



MONTHLY INSIGHTS REPORT

MAY 2022

CRYPTO RISK AND TRADITIONAL MARKETS RISK: A COMPARISON

These monthly reports leverage our unique insights to tell stories of the cultural and economic impact of crypto adoption.

TL;DR:

- In finance theory, the evaluation of the true risk of an asset includes two components: (i) volatility; and (ii) correlation with the overall market.
- In examining crypto's volatility, we find that Bitcoin and Ethereum have similar volatility to commodities such as oil and natural gas, and comparable in size and volatility to stocks such as Tesla, Lucid, and Moderna.
- In examining crypto's correlation with the overall market, we find that large cap cryptos have a lower volatility and a higher correlation than other cryptos with the overall market.
- In examining crypto's beta, which, is the product of volatility and correlation, and the true measure of the risk of an asset, we find that Bitcoin and Ethereum have similar risk profiles to many other commonly held stocks included in the Nasdaq 100.

INTRODUCTION

It is a common refrain that cryptocurrencies are disproportionately volatile compared to traditional assets, and therefore an unsafe risk. In this report, we assess how risky crypto assets really are. We begin with defining how to measure risk, and then compare the risk of crypto assets relative to commodities, stock indices, and individual stocks.

Finance theory informs us that the right measure of risk is the product of (i) the volatility of crypto returns and (ii) the correlation between cryptocurrency returns and the overall market returns. In other words, risk is not only how an asset price moves over time, but also how it co-moves with the overall market. In this report, we provide an analysis of both components of risk. Going forward, we will apply this same framework on a regular basis to objectively and systematically examine crypto's risk.

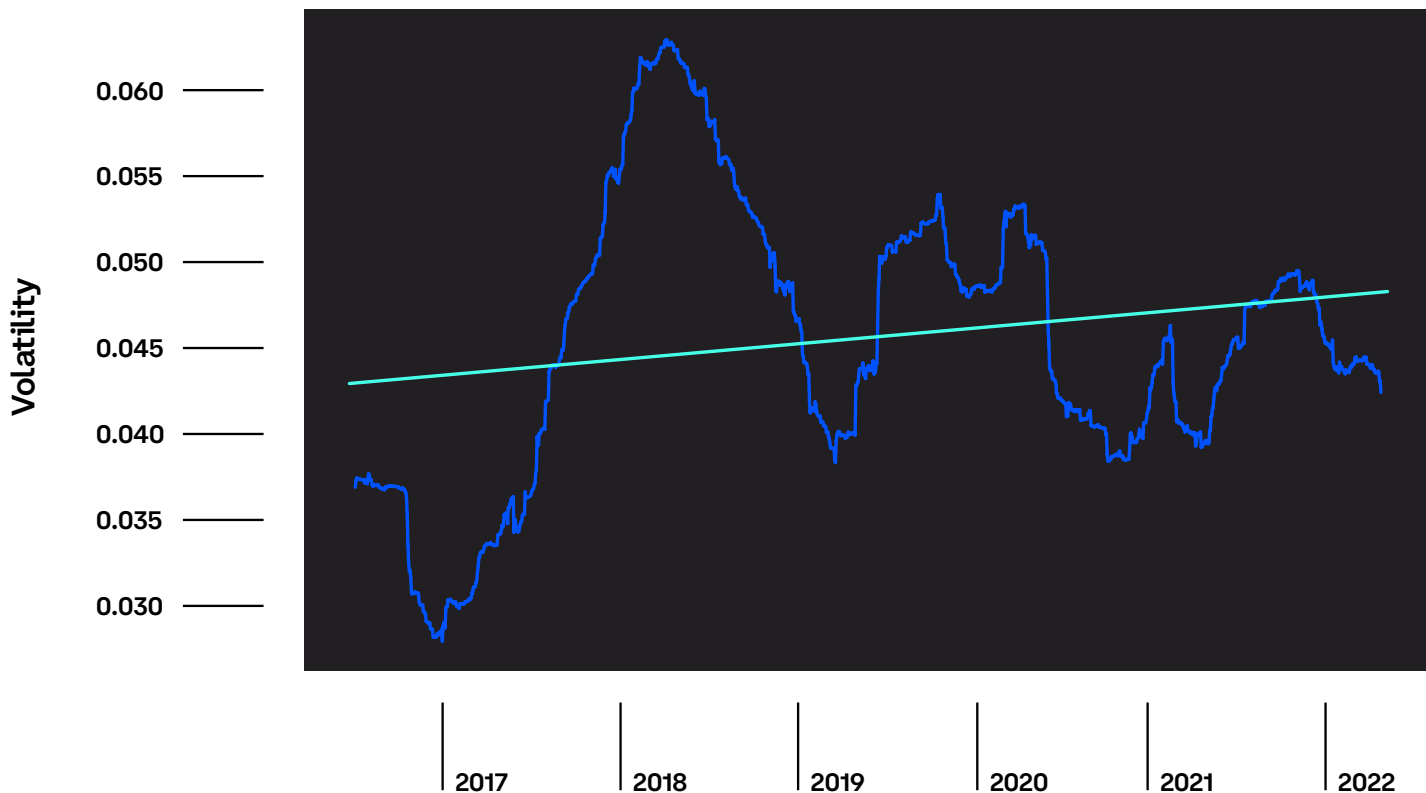
First, we compare the volatility of cryptocurrencies to that of precious metals, commodities, stock indices, and individual stocks. Second, we examine how cryptocurrencies co-move with the overall stock market. Finally, we bring these two components together to determine how to comprehensively assess cryptocurrency's risk.

VOLATILITY IN CRYPTO MARKETS

First, we look at the volatility of cryptocurrency returns. Figure 1 shows the evolution of daily volatility (1-year rolling) over time from July 2015 until the end of April 2022.¹

Since 2016, Bitcoin has been changing in value by about 4.4% each day on average. Moments of relative calm are followed by times of high volatility, as in early 2018, late 2019, and late 2021. As of the end of April 2022, the market volatility is slightly below the historical average. Many crypto commentators have argued that as the cryptocurrency market develops and matures, we would observe volatility declining. The linear fit line in the figure shows that the volatility has not yet subsided, and, if anything, it has increased slightly over time.

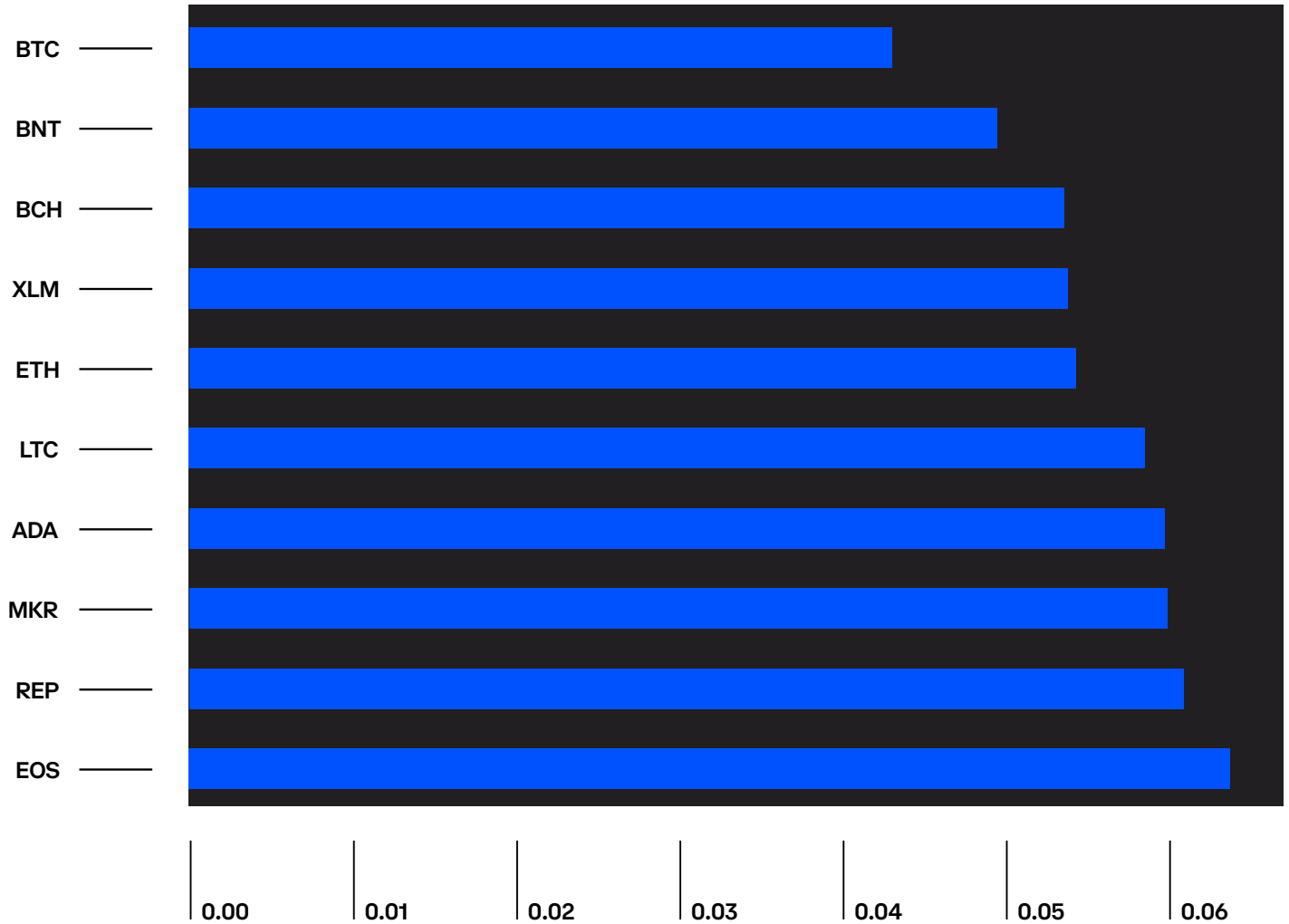
FIG 1: BITCOIN DAILY VOLATILITY (1YR-ROLLING)



¹ All figures used in this report are as of April 30, 2022.

Bitcoin is the most well-known cryptocurrency, but there are over 18,000 other cryptocurrencies. Among all cryptocurrencies, Bitcoin has the lowest volatility, followed by Bancor, Bitcoin Cash, Stellar, and Ethereum, as shown in Figure 2.

FIG 2: CRYPTO WITH LOWEST DAILY VOLATILITY OVER LAST YEAR



In fact, there is a negative relationship between cryptocurrency market size and volatility. In Figure 3, each blue dot represents a cryptocurrency. On average, the most popular cryptocurrencies with large trading volume display a lower volatility, around 4-6% per day, while volatility is in the 8-10% range for cryptocurrencies with lower trading volume. This pattern is consistent with what we observe in the stock market, where large mature firms are less volatile than smaller younger ones.

FIG 3: RELATIONSHIP VOLATILITY - TRADING VOLUME IN CRYPTO

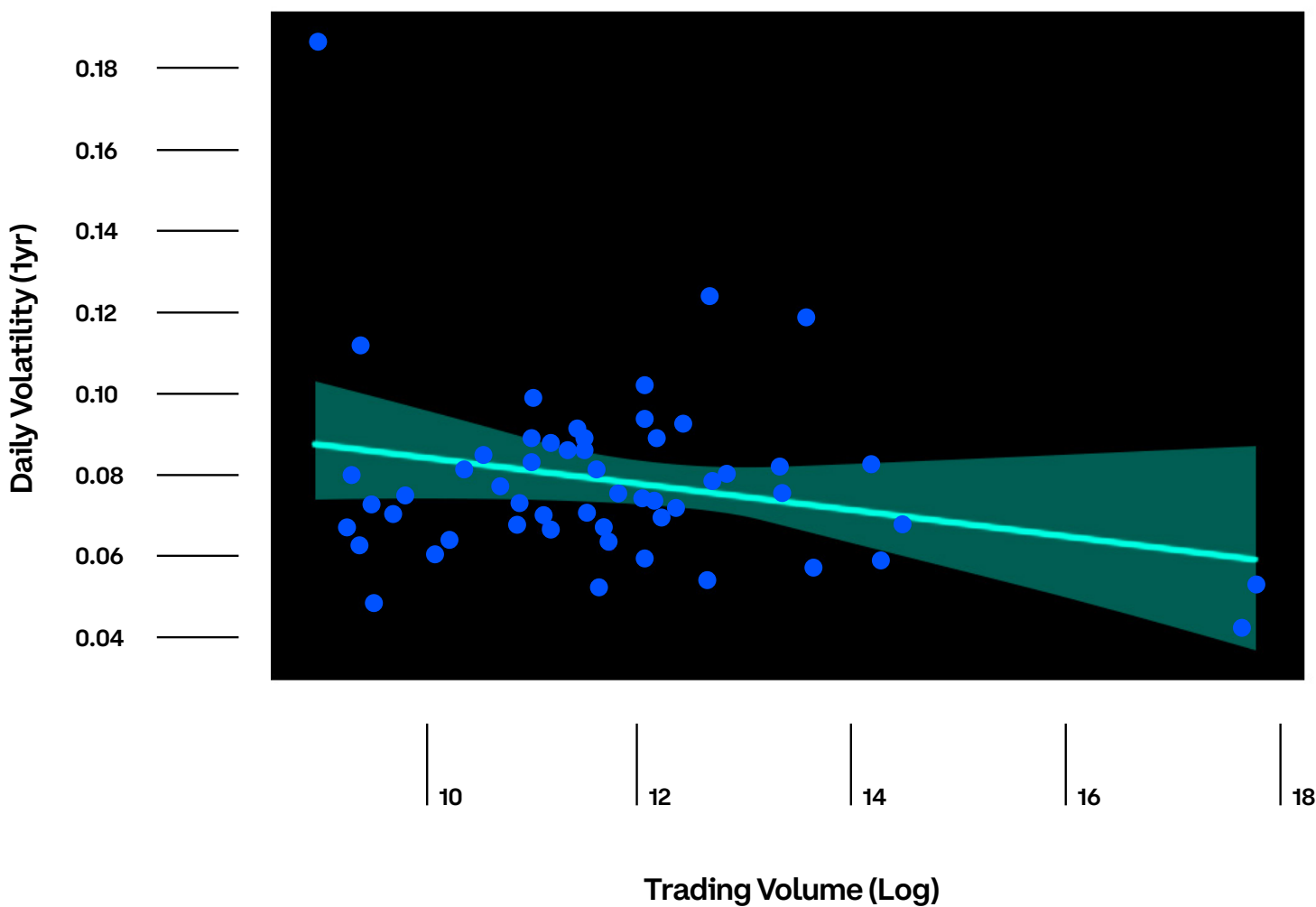
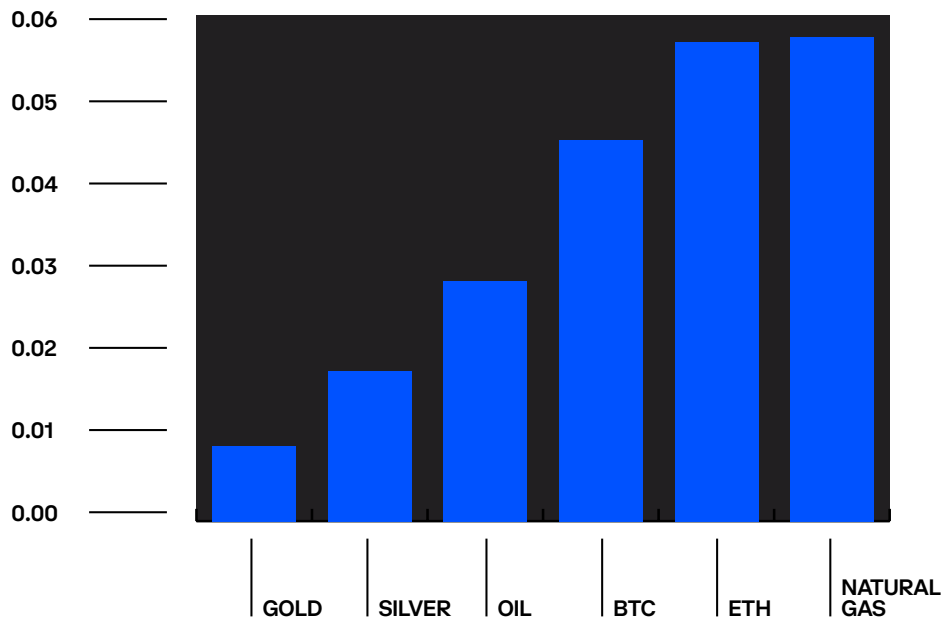
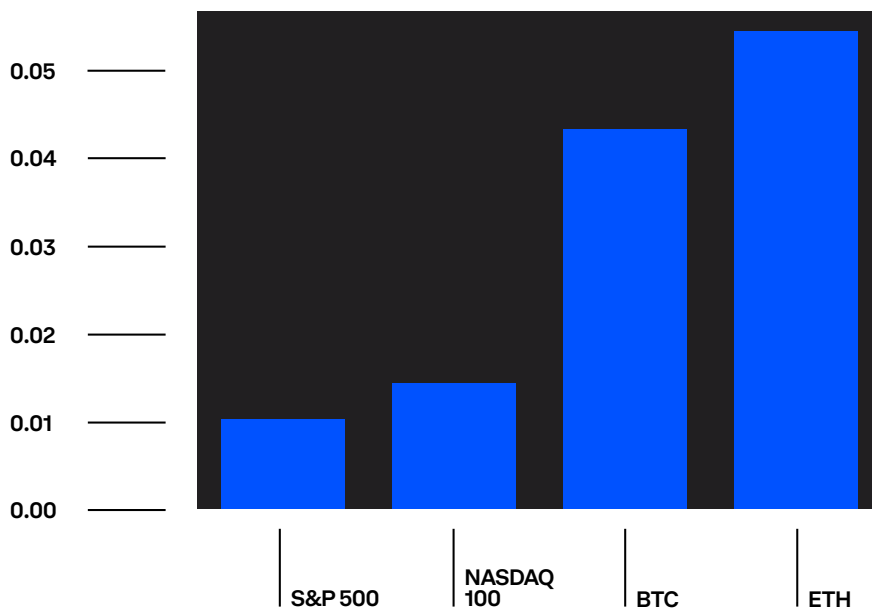


FIG 4: VOLATILITY: CRYPTO VS OTHER COMMODITIES



Proponents of Bitcoin often claim that the immutability, portability, divisibility, and limited supply embedded in the code make Bitcoin an ideal vehicle for storing value and acting as a hedge against inflation. Bitcoin is therefore often compared to gold and other commodities. Here, we compare the volatility of Bitcoin with that of traditional commodities: gold, silver, oil, and natural gas. Looking at the last year of price changes, Figure 4 shows that precious metals like gold and silver have relatively low daily volatility, between 1% and 2%, whereas cryptocurrencies like Bitcoin and Ether have volatilities that are similar to natural gas and oil, between 4% and 5%.

FIG 5: VOLATILITY: CRYPTO VS STOCK INDICES



Finally, we compare crypto volatility with that of the stock market. Commentators often compare individual cryptocurrencies to stock indices to conclude that crypto is disproportionately volatile. Figure 5 shows that Bitcoin and Ethereum’s volatility is 3 to 4 times higher than the S&P 500 and the Nasdaq 100 indices. But stock indices are not a comparable benchmark for assessing the volatility of individual cryptocurrencies: indices are baskets of many stocks, designed for low volatility because of the diversification effect.

A comparable benchmark is to compare cryptocurrencies with individual stocks. Given the technology embedded in crypto, the natural benchmarks are the 100 stocks that constitute the Nasdaq 100 index. The Nasdaq 100 is a large-cap growth index and includes 100 of the largest domestic and international non-financial companies listed on the Nasdaq Stock Market based on market capitalization. Technology stocks are also the dominant sector in the Nasdaq 100.

In figure 6, we present a scatterplot of all 100 Nasdaq 100 stocks ranked by market capitalization and volatility. Each blue dot in the figure represents a stock. While the average daily volatility of the Nasdaq 100 is around 1.5%, individual stocks have much higher volatility. Additionally, there seems to be a trend of small cap stocks typically having higher volatility, while large cap stocks like Apple, Google, and Microsoft have lower volatility.

We then turn our attention to Ethereum and Bitcoin, the two red dots in the graph. They are in the top decile of volatility among the Nasdaq 100 constituents, but are not the most volatile: 5 stocks are more volatile than Bitcoin, and 2 are more volatile than Ethereum. Bitcoin is similar both in terms of volatility and size to Tesla. Ethereum, on the other hand, is more comparable to Lucid and Moderna.

FIG 6: VOLATILITY: CRYPTO VS NASDAQ 100 CONSTITUENCIES

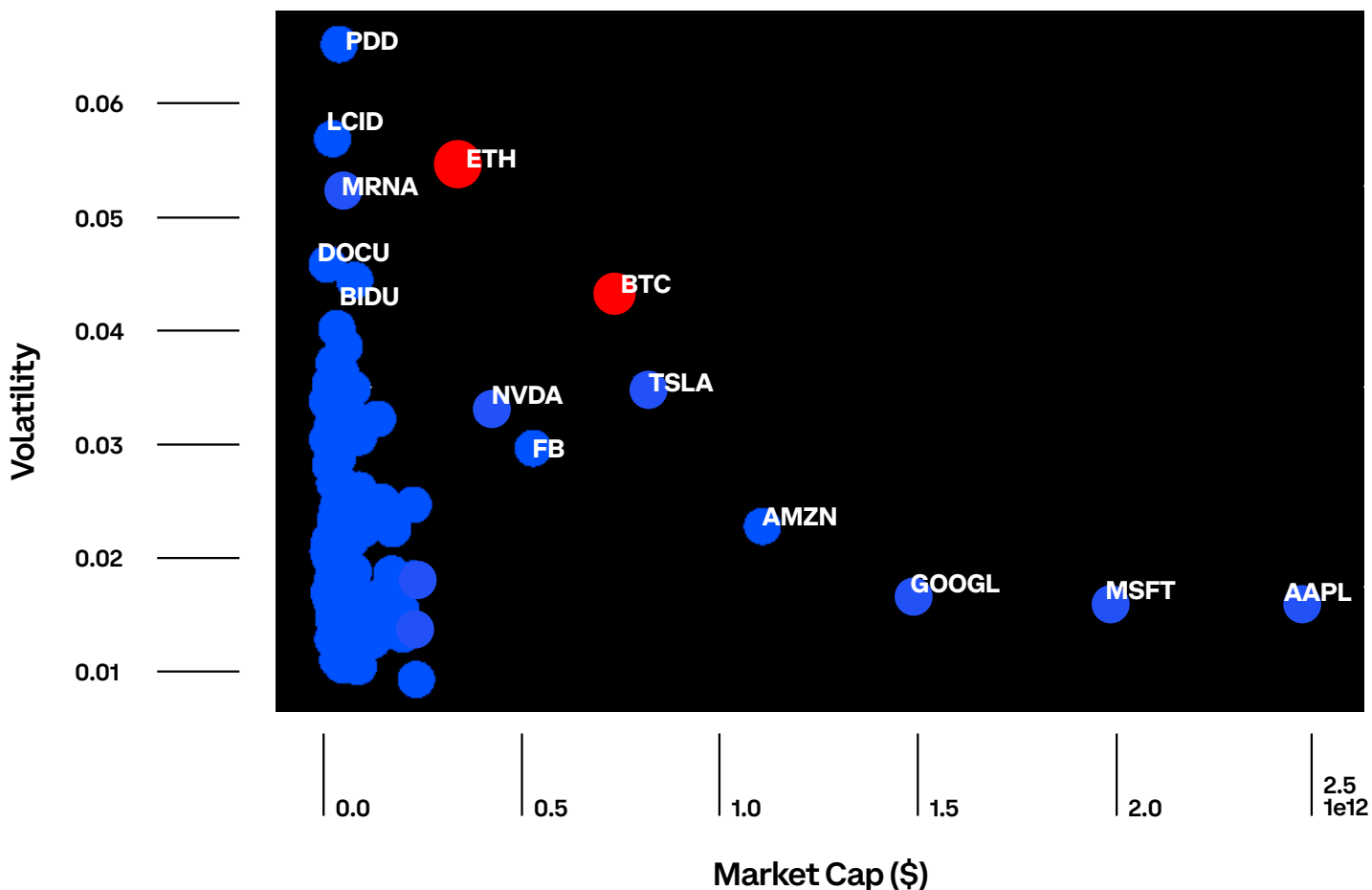
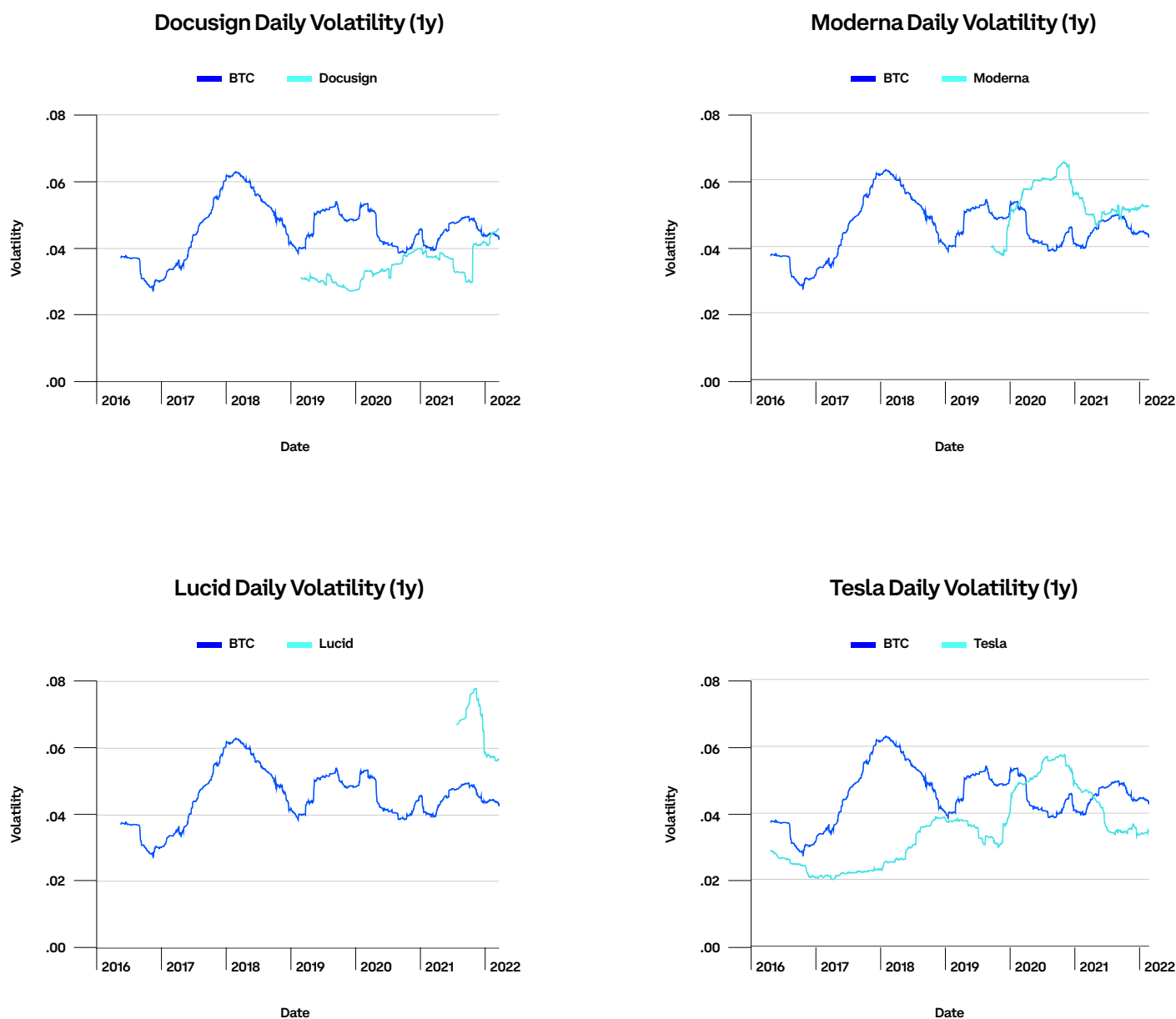


Figure 7 compares the volatility of BTC relative to Docusign, Lucid, Moderna and Tesla. As shown in the graphs, like with the case of Bitcoin, these stocks experience periods of high volatility, followed by moments of calm. More importantly, in many months, the volatility of these stocks are significantly higher than the volatility of Bitcoin.

FIG 7: RELATIONSHIP CORRELATION - TRADING VOLUME IN CRYPTO



CORRELATION BETWEEN CRYPTO & STOCK MARKETS

When assessing the risk of an asset, two components need to be considered. The first is the asset’s volatility relative to the overall market. The second is the correlation between the asset and the market. Diverse asset portfolios would consider a particular stock to be very safe even if very volatile if there is no correlation with the market. To understand the overall risk of crypto, we thus need to consider the correlation with the overall market, which we proxy in this report with the S&P 500.

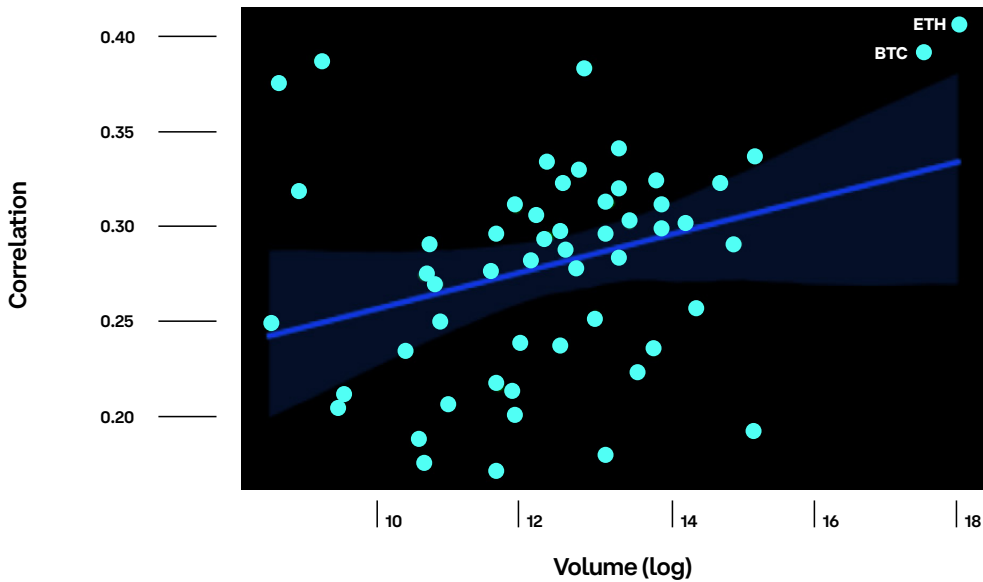
Figure 8 shows the trend in correlation between Bitcoin and the S&P 500. Until early 2020, the crypto market was virtually uncorrelated with the market. But since 2020, the crypto market has begun moving more in tandem with the market. The correlation between Bitcoin and the S&P 500 currently ranges between 20-40%.

FIG 8: CORRELATION BITCOIN – S&P 500



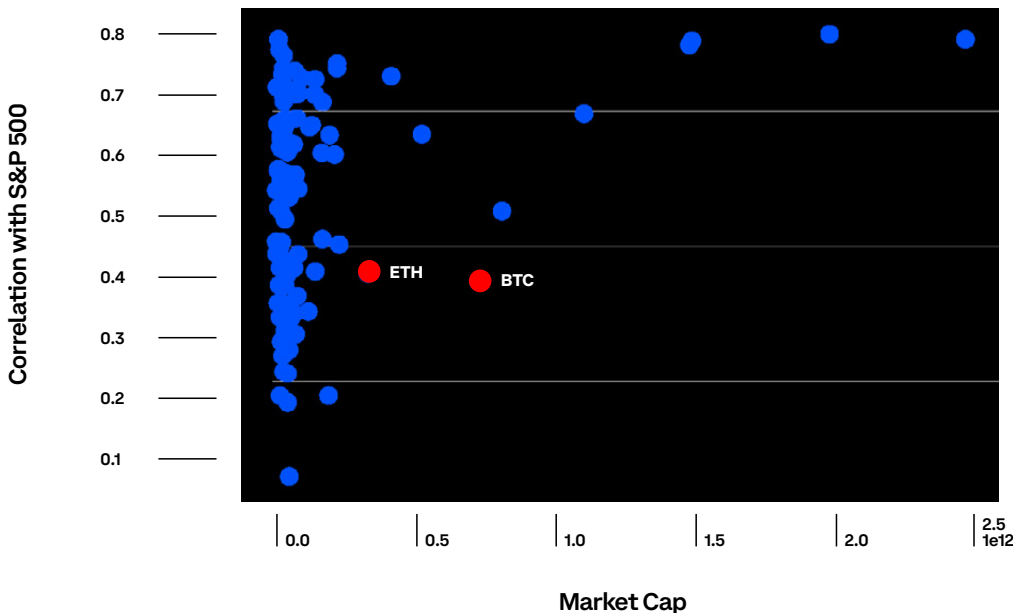
Turning to other cryptocurrencies, we find that while Bitcoin and Ethereum have the lowest volatility, they also have the highest market correlation. In fact, Figure 9 shows that cryptocurrencies with less volume have lower correlation with the overall market.

FIG 9: CORRELATION: CRYPTO VS NASDAQ 100 CONSTITUENCIES



Despite the increasing correlation between cryptocurrencies and the stock market, the overall level of correlation is still relatively low. Over the last year, the average correlation between the constituents of the Nasdaq 100 and the S&P 500 has been 55%, while the average correlation between cryptocurrencies and the S&P 500 has been only 27%. Figure 10 shows that Bitcoin and Ethereum are in the lowest quartile of correlation across all Nasdaq 100 stocks.

FIG 10: CORRELATION WITH S&P 500



BETA: ASSESSING THE RISK OF THE CRYPTO MARKETS

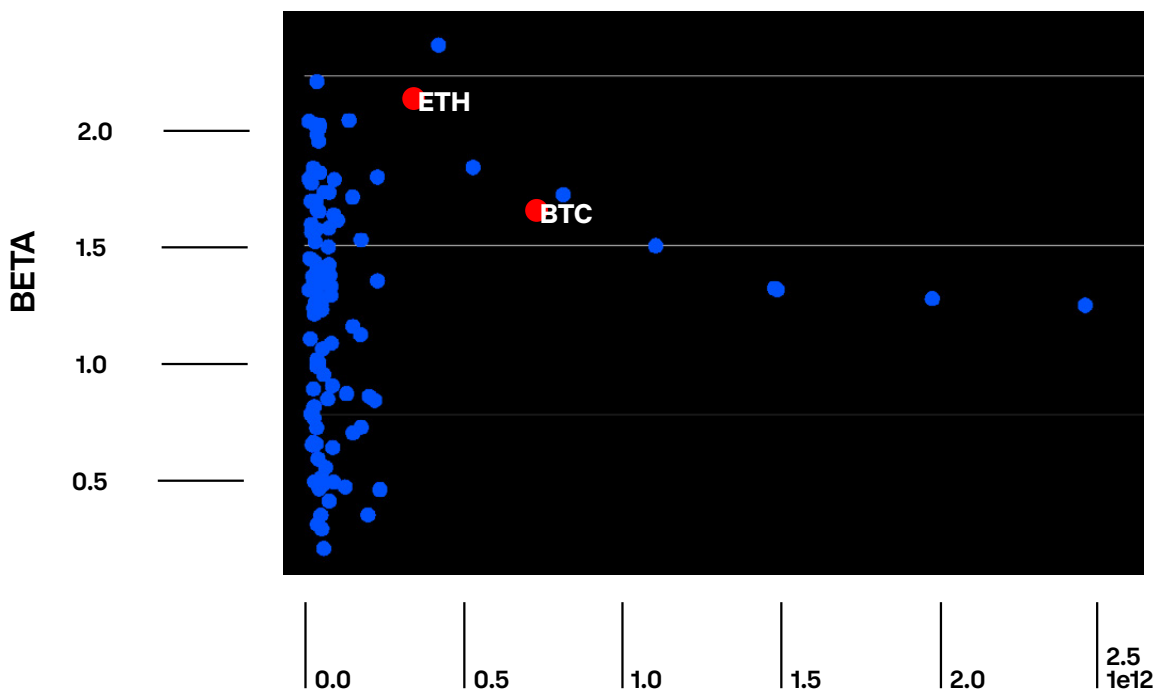
The guiding principle in assessing the riskiness of an asset should not solely be volatility, or correlation with the overall market, but a combination of the two. In finance, we call this "Beta," or the common risk of an asset relative to the market.

$$\text{Beta} = \rho \frac{\sigma}{\sigma_m}$$

Where ρ is the correlation between the asset and the market, σ is the volatility of the asset, and σ_m the volatility of the market. In other words, an asset is risky if it is correlated with the market and has a high volatility relative to the market.

Figure 11 plots the beta of all Nasdaq 100 stocks, as well as Bitcoin & Ethereum.

FIG 11: BETA: CRYPTO VS NASDAQ 100 CONSTITUENCIES



This scatterplot illustrates that Bitcoin is not even in the top 20 percentile of most risky stocks, while Ethereum would rank as third highest in the Nasdaq 100. In other words, cryptocurrencies like Bitcoin and Ethereum have similar risk profiles to many other commonly held stocks included in the Nasdaq 100.

CONCLUSIONS

Cryptocurrencies have been portrayed in the media as a very risky asset class. This article provides a discussion about the right metrics to use to measure risk in asset pricing, and some context to benchmark the riskiness of cryptocurrencies relative to other assets, such as commodities, stock indices, and individual stocks. Overall we find that cryptocurrencies display risk profiles comparable to commodities such as oil and natural gas, and to stocks commonly included in the Nasdaq 100.

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