

ASHR Data Descriptive Analysis

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Price

Here we provide some descriptive facts about our financial data on ASHR prices.

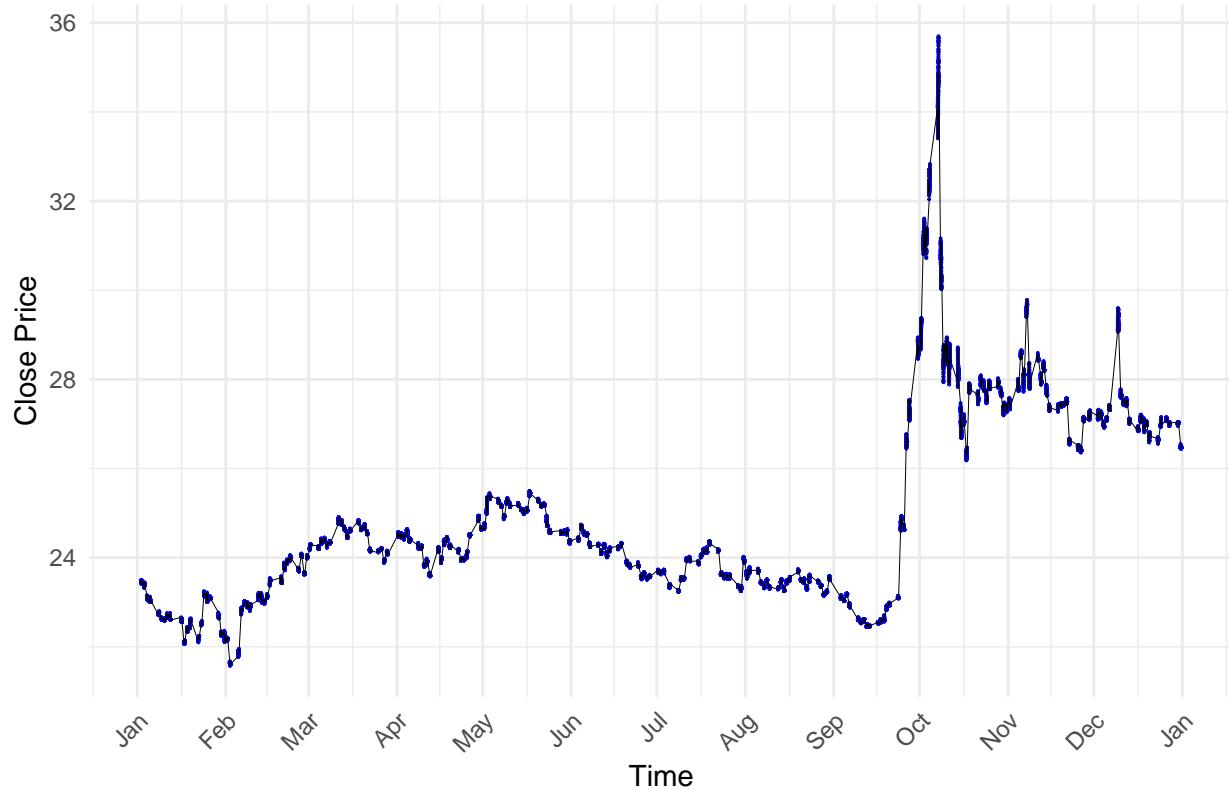
Plots

```
#All Time  
price_plotter(raw_ASHR, "ASHR Price Over Time")
```



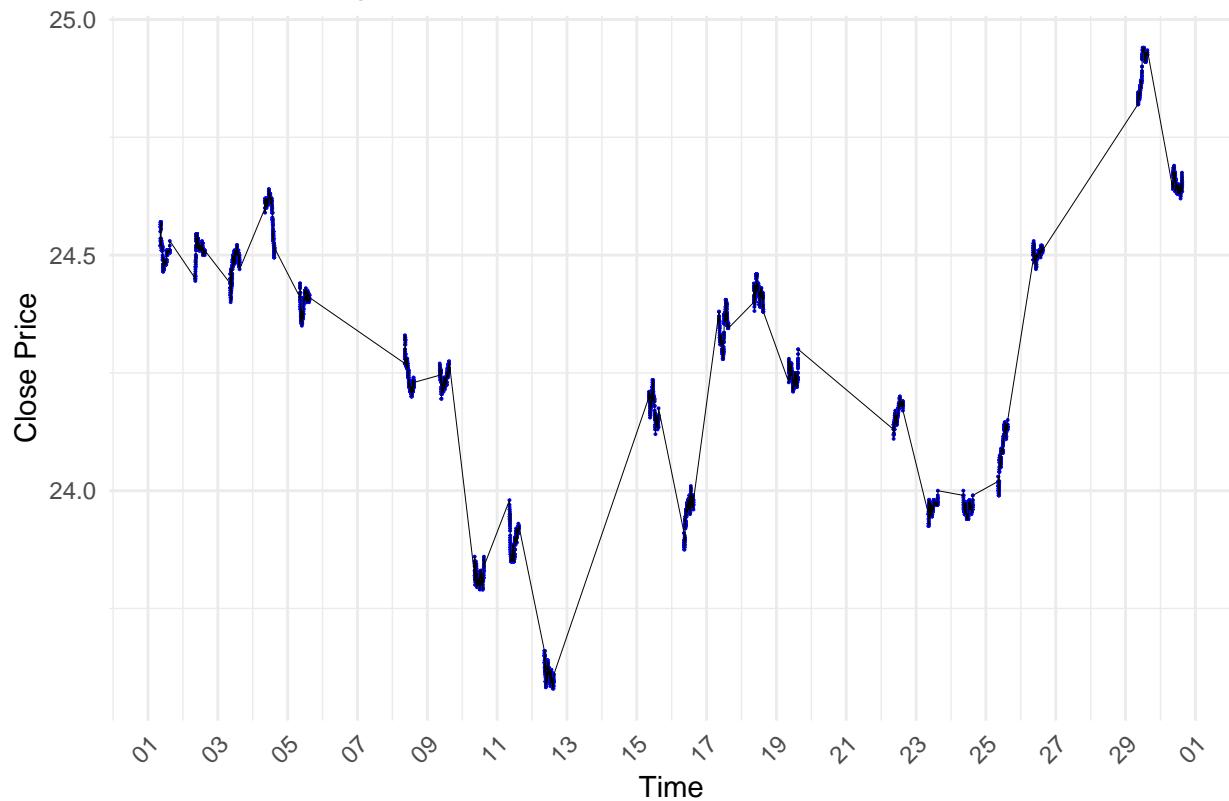
```
#2024  
ASHR_2024 = year_selector(raw_ASHR, 2024)  
price_plotter_year(ASHR_2024, "ASHR Price - 2024")
```

ASHR Price – 2024



```
#April 2025  
ASHR_2025_04 = month_selector(raw_ASHR, 2024, 04)  
price_plotter_month(ASHR_2025_04, "ASHR Price - April 2025")
```

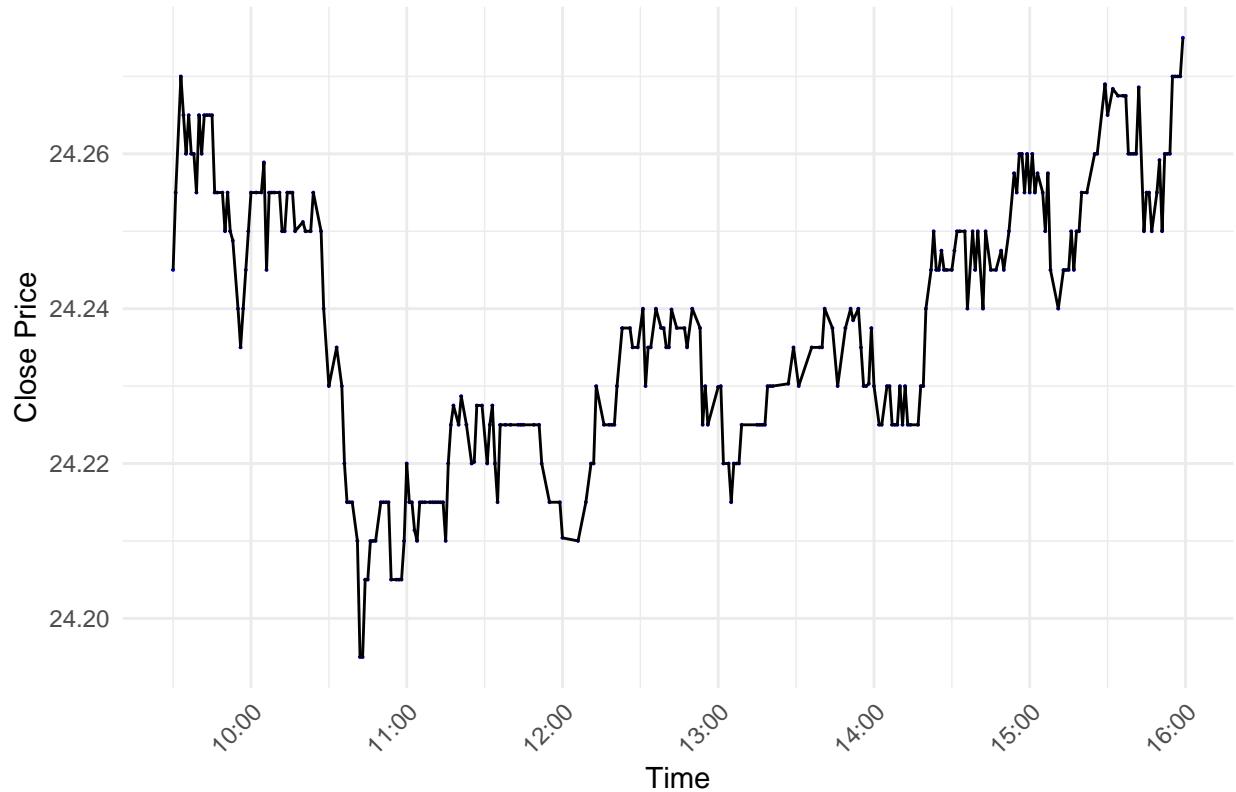
ASHR Price – April 2025



#9th of April 2025

```
ASHR_2025_04_09 = day_selector(raw_ASHR, 2024, 04, 09)
price_plotter_day(ASHR_2025_04_09, "ASHR Price - 9th of April 2025")
```

ASHR Price – 9th of April 2025

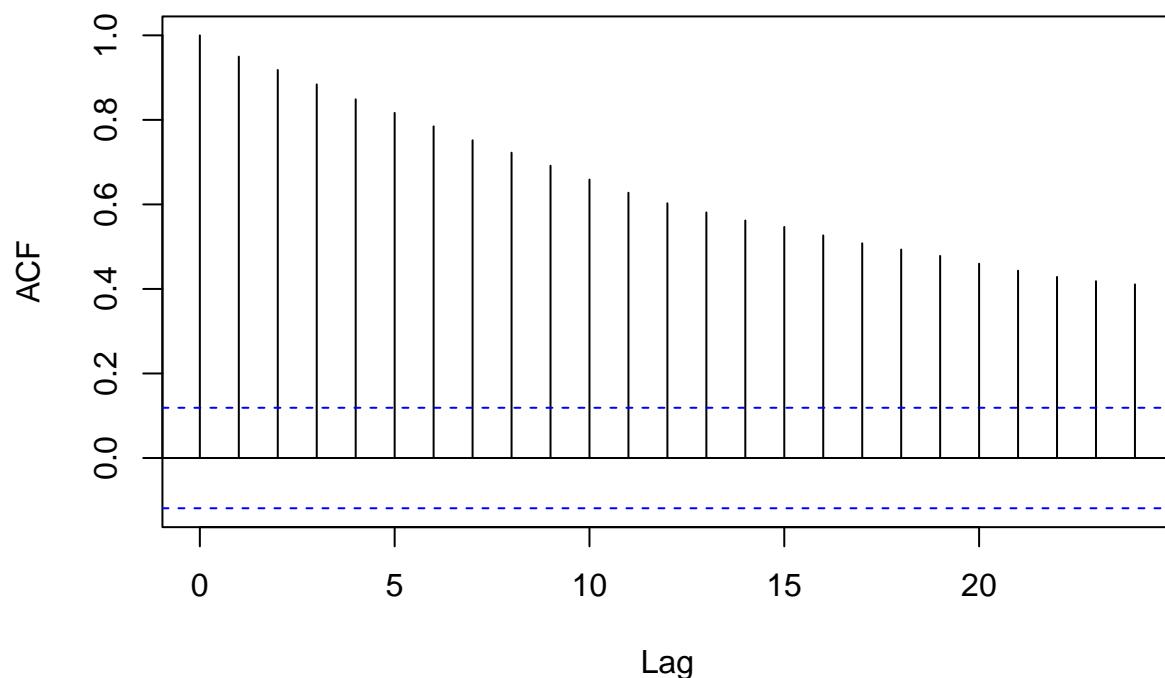


Time Series Analysis

This is not at all related to our final analysis. It is just in order to see the financial data on its own and how it behaves as a time series.

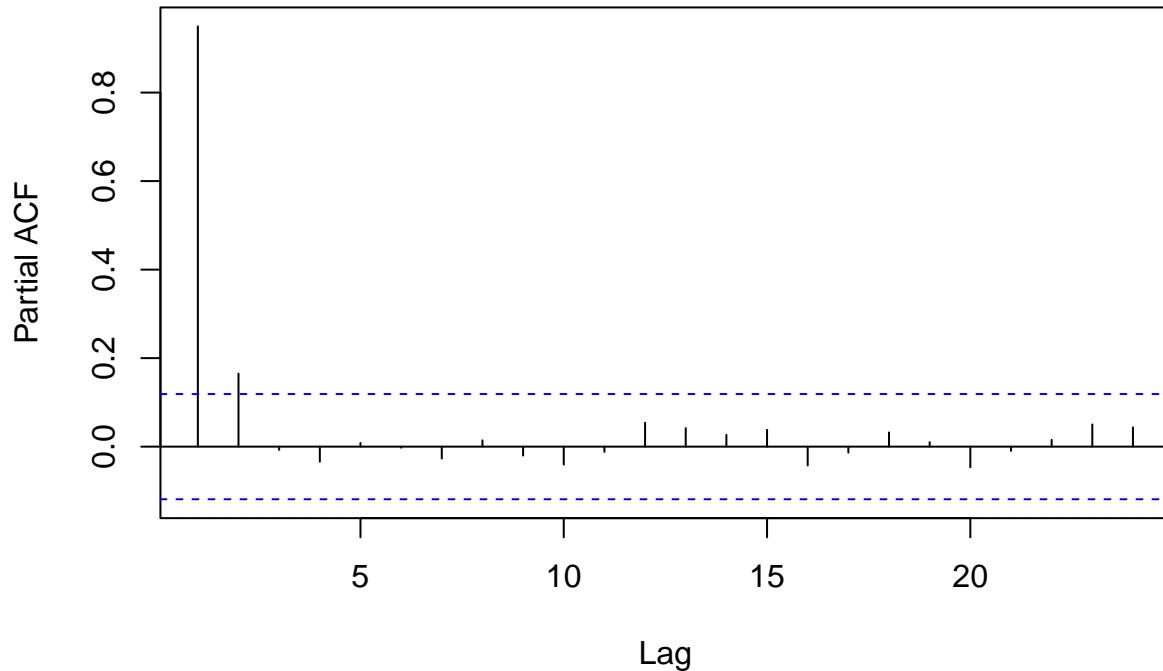
```
acf(ASHR_2025_04_09$close)
```

Series ASHR_2025_04_09\$close



```
pacf(ASHR_2025_04_09$close)
```

Series ASHR_2025_04_09\$close



```
AR1 = arima(ASHR_2025_04_09$close, c(1,0,0), method="ML")
AR2 = arima(ASHR_2025_04_09$close, c(2,0,0), method="ML")
AR3 = arima(ASHR_2025_04_09$close, c(3,0,0), method="CSS")
table1 = export_summs(AR1,AR2,AR3, model.names = c("AR1","AR2","AR3"), digits = 4)
huxtable::caption(table1) <- "AR Estimations"
huxtable::set_width(table1, 0.8)
```

```
AR1res = as.numeric(AR1$residuals)
AR1res_lagged <- lag(AR1res, 1)
iidcheck1 = lm(AR1res ~ AR1res_lagged)
AR2res = as.numeric(AR2$residuals)
AR2res_lagged <- lag(AR2res, 1)
iidcheck2 = lm(AR2res ~ AR2res_lagged)
AR3res = as.numeric(AR3$residuals)
AR3res_lagged <- lag(AR3res, 1)
iidcheck3 = lm(AR3res ~ AR3res_lagged)
table2 = export_summs(iidcheck1,iidcheck2,iidcheck3,
                      model.names = c("AR1 Residuals","AR2 Residuals","AR3 Residuals"),
                      digits = 4)
huxtable::caption(table2) <- "Checking Residuals"
huxtable::set_width(table2, 0.8)
```

Table 1: AR Estimations

	AR1	AR2	AR3
ar1	0.9996 (NaN)	0.7743 (0.0598)	0.7493 (0.0593)
intercept	24.2383 (0.1550)	24.2427 (0.0091)	24.2388 (0.0106)
ar2		0.1962 (0.0602)	0.2006 (0.0740)
ar3			0.0227 (0.0593)
nobs	272	272	272
sigma	0.0051	0.0049	0.0048
logLik	1048.5063	1057.8756	
AIC	-2091.0125	-2107.7512	
BIC	-2080.1951	-2093.3280	
nobs.1	272.0000	272.0000	272.0000

*** p < 0.001; ** p < 0.01; * p < 0.05.

Realised Volatility

Computations

```
#avg per day for each month of any dataset
vol_ASHR_daily = r.vol_daily(raw_ASHR,merge=F)
head(vol_ASHR_daily)
```

```
#can then filter out years, months, or days
vol_24d = year_selector(vol_ASHR_daily,2024)
vol_24_08d = month_selector(vol_ASHR_daily,2024,08)
vol_24_11_04d = day_selector(vol_ASHR_daily,2024,11,04) #scalar
```

```
#avg per hour for each day of each month of any dataset
vol_ASHR_hourly = r.vol_hourly(raw_ASHR,merge=F)
head(vol_ASHR_hourly)
```

Table 2: Checking Residuals

	AR1 Residuals	AR2 Residuals	AR3 Residuals
(Intercept)	0.0001	-0.0000	-0.0000
	(0.0003)	(0.0003)	(0.0003)
AR1res_lagged	-0.2090 ***		
	(0.0597)		
AR2res_lagged		0.0025	
		(0.0611)	
AR3res_lagged			0.0021
			(0.0611)
N	271	271	271
R2	0.0435	0.0000	0.0000

*** p < 0.001; ** p < 0.01; * p < 0.05.

timestamp	r_vol_d
2014-01-02	0.00046
2014-01-03	0.000693
2014-01-06	0.000456
2014-01-07	0.000229
2014-01-08	0.000352
2014-01-09	0.00036

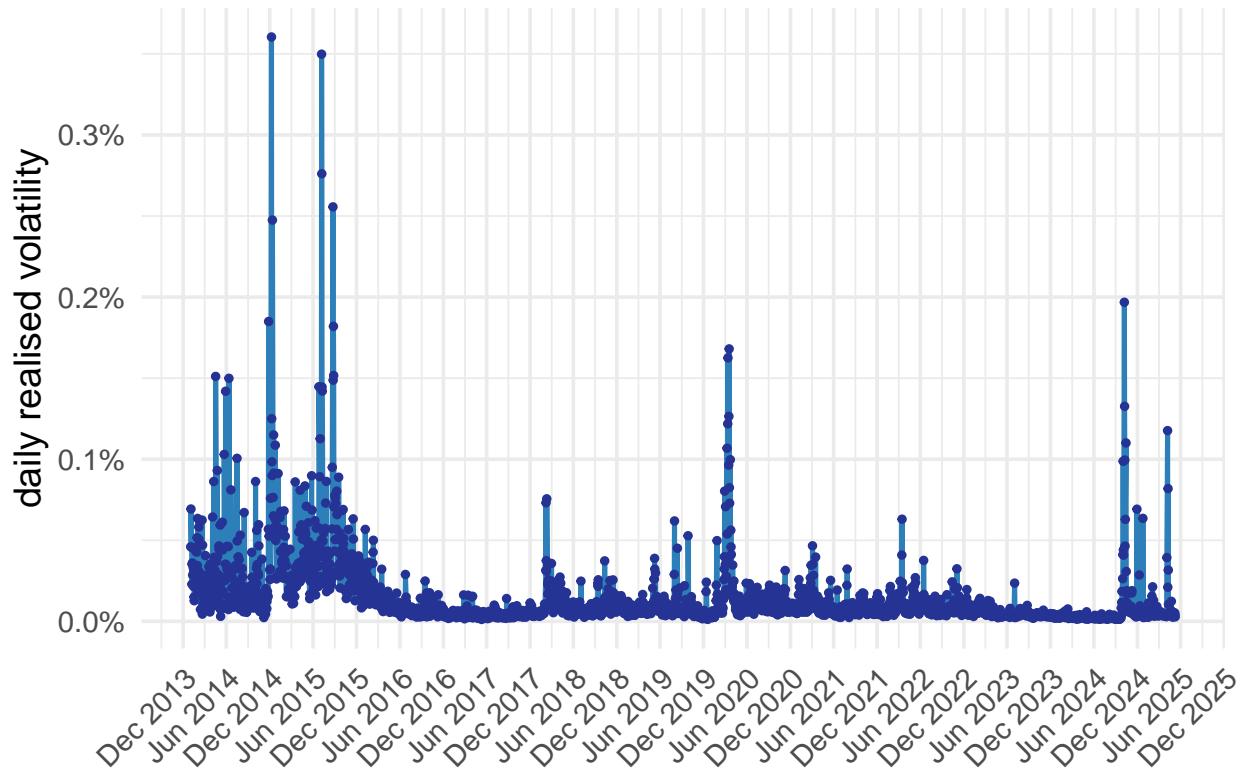
```
#can then filter out years, months, or days
vol_24h = year_selector(vol_ASHR_hourly,2024)
vol_24_08h = month_selector(vol_ASHR_hourly,2024,08)
vol_24_11_04h = day_selector(vol_ASHR_hourly,2024,11,04) #vector
```

Plots

```
#avg per day volatility all time
dvol_plotter(vol_ASHR_daily, breaks="yearly",
             title="ASHR Volatility Over Time")
```

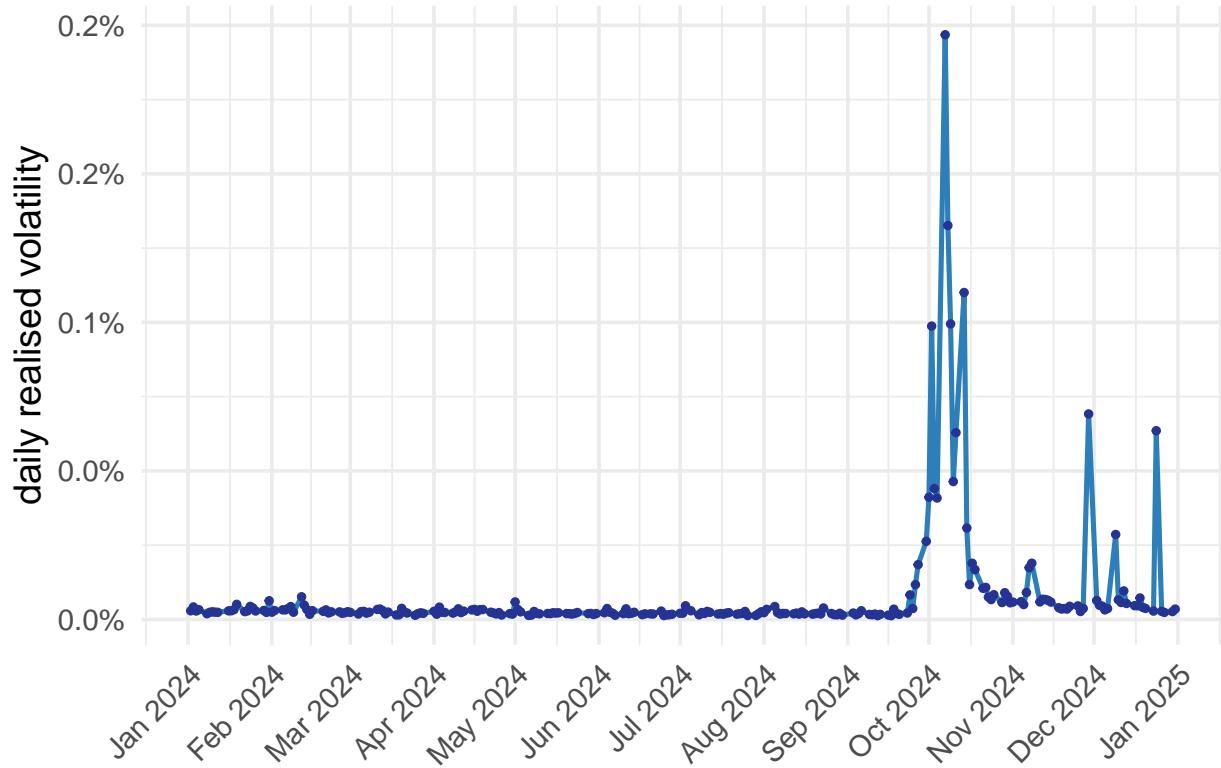
timestamp	r_vol_h
2014-01-02 09:00:00	0.000566
2014-01-02 10:00:00	0.000726
2014-01-02 11:00:00	0.000341
2014-01-02 12:00:00	0.000639
2014-01-02 13:00:00	0.00025
2014-01-02 14:00:00	0.000264

ASHR Volatility Over Time



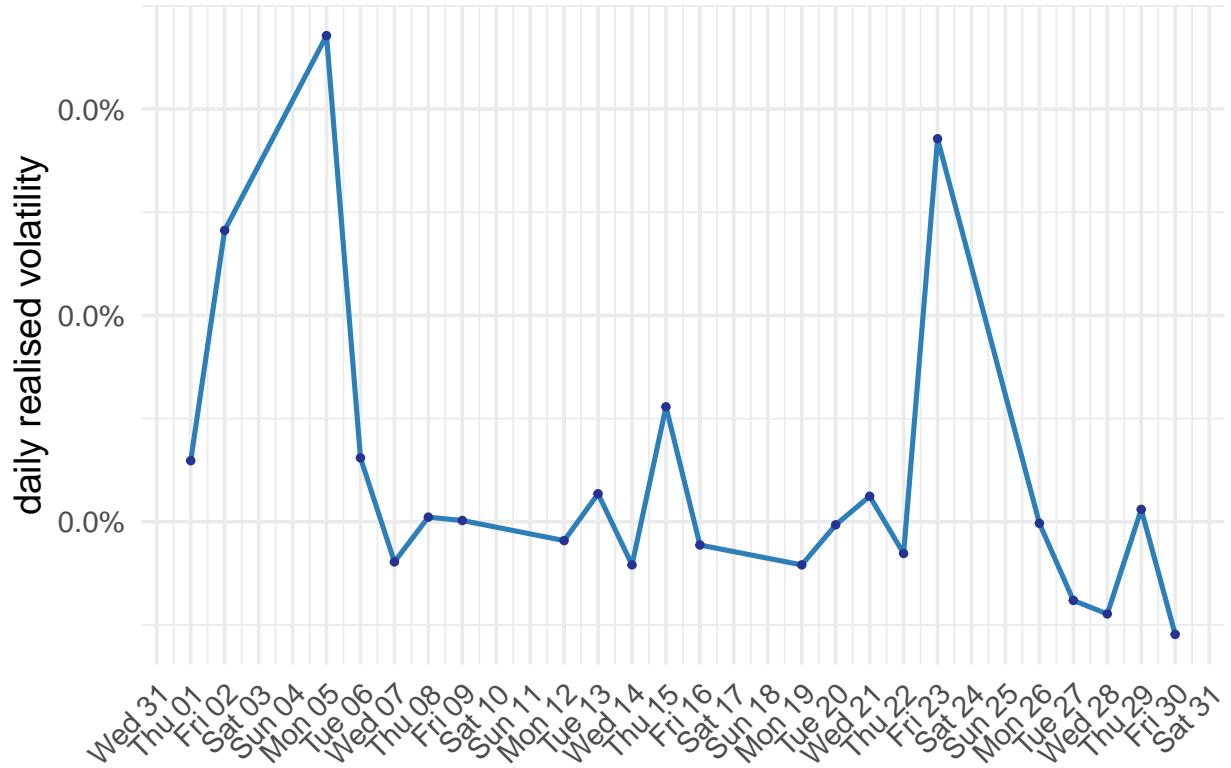
```
#avg per day volatility in a year
dvol_plotter(vol_24d, breaks="monthly",
             title="Realised Volatility - ASHR 2024")
```

Realised Volatility – ASHR 2024



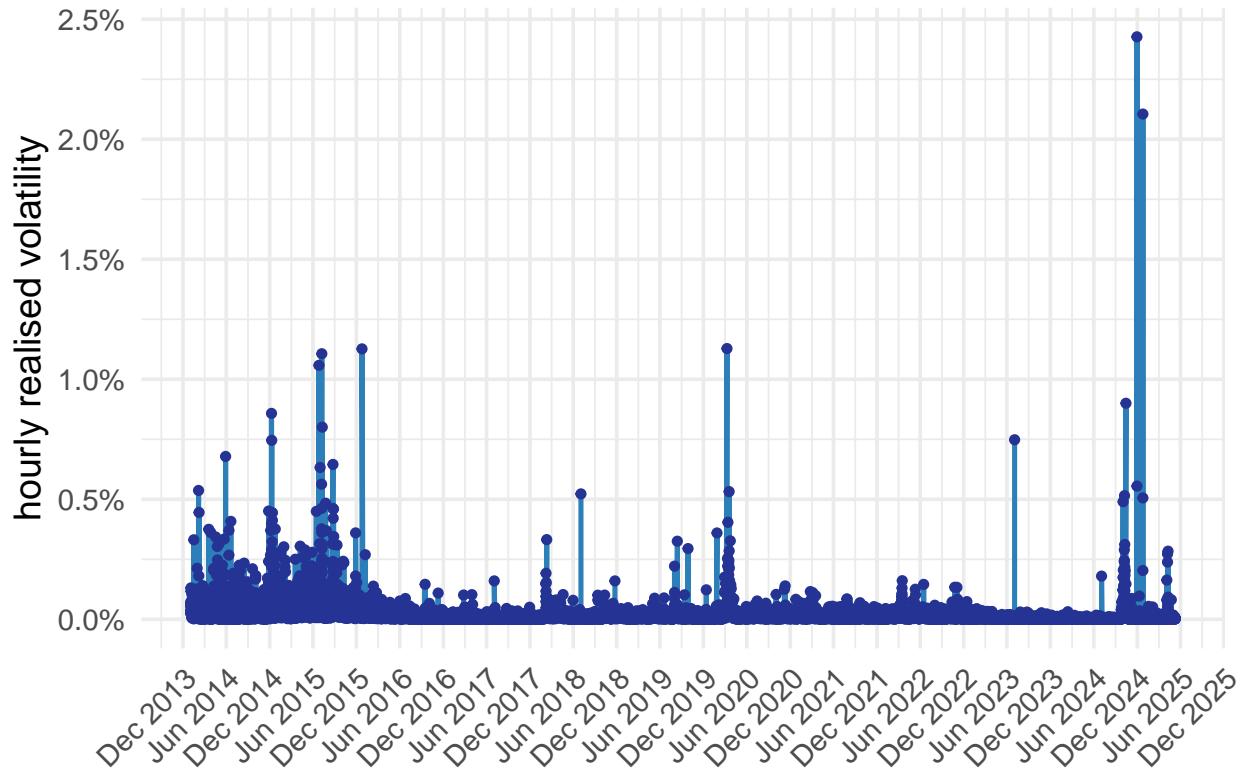
```
#avg per day volatility in a month
dvol_plotter(vol_24_08d,breaks="daily",
             title="Realised Volatility - ASHR August 2024")
```

Realised Volatility – ASHR August 2024



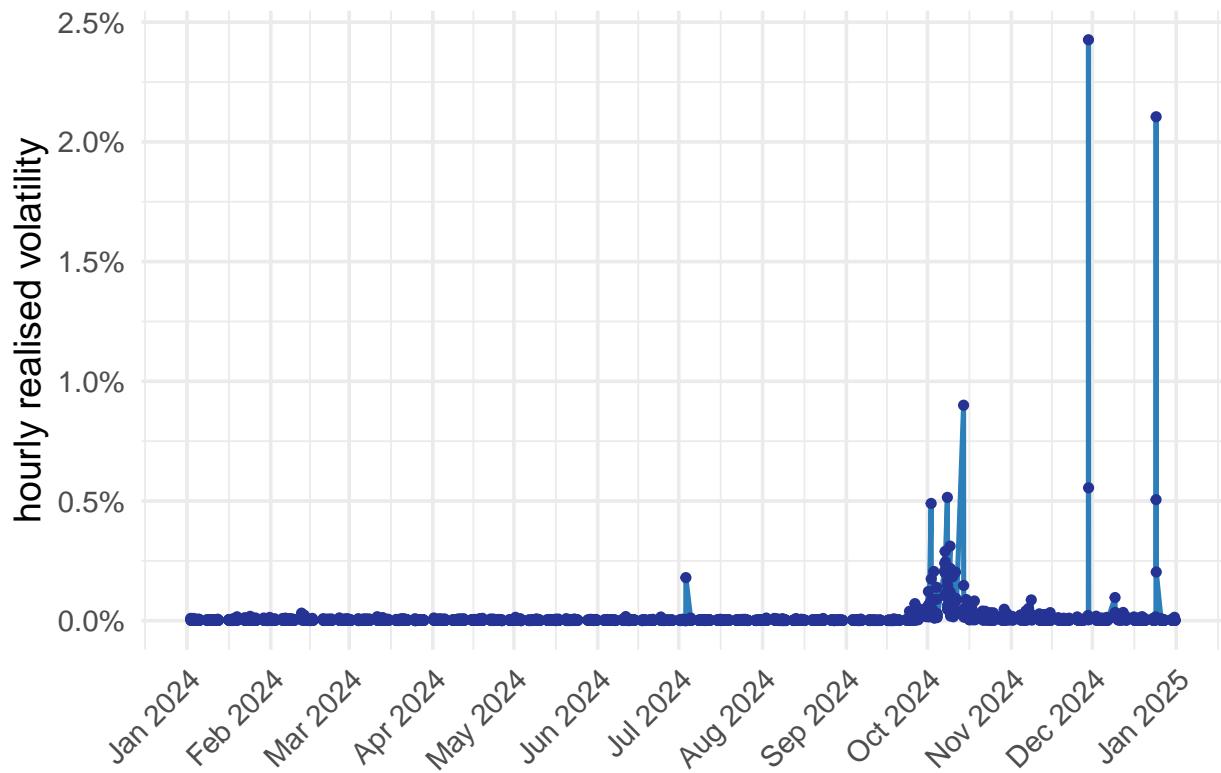
```
#hourly volatility all time
hvol_plotter(vol_ASHR_hourly, breaks="yearly",
             title="ASHR Volatility Over Time")
```

ASHR Volatility Over Time



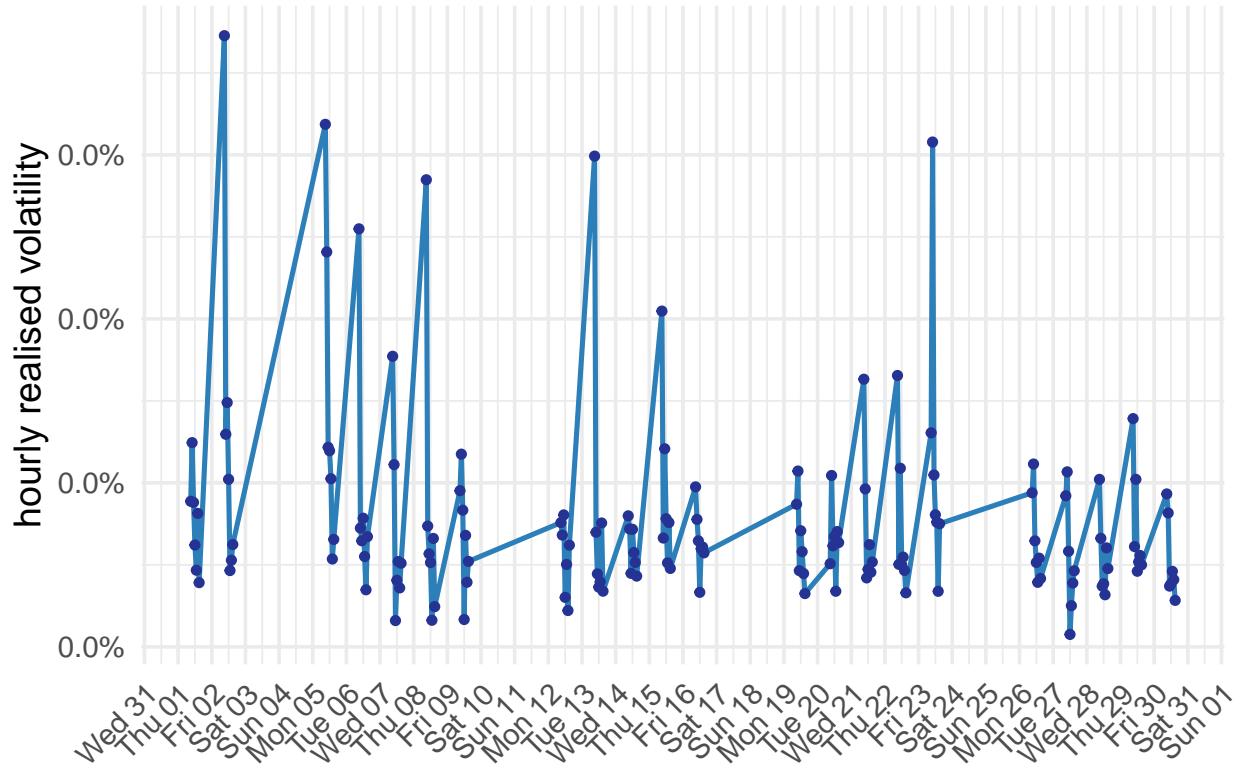
```
#hourly volatility in a year  
hvol_plotter(vol_24h, breaks="monthly",  
             title="Realised Volatility - ASHR 2024")
```

Realised Volatility – ASHR 2024



```
#hourly volatility in a month
hvol_plotter(vol_24_08h, breaks="daily",
             title="Realised Volatility - ASHR August 2024")
```

Realised Volatility – ASHR August 2024



```
#hourly volatility in a day
hvol_plotter(vol_24_11_04h, breaks="hourly",
             title="Realised Volatility - ASHR 4th of November 2024")
```

Realised Volatility – ASHR 4th of November 2024

