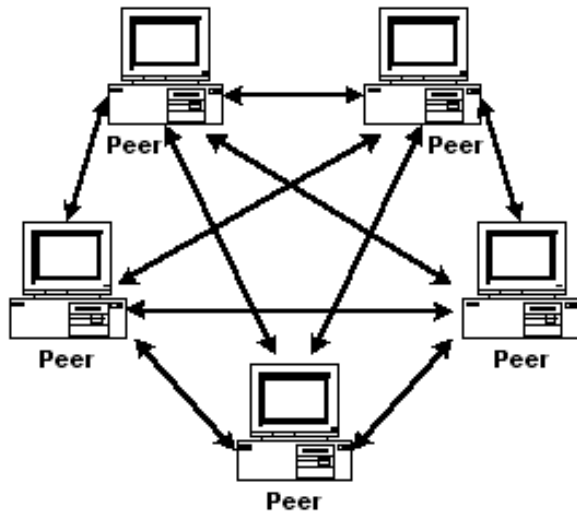


Bitcoin: Exploring its Short and Volatile History



Presentation Outline

- **Bitcoin Introduction**
- **Text Analysis on Bitcoin-related news articles**
- **Time Series Exploration**

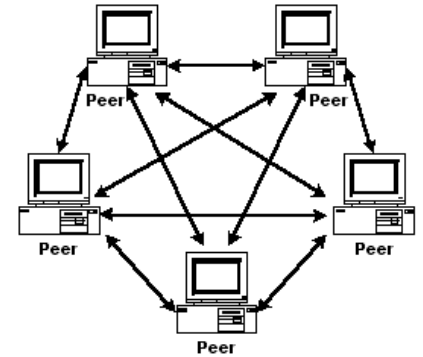
What is Bitcoin?

- **Serves as a means of exchange**
 - May 7, 2017 ~ \$1558.00 USD per 1 BC
 - July 17, 2010 ~ \$ 0.07 USD per 1 BC
 - Total Return Rate ~ 2225600%
 - Annual Return Rate ~ 333%



What is Bitcoin? (continued)

- **Decentralized (P2P)**
 - No *human* central banking authority
- **Secure*, anonymous*, international**
- **Limited in total amount**
 - 21 million bitcoins by 2040
 - 16 million bitcoins currently in existence
- **Blockchain proof-of-work algorithm**
 - https://en.wikipedia.org/wiki/Proof-of-work_system

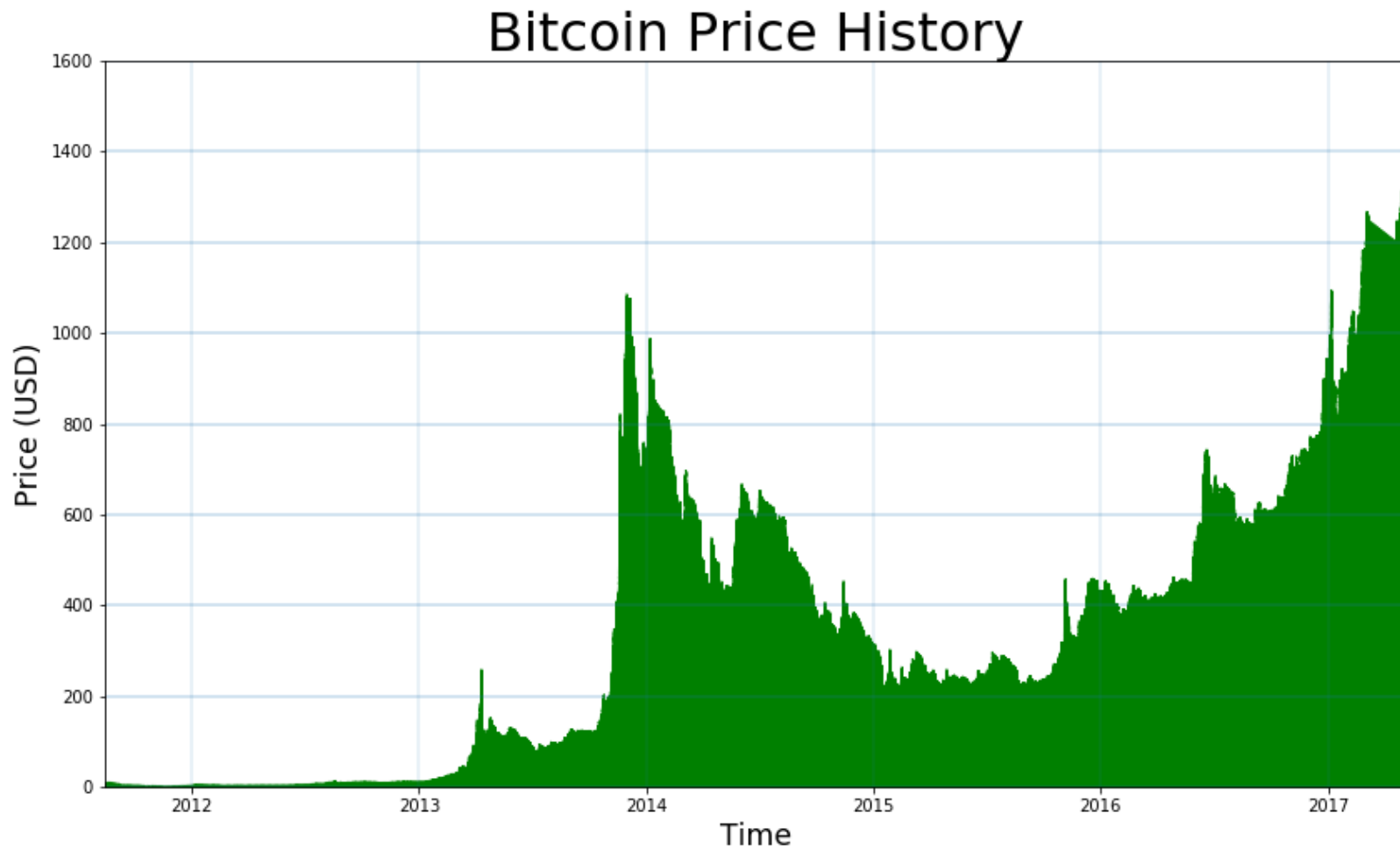


* I am not responsible for any financial losses or legal trouble you may incur while engaging in the buying or selling of products with bitcoin

Peculiarities?

- **Serves unique niches**
 - Move money without state interference
 - Money laundering
 - Anonymous purchasing
 - Substitute for less stable currencies
- **On the border of legality**
 - How to bring into existing financial system?
 - How to monetize?

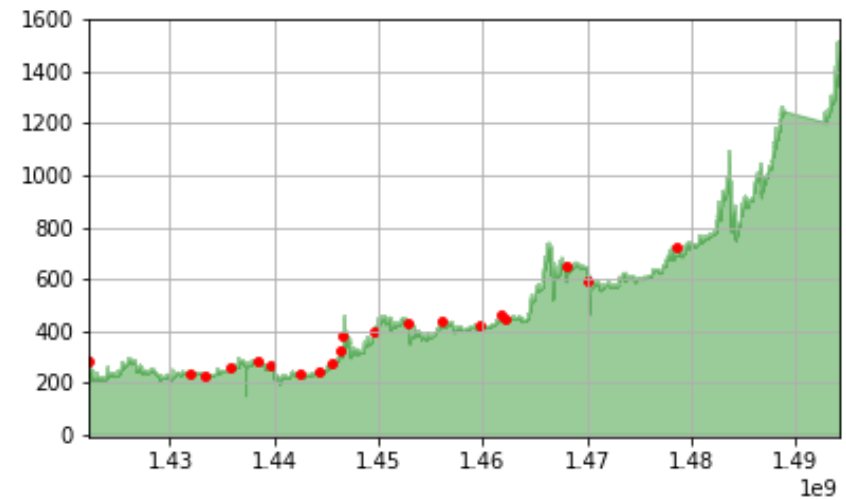
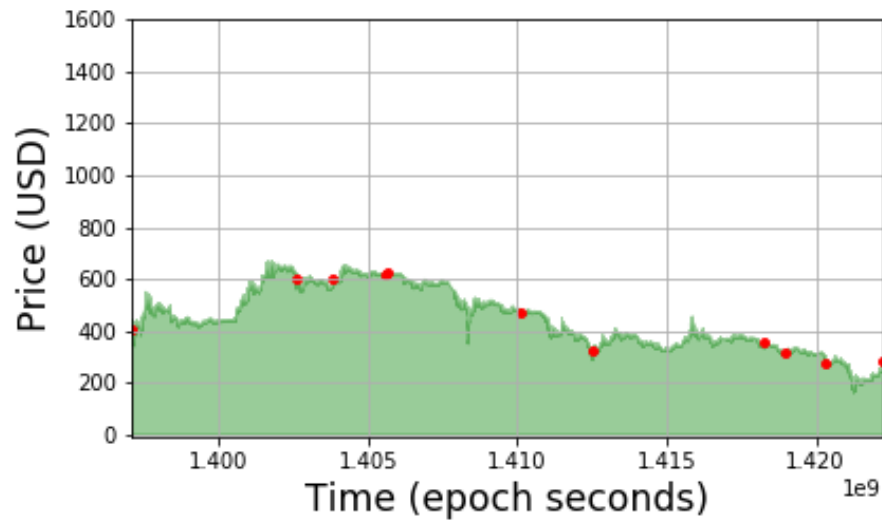
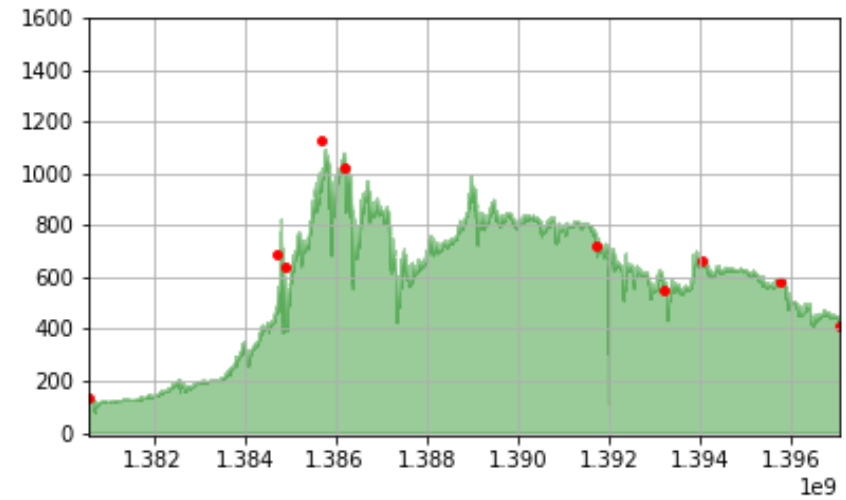
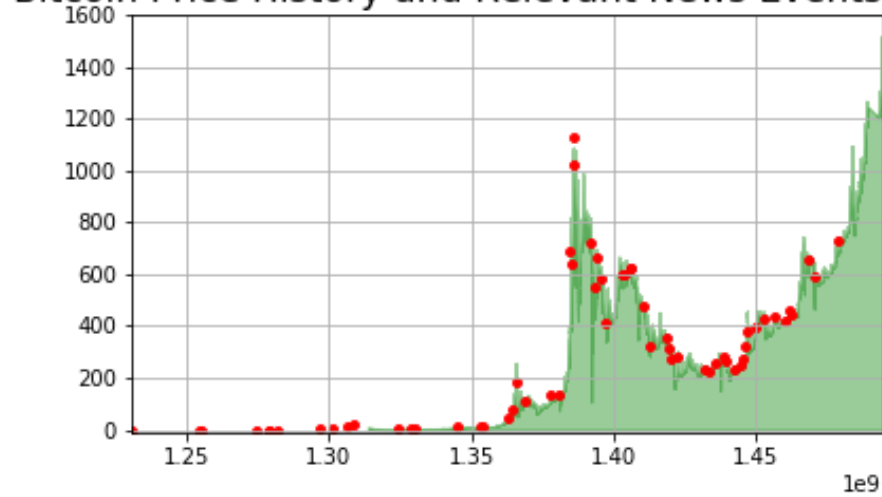
High Price Volatility

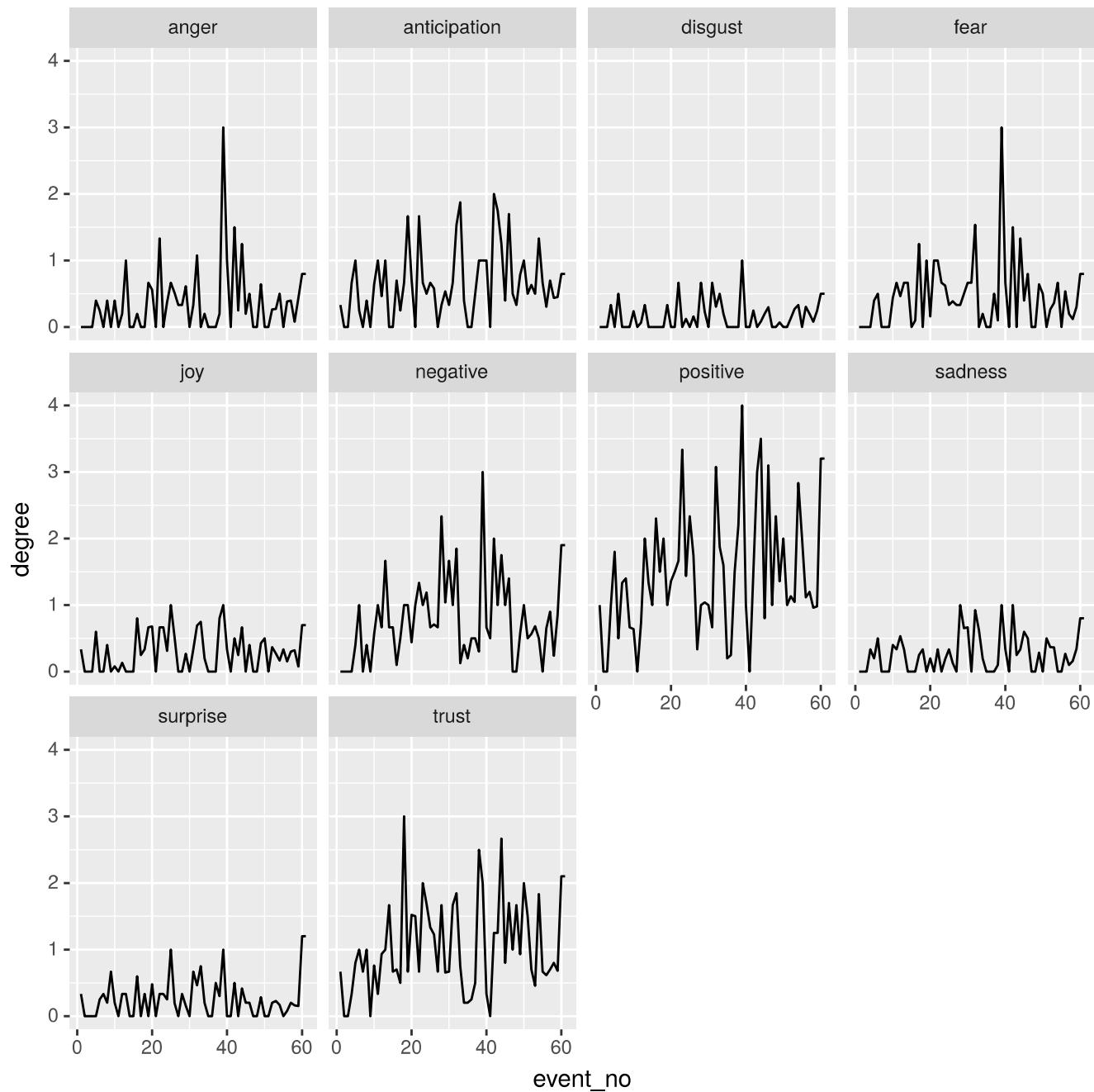


Sentiment Analysis with Syuzhet in R

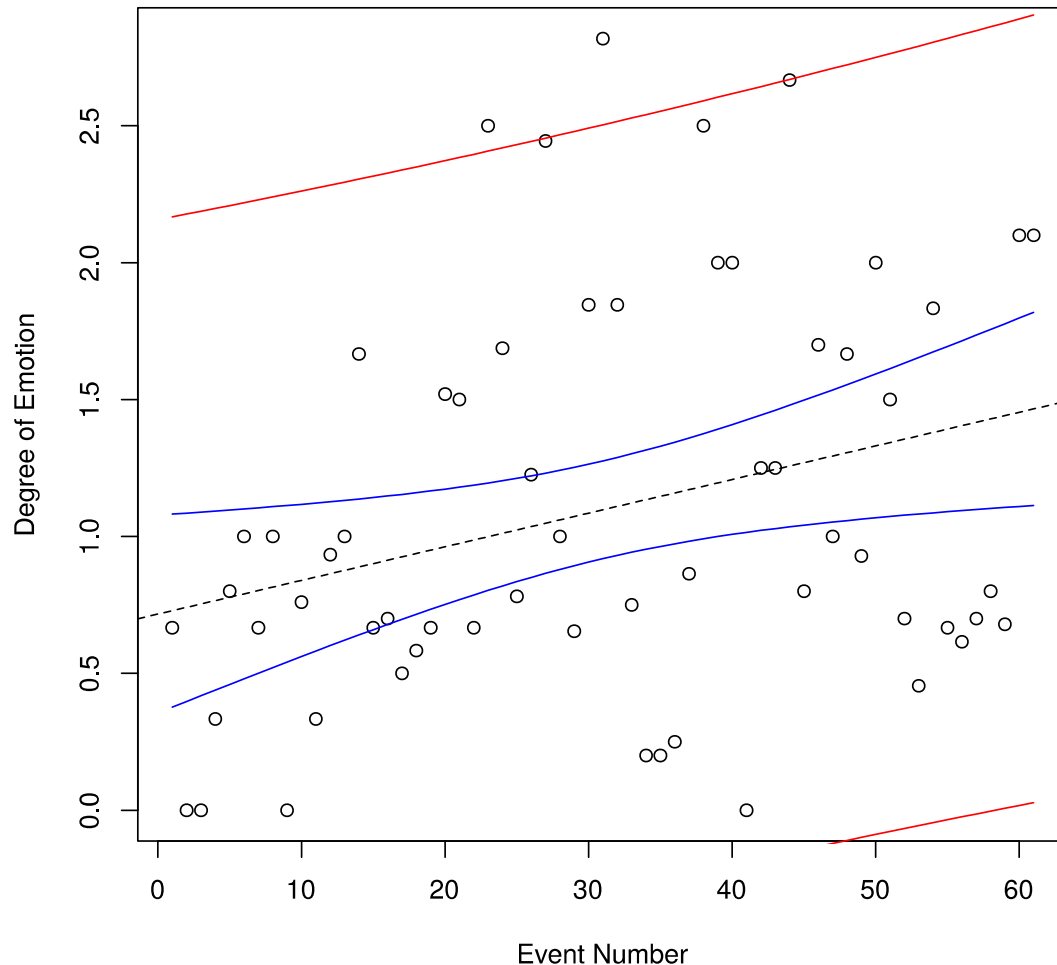
- Correlation between the “sentiment” of a news article and the price movement?
- Use Syuzhet package in R to analyze text of news articles and relate to the 10 day price difference
- Found 61 articles and price history from 99bitcoins.com

Bitcoin Price History and Relevant News Events





nrc_sentiment Trust over Time for 99Bitcoins.com News Articles



Residuals:

Min	1Q	Median	3Q	Max
-1.22024	-0.46937	-0.07944	0.52544	1.72078

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.716599	0.180686	3.966	0.0002 ***
event_no	0.012284	0.005068	2.424	0.0184 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.6969 on 59 degrees of freedom

Multiple R-squared: 0.09055, Adjusted R-squared: 0.07514

F-statistic: 5.874 on 1 and 59 DF, p-value: 0.01845

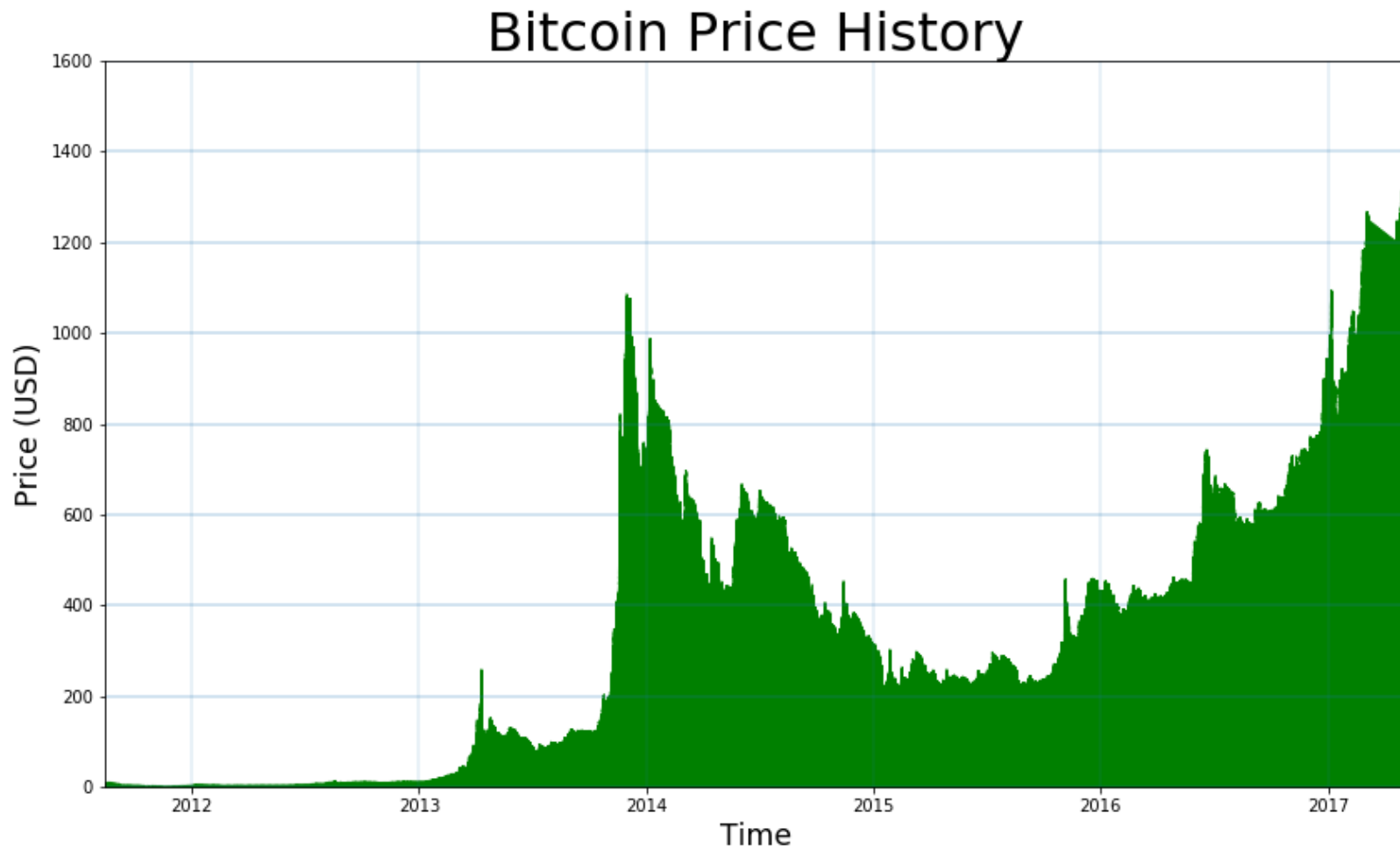
Next Steps for Text Analysis

- **Correlate emotion movement to price movement**
- **Python NLP?**
- **Need more text i.e. [coindesk.com](https://www.coindesk.com)**
- **Multiple Linear Regression**

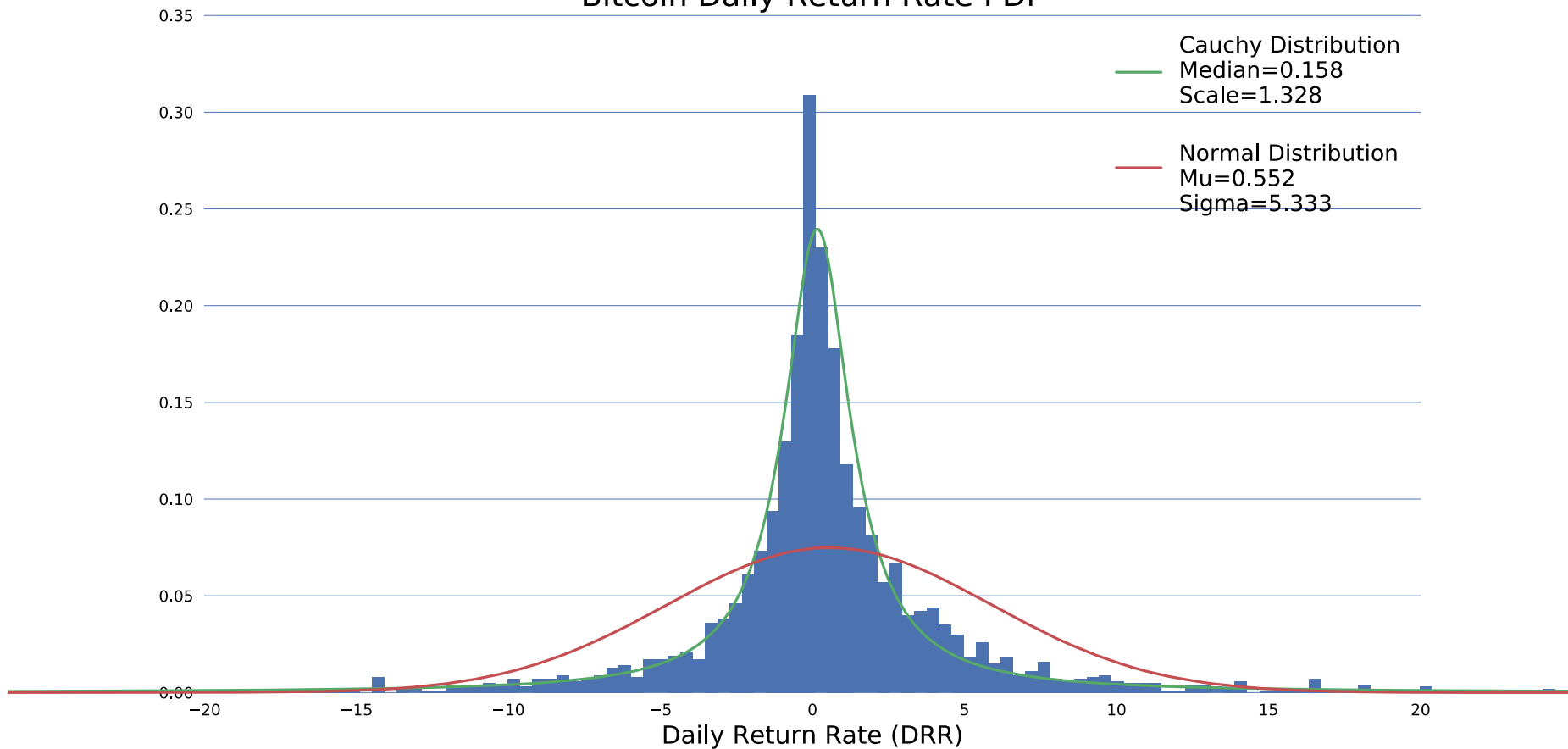
Time Series Modeling

- By digging into the price movements of the data on **btc-e** can I better understand its movement?
- Working towards a bitcoin pricing model

The Price History Again

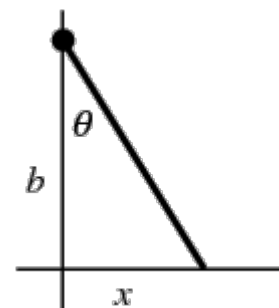


Bitcoin Daily Return Rate PDF

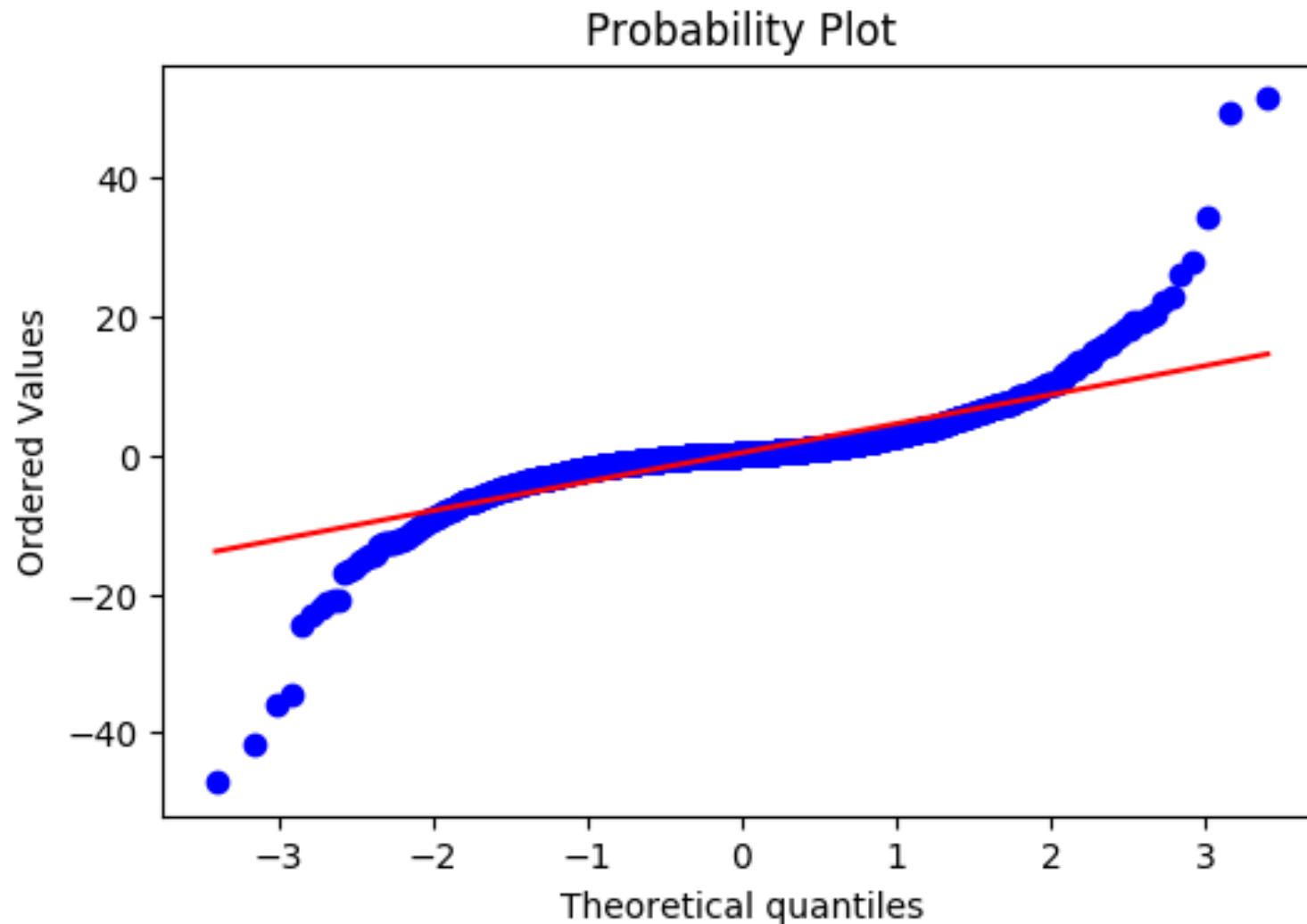


Cauchy Distribution

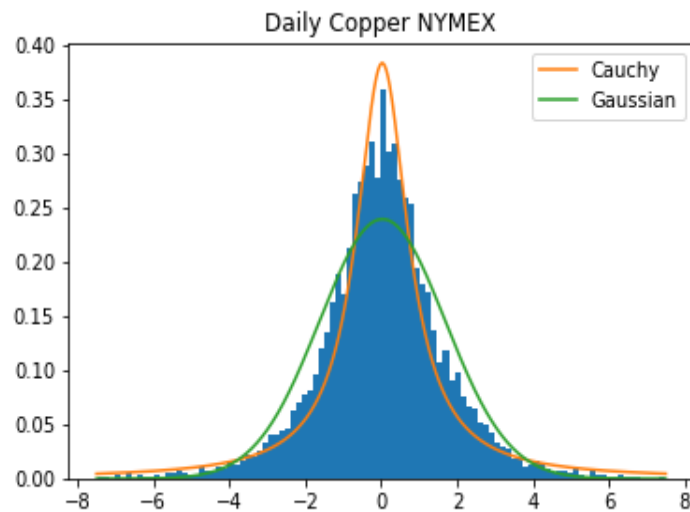
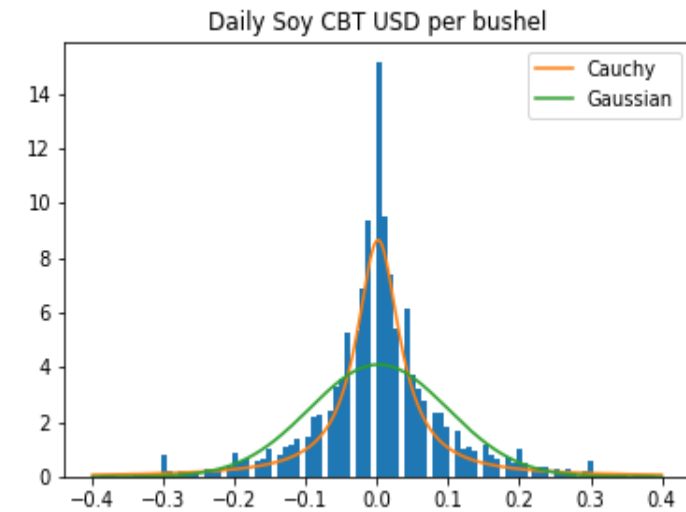
$$f(x) = \frac{1}{\pi\gamma \left[1 + \left(\frac{x-x_0}{\gamma} \right)^2 \right]} \quad \text{and} \quad \text{FWHM} = 2\gamma.$$



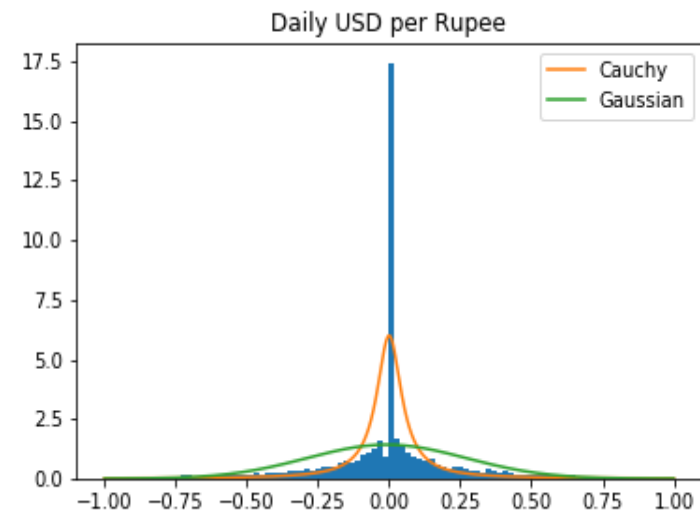
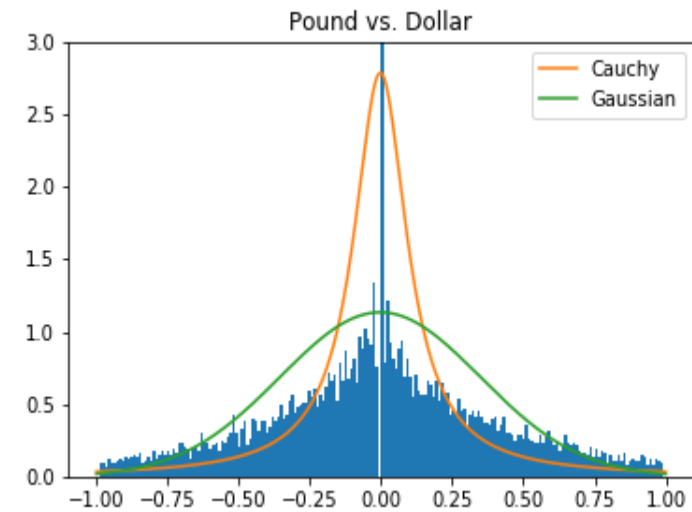
QQ plot for Daily Return Rate



Commodities



Currencies



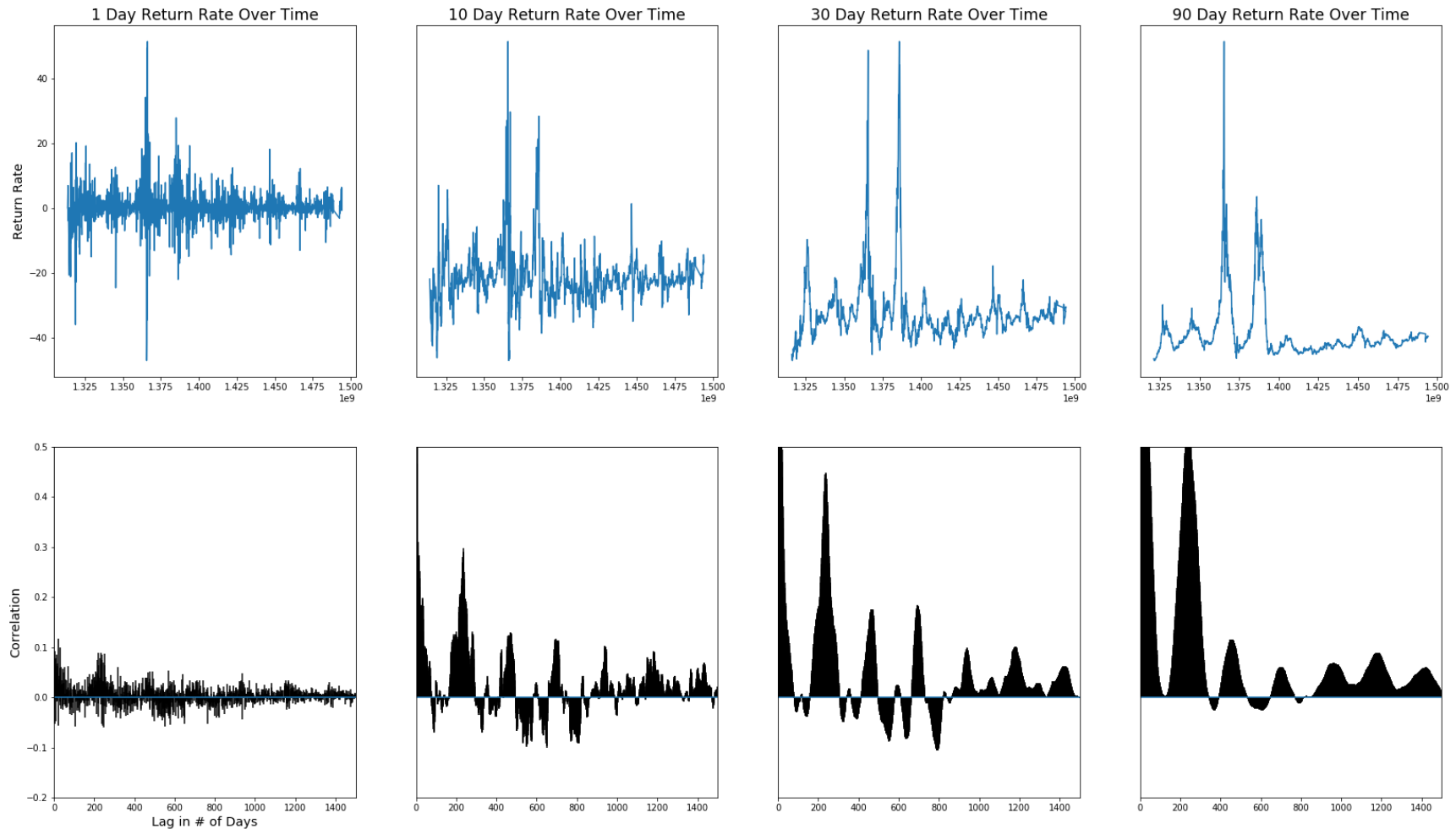
Bitcoin, Currency or Commodity?

- **Commonly thought of as a currency**
 - Somewhat of a misnomer
- **Bitcoin is akin to a commodity**
 - Scarce
 - *Accommodates* a need
 - Perceived intrinsic value
- **The answer to this question has legal and financial ramifications**
 - <http://www.coindesk.com/bankruptcy-judge-bitcoin-property-currency/>
 - <https://www.digitaltrends.com/business/cftc-defines-bitcoin-as-commodity/>

Future Improvements/Directions

- **Fit parameters!**
- **Get information from the block chain itself (blockr.io) for exchange independent data**
 - Transaction volume per coin
- **Signal Processing**
 - Fast Fourier Transforms
 - Auto-correlation
 - Monte Carlo?
- **Differences among Various Exchanges**

Autocorrelation Plots



Various Bitcoin Return Rates

