Unveiling the Link Between Option Tails and Spot-Volatility Correlations

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This study explores the significance of the correlation between the spot price and the implied volatility (spot-vol or spot-volatility correlations) in the cryptocurrency market, particularly through the Bitcoin ETF approval process. It highlights how these correlations for Bitcoin and Ethereum serve as vital indicators of market sentiment and dynamics, becoming especially informative in the context of regulatory changes. By examining the relationship between Volmex Tail Index (VTI) and Volmex Spot-Volatility Correlation Indices (VCORR; BVCORR or Bitcoin Volmex Spot-Volatility Correlation Index and EVCORR or Ethereum Volmex Spot-Volatility Correlation Index), the analysis emphasizes the importance of these indicators in understanding market behaviors.

Introduction

In this research, we focus on the intricate dynamics of spot-vol correlations as observed by the Bitcoin ETF approval process. We argue that these correlations are not merely statistical artifacts but are pivotal in understanding market sentiment, investor behavior, and the broader financial ecosystem's response to significant regulatory milestones.

Comparing backward-looking correlation data (i.e., VCORR) to forward-looking option market indicators (VTI, Skew, BVIV, EVIV), our analysis aims to unravel the complex interplay between regulatory events and market dynamics, offering novel insights into technical analysis within the crypto domain.

Understanding Spot-Vol Correlations

To measure spot-vol correlations, we use Volmex Spot-Volatility Correlation Index[1] (VCORR) which calculates the correlations between the price movements and the implied volatility of Bitcoin and Ethereum, in a backward-looking fashion, offering insights into the realized market behaviors.

[1] 30-day time window with returns sampled every 6 hours

VCORR's traditional role has been pivotal in understanding how price actions correlate with the changes in implied volatility. In other words, how option markets react to the changes in spot markets. However, forward-looking indicators like Volmex Tail Index[2] (VTI), derived from options markets, are essential for capturing market expectations about the future returns, reflecting investor sentiment ahead of events. The Bitcoin ETF approval process underscored the significance of these metrics, revealing how regulatory milestones can influence market dynamics, highlighting the complementary nature of historical and anticipatory analyses in financial markets.

Analysis

The court ruling in favor of Grayscale against the SEC on August 29, 2023, marked a significant victory in the effort to launch a Bitcoin ETF. The D.C. Circuit Court of Appeals found the SEC's denial of Grayscale's application to be "arbitrary and capricious," highlighting inconsistencies with the SEC's treatment of similar products. This decision vacated the SEC's June 2022 rejection of the proposal, which influenced the future of spot bitcoin ETF approval that eventually happened on January 10, 2024. We call this period the "ETF Hype" period, and investigate the market sentiment using VCORR and some other indicators during ETF Hype, and Post-ETF Hype which starts from ETF approval and ends on February 5, 2024.

Returns vs Implied Volatilities

Figure 1 below shows the cumulative returns from August 30, 2023 to February 5, 2024, together with implied volatilities of Ethereum (EVIV) and Bitcoin (BVIV).

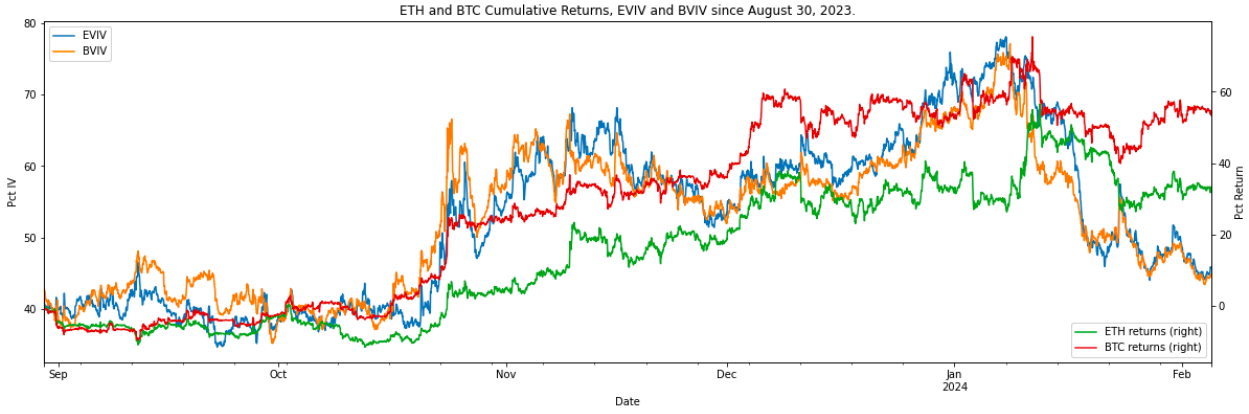

Figure 1: ETH and BTC Cumulative Returns, EVIV and BVIV

[2] It measures the difference between the 30-day implied volatility and the Black-Scholes implied volatility of at-the-money (ATM) options with 30-day maturity. For Bitcoin and Ethereum, this calculation utilizes the Bitcoin Volmex Implied Volatility Index (BVIV) and the Ethereum Volmex Implied Volatility Index (EVIV), respectively.

The plot indicates a significant positive market response during the ETF Hype period, with ETH returning 35.58% and BTC returning 66.40%. The increase in implied volatilities and the high correlation between spot price and implied volatility for both ETH (90.96%) and BTC (89.93%) suggest that market sentiment and investor expectations were strongly influenced by the developments surrounding the Bitcoin ETF approval process.

Given the interesting behavior shown in Figure 1, it is important to look at how the spot-vol correlations were. Figure 2 plots ETH and BTC VCORR and cumulative returns below during the same time window.

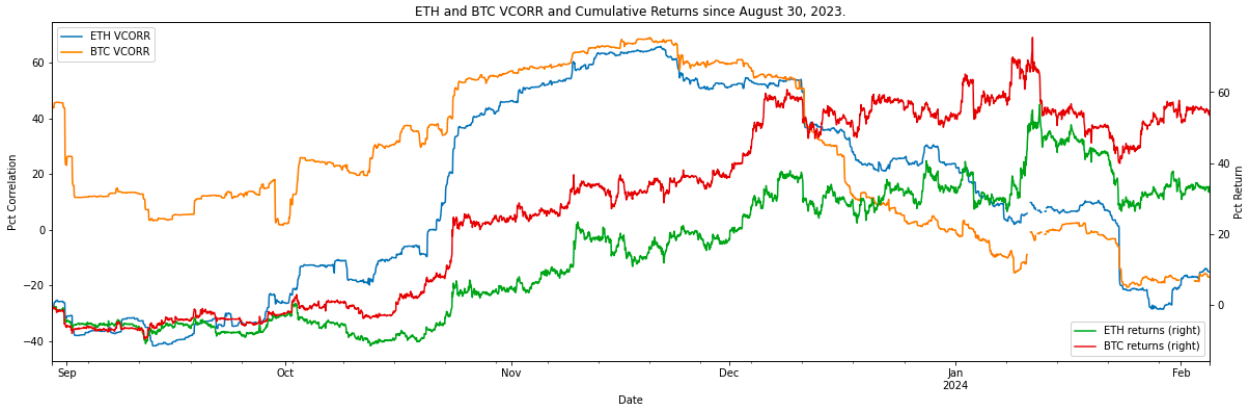

Figure 2: VCORR and Cumulative Returns for ETH and BTC

As can be seen in the figure, VCORRs peaked in late November 2023 and since then they have decreased substantially. The initial increase suggests a growing alignment between price and implied volatility moves, driven by speculation and investor reactions to news and developments related to the ETF Hype. The subsequent fall in VCORR values indicates a shift towards more stable market conditions or a change in the relationship between price movements and volatility as the market digests the implications of the ETF approval and adjusts to new information.

Another observation is that ETH VCORR (EVCORR) was initially higher than BTC VCORR. However, they reversed positions, with BTC VCORR surpassing that of ETH in early December 2023. This suggests a notable shift in the market dynamics between these two cryptocurrencies. The initial higher EVCORR could indicate it was experiencing more pronounced reactions to market events or news in relation to its implied volatility compared to BTC. However, BTC spot-vol correlations gained momentum because the ETF approval process was directly about Bitcoin and thus BTC VCORR became higher and has remained so, albeit with a narrowing difference in recent days, might reflect a shift in investor focus or a change in the market's perception of risk and responsiveness between the two assets. This observation could provide insights into the evolving market structure and investor sentiment surrounding these cryptocurrencies.

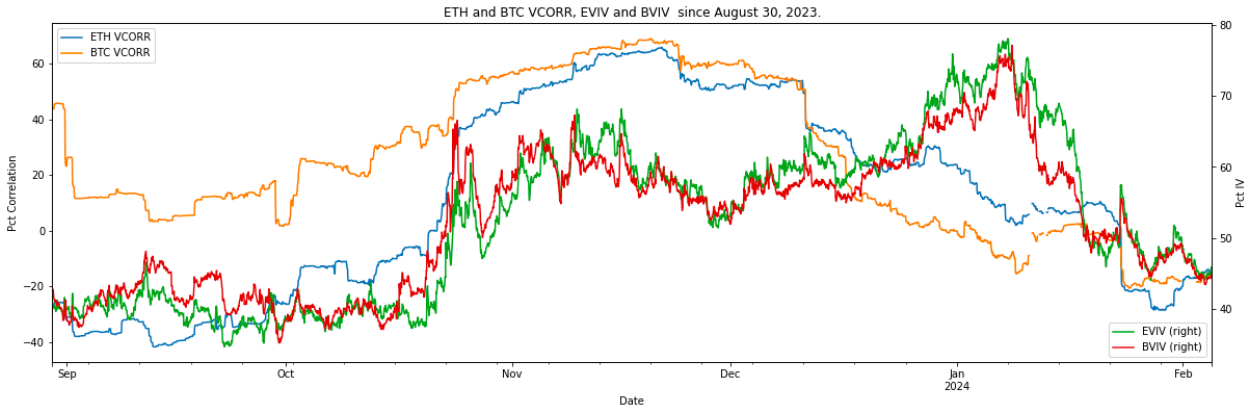

Figure 3: ETH and BTC VCORR, and EVIV and BVIV

Figure 3 displays spot-vol correlations and implied volatilities for ETH and BTC. The sharp increase in late October aligns with the increased spot-vol correlations, a trend not observed in the weeks preceding the ETF approval.

Spot-Vol Correlations vs Option Tails and Skew

We have seen so far that spot-vol correlations have the ability to provide insights into market sentiment and risk perception. Understanding these correlations helps investors and analysts predict market trends and make informed decisions, especially in the context of complex financial instruments and environments. For this reason, we can look at the options markets and compare the informative indicators, like VTI and Skew, derived from options.

One of these two indicators, "Skew" is defined as the ratio of the Black-Scholes implied volatility difference between 25-delta (OTM) put and call options[3] to the Black-Scholes implied volatility of the ATM options.[4] Skew reflects the market's perception of risk by measuring the differential in expensiveness between put and call options, indicating whether investors are more concerned about price declines or optimistic about price gains.

The other one, VTI, the difference between model-free implied volatility (measured by BVIV and EVIV) and the Black-Scholes implied volatility of the ATM options, provides insights into the market's view on extreme price movements.

Together, these metrics alongside spot-vol correlation offer a comprehensive view of market sentiment, indicating whether current conditions are seen as risky or stable, and help in predicting future market behavior.

[3] Put minus call
[4] All options used in the calculation expire in 30 days.

Figure 4 shows the relationship between skew and the spot-vol correlation by plotting VCORR and Skew since the court ruling against SEC.

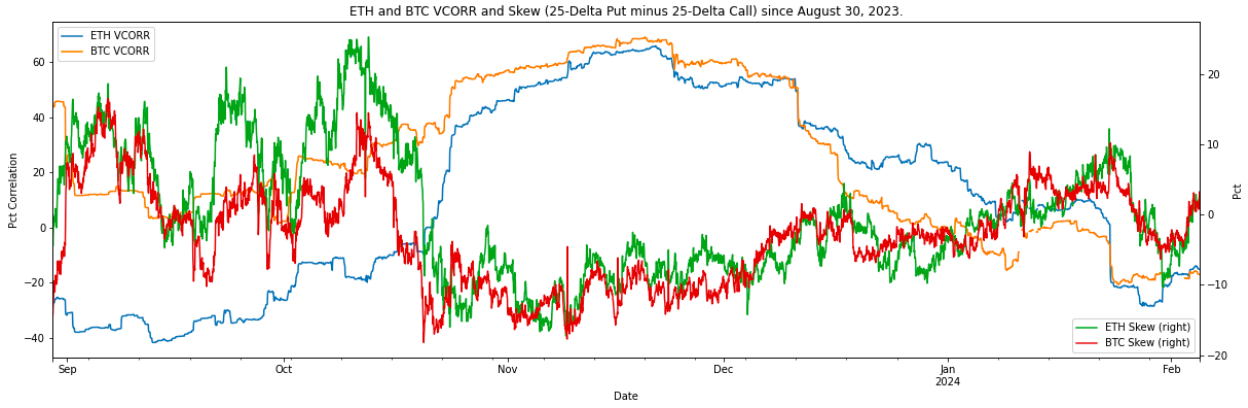

Figure 4: ETH and BTC VCORR and Skew

The correlation between Skew and EVCORR (ETH VCORR) shows significant variation across different periods. During the ETF Hype, there was a strong negative correlation of -78.60%, indicating that as Skew moved in one direction, VCORR tended to move in the opposite. Post-ETF Hype, the correlation turned positive to 36.58%, suggesting a shift in the relationship between these metrics.

The correlation for BTC, as can be seen in Figure 4, also varied significantly across different periods. During the ETF Hype, there was a negative correlation of -63.78%, indicating an inverse relationship between Skew and VCORR movements. In the Post-ETF Hype period, this relationship became positive, at 50.21%, suggesting a shift in how these metrics interacted.

The significant variation in these correlations across different periods, especially around the ETF Hype and Post-ETF Hype phases, suggests that regulatory decisions (expected or observed), can have a strong impact on the relationship between these metrics. The shift from a strong negative to a positive correlation post-regulatory events highlights how market dynamics and perceptions of risk and volatility are influenced by such decisions.

Figure 5 shows the relationship between VTI and the spot-vol correlation for ETH and BTC, which look inversely related to each other. The correlation between VTI and EVCORR (ETH VCORR) indicates a consistently negative relationship across different periods. During the ETF Hype, the correlation was very strong and negative at -82.54%, suggesting a pronounced inverse relationship between these metrics. In the Post-ETF Hype period, the correlation remained negative but lessened to -50.46%. Overall, there is a consistent inverse relationship between the VTI and EVCORR (ETH VCORR).

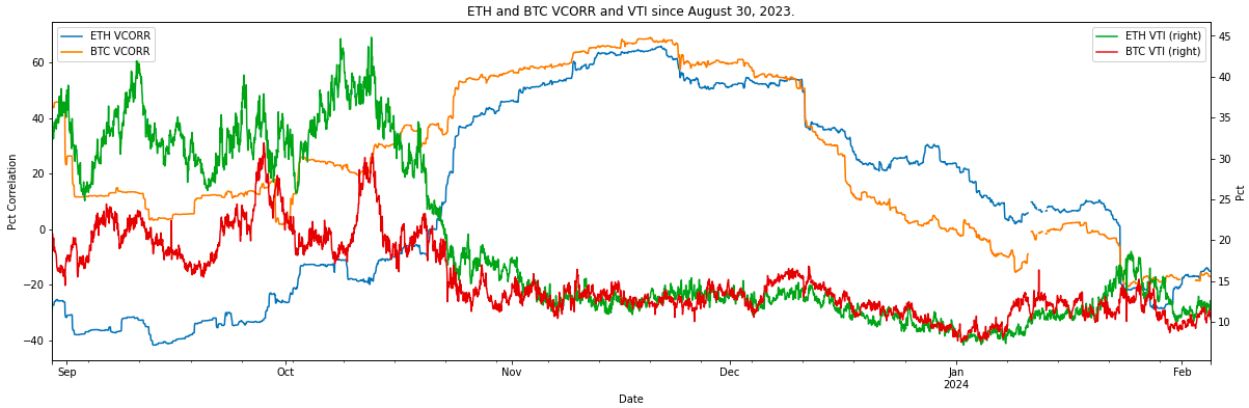

Figure 5: ETH and BTC VCORR and VTI

The correlation between VTI and VCORR for BTC, unlike ETH, varied significantly across different periods. During the ETF Hype, the correlation was slightly negative at -20.60%, indicating a weak inverse relationship. In the Post-ETF Hype period, the correlation turned slightly positive at 6.06%, suggesting that there was virtually no consistent relationship between the VTI and VCORR for BTC over the observed time frame, likely due to BTC's central role in the ETF approval process. This suggests that regulatory events can influence the relation between option markets and spot markets.

Key findings

Inverse Relationships

There are consistently strong negative correlations between certain metrics, such as VTI and EVCORR (ETH VCORR) indicating inverse relationships between market perceptions of tail risk and price-volatility correlations, which could be seen as an early signal of a potential excitement for the ETF approval process for Ethereum.

Divergence in Correlations

The correlation patterns between ETH and BTC in terms of Skew, VCORR, and VTI differences highlight diverging market behaviors and risk perceptions between the two cryptocurrencies.

The Impact of Regulatory Decisions

Expectations and realizations of regulatory actions can significantly influence market perceptions of risk and volatility, altering how these metrics interact and reflect investor sentiment and market conditions.

Conclusion

The Bitcoin ETF approval process illuminated the significance of spot-vol correlations as crucial indicators, offering deep insights into market sentiment and dynamics. These correlations, especially before the Bitcoin ETF approval, underscored their informativeness in reflecting investor expectations and reactions to regulatory developments.

The relationship between option market signals like VTI and spot-vol correlations (VCORR) further emphasized the value of understanding these metrics in tandem, highlighting the nuanced impact of major market events on cryptocurrency behavior and investor strategies.

With the upcoming SEC decision on Ethereum ETF applications in May 2024, the consistent negative correlation between VTI and EVCORR (ETH VCORR) suggests a close watch on how regulatory anticipation or outcomes affect the relationship between tail risk perceptions and price-volatility dynamics. A continuation in this correlation could signal the market sentiment towards ETH, reflecting investor expectations and reactions to regulatory actions. This insight could be crucial for understanding potential market movements and risk assessment strategies leading up to and following the regulatory decision.