Final Project: Milestone 2

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Crypto-Currency and Stock Data

```
##       Index                 data        
##  Min.   :2016-10-01   Min.   :   6.822  
##  1st Qu.:2017-12-31   1st Qu.: 158.418  
##  Median :2019-04-01   Median : 255.537  
##  Mean   :2019-04-01   Mean   : 589.463  
##  3rd Qu.:2020-06-30   3rd Qu.: 557.063  
##  Max.   :2021-09-30   Max.   :4168.701  
##                       NA's   :4
```

Graphing the Time Series

Figure 1 shows the time series for Ethereum over the past 5 years. It appears to be a multiplicative, non-stationary time series with an exponential positive trend that has exploded most recently in 2021.

```
autoplot(data)
```

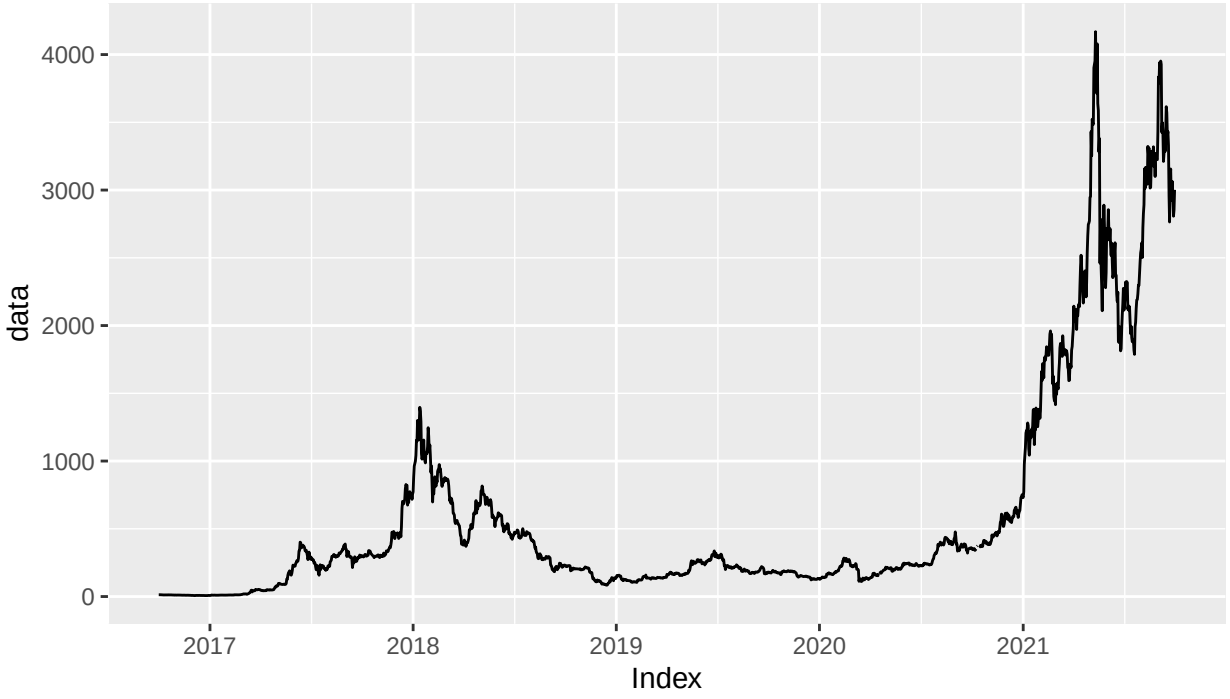

Figure 1

Figure 2, we can see the time series with a log transformation. It has transformed the exponential behavior into something more linear. There still remains a general increasing trend, and appears to be more additive.

```
autoplot(log(data))
```

Figure 2

Figure 3, we can see the log returns. The plot shows general white noise with a few outliers in 2017 and 2020.

```
autoplot(diff(log(data)))
```

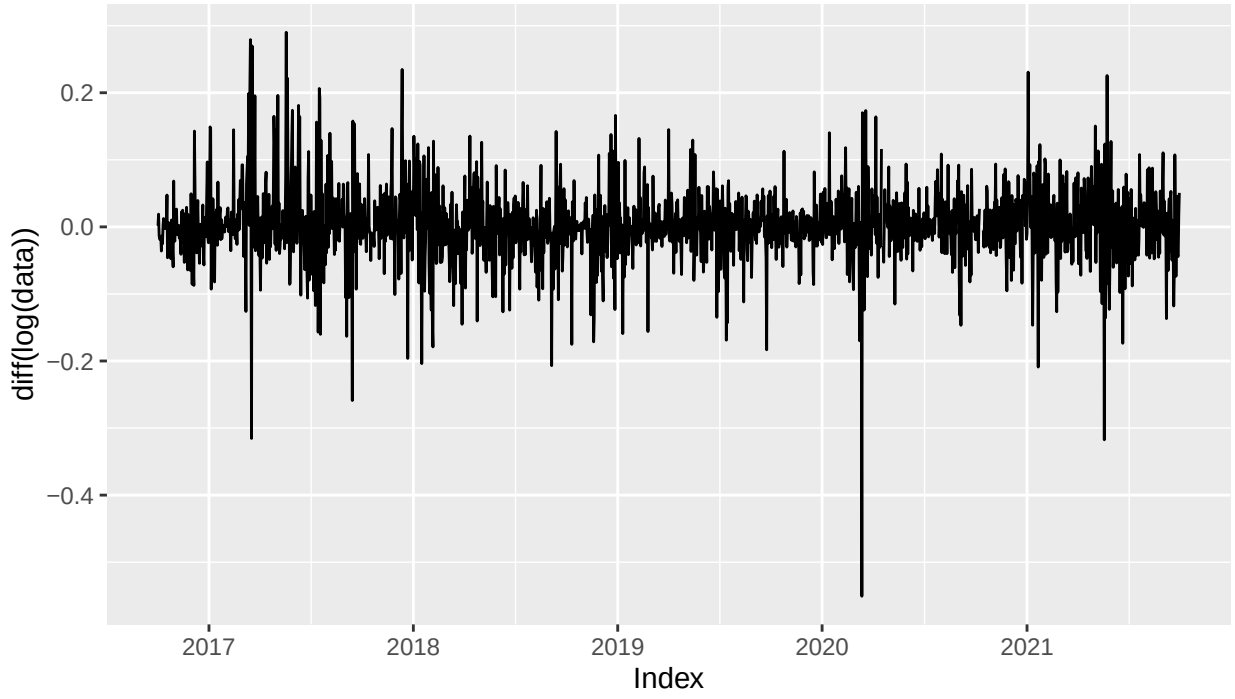

Figure 3

Auto-correlation

Figure 4 is the ACF plot. Auto-correlation has a strong presence in this time series. The ACF gradually decreases indicating a non-stationary series.

```
acf(log(data), na.action = na.pass)
```

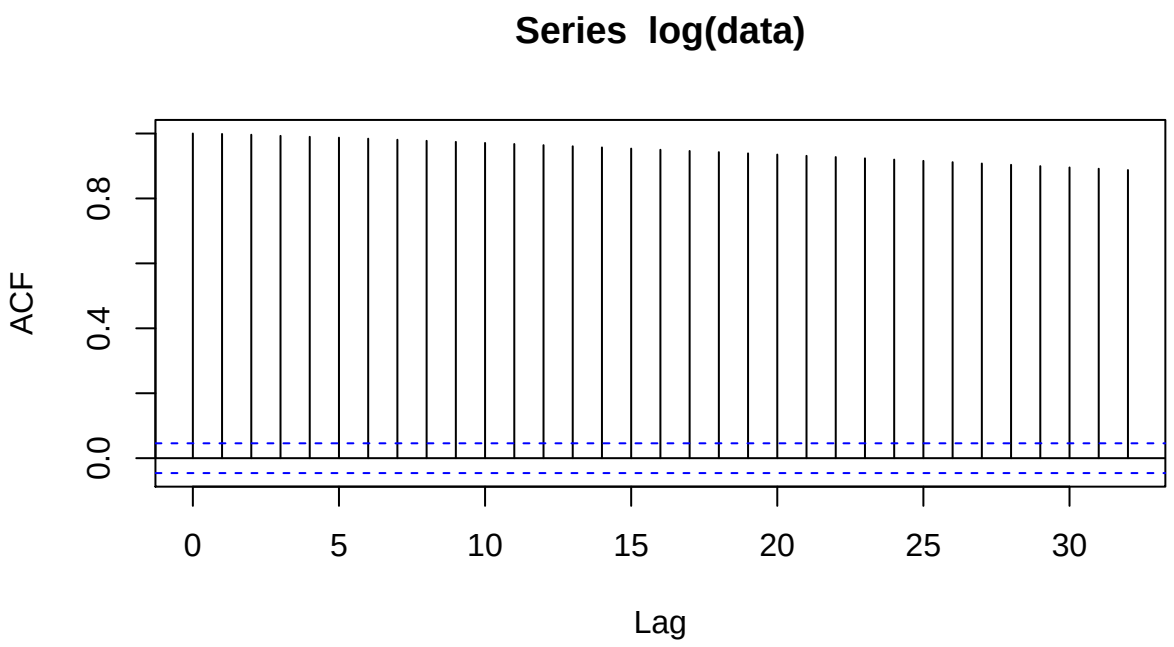

Figure 4

Ljung Box Test

This can be further confirmed by performing the Ljung Box test. At lag 1, the Ljung-Box p-value is close to zero. This indicates that at the 99% confidence, the null hypothesis is rejected and one can conclude that the series is not independently distributed and exhibit serial correlation.

```
Box.test(log(data), lag = 1, type = "Ljung-Box")
```

```
##
##  Box-Ljung test
##
## data:  log(data)
## X-squared = 1819.9, df = 1, p-value < 2.2e-16
```