Financial Data Analysis

Contents

Data

Raw Data

```
#political shocks
#raw_truths <- read.csv(here("data/political_data", "trump_all_truths.csv"))
#raw_tweets <- read.csv(here("data/political_data", "tweets.csv"))


#market prices
raw_ONEQ <- read.csv(here("data/market_data", "ONEQ.csv")) #USA
raw_SMI <- read.csv(here("data/market_data", "SMI.csv")) #CH
raw_VTHR <- read.csv(here("data/market_data", "VTHR.csv")) #USA
raw_VTI <- read.csv(here("data/market_data", "VTI.csv")) #USA
raw_DAX <- read.csv(here("data/market_data", "DAX.csv")) #DE
raw_ASHR <- read.csv(here("data/market_data", "ASHR.csv")) #CHINA
data_loader_months(year=2025,months=1:2,symbol="ASHR")

#S&P500
data_loader(year=2021,months=1:6,"SPY")
data_loader(year=2024,months=1:12,"SPY")
data_loader(year=2025,months=1:4,"SPY")

#STOXX50
data_loader(year=2024,months=1:12,"VGK")
data_loader(year=2025,months=1:4,"VGK")
```

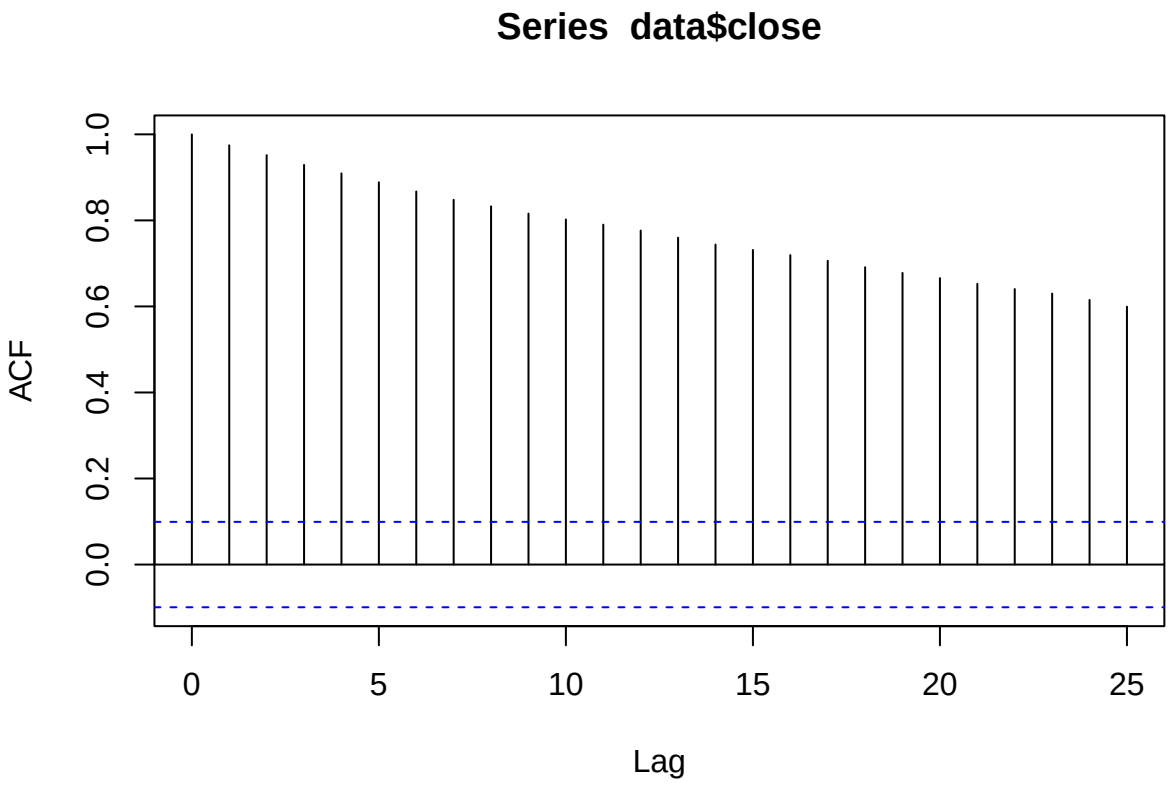
Quick Analysis

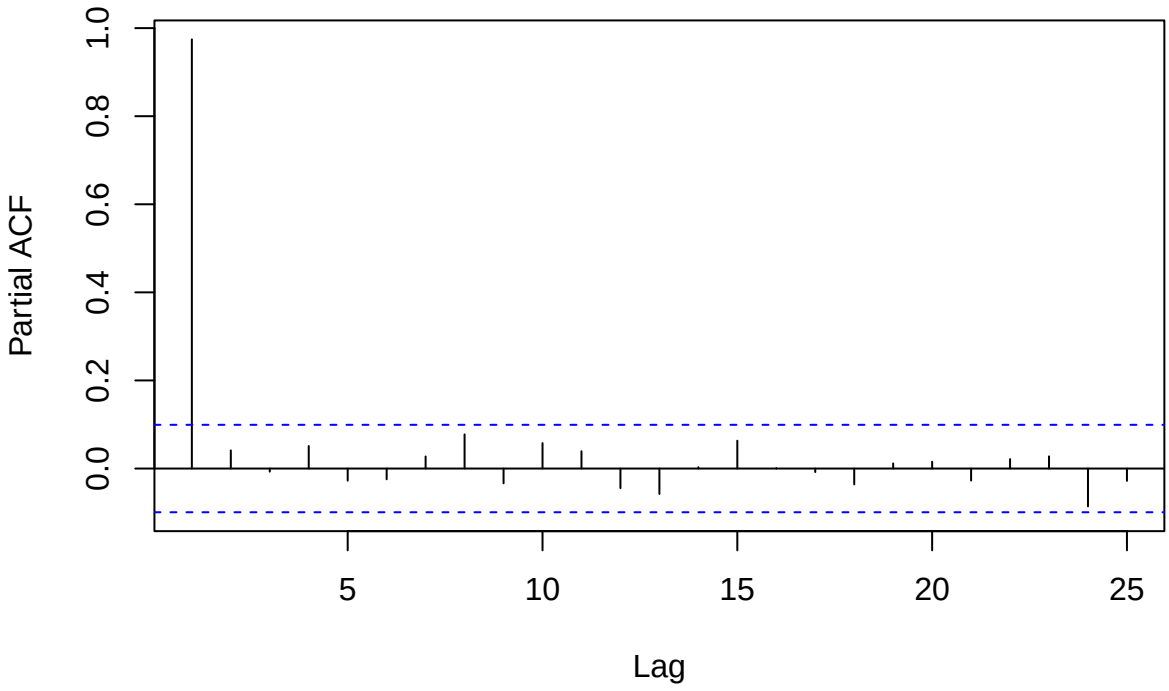
SPY April 2nd 2025

```
#extract a particular day
SPY_25_04_02 = day_selector(raw_SPY_2025,2025,04,02) #april 2nd 2025

#let's plot it
price_plotter_day(SPY_25_04_02,"SPY Price on April 2nd 2025")
```


```
#quickly test some ARMA specifications
quick_arma(SPY_25_04_02,1,0,0) #checking AR1,AR2,AR3
```


Series data$close
ACF
1.0
0.8
0.6
0.4
0.2
0.0
0
5
10
15
20
25
Lag




```
##                                AR Estimations
##
##                                  AR-1        AR-2         AR-3
##
##                  ar1            0.9975      0.9728       1.4609
##                                 (0.0030)    (0.0514)   (NaN)
##                  intercept    561.0971    561.3655      562.5635
##                                 (3.2897)    (3.4352)    (22.1897)
##                  ar2                         0.0249       0.0770
##                                              (0.0515)     (0.0013)
##                  ar3                                      -0.5386
##                                                           (0.0007)
##
##                  nobs         390         390           390
##                  sigma          0.2854      0.2853        0.3414
##                  logLik       -67.0847    -66.9808     -135.4359
##                  AIC          140.1693    141.9615      280.8718
##                  BIC          152.0678    157.8261      300.7025
##                  nobs.1       390.0000    390.0000      390.0000
##
##                  *** p < 0.001; ** p < 0.01; * p <
##                  0.05.
##
## Column names: names, AR-1, AR-2, AR-3
##                                Checking Residuals
##
```

```
##                         AR-1 Residuals   AR-2 Residuals   AR-3 Residuals
##
##        (Intercept)            0.0302 *         0.0291 *      -0.0051
##                              (0.0145)         (0.0145)       (0.0171)
##        REG1res_lagged        -0.0476
##                              (0.0510)
##        REG2res_lagged                         -0.0217
##                                               (0.0511)
##        REG3res_lagged                                        -0.1733 ***
##                                                              (0.0503)
##
##        N                    389              389            389
##        R2                     0.0022           0.0005         0.0297
##
##        *** p < 0.001; ** p < 0.01; * p < 0.05.
##
## Column names: names, AR-1 Residuals, AR-2 Residuals, AR-3 Residuals
```

```
#quick_arma(SPY_25_04_02,2,0,0) #checking AR2,AR3,AR4

#extract a particular month
SPY_24_09 = month_selector(raw_SPY_2024,2024,09) #november 2024
```

Realised Volatility

```
#average per day (outputs scalar)
r.vol_day(SPY_25_04_02)
```

```
## [1] 0.08152862
```

```
#average per day for each day in a month (outputs vector of each day's realised volatility)
r.vol_month(SPY_24_09)
```

```
##  [1] 0.03554182 0.06306683 0.04483728 0.07865960 0.02596162 0.03080083
##  [7] 0.06853948 0.04630338 0.02524256 0.02271454 0.03173591 0.14493815
## [13] 0.03160202 0.02320854 0.01822570 0.01616798 0.01071128 0.01843709
## [19] 0.01466890 0.02055323
```

```
#avg per day in each month of a year
year_avg = r.vol_year(raw_SPY_2024)
head(year_avg)
```

```
##           [,1]       [,2]        [,3]       [,4]        [,5]       [,6]
## [1,]        NA 0.02114390 0.011284204 0.01039484 0.073471057         NA
## [2,] 0.01241581 0.02640185          NA 0.01106034 0.032803729         NA
## [3,] 0.02025087         NA          NA 0.01569628 0.028870802 0.02989432
## [4,] 0.01355826         NA 0.007255057 0.03713616          NA 0.02711578
## [5,] 0.02083613 0.01548199 0.019712747 0.03546997          NA 0.01027460
## [6,]        NA 0.01568893 0.040378114         NA 0.006682677 0.01101285
```

```
##            [,7]       [,8]       [,9]      [,10]      [,11]       [,12]
## [1,] 0.02427736 0.08118317         NA 0.05623392 0.03406768          NA
## [2,] 0.01410976 0.11141425         NA 0.02502399         NA 0.007057617
## [3,] 0.02672748         NA 0.03554182 0.05303873         NA 0.007357840
## [4,]         NA         NA 0.06306683 0.03959099 0.02818465 0.007290868
## [5,] 0.01001467 0.25271880 0.04483728         NA 0.02382001 0.008227533
## [6,]         NA 0.09794829 0.07865960         NA 0.03050460 0.009179047
```

```
#for each hour in a day (outputs a vector of each hour's realised volatility)
r.vol_day_hour(SPY_25_04_02)
```

```
## [1] 0.15760939 0.08701794 0.06571201 0.06303564 0.06319524 0.08271313 0.06726031
```

```
#for each hour in a day for each day in a month (outputs a matrix)
month_hour = r.vol_month_hour(SPY_24_09)
huxtable(head(data.frame(month_hour)))
```

X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X
0.0296	0.0304	0.121	0.0735	0.0232	0.0419	0.0384	0.0141	0.075	0.0243	0.0624	0.0155	0.02
0.0398	0.0607	0.106	0.0779	0.0539	0.0585	0.0284	0.026	0.0428	0.0253	0.0296	0.0349	0.01
0.0256	0.0486	0.0732	0.0547	0.0178	0.0179	0.0181	0.0168	0.0319	0.0315	0.013	0.0132	0.00
0.0124	0.0302	0.0683	0.0275	0.0133	0.0199	0.0471	0.00939	0.0124	0.0112	0.0225	0.00894	0.00
0.0219	0.0189	0.0408	0.0135	0.0093	0.00948	0.0376	0.0152	0.0117	0.013	0.0111	0.00717	0.01
0.0194	0.0147	0.0452	0.0745	0.0279	0.0104	0.035	0.333	0.0253	0.0237	0.00372	0.0118	0.00

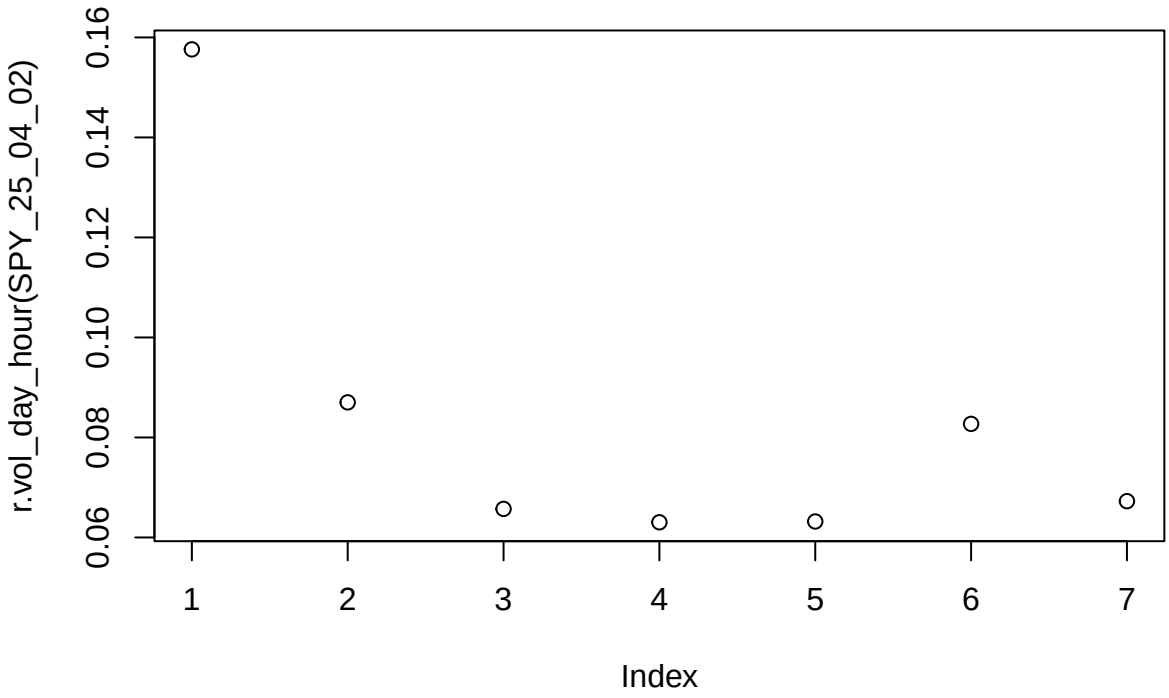
```
#for each hour in each day of each month of an entire year
vol_SPY2024 = r.vol_year_hour(raw_SPY_2024,merge=F)
head(vol_SPY2024)
```

timestamp	r__vol__h
2024-01-02 09:00:00	0.0302
2024-01-02 10:00:00	0.0159
2024-01-02 11:00:00	0.0105
2024-01-02 12:00:00	0.00662
2024-01-02 13:00:00	0.00867
2024-01-02 14:00:00	0.00758

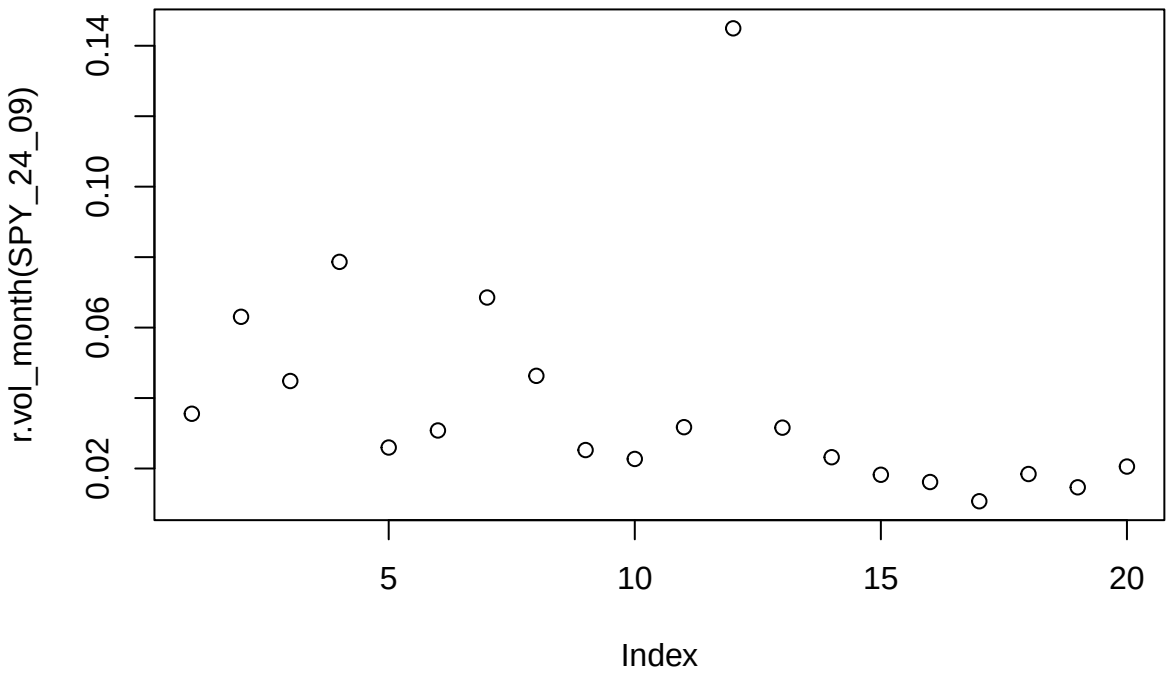
```r
vol_24_09 = month_selector(vol_SPY2024,2024,09)
vol_24_04_02 = day_selector(vol_SPY2024,2024,04,02)

#plots

#hours in a day
plot(r.vol_day_hour(SPY_25_04_02))
```

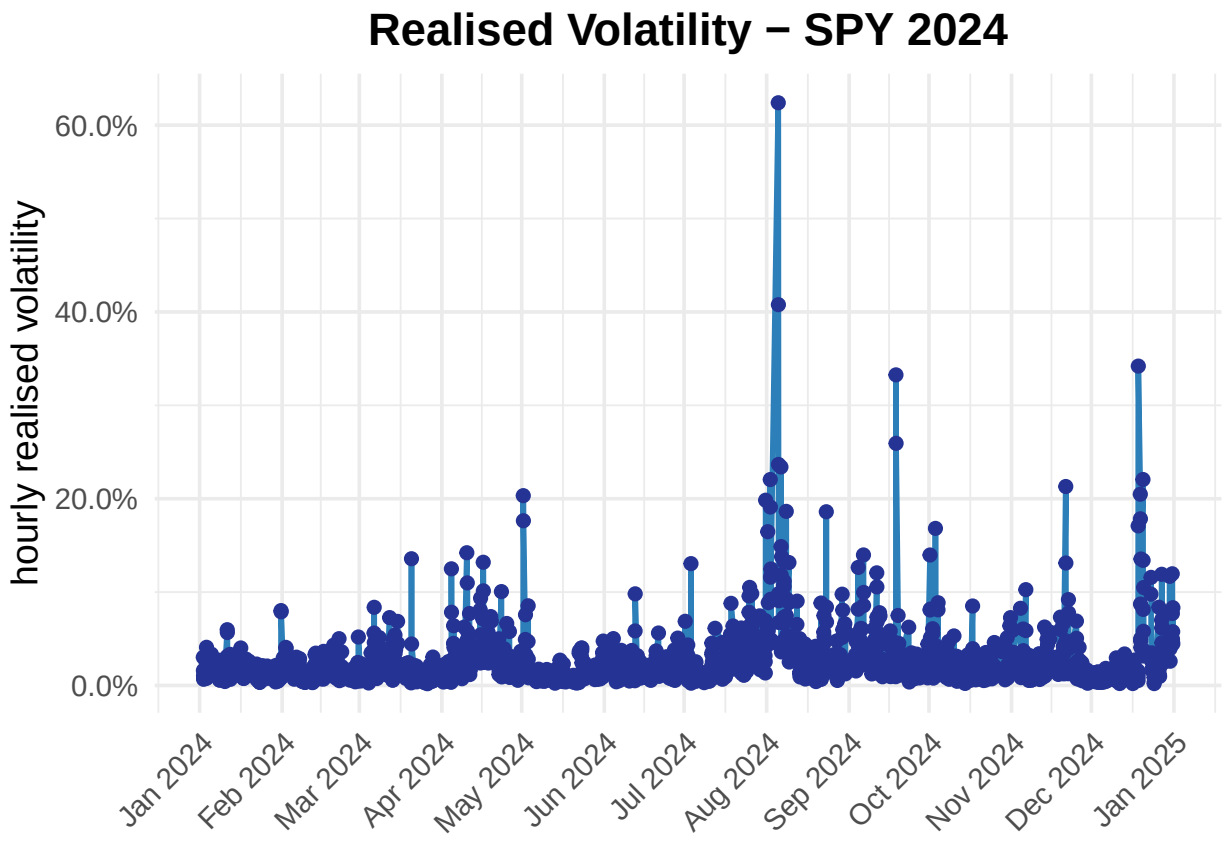



```r
#days in a month
plot(r.vol_month(SPY_24_09))
```

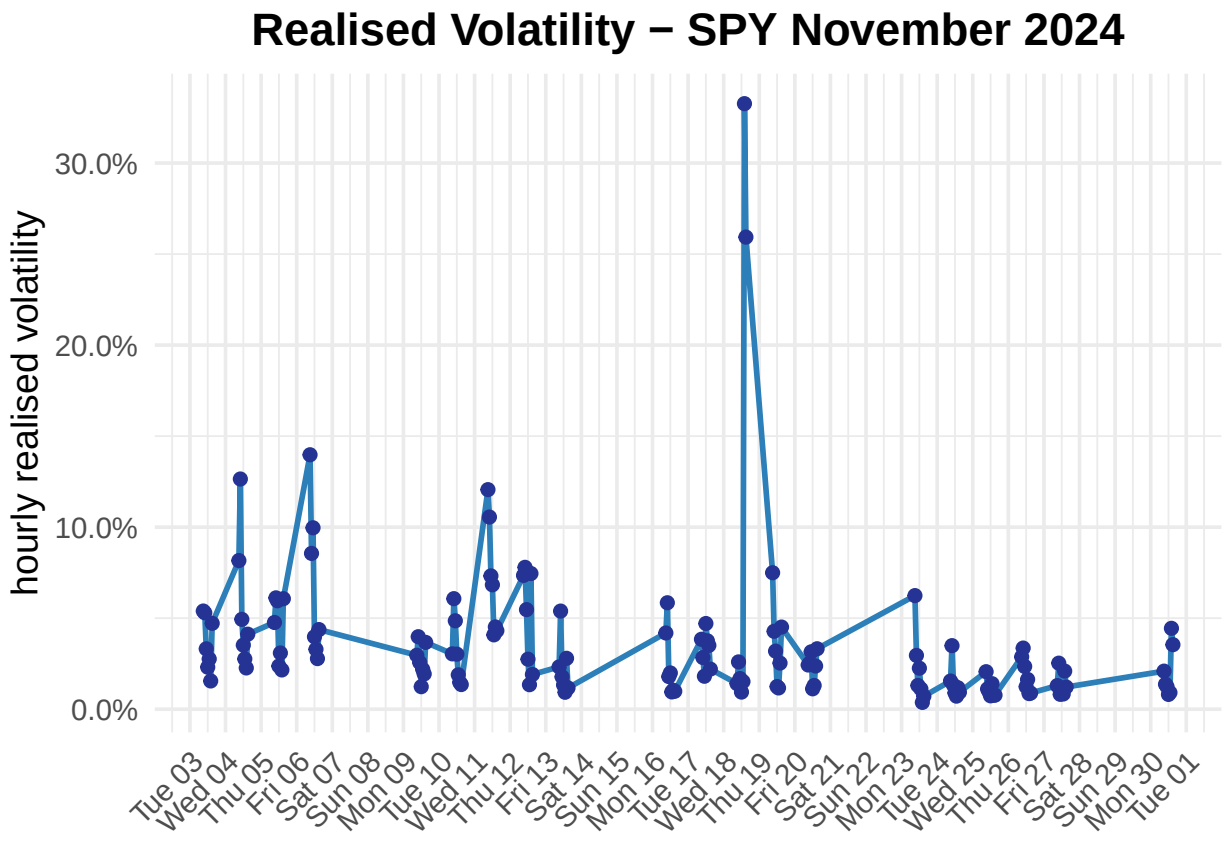



```
vol_plotter(vol_SPY2024,breaks="monthly",
                            title="Realised Volatility - SPY 2024")
```

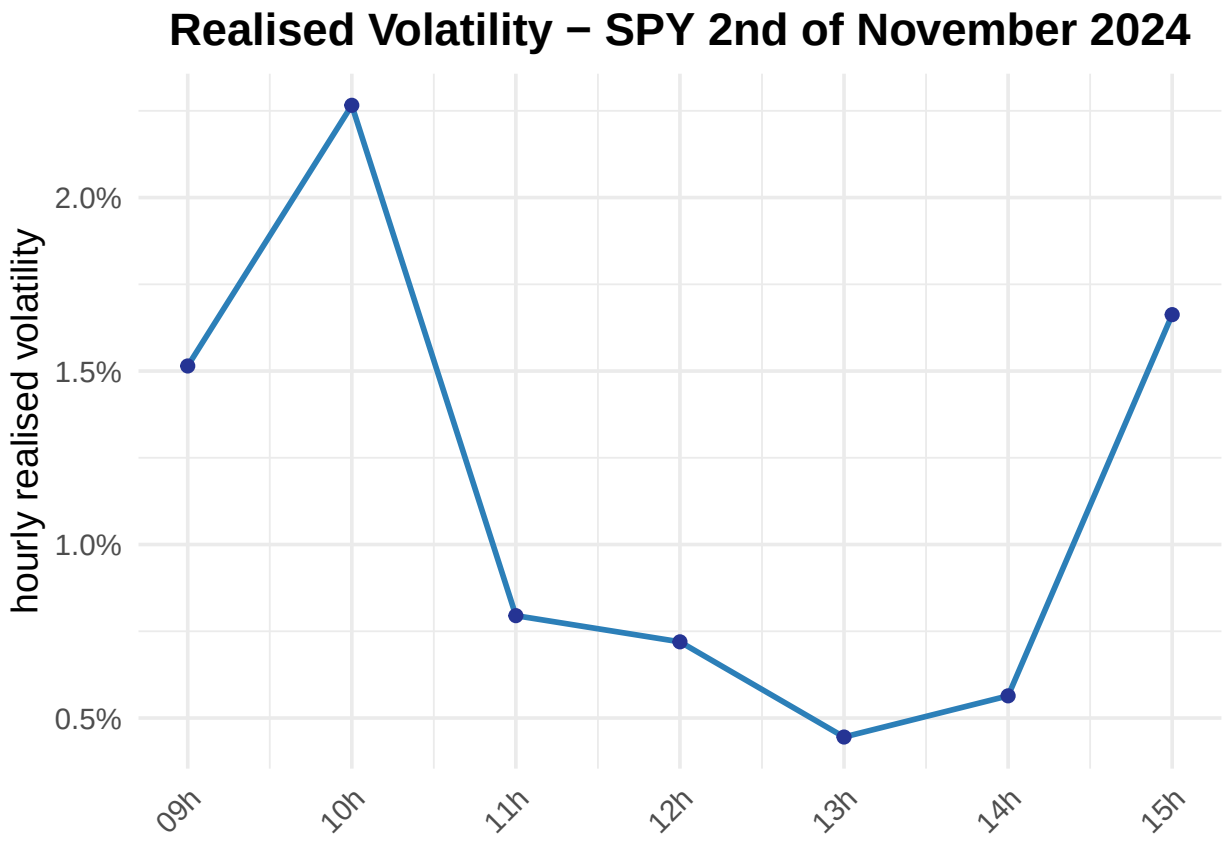
```
## Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use `linewidth` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.
```




```
vol_plotter(vol_24_09,breaks="daily",
                    title="Realised Volatility - SPY November 2024")
```




```
vol_plotter(vol_24_04_02,breaks="hourly",
              title="Realised Volatility - SPY 2nd of November 2024")
```


Realised Volatility − SPY 2nd of November 2024
hourly realised volatility
2.0%
1.5%
1.0%
0.5%
09h
10h
11h
12h
13h
14h
15h