Assessing Bitcoin as an Asset Class

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What is Bitcoin? And Who's Asking?

- Is it a store of value? (Gold) (Bonds)
- Is it simply a speculative instrument (volatility play)?
- Is it an actual currency? (EUR, USD)
- Government's may ask: Will it destabilize global currency markets and monetary policy?
- Financial Institutions may ask: Will it cut out the financial intermediary in most transactions?
- I'm asking: What does the market think it is?

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Specifically: I want to compare and contrast Bitcoin against asset classes (Stocks, Commodities, Currency, Debt Instruments)

Dataset

Asset Class	Data	Features	Source	Date-Range
Stocks/Shares in Publicly Traded Companies	S&P 500 (SNP)	Price, Trade Volume	Yahoo Finance	2004-11-19 to 2019-04-18
Commodities (Gold)	SPDR Gold Shares (GLD)	Price, Trade Volume	Yahoo Finance	
Currencies (FOREX)	EUR/USD & USD/JPY	Price, Trade Volume	Dukascopy Currency Database	
Corporate Debt	iShares iBoxx Investment Grade Corporate Bond ETF (LQD)	Price, Trade Volume	Yahoo Finance	
Risk Free bonds	iShares 7-10 Year Treasury	Price, Trade Volume	Yahoo Finance	
Cryptocurrencies (BTC)	Bitcoin USD (BTC-USD)	Price, Trade Volume	Yahoo Finance	2010-07-16 to 2019-04-18

Outline for Analysis

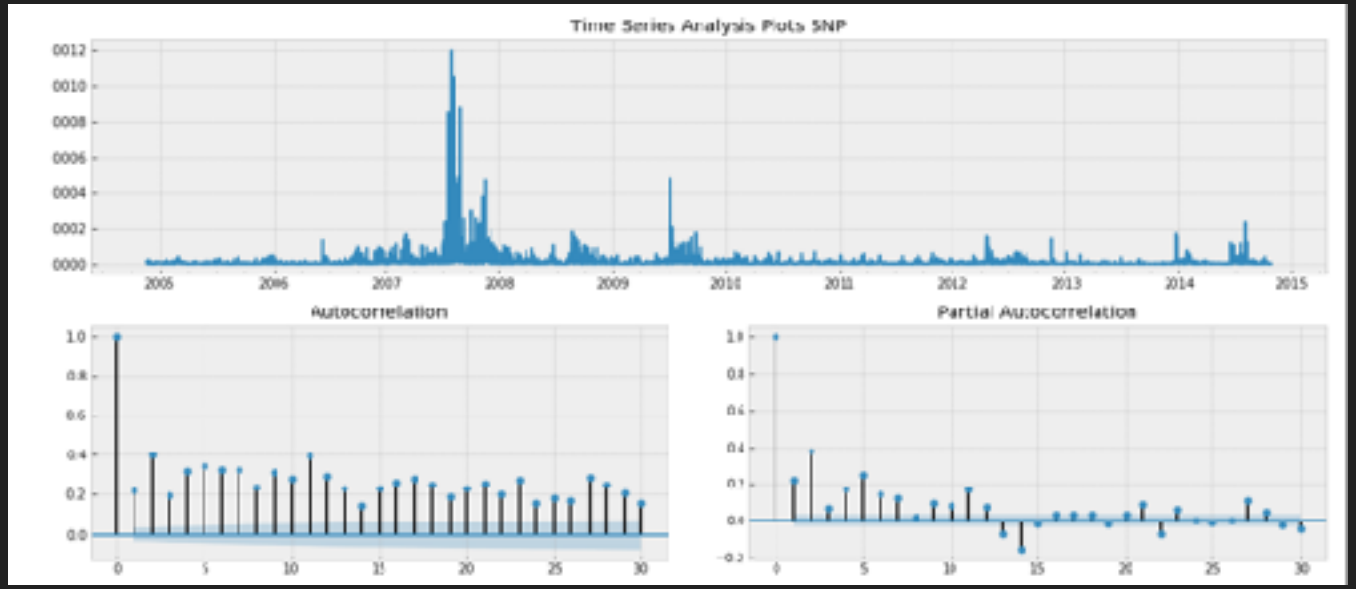
1. Create a Feature to model Asset Variance
    a. Utilizing ARIMA/GARCH
2. Create a Support Vector Machine
    a. Goal is to Predict the Direction of Returns (+1,-1)
3. Create an ANN Classifier
    a. Goal is to Predict with reasonable accuracy what bucket an asset falls into based on specific features

Creating a new feature with ARIMA

- ARIMA stands for Auto-Regressive Integrated Moving Average
- Used in Time Series Analysis when a time series displays certain Auto-Regressive tendencies
- Can be broken down into two components:
  - Auto-Regressive (AR) Model
    - Time Series that is regressed on lagged instances of itself
  - Moving-Average (MA) Model
    - Time Series Forecast Errors regressed on lagged instances of itself
  - Integrated Component:
    - Method of making the series “Stationary”
- How do we know what to do?

Start with ARIMA/GARCH

- We decide our ARIMA parameters via the Auto and Partial-Autocorrelation Plots, and use the residuals from this model as a proxy for model variance



Creating a Support Vector Machine

- Goal: Train an SVM Directional Classifier to forecast the direction of price movement 1-month out for each Asset Class in the Dataset and asses the utility of our ARIMA residuals
- Test each SVM on unseen Bitcoin price volatility, momentum (model1) and residuals (model 2)
- The best classifier will likely have the closest relationship to Bitcoin as an Asset Class

W/O Residual

	S&P 500	Gold	EUR/USD	USD/JPN	Corp_Bonds	Treas_Bonds
C_Param	10	0.001	1	0.0001	10	0.001
Gamma	10	0.01	100	100	1	0.01
Bitcoin Train_Accuracy	0.567483	0.565599	0.37302	0.535599	0.474576	0.565599
Bitcoin Test_Accuracy	0.565566	0.565888	0.331461	0.539688	0.47191	0.539888

With ARIMA Residuals

	S&P 500	Gold	EUR/USD	USD/JPN	Corp_Bonds	Treas_Bonds
C_Param	100	0.0001	100	1	10	0.001
Gamma	0.0001	0.001	100	0.001	0.1	1
Bitcoin Train_Accuracy	0.563716	0.563716	0.694915	0.563716	0.502197	0.563716
Bitcoin Test_Accuracy	0.606742	0.606742	0.674157	0.606742	0.567416	0.606742

Creating a Neural Net Classifier

- Goal: Take advantage of the flexibility of the input and output space to create an asset classifier with an input size of 60 (20-days of Logged Prices, Traded Volume, and ARIMA Residuals) and output size of 4 (Share, Gold, Curr, Com)

	S&P 500	EUR/USD	GOLD	Treas_Bond	Test Accuracy	Train Accuracy
Sigmoid	1289	1187	21	409	0.347103	0.350806
TanH	591	1520	200	582	0.121809	0.136039
ReLU	577	779	745	785	0.015385	0.004703

	S&P 500	EUR/USD	GOLD	Treas_Bond
S&P 500	0.566721	0.034060	0.284564	0.215287
EUR/USD	0.050260	0.802311	0.010738	0.030400
GOLD	0.246101	0.002567	0.562416	0.220299
Treas_Bond	0.136015	0.160462	0.142282	0.515024

	S&P 500	EUR/USD	GOLD	Treas_Bond
ReLU Classification	0.13251	0.801348	0.01909	0.047052

Interesting Findings?