

Stock Market & GDP Analysis

Exploratory data analysis (EDA):

○ Count of observations and features

The VXX table has 3,983 observations and 6 features. The VTI table has 5,910 observations and 6 features. The GDP table has 91 observations and 2 features. The Bitcoin table has 350 observations and 6 features.

○ Data type of each feature — categorical or numerical?

Date values are categorical, and the GDP values, stock market values (open, close, high, low, volume), Bitcoin values are numerical.

○ Created fields?

I created a measure to calculate the YOY percentage growth.

Data Cleaning and Wrangling:

Cleaning

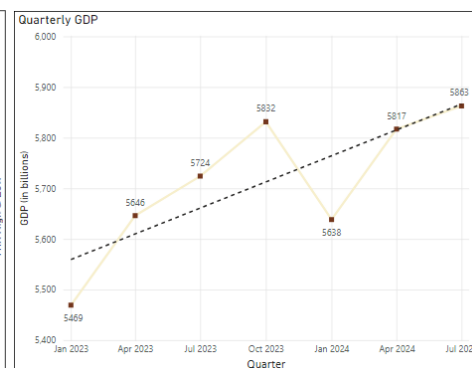
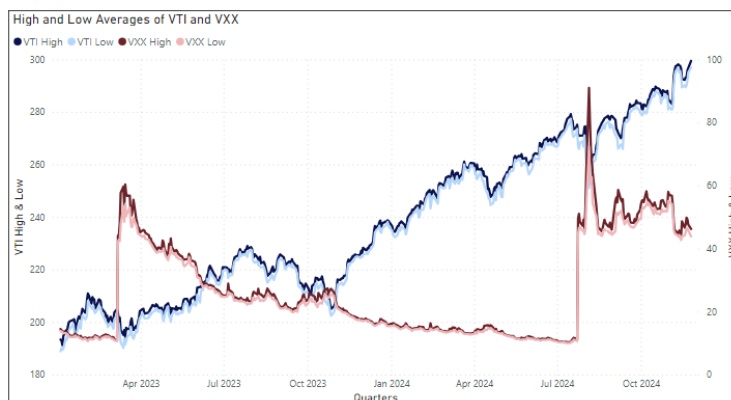
- When using the API, changed the placement of the date values (previously displayed as columns, now included into a single column) with Python
- Renamed columns (from “1.open” to “open”) in Power BI with Power Query
- Deleted index columns in Power BI with Power Query

Wrangling

- Created a Year column for the GDP data table
- In the model view, managed relationships and connected the VTI and VXX tables by date
- Created line graphs for: the VXX and VTI values, the GDP values, the Bitcoin values, and YOY GDP growth
- Created matrix table for the GDP and GDP YOY Growth values
- Calculated YOY Growth for GDP with measure in Power BI

Part 1:

How have GDP, VXX, and VTI changed during the last year or so? How have these values changed with respect to each other?



Throughout 2023, GDP saw a moderate steady increase. Following 2023's Quarter 4 peak, in the first quarter of 2024, the GDP then saw a small decline, with a quick rebound in the second quarter. By Quarter 3, it surpassed the levels of 2023 Quarter 4. Throughout this period, the year over year growth percentage hovered around 2.40%-3.24%. The quarter 4 increase and quarter 1 decrease reflect seasonal patterns, typical of GDP trends for previous years.

VXX tracks volatility and increases during times of market turbulence. The VXX has significantly fluctuated since January 2023. In March 2023, in the span of two days, the VXX jumped from \$10.86 (March 6) to \$44.16 (March 7). Within the next few days, it increased to \$60.38 (March 15). This market uncertainty can be explained by the regional US banking crisis, when Silicon Valley Bank (SVB) collapsed (Visual Capitalist). The VXX then steadily decreased until July 23, 2024, during 2024's third quarter, when it was trading at \$10.97. Market uncertainty surged again as President Joe Biden announced his decision to drop out of the presidential race in July. The value shot up on July 24, 2024 to \$49.67, and sharply increased until August 5, 2024, when it reached \$91.02. Within the next 9 days, it decreased to \$46.45 and has since stood between \$46 and \$59 during 2024's fourth quarter. The sharp and frequent fluctuations highlight moments of market turbulence and investor anxiety, influenced by a variety of factors, including the SVB collapse and the presidential period.

VTI represents is the overall measure of stock prices and increases as stock performance increases. Since January 2023, the high values of VTI have steadily increased, with a short period of decline during the end of the third quarter and the beginning of the fourth quarter. On November 25, 2024, it stood at its highest, with shares trading at \$299.47. While the VTI values were not significantly impacted by high VXX values during 2024's third quarter, during times of high volatility, the VTI curve is less smooth.

Are they moving together, or counter to each other?

From January 2023 until November 2024, the GDP and VTI values generally move together, apart from 2024's first quarter, when the GDP experiences the usual seasonal small decline. In general, GDP and VTI values can increase together, as a good economy signifies high stock prices.

Regarding the VTI, and VXX values, when the market (VTI) acts in a predictable way, the volatility (VXX) decreases. The VTI and VXX values generally move counter to each other, except for unpredictable shocks which increase investor fear. This can be witnessed during the third quarter of 2024, on July 22, when President Joe Biden withdrew his 2024 presidential bid. During this period, the VXX increased significantly, and the VTI saw a small decline, but quickly rebounded, while the VXX remained high. Fears, represented by the VXX index, have remained high during the election season, including post Trump victory.

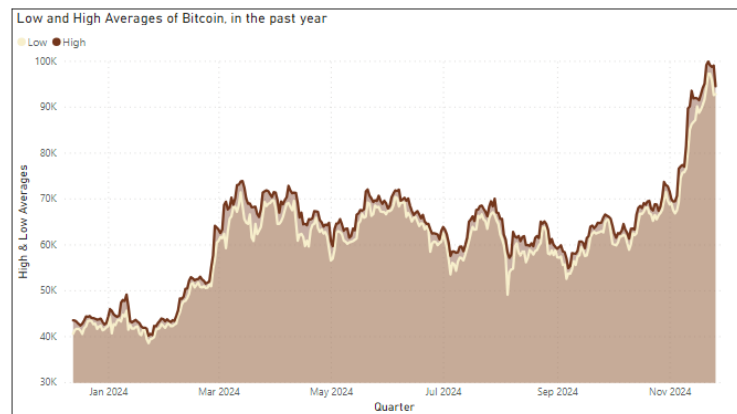
What are the limitations of using this data to try to understand the health of the national economy?

The GDP, and the VXX and VTI are helpful measures to describe the health of the national economy. However, they don't tell the full story. Namely, while the GDP provides data on the economy, it doesn't account for debt, unemployment, or inflation, all significant parts of a national economy. While the VTI provides useful information about the stock market performance, it does not always correlate with the GDP, as was the case in quarter 1 of 2024, when GDP decreased and the VTI kept increasing. Lastly, while the VXX index provides a good measure of market fear, fear itself does not lead the market. As we can see in the data, VTI can continue to increase while VXX peaks. The VXX solely reflects investor sentiment.

Part 2:

What has happened in the cryptocurrency market in the last few years?

Bitcoin was launched in 2009. Since its creation, the market of cryptocurrency has significantly grown. In the last year, the Bitcoin market saw increases in February-March and November. The price reached its highest on November 22, at \$99,860. The March 2024 growth spurt can be explained by the approval of Bitcoin EFTs in the US (Statista). The November 2024 cryptocurrency increase can be explained by Donald Trump's victory in the United States 2024



presidential election. During the July 2024 Bitcoin Conference in Nashville, Trump embraced the growth of the cryptocurrency market, branding himself as the pro-crypto candidate, vowing to create a bitcoin advisory council, and pledging to keep US bitcoin holdings.

■ How has the price of Bitcoin moved in regards to VTI, the overall measure of stock prices? And in regards to VXX?

The price of Bitcoin does not seem to be correlated to VTI or VXX. The increases/decreases of Bitcoin do not exactly overlap with those of VTI or VXX. Instead, increases in Bitcoin prices occur in February-March and November 2024 can be explained by crypto-currency-specific events: the approval of Bitcoin EFTs in March and Donald Trump's victory in November. While the VXX and Bitcoin both see increases during the presidential period, they see them at different times (for VXX, it begins when Biden drops out of the race, for Bitcoin, it begins when Trump wins).

■ What are the limitations of using this data to try to understand the cryptocurrency market?

The following Bitcoin data gathered for this analysis is not representative of the entire cryptocurrency market. There are many different forms of digital currency.

While the factors that affect stock prices similarly impact cryptocurrency, there are limitations to using crypto data to understand stock market performance. Crypto is highly volatile, more susceptible to market manipulation, and does not have regulatory protections. While high crypto numbers may signify a healthier investor confidence, they are not measure of a healthier economy, which can be analyzed with GDP, the VXX and VTI indexes.

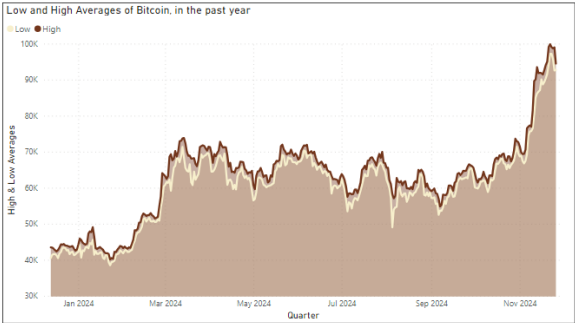
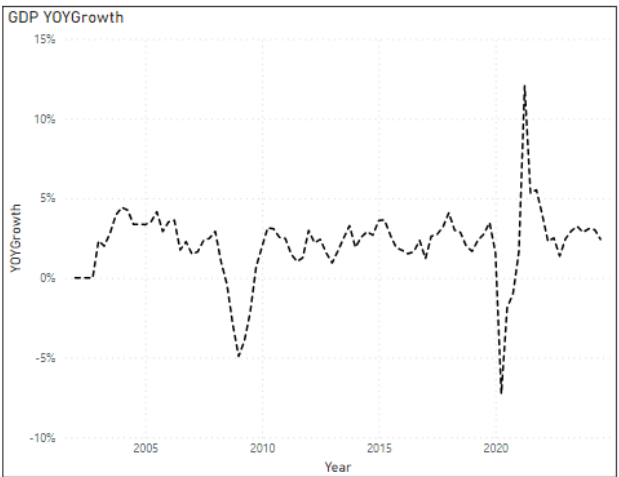
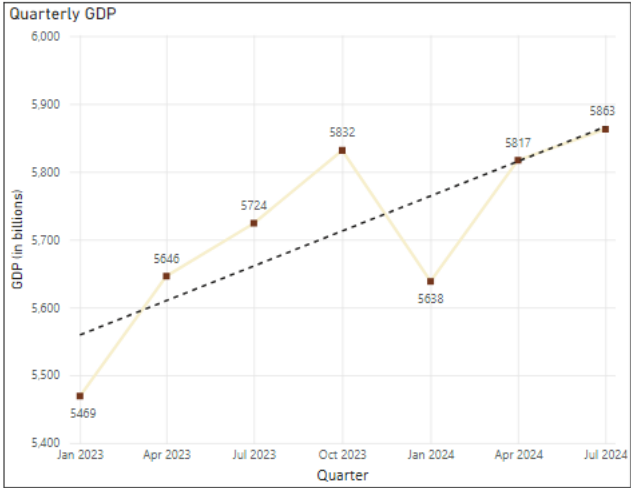
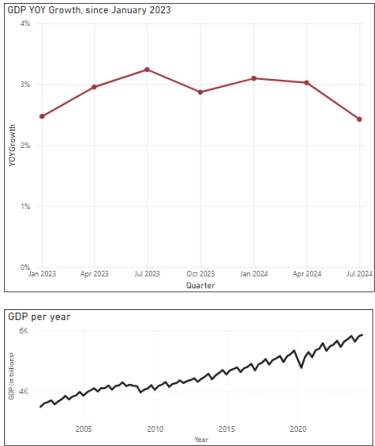
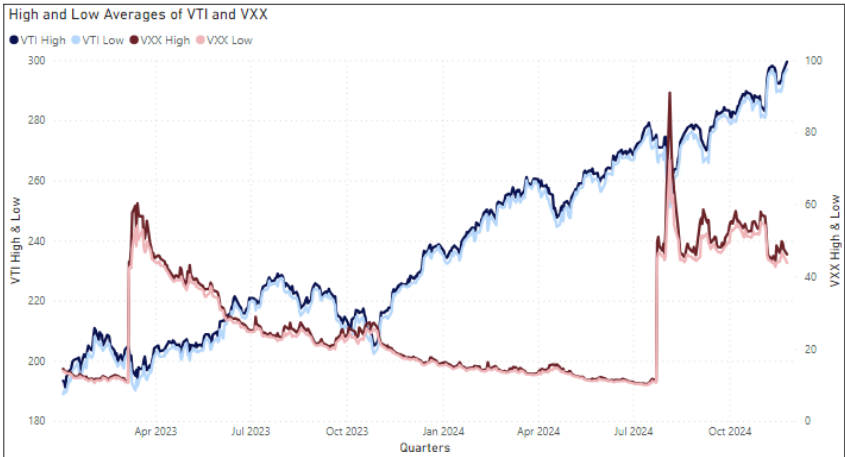
● Business recommendation

When thinking about investing in the stock market and buying shares, consider a couple of aspects. While the GDP has shown steady growth over the last few years, it's crucial to remember that it does not tell the full story about the health of the national economy. To obtain this full picture, one must look at unemployment rates, inflation, or national debt.

While the VTI and VXX index may appear to move counter to each other, during times of unpredicted shocks, this is no longer the case. It's crucial to remember that fear itself does not lead the market. High volatility does not imply low stock market performance. From the data, we see that the VTI index can continue to increase (albeit with more fluctuations), even when the VXX is high.

Furthermore, while investors should tread carefully with crypto as it's not well regulated or protected, it will be a growing industry in the coming years. In July 2024, at a Bitcoin conference, President-elect Donald J. Trump branded himself as the pro-crypto candidate, vowing to create a bitcoin advisory council, and pledging to keep US bitcoin holdings. Bitcoin saw an significant increase in November when Trump was elected. For the coming years, investors are being told to closely watch the creation of a bitcoin reserve, and growth in the mining sector (Torpey).

Supporting Visualizations



Work Cited

- Associated Press. (2024). *Bitcoin and crypto: Donald Trump election impact*. AP News. Retrieved from <https://apnews.com/article/bitcoin-crypto-donald-trump-election-c2e2a1a895288c5e9c0df2721012a5bb>
- Rooney, K. (2024, November 6). *Trump claims presidential win: Here's what he promised the crypto industry ahead of the election*. CNBC. Retrieved from <https://www.cnbc.com/2024/11/06/trump-claims-presidential-win-here-is-what-he-promised-the-crypto-industry-ahead-of-the-election.html>
- Statista. (2024). *Bitcoin price index*. Retrieved from [https://www.statista.com/statistics/326707/bitcoin-price-index/#:~:text=Bitcoin%20\(BTC\)%20price%20again%20reached,involving%20Tesla%20and%20Coinbase%2C%20respectively](https://www.statista.com/statistics/326707/bitcoin-price-index/#:~:text=Bitcoin%20(BTC)%20price%20again%20reached,involving%20Tesla%20and%20Coinbase%2C%20respectively)
- Visual Capitalist. (2024). *Market volatility in 2023*. Retrieved from <https://www.visualcapitalist.com/sp/market-volatility-in-2023/>
- USA Today. (2024, November 23). *Bitcoin price explained*. Retrieved from <https://www.usatoday.com/story/money/2024/11/23/bitcoin-price-explained/76525250007/>
- Crypto.com. (n.d.). *Key macroeconomic indicators and their impact on the cryptocurrency market*. Retrieved from <https://crypto.com/en/university/key-macroeconomic-indicators-impact-on-cryptocurrency-market>
- CCN. (n.d.). *How crypto is shaping global economies and GDP*. Retrieved from <https://www.ccn.com/news/crypto/crypto-shaping-global-economies-gdp-how/>
- Investopedia. (n.d.). *Bitcoin's price history*. Retrieved from <https://www.investopedia.com/articles/forex/121815/bitcoins-price-history.asp>
- Torpey, K. (2024, November 6). *What Trump's election win could mean for Bitcoin and crypto*. Investopedia. <https://www.investopedia.com/what-trumps-election-win-could-mean-for-bitcoin-crypto-8740461>