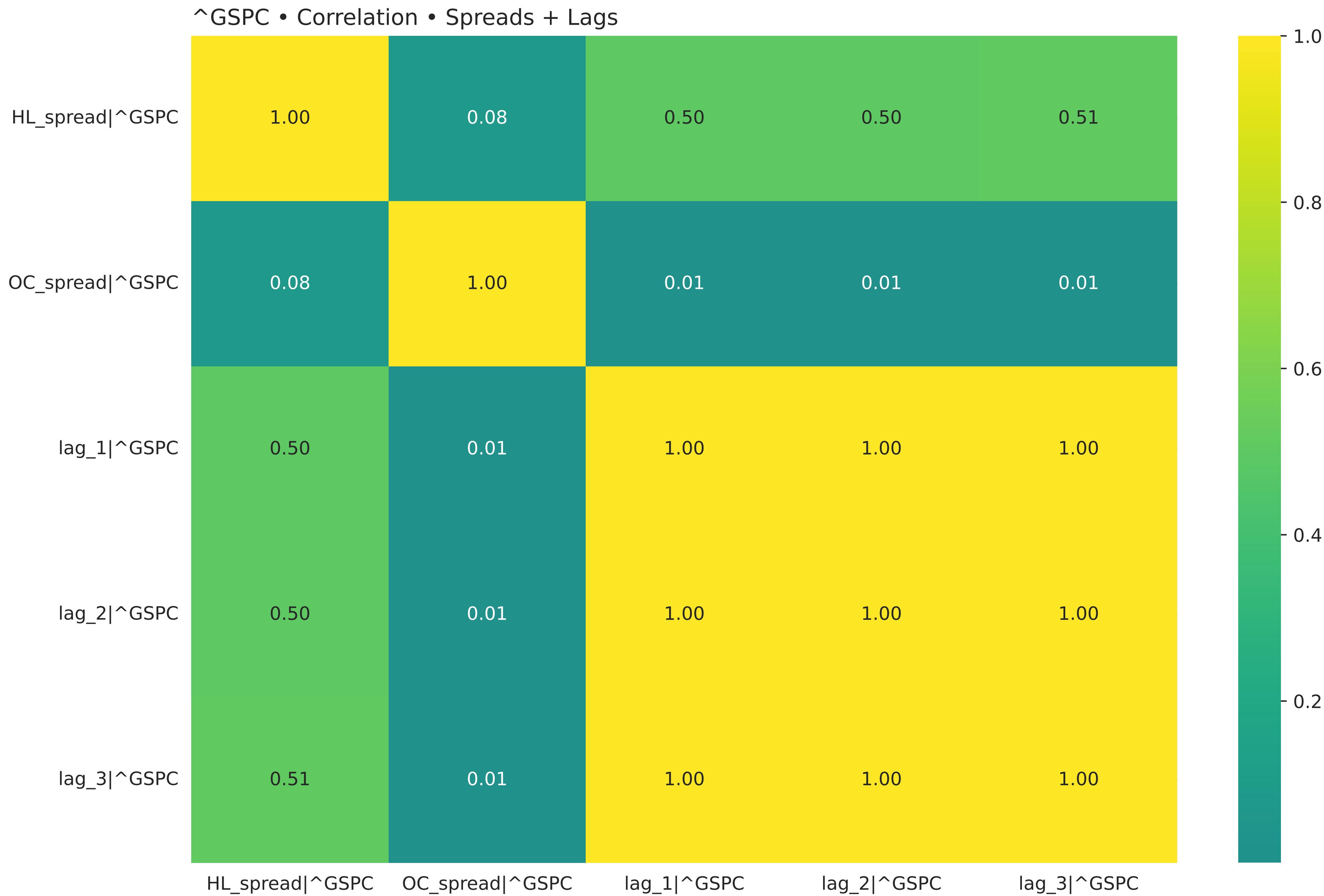


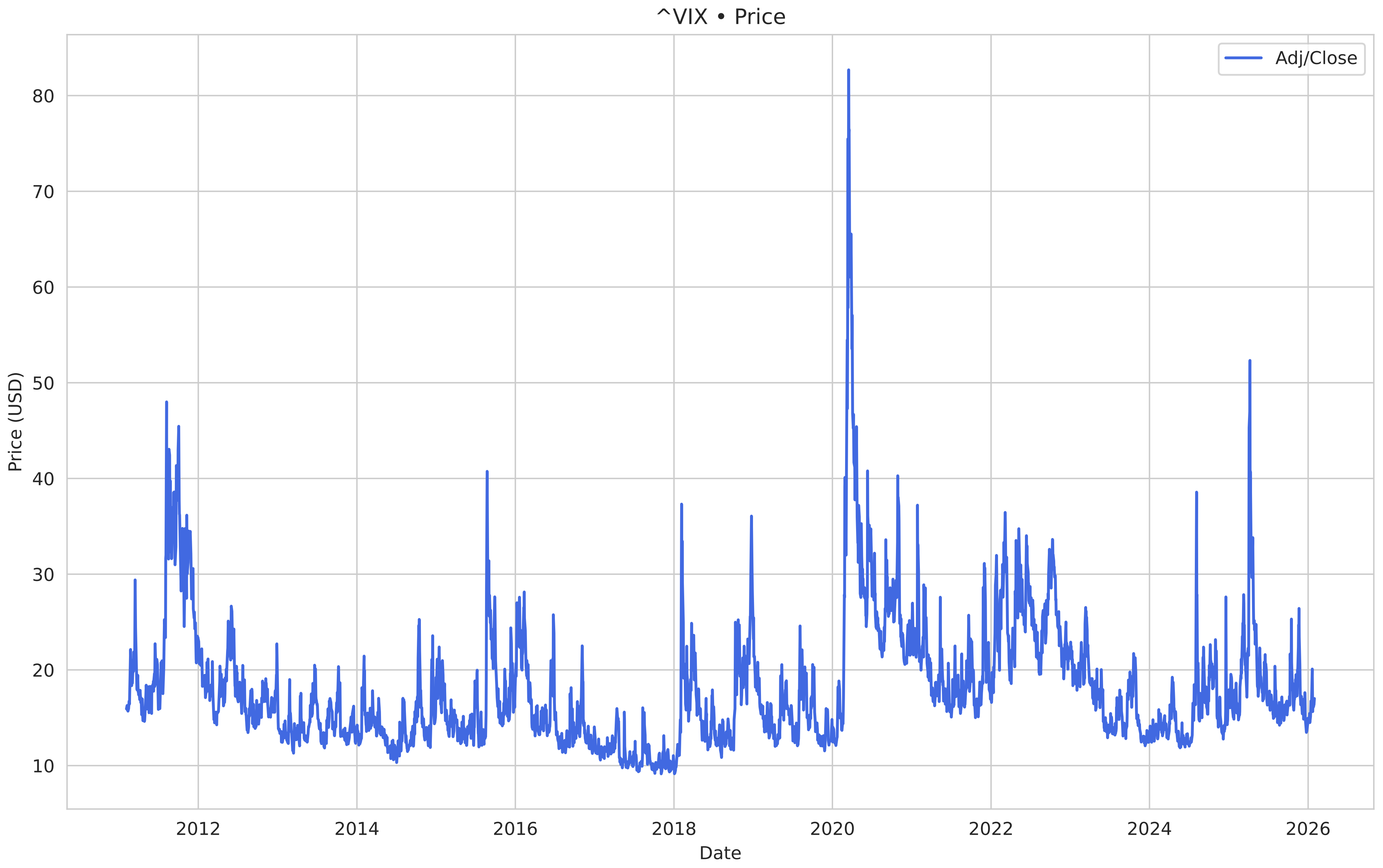
^GSPC • Moving Averages / EMAs

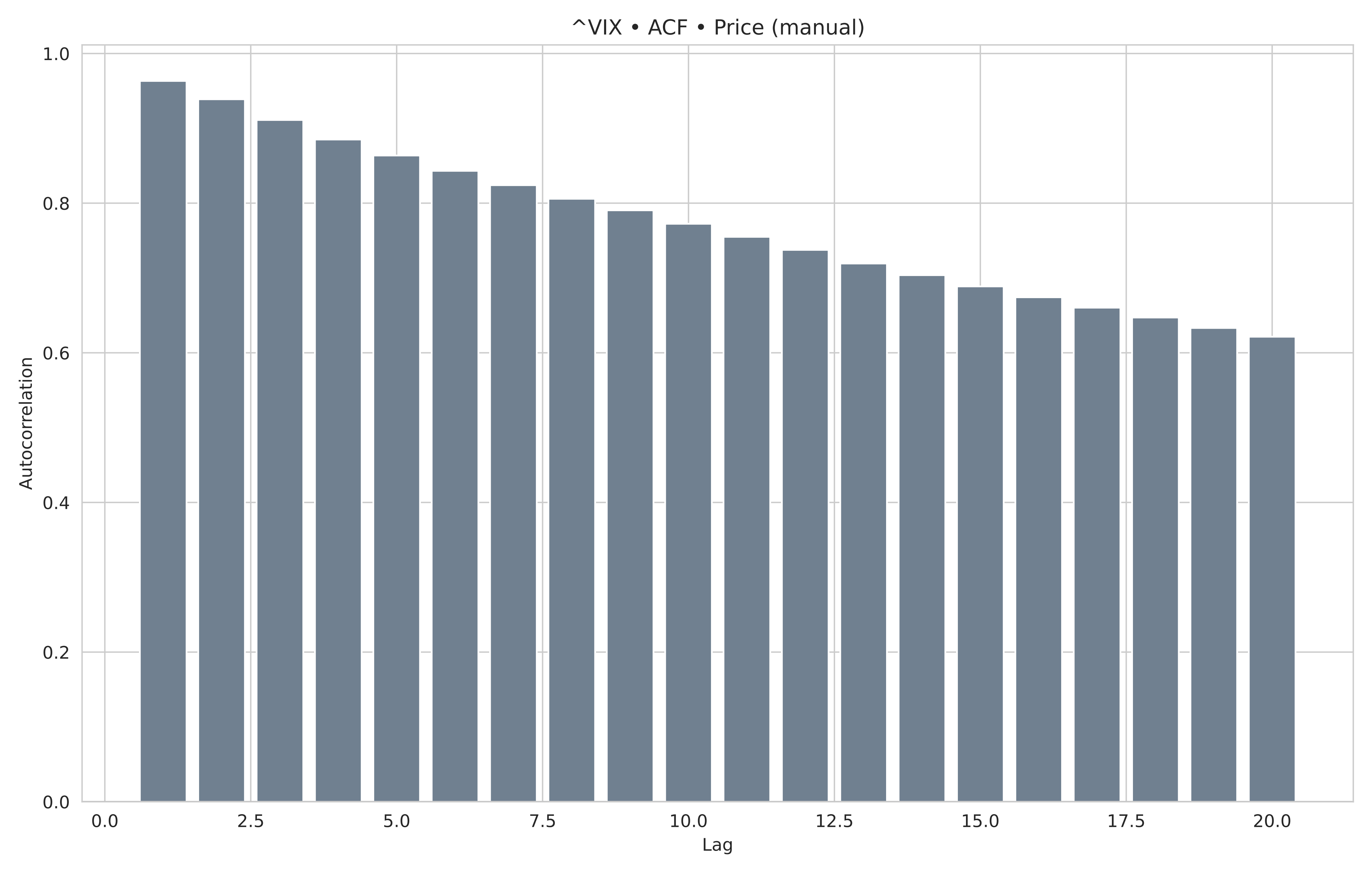


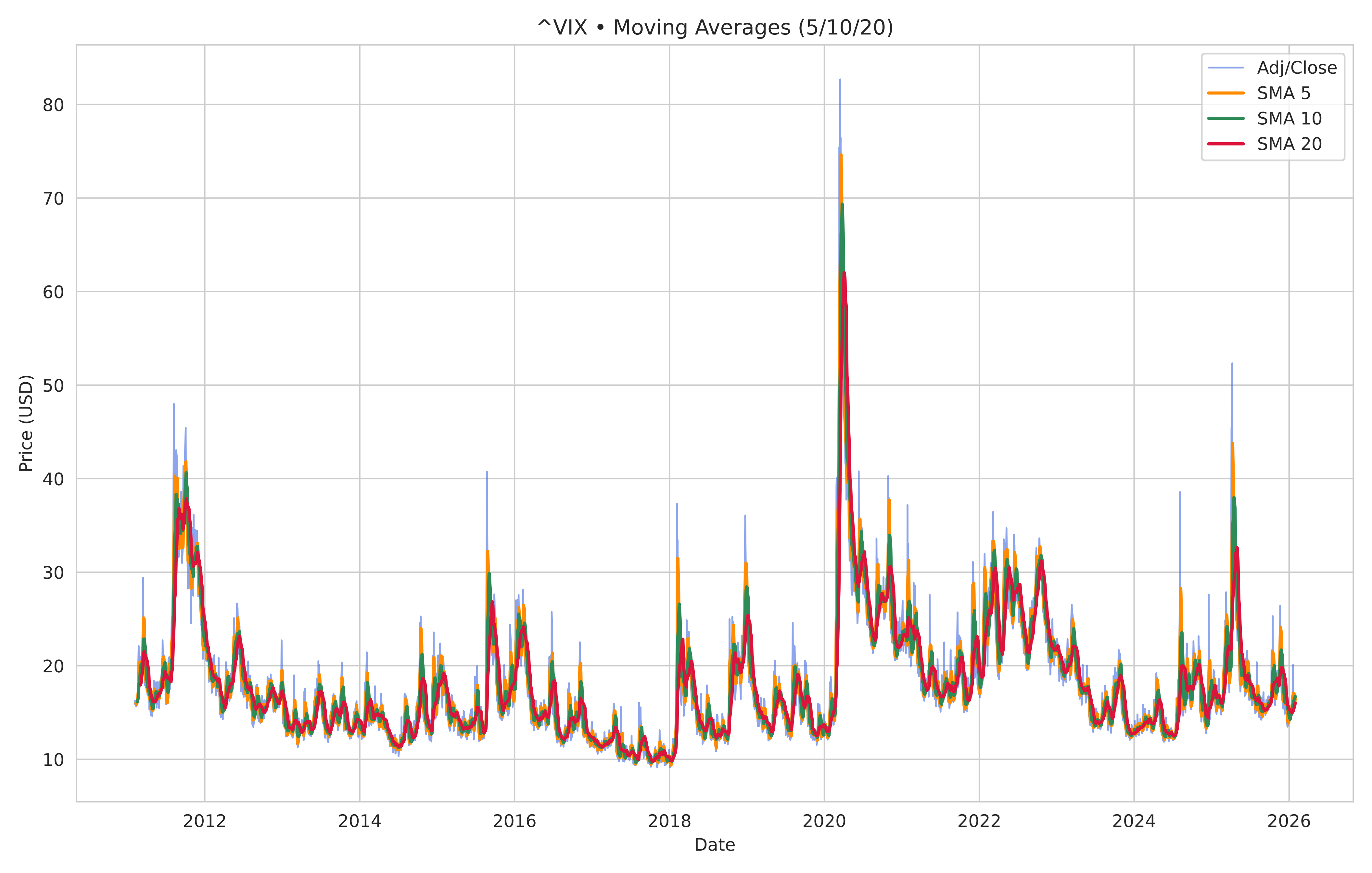

^GSPC • Lagged Prices
lag_1|^GSPC
lag_2|^GSPC
lag_3|^GSPC
Count
0
50
100
150
200
250
300
2000
4000
6000
lag_1|^GSPC
lag_2|^GSPC
lag_3|^GSPC


^GSPC • Correlation • Moving Averages
SMA_5|^GSPC
EMA_5|^GSPC
SMA_10|^GSPC
EMA_10|^GSPC
SMA_20|^GSPC
EMA_20|^GSPC
1.00
1.0000
0.9999
0.9998
0.9997
0.9996
0.9995
0.9994
0.9993
0.9992

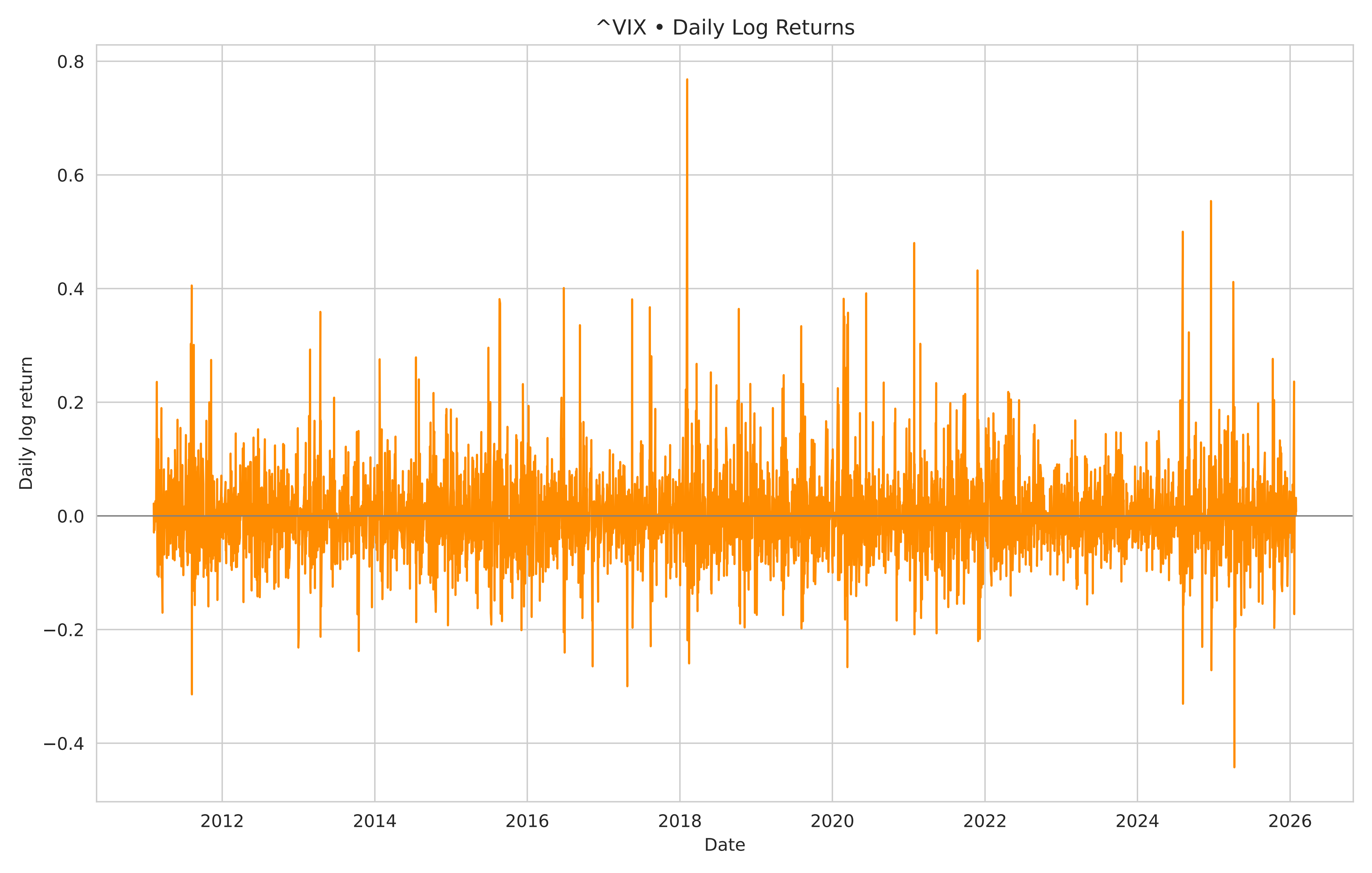

^GSPC • Correlation • Spreads + Lags
HL_spread|^GSPC
OC_spread|^GSPC
lag_1|^GSPC
lag_2|^GSPC
lag_3|^GSPC
1.00
0.08
0.50
0.50
0.51
0.08
1.00
0.01
0.01
0.01
0.50
0.01
1.00
1.00
1.00
0.50
0.01
1.00
1.00
1.00
0.51
0.01
1.00
1.00
1.00
1.0
0.8
0.6
0.4
0.2


^VIX • Price
Adj/Close
Price (USD)
80
70
60
50
40
30
20
10
2012
2014
2016
2018
2020
2022
2024
2026
Date

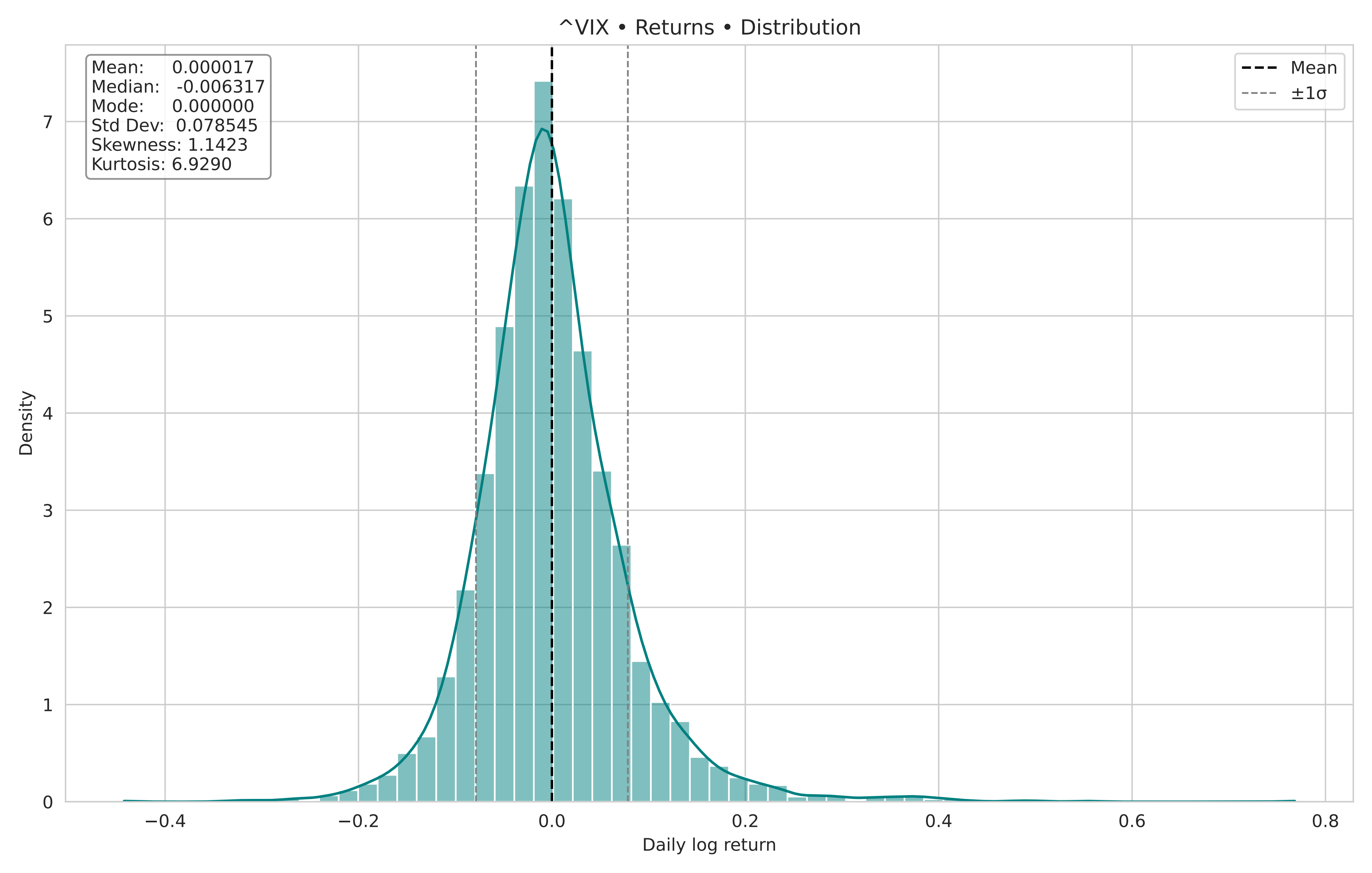

^VIX • ACF • Price (manual)
Autocorrelation
Lag
0.0
0.2
0.4
0.6
0.8
1.0
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

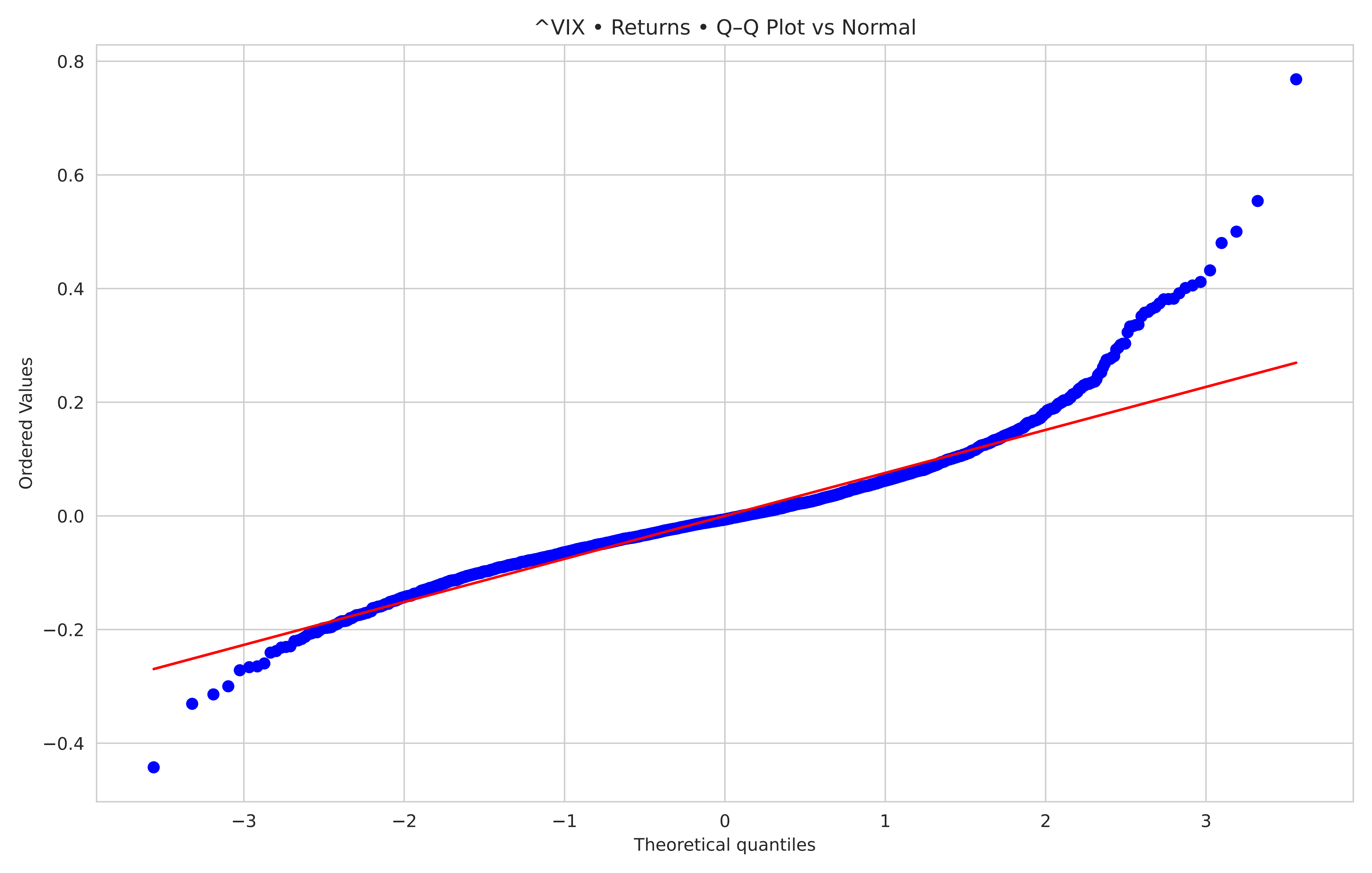


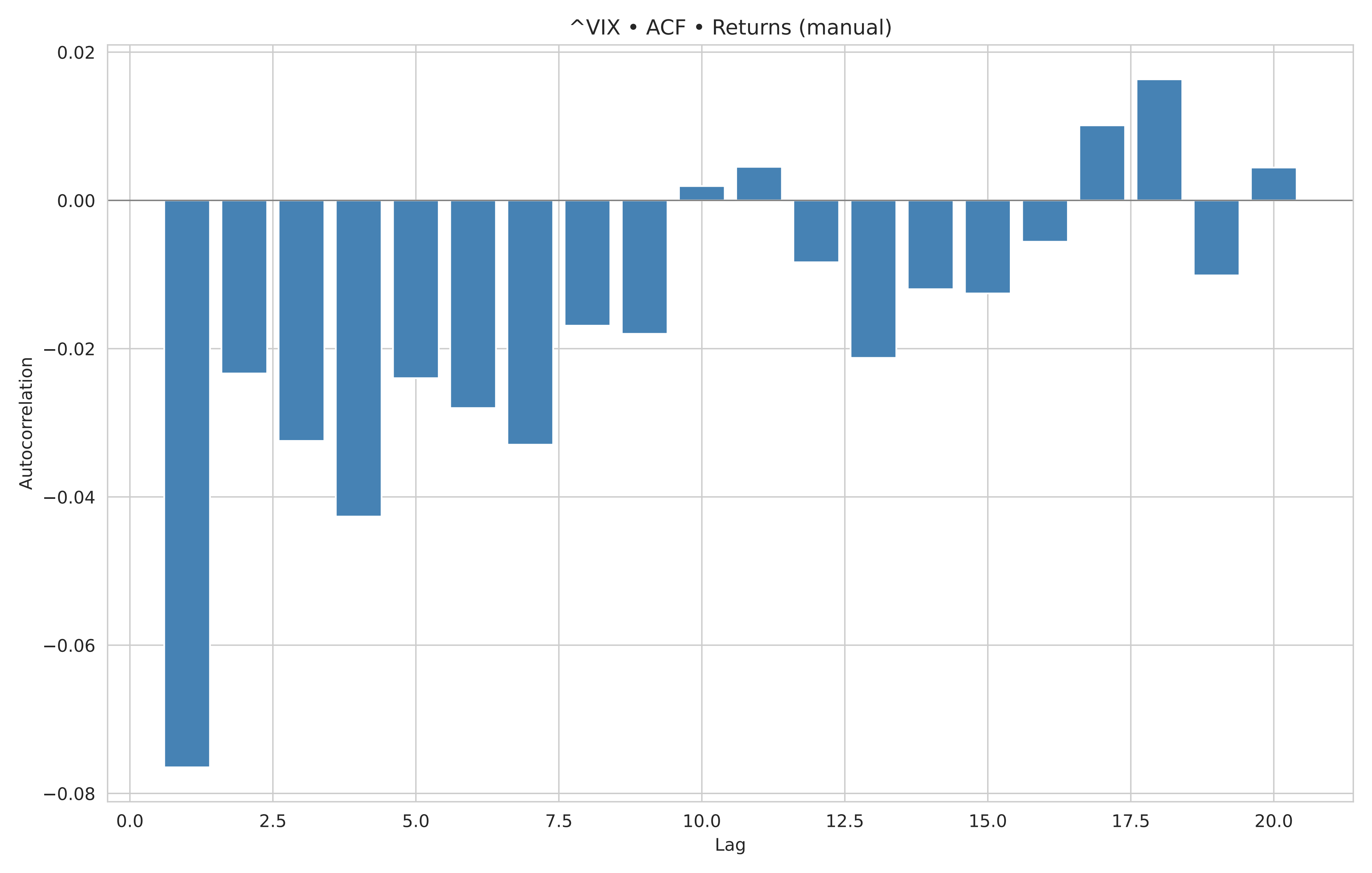
^VIX • Moving Averages (5/10/20)
Adj/Close
SMA 5
SMA 10
SMA 20
Price (USD)
Date
10
20
30
40
50
60
70
80
2012
2014
2016
2018
2020
2022
2024
2026

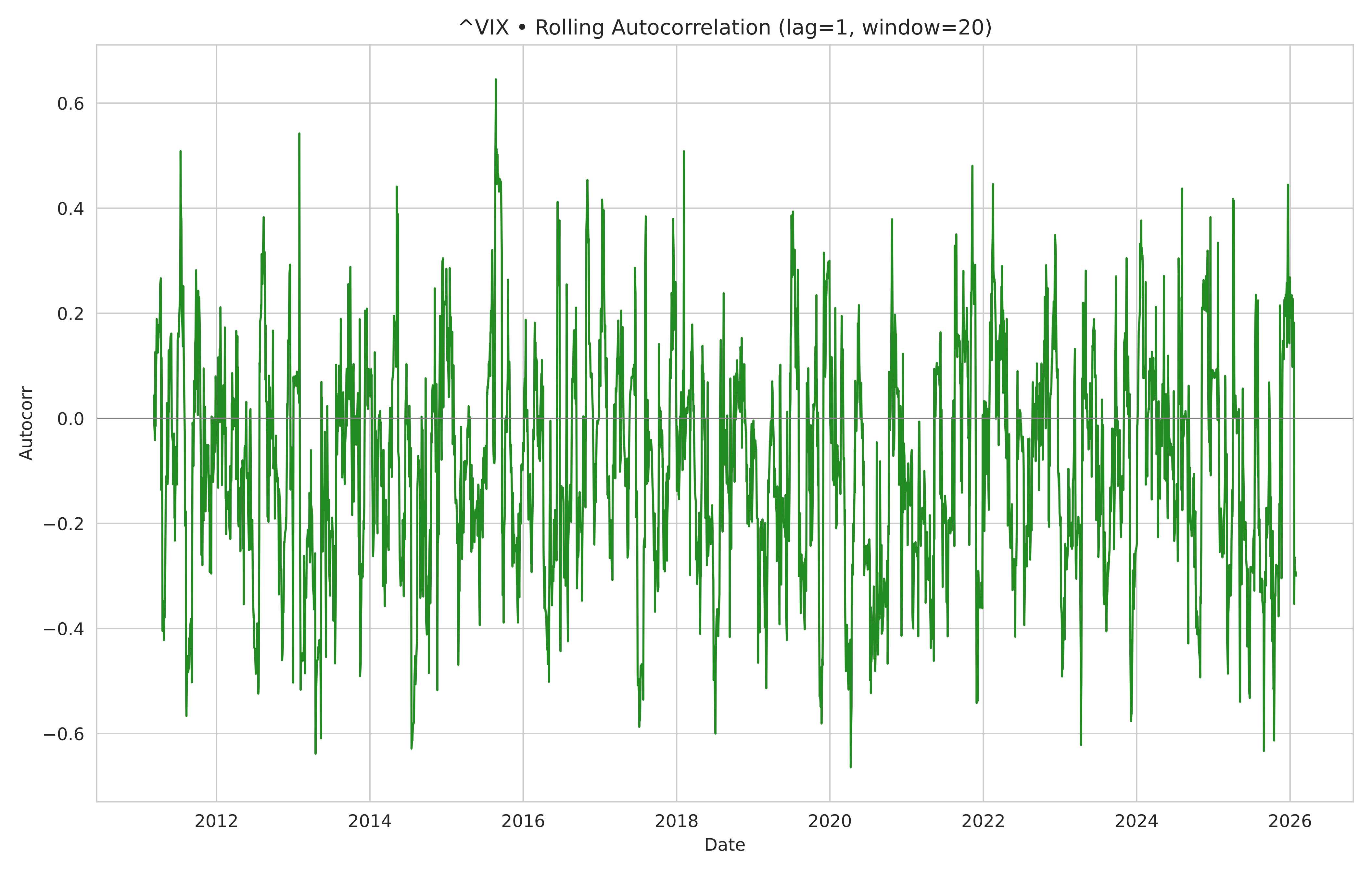


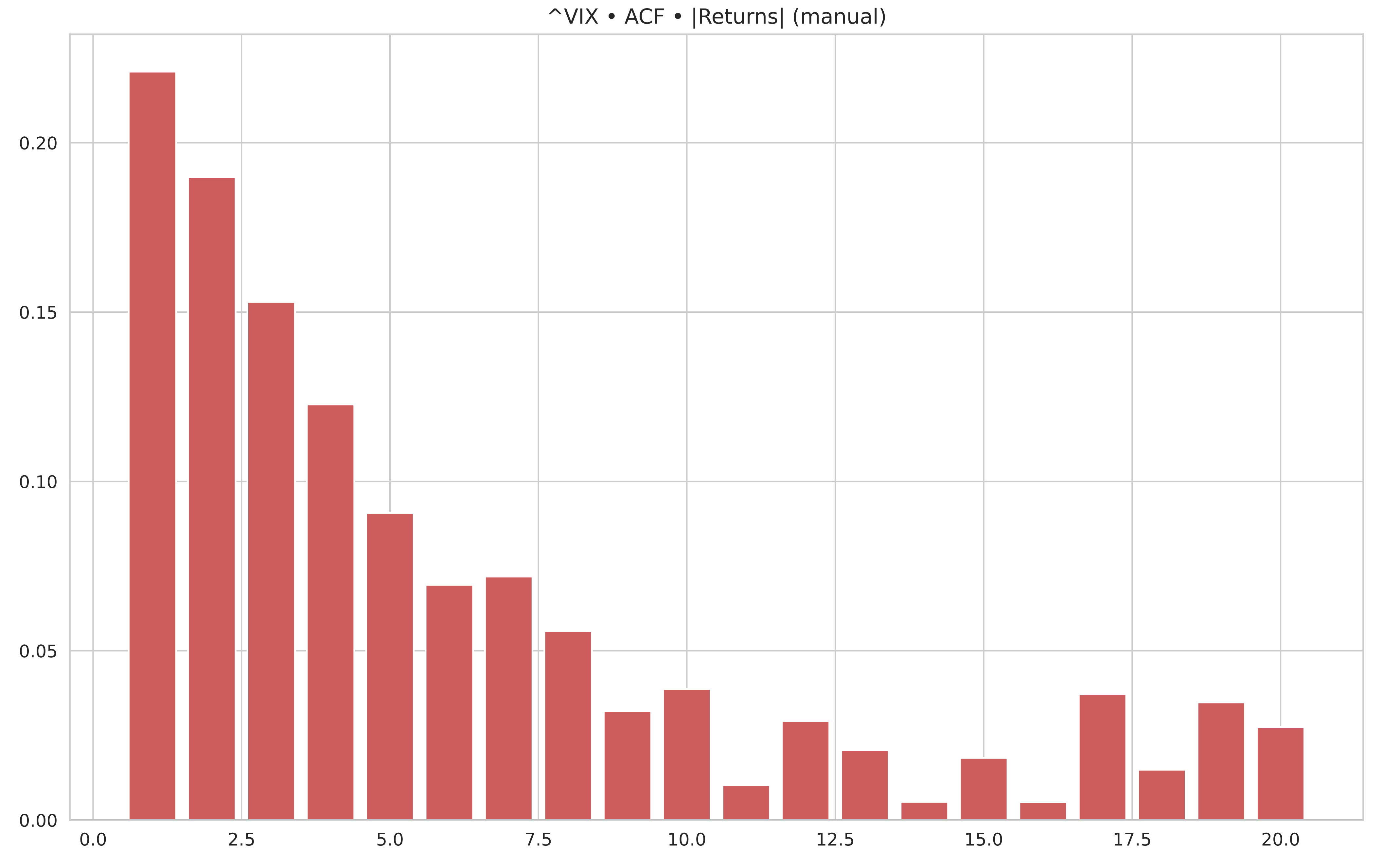
^VIX • Daily Log Returns
Daily log return
Date
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
2012
2014
2016
2018
2020
2022
2024
2026

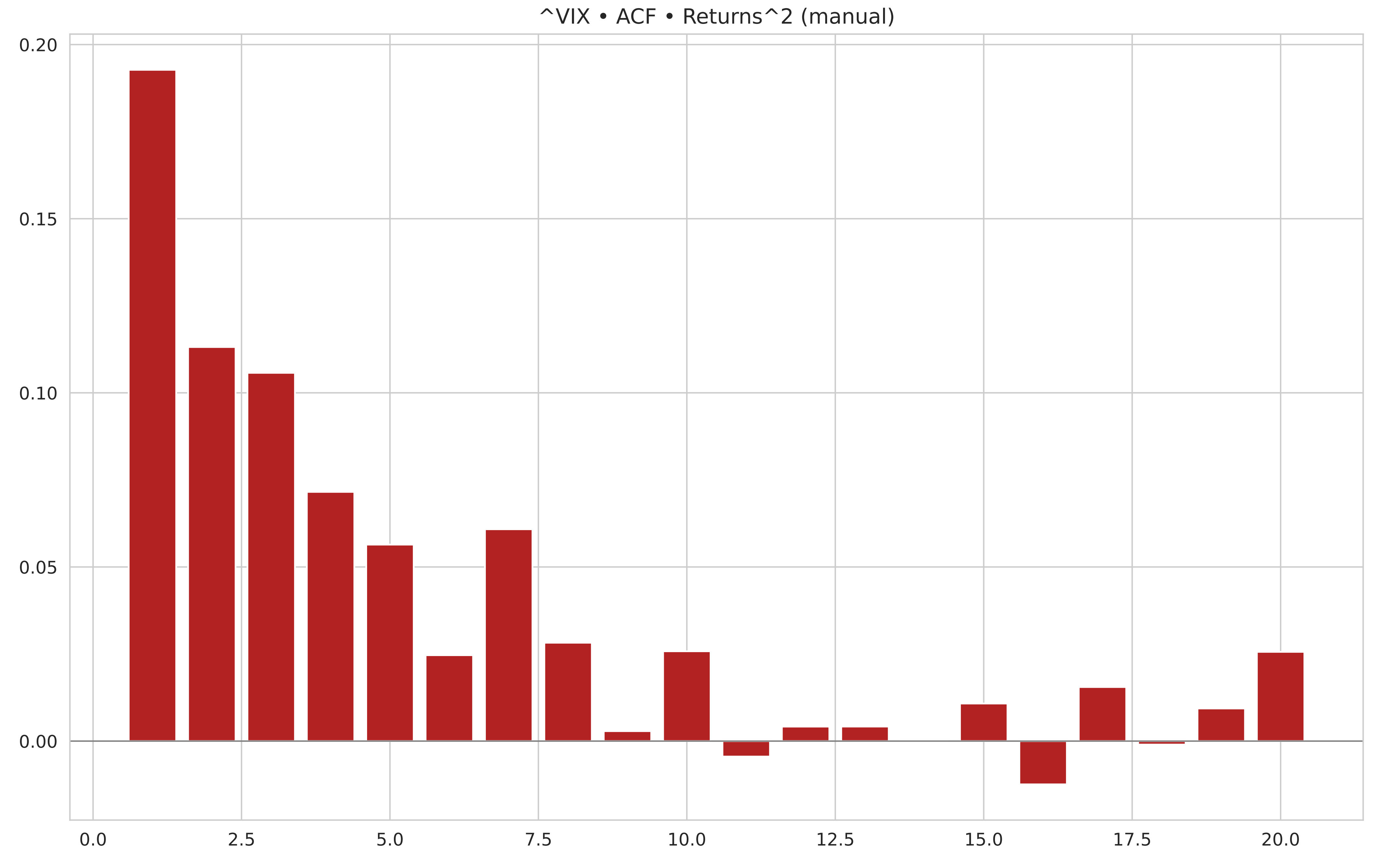

^VIX • Returns • Distribution
Mean: 0.000017
Median: -0.006317
Mode: 0.000000
Std Dev: 0.078545
Skewness: 1.1423
Kurtosis: 6.9290
Mean
±1σ
Density
Daily log return
−0.4
−0.2
0.0
0.2
0.4
0.6
0.8
0
1
2
3
4
5
6
7

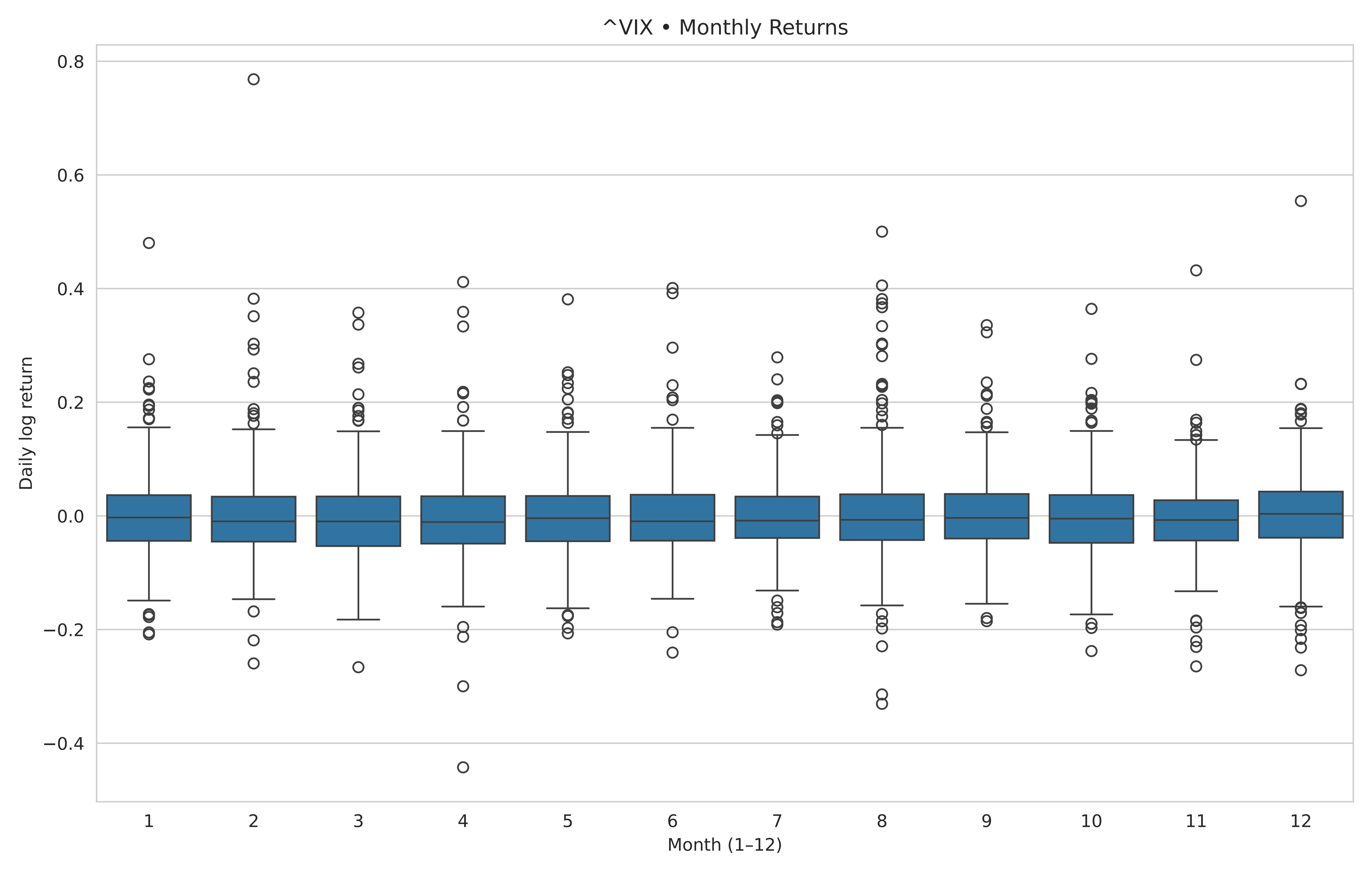

^VIX • Returns • Q–Q Plot vs Normal
Ordered Values
Theoretical quantiles
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−3
−2
−1
0
1
2
3


^VIX • ACF • Returns (manual)
0.02
0.00
−0.02
−0.04
−0.06
−0.08
Autocorrelation
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Lag

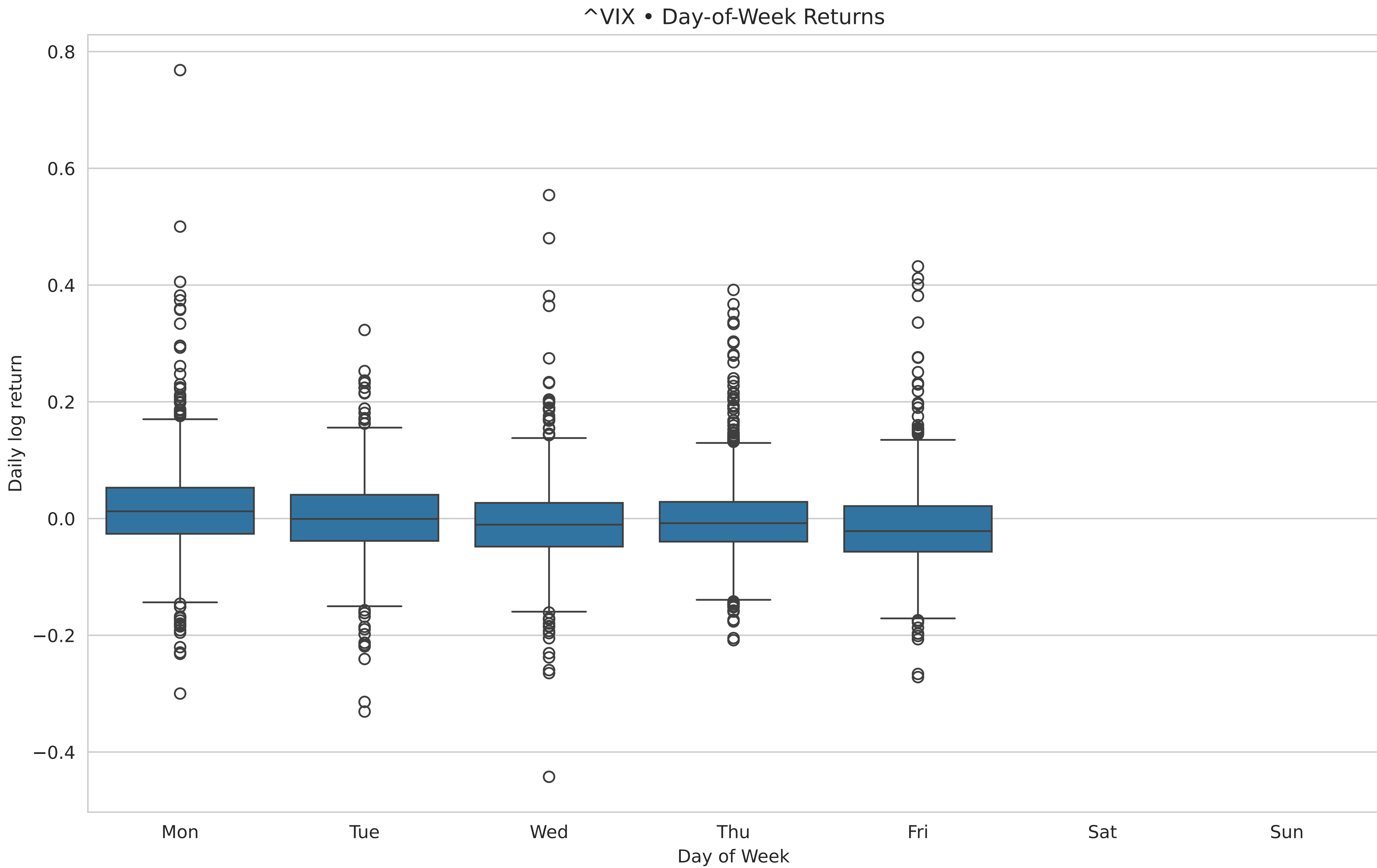

^VIX • Rolling Autocorrelation (lag=1, window=20)
Autocorr
Date
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
2012
2014
2016
2018
2020
2022
2024
2026


^VIX • ACF • |Returns| (manual)
0.00
0.05
0.10
0.15
0.20
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

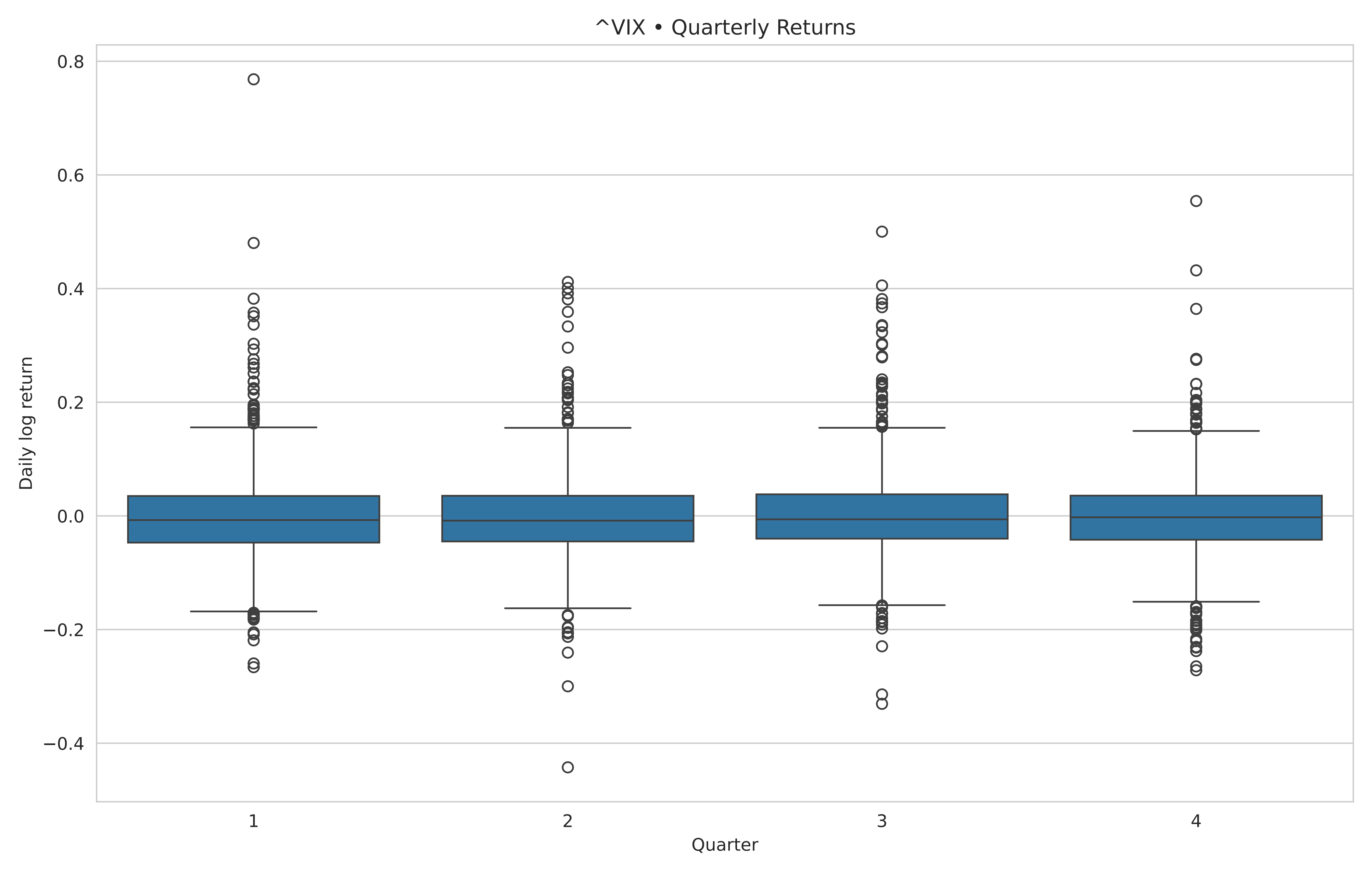

^VIX • ACF • Returns^2 (manual)
0.20
0.15
0.10
0.05
0.00
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

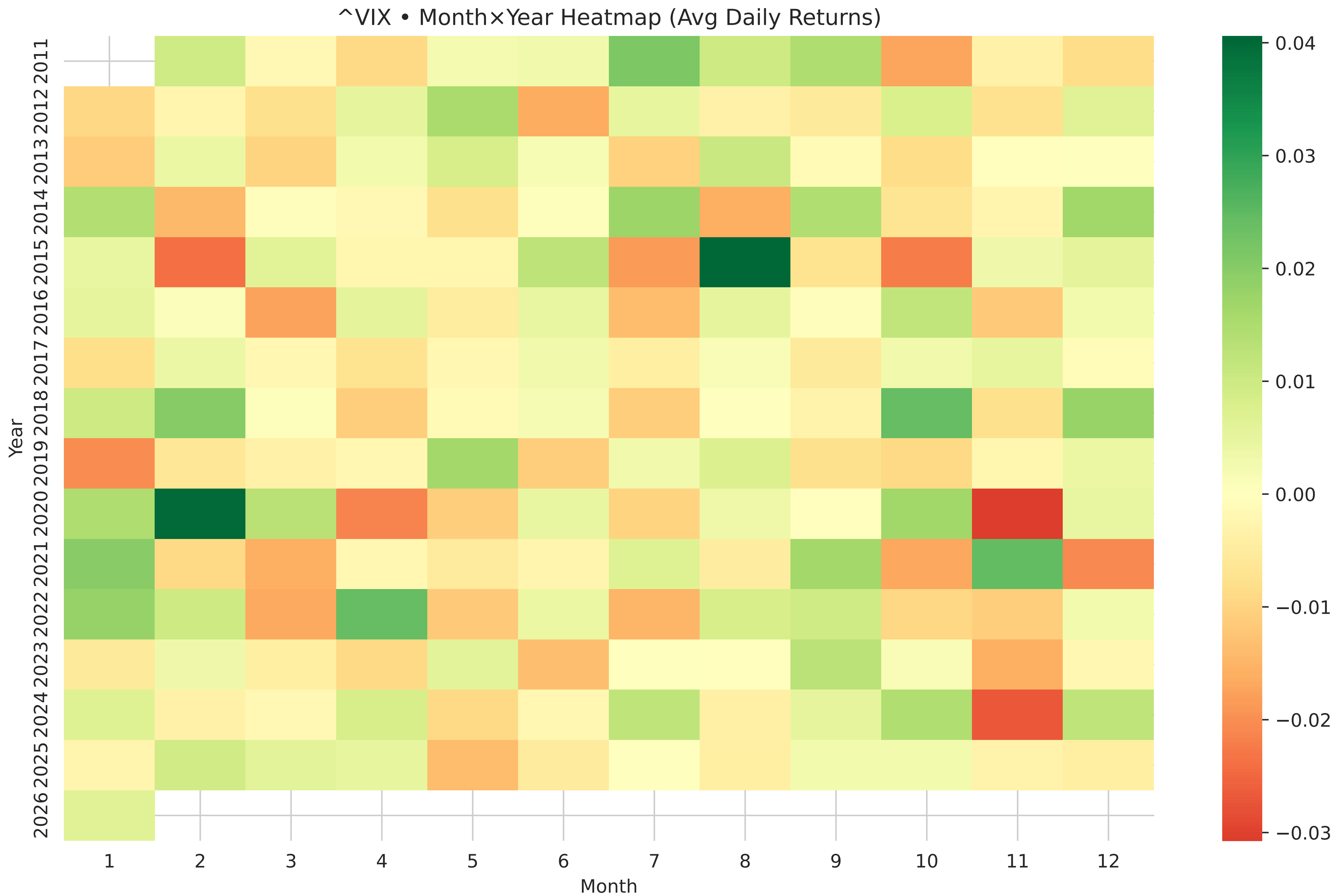


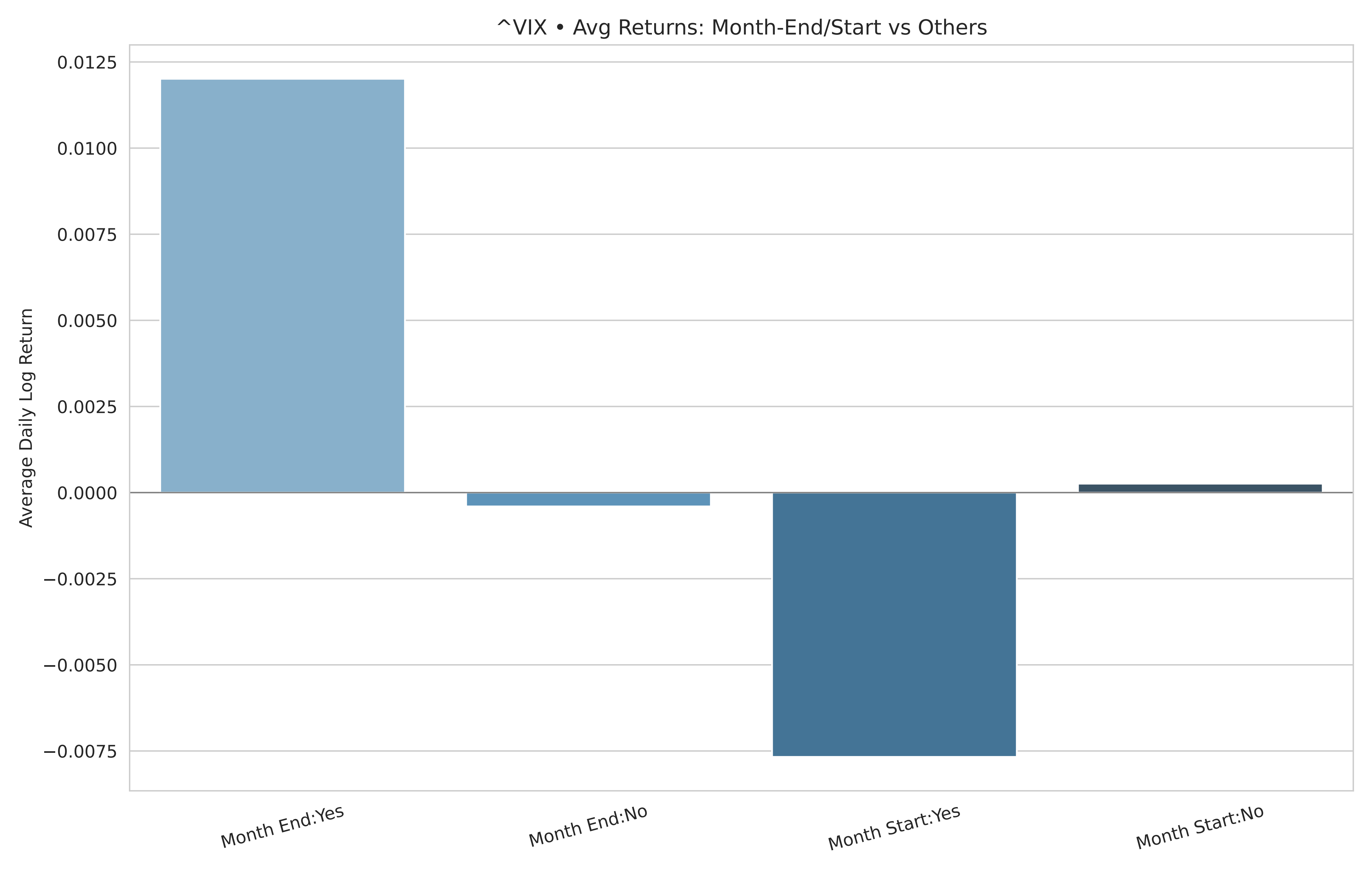
^VIX • Monthly Returns
Daily log return
Month (1–12)
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
1
2
3
4
5
6
7
8
9
10
11
12

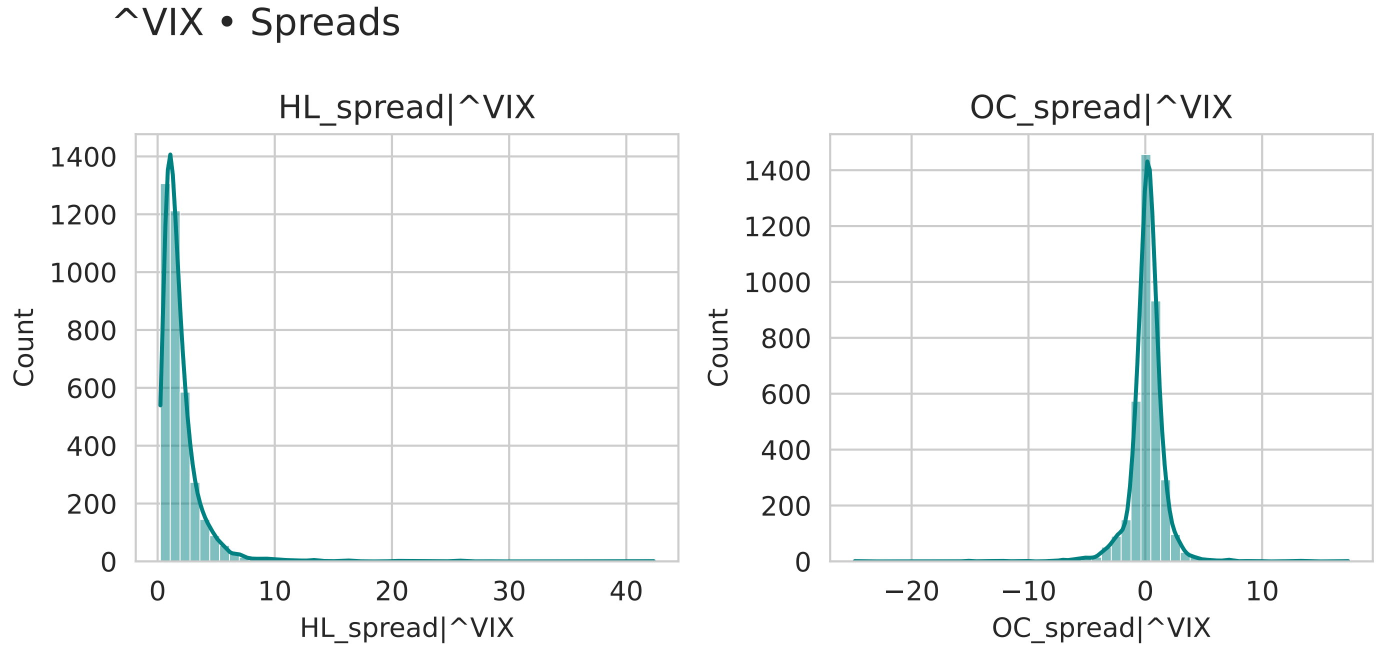


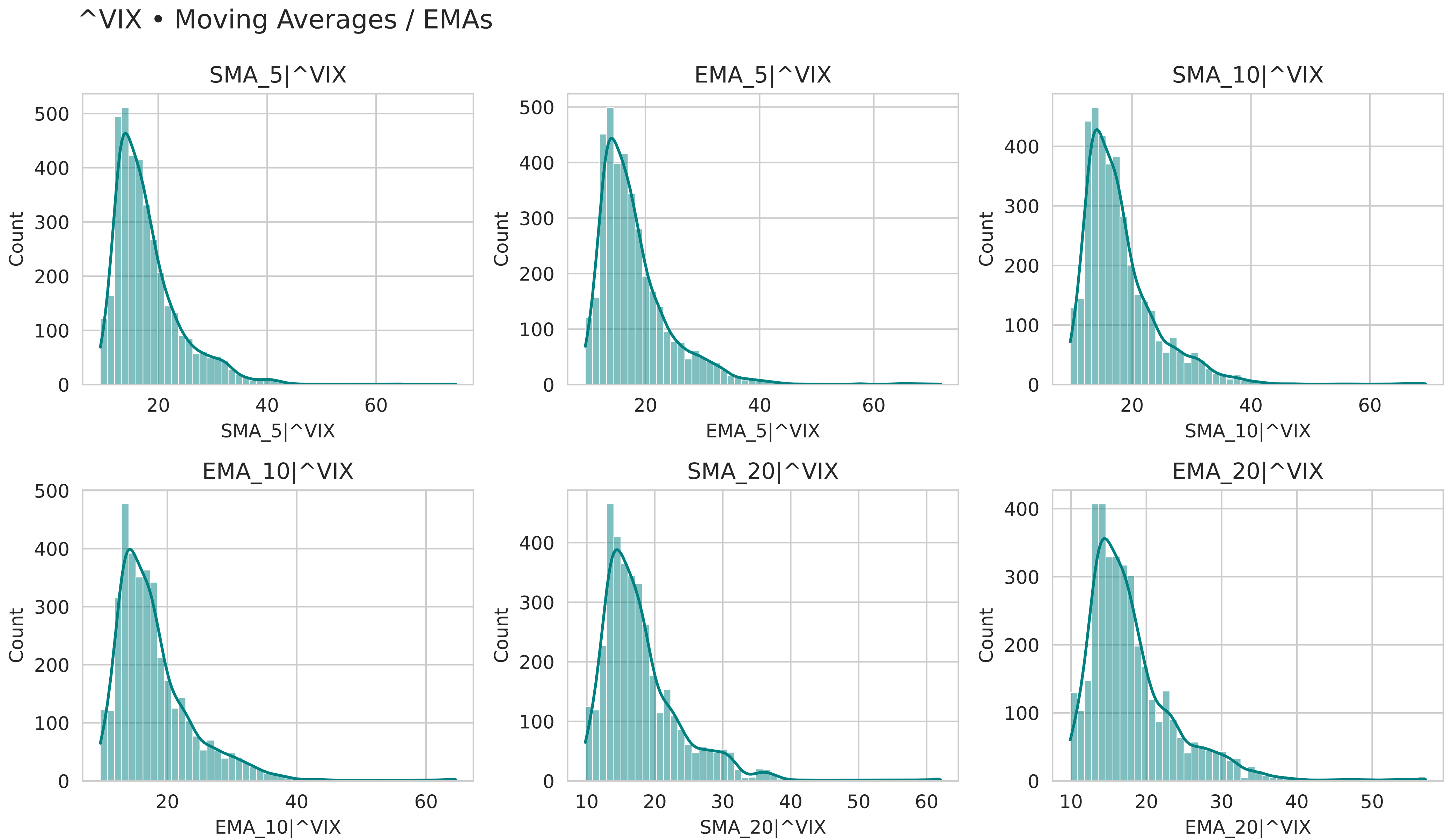
^VIX • Day-of-Week Returns
Daily log return
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Day of Week


^VIX • Quarterly Returns
Daily log return
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
1
2
3
4
Quarter

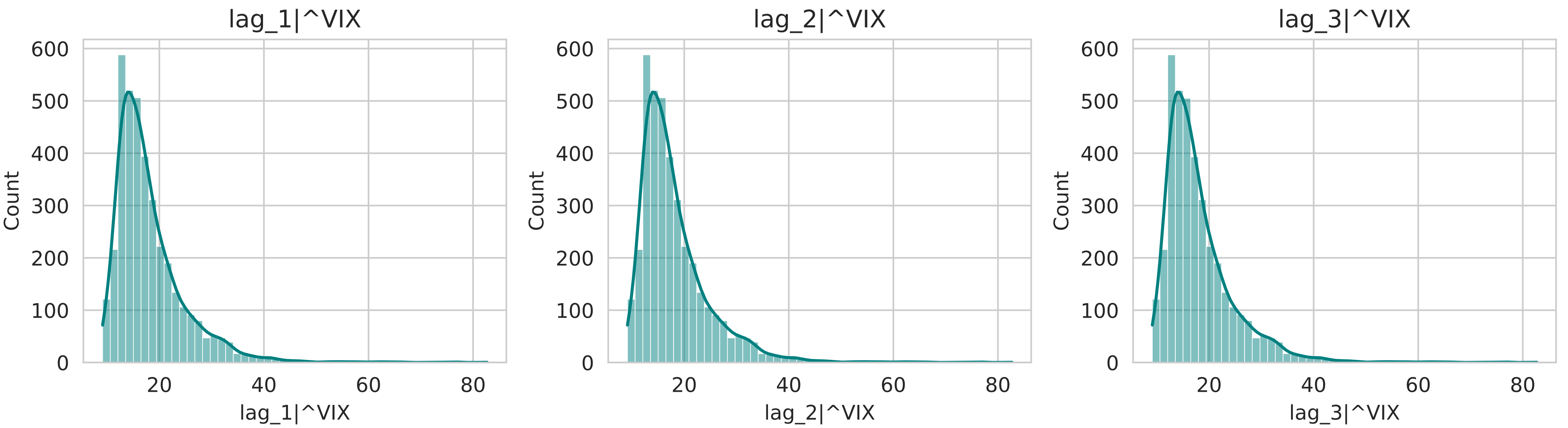

^VIX • Month×Year Heatmap (Avg Daily Returns)
Year
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
Month
1
2
3
4
5
6
7
8
9
10
11
12
0.04
0.03
0.02
0.01
0.00
−0.01
−0.02
−0.03


^VIX • Avg Returns: Month-End/Start vs Others
Average Daily Log Return
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
−0.0025
−0.0050
−0.0075
Month End:Yes
Month End:No
Month Start:Yes
Month Start:No

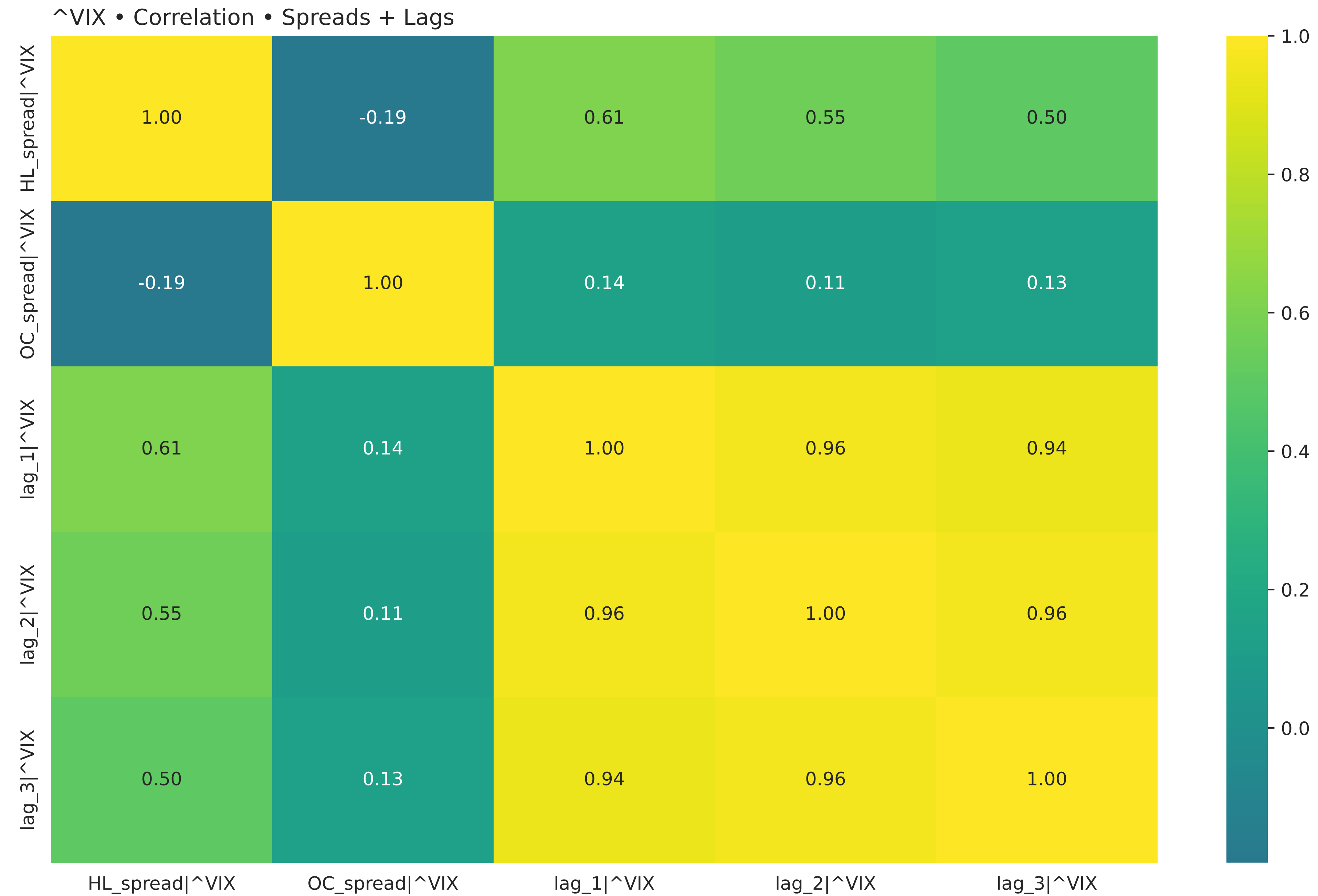

^VIX • Spreads
HL_spread|^VIX
OC_spread|^VIX
Count
1400
1200
1000
800
600
400
200
0
0
10
20
30
40
−20
−10

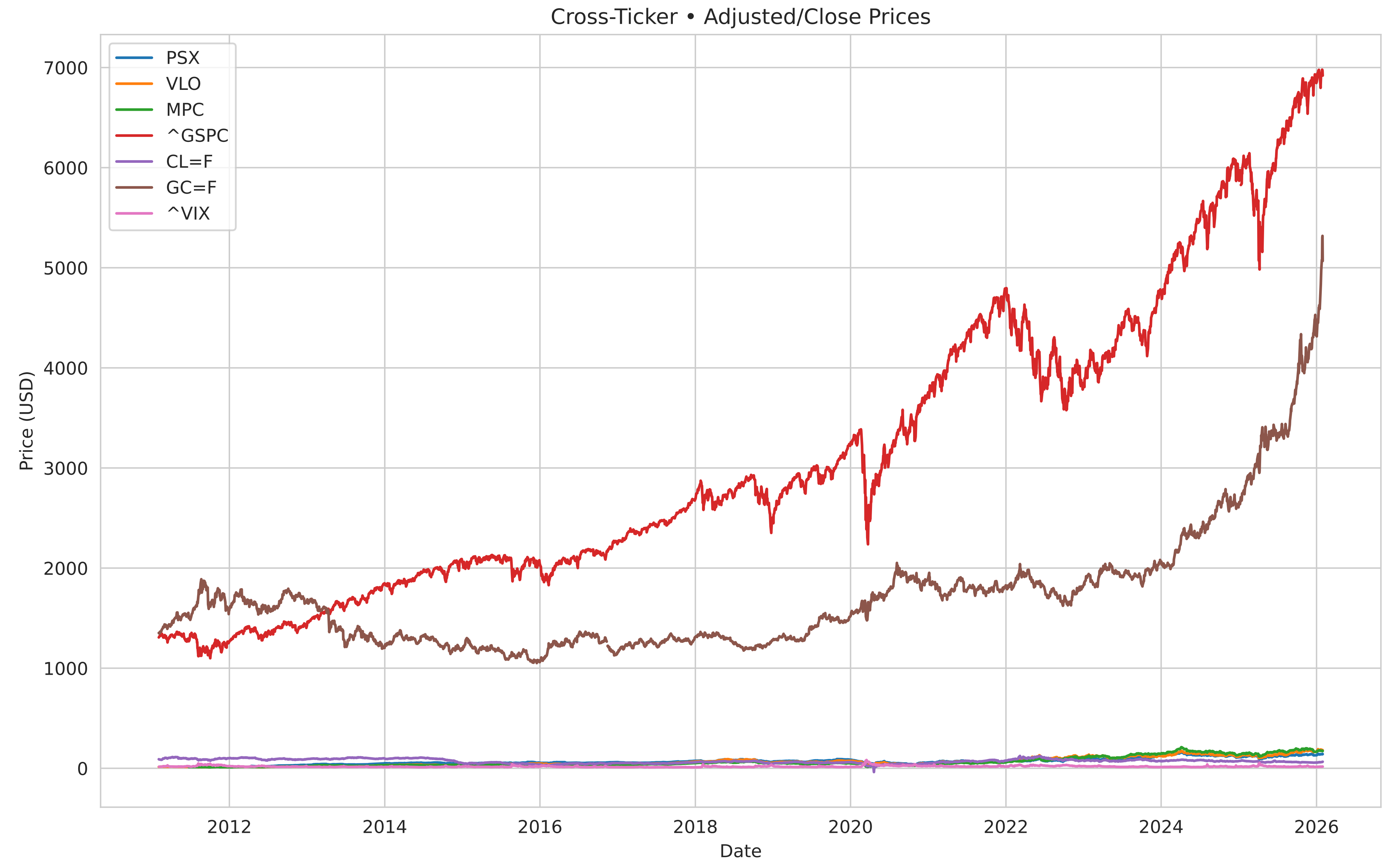

^VIX • Moving Averages / EMAs
SMA_5|^VIX
EMA_5|^VIX
SMA_10|^VIX
EMA_10|^VIX
SMA_20|^VIX
EMA_20|^VIX
Count

^VIX • Lagged Prices




^VIX • Correlation • Moving Averages
SMA_5|^VIX
EMA_5|^VIX
SMA_10|^VIX
EMA_10|^VIX
SMA_20|^VIX
EMA_20|^VIX
1.00 1.00 0.98 0.99 0.92 0.95
1.00 1.00 0.98 0.99 0.92 0.96
0.98 0.98 1.00 1.00 0.96 0.98
0.99 0.99 1.00 1.00 0.96 0.99
0.92 0.92 0.96 0.96 1.00 0.99
0.95 0.96 0.98 0.99 0.99 1.00
1.00
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92


^VIX • Correlation • Spreads + Lags
HL_spread|^VIX
OC_spread|^VIX
lag_1|^VIX
lag_2|^VIX
lag_3|^VIX
1.00
-0.19
0.61
0.55
0.50
-0.19
1.00
0.14
0.11
0.13
0.61
0.14
1.00
0.96
0.94
0.55
0.11
0.96
1.00
0.96
0.50
0.13
0.94
0.96
1.00
1.0
0.8
0.6
0.4
0.2
0.0



Cross-Ticker • Adjusted/Close Prices
PSX
VLO
MPC
^GSPC
CL=F
GC=F
^VIX
Price (USD)
7000
6000
5000
4000
3000
2000
1000
0
2012
2014
2016
2018
2020
2022
2024
2026
Date

Cross-Ticker • Log Return Correlation