To The Moon: Analyzing the Temporal Relation of Cryptocurrency Prices

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Objective:

- Analyze historical data for cryptocurrencies, focusing on recurring trends and patterns related to different time intervals.
- Aim is to provide valuable insight into any potential trends in price fluctuation.
- This analysis serves as a market report that can aid investors trading in cryptocurrencies.

Motivation:

Cryptocurrencies are growing in prominence as an alternative investment class. Cryptocurrencies like Bitcoin have exhibited unprecedented price volatility, creating both opportunities and risks for investors and traders. Understanding temporal dynamics can help mitigate risk and optimize investment strategies.

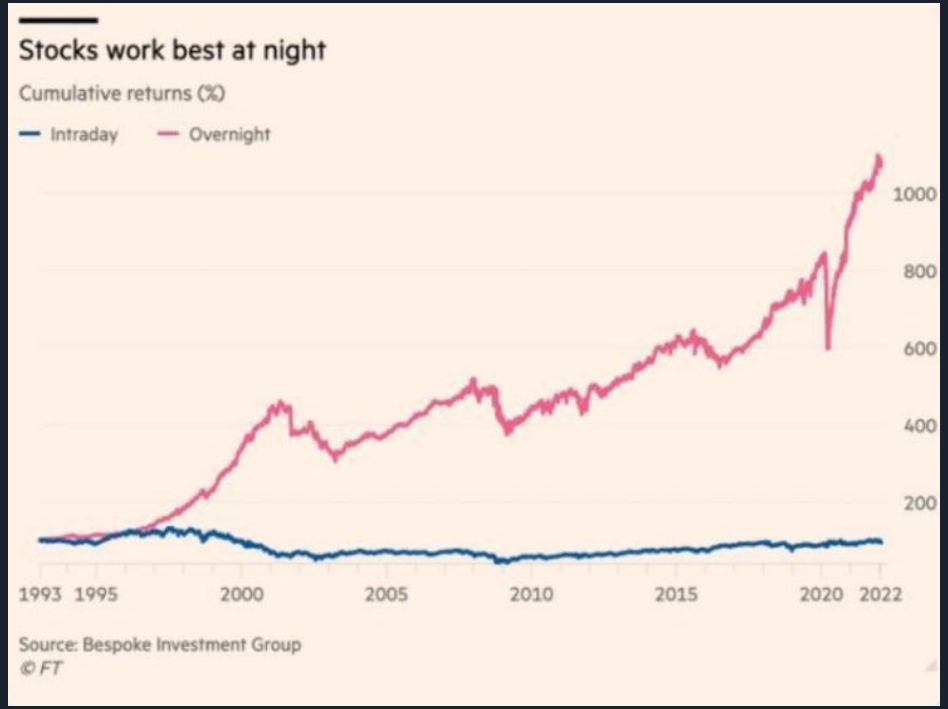
- Enhanced Decision-Making
- Risk Mitigation
- Long-Term Investment Strategies
- Education and Research

Preliminary Discussion of Data:

- Cryptocurrency markets are open 24/7
  - It is difficult to define a true open and close like other national stock exchanges would hold
  - Technically opens at 00:00 am and closes at 23:59 pm.
  - Does not behave exactly like other markets
- Historical data on cryptocurrencies (5 years):
  - Bitcoin (BTC)
  - Ethereum (ETH)
  - Litecoin (LTC)
- Looking for low-computational parameters for developing a trading algorithm.
- Focus on short term holding patterns > 1 month.
  - Opposed to holding positions for several years.
  - The overall goal is to determine optimal holding periods, ie. trading only on Mondays.

Background:

- Previous companies have done similar research with the S&P 500
- Bespoke Investment Group found that buying at the close and selling at the open would lead to an 1100% increase in profit.
- Likewise, buying at open and selling at close yields 20% loss.
- Can a similar type of solution be found for cryptocurrencies which emphasizes simple parameters. (Occam's Razor)

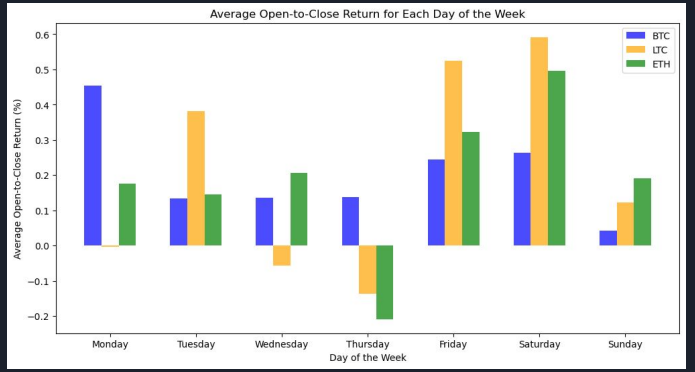


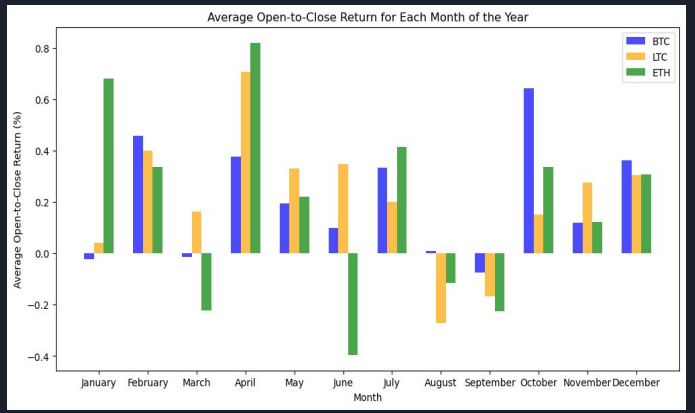
Approach/Methodology:

- Take a few years of historical data for the 3 more popular cryptocurrencies
    - Obtained from Yahoo Finance
        - 2015 for litecoin and Bitcoin
        - November of 2017 for Ethereum.
    - Data available in a CSV format
- Parsed out everything we did not need such as:
    - High and low of each day(unpredictable), especially on a single day, we stripped this data out to use in the rest of our analysis.
- Beginning with bitcoin (BTC), we ran each kind of cryptocurrency through various models and analyses, focusing on the daily returns (bought at the open, held for 24 hours, and sold at the close).
    - Analyzed on various time frames, Day of the Week, Month of the Year
- After running analysis on the individual currencies:
    - We combined them in order to infer any further trends or correlation in the data
    - By performing these calculations and running through these models, we began to see a trend in how investing like this may work in the real world exactly as Bespoke investment did with the S&P in the 1990's.

Results:

- Daily Trends:
  - BTC most profitable on Mondays
  - LTC/ETH most profitable on Saturdays & Fridays
- Monthly Trends:
  - LTC/ETH most profitable in April
  - LTC least profitable in August, June for ETH
  - BTC most profitable in October - Least profitable in September



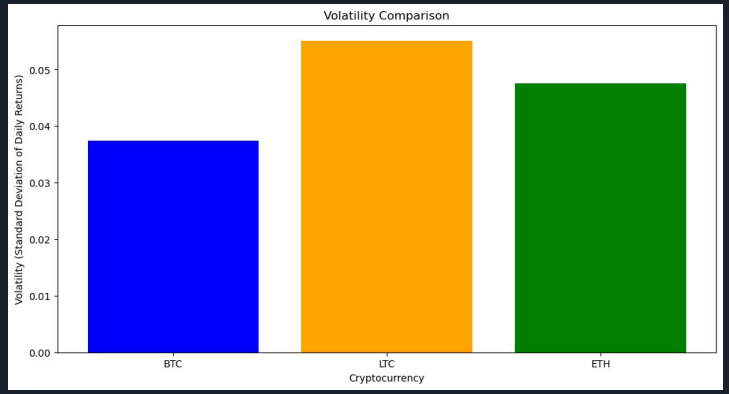


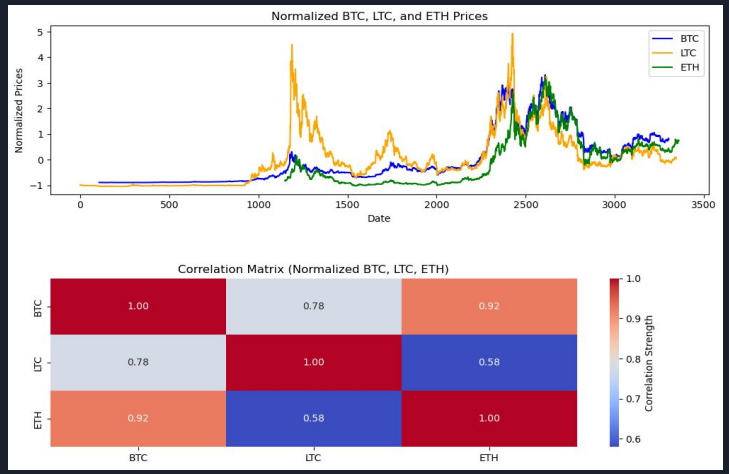
Results Cont

- Inter-Crypto Relations:
  - BTC influences market sentiment (LTC & ETH follow)
- Volatility:
  - LTC exhibits highest price fluctuations
- Predictive Modeling:
  - Created a basic ML model to predict if a given day was profitable
  - 78% accurate, 0.76 precision
  - Looks promising, though it may be misleading
  - Performs well on historical data
  - Model less likely to predict current data after

Model Accuracy: 0.78
Classification Report:

	precision	recall	f1-score	support
0	0.76	0.76	0.76	295
1	0.79	0.79	0.79	345
accuracy			0.78	640
macro avg	0.78	0.78	0.78	640
weighted avg	0.78	0.78	0.78	640





Primary Issues Encountered:

- Limited data for market opening/closing analysis
  - Objective: Analyze cryptocurrency market prices concerning global market opening/closing times
  - Challenge: Historical data labels open/close at 00:00 AM and 23:59 PM, hindering detailed analysis
- Adaptation:
  - Pivot: Unable to assess intraday price changes on a large scale
  - Revised Focus: Explored trends with different time intervals (days of the week, months of the year)

Future Work:

- Machine learning for enhanced predictions
  - Train a model with existing data
  - Explore profitability trends during specific months and/or times of the year
- Advancing predictive models:
  - Leverage new algorithms and statistical methods
  - Train models on extensive data for nuanced behavior
- Deeper insights with ML:
  - Combine research with ML for a comprehensive understanding
  - Provide investors and analysts with informed decision making tools
- Expanding Analysis:
  - Gather data from more cryptocurrencies
  - Explore trends across different digital assets

Org Chart (Timeline/Responsibilities):

- Data Selection - Oct. 1st
  - Collect all the data required to feed the model.
- Data Cleaning - Oct 15th
  - Data will need to be cleaned and formatted so that it will work within the developed model.
- Build Model using Python - Oct 21st
  - Complete the model that will be used to analyze cryptocurrency prices in relation to specific temporal dimensions, eg. time of day, day, month, year.
- Analyze Results - Oct 28th
  - Results obtained from the model will need to be analyzed for any patterns.
- Draw Conclusions - Nov 1st
  - Once results have been analyzed, we must draw conclusions
- and find any market insight based on the results retrieved.
- Create Diagrams - Nov 7th
  - Patterns from the results will best be represented in visual format. This will also be the key element of the presentation to the class
- Finish Report - Nov 30th
  - An overarching compilation of all the parts of the project in written form. Includes Introductions, Objectives, Methodology, Results, and Conclusions.
- Finish Presentations - Dec 3rd
  - A PowerPoint presentation that combines the figures produced from the "Create Diagrams" milestone with key components of the report to create a succinct and informative overview of our project to other students.

Org Chart (Timeline/Responsibilities) Cont.:

- Responsibilities:
  - Kellan Christ: Coordinator
    - Set forth individual tasks
    - Created overall project objective
  - Cory Headrick: Monitor
    - Worked on code, model, and analysis
    - Implemented designs & direction set forth by Coordinator
  - Kevin Craddock: Recorder
    - Also worked on code & analysis
  - Logan Bowers: Checker
    - Analysis & interpretation of models provided by Cory & Kevin

Sources:

Udland, Myles. “Buy the Close, Sell the Open.” Yahoo! Finance, Yahoo!, finance.yahoo.com/news/buy-close-sell-open-114705554.html. Accessed 28 Nov. 2023.

Questions?