THE BLOCK · Research

Crypto Derivatives: State of the Market

Commissioned by

FALCONX

THE BLOCK CRYPTO, INC. | April 2022

Executive Summary

This report provides key insights into the state of the crypto derivatives market. Section 1 starts by highlighting the increasing inflow of institutional capital into the crypto space. It then outlines the main crypto derivative products and their differences to those in the traditional finance space.

Section 2 takes stock of the state and recent developments in the crypto derivatives market by looking at the four key metrics i) volume, ii) open interest, iii) funding rates, and iv) implied volatility. It provides several insights:

- Both volume and open interest metrics indicate that the crypto derivatives market has grown considerably;

- Activity in crypto options relative to futures is set to grow strongly if ratios of options to futures for (i) open interest and (ii) volume converge to those found in the traditional finance space;

- Activity on the crypto derivatives market continues to exceed that on spot markets, indicating some degree of market maturation;

- Implied volatility is still relatively high in comparison to equity markets, but continues to trend downwards, and funding rates have been compressed.

Section 3 sheds light on the major derivative trading venues, which are providing the infrastructure that makes possible the strong growth in the crypto derivatives space. It is shown that most crypto derivative venues are of a centralized crypto-native nature. In addition, it is discussed how liquidity network service providers give investors access to aggregated liquidity from crypto exchanges and OTC venues to address liquidity fragmentation. This aggregation may result in better liquidity, transparency, and pricing.

Section 4 concludes and provides an outlook on future growth and developments in case there is further regulatory scrutiny.

About

Commissioned by FALCONX

FalconX is a fully comprehensive digital asset platform that allows institutions to access and manage all of their crypto strategies through a single interface and seamless workflows, making it easy to execute trading, credit and clearing all in one place. FalconX's crypto-as-a-service offering powers leading banks, FinTech institutions, and investment applications to easily add crypto to their product offerings with a goal of enabling the next billion users to enter the crypto space. It is also the first and only cryptocurrency swap dealer registered with the National Futures Association (NFA) and one of the first crypto-focused Primary Level Members of the International Swaps & Derivatives Association (ISDA). The company is backed by investors including Accel, Altimeter Capital Management, American Express Ventures, Coinbase Ventures, Lightspeed Venture Partners and Tiger Global Management. FalconX has offices in Silicon Valley, New York, Chicago, Bengaluru, and Malta. For more information visit http://falconx.io or follow them on Twitter and LinkedIn.

Researched by The Block and The Block Research

The Block is an information services company founded in 2018. Its research arm, The Block Research, analyzes an array of industries including digital assets, fintech, and financial services.

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Acknowledgements

I would like to thank FalconX for commissioning this research report, and the support which made its production possible. Specifically, I thank Parth Chaturvedi, Evelyn Chen, Amy Gordona, Ryan Kim, David Martin, Nidhi Singhvi, and Vish Subramanian.

In addition, I thank everyone at The Block who helped with this report: Andrew Cahill, Saurabh Deshpande, Carlos Reyes, and our talented designer Zoe del Rosario.

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Section 1: Introduction

Over the past few years crypto currency markets have expanded significantly, not only in terms of market capitalization, but also in terms of interest and participation from institutional investors. It's no longer a question of when institutional investors will come, but rather how quickly, and what that means for the crypto industry. This development coincides with tremendous growth of the crypto derivatives market and crypto derivative innovations taking place. The increasing participation of institutional investors and the growth in the crypto derivatives market, are likely mutually reinforcing and indicate a degree of maturation. Since derivatives are an important building block for efficient market participation, they are of particular importance to institutional investors. This report assesses recent developments in the crypto derivatives market and gives an overview on the derivatives' trading venue landscape, mostly from an institutional investors' perspective.

The Influx of Institutional Capital Into the Crypto Space

Over the past years an initially trickling inflow of institutional capital has been turning into a broader stream. A growing number of institutional investors, ranging from Blackrock, the world's largest asset manager, to MassMutual, an insurance giant founded in 1851, allocate a percentage of their portfolios to crypto and digital assets. In 2021 institutional investors increased their exposure to crypto funds by 37% to a total (crypto) assets under management of $62.5bn.[1] Among these flows, bitcoin and ether are still largely dominating. This development appears even more spectacular when recalling that as late as 2018 regulators referred to bitcoin as "the evil spawn of the financial crisis" or "a combination of a bubble, a Ponzi scheme and an environmental disaster".[2]

Two reasons may explain these enormous inflows.[3] First, the crypto space has considerably outperformed all other asset classes, by a wide margin. Since the beginning of 2017, the market capitalization of all crypto currencies has increased 99x to $2.17tn.[4] Such outperformance whets the appetite of professional investors, who see a lot more upside potential – in particular when comparing the market capitalization of this relatively new asset class to the total market capitalization of the stock market ($120tn) or fixed income ($123.5tn).[5] Second, due to their usually low correlation to other assets, crypto currencies can provide additional portfolio diversification.[6]

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[1] See "CoinShares: Digital Asset Fund Flows". These figures do not include companies that directly hold bitcoin (worth >$10bn as of 31 March 2022), or venture funding volume ($25.1bn in 2021).
[2] See "Financial Times: ECB official dubs bitcoin 'evil spawn of the financial crisis".
[3] Also see "Fidelity: Digital Assets Survey".
[4] Calculated as of 31 March 2022. See https://coinmarketcap.com/charts/.
[5] See "SIFMA: Research Quarterly: Equity", and "SIFMA: capital Markets Factbook", respectively.
[6] Note however that this mostly holds true in a 'risk-on' environment, whereas in times of market stress, cryptocurrencies tend to become highly correlated with other 'risk-on' assets.

With the influx of institutional investors comes an ever-growing demand for derivatives, which allow for efficiently implementing sophisticated portfolio strategies. Financial derivative instruments, such as options and futures are sophisticated financial tools, which can provide investors with several advantages such as efficient risk transfer, capital efficiency, and beneficial tax treatment. Some of these benefits may mostly accrue when managing sizable portfolios, and involve additional resources such as advice from tax professionals. For these reasons, derivatives are particularly sought after by institutional investors. The following provides an outline of crypto derivatives and the advantages they offer to market participants.

Crypto Derivatives

The most common derivative contracts are forwards, futures, swaps and options. Of the many actively used derivative products in the broader financial markets, only a few are currently utilized to a substantial degree in crypto currency markets. The most important of these are futures, which are similar in nature to perpetual swaps, and options. While these, and in particular perpetual swaps, dominate in terms of volume, the usage and development of derivatives is rapidly expanding.

Futures

The setup of crypto futures is similar to cash-settled, quarterly futures. However, there are notable differences in terms of regulatory oversight as well as related trading availability. Some crypto futures can be traded via fully regulated venues such as the Chicago Mercantile Exchange (CME) or Bakkt Holdings while it is unclear whether other exchanges such as Binance or FTX are properly regulated in all jurisdictions in which they offer products.[7] Crypto-native exchange venues[8] offer trading 24/7, while more traditional venues such as the CME do not. Furthermore, while regulated exchanges offer products based mainly on the most established crypto currencies such as bitcoin and ether, less regulated exchanges offer futures on a wider range of underlying assets. Finally, a related difference between futures on traditional equities and those on crypto currencies is that for the latter there are numerous (single-name) futures on individual assets,[9] while for the former, single-stock futures are rare (for example, there is deep liquidity on indices like the S&P500 but not on the constituent stocks). A more granular set of futures, such as in the crypto space, can be beneficial for highly tailored strategies and hedging purposes.

[7] Some entities pro-actively implement KYC regulations, or have parts of their business licensed in some jurisdictions, but many crypto exchanges are still essentially outside the regulatory perimeter. For example, while FTX US is regulated in the US, the remainder company (FTX) is regulated partly in Antigua and Barbuda, the Bahamas, and Gibraltar. Note that for regulatory reasons some institutional investors can only invest in crypto assets via derivatives on fully regulated exchanges.

[8] Section 3 provides insights into different venues, broadly categorized into crypto-native (mainly focussed on crypto products) and traditional venues.

[9] Data on more than 250 cryptocurrency futures are provided on Coinglass.

Perpetual Swaps

Perpetual swaps (often simply referred to as perpetuals or "perps") are only offered on crypto-native venues. They are closely related to traditional cash-settled futures contracts, but feature some notable differences. First, they do not expire, meaning that there is no need to periodically roll-over, or cash-settle contracts. Second, perpetuals can be traded on margin with considerable leverage (some exchanges offer beyond 100x leverage). Related to this point is that some perpetuals can also be margined in their underlying, which may be more capital efficient.[10] Third, perpetuals maintain their price to the underlying's spot price through what is known as a funding rate.

Funding rates are a percentage fee that is paid or received by participants holding open positions. For example, if a perpetual is priced above the underlying's spot price then market participants with open long positions pay the funding rate to those with open short positions. If the perpetual's price is below the underlying's spot price then the reverse occurs.[11] In other words, given that perpetual futures don't have an expiry, the spot price is tied to the futures price via a funding fee mechanism, wherein either side (long or short) pays the funding fee to the other side depending on whether the future's market price is above or below the spot price.[12]

The more perpetual prices diverge from their underlying, the more the funding rate increases or decreases to incentivize traders to take the opposite side of the trade in order to bring the contract price closer to the underlying's spot price. Funding rates are periodically charged and distributed, usually every 1 to 8 hours, depending on the exchange venue. During bull runs, or other periods of high volatility, when many market participants expect prices to make large short-term moves, funding rates can reach three digit annualized return numbers. Strategies like the cash and carry futures trade, which is enacted by entering into a long spot position and shorting the perpetual futures contract (or vice versa), can be extremely profitable in exuberant crypto markets.[13]

Given the similarities between plain vanilla futures and perpetuals, in the following sections we use the term futures to cover both futures with a fixed maturity and perpetual swaps.

[10] For example, when implementing a 'long bitcoin spot and short bitcoin futures' basis trade (cash-and-carry), on exchanges such as Kraken, one can provide margin in the form of bitcoin. Implementing the same strategy on CME requires more capital because the margin is denominated in USD.

[11] Perpetuals require this reference index price. While some exchanges with deep liquidity on the spot market can reference directly to that market, on-chain derivative exchanges require an oracle, for example via Chainlink data feeds.

[12] Due to this mechanism, perpetual swaps' prices tend to move back towards the underlying's spot price over time. Market arbitrage may speed up this process.

[13] See, for example, "Nasdaq: How one Fund Used the Carry Trade to Beat Bitcoin" for an illustrative example of the carry trade and its profitability.

Options

The entrance of institutional investors has increased the demand for hedging and additional ways to generate yield. One of the traditional products that provides for this while offering a more sophisticated way to express a market view are option contracts. Options make up a rapidly growing segment of the derivatives market, though they are not yet as widely used as futures.

Crypto options have a number of unique features. Similar to perpetuals, crypto options can be traded 24/7 and may be subject to an uncertain regulatory backdrop, with the exception of regulated exchange venues, for example such as CME, or bespoke OTC offerings, such as, for example, those provided by DRW, FalconX, Galaxy and Genesis.[14] Further differences between crypto options depend on whether they are traded on a centralized venue, such as Deribit, the largest crypto currency options trading venue, where buyers and sellers are matched by a trading engine, or in Decentralized Finance (DeFi), where one either trades directly peer-to-peer or via an automated market maker (AMM). Currently, DeFi crypto options are rather niche in terms of volume, with on-chain protocols struggling to bootstrap liquidity.[15] This is to some extent due to high transaction costs, complex UI, high collateralization, and low on-chain liquidity.[16] As is shown in Section 2, crypto options are mainly traded on Deribit, which only offers bitcoin and ether as underlyings. This is different to the traditional finance space, where most equities are covered by options.

Other Derivative Products

Non-deliverable forwards (NDF), which are very common in foreign exchange markets, are cash-settled forward contracts. NDFs are currently rather niche in the crypto currency space. However, their importance in traditional financial markets for sophisticated investors in combination with the increasing emergence of institutional capital in the crypto currency space, has led to speculation that they will see considerable growth going forward.[17] NDFs may provide a set of use cases that are unique to crypto. For example, a market participant, who is long a portfolio of NFTs, may want to hedge the risk related to Ethereum.

Options vaults are an innovative options-based product, where market participants can stake assets, which are then deployed to options strategies such as covered calls and cash-covered puts. The yield of the vaults is further enhanced by token rewards and investing the vault stake in yield-bearing tokens. Once deemed accessible (by regulation), institutional investors may increasingly tap into these

[14] See "Bloomberg: Trading Firm DRW Allows Crypto Investors to Hedge Risk with Bilateral Options".
[15] For a deep-dive into DeFi option protocols see "Zee Prime Capital: A lot of on-chain options, but few to exercise".
[16] Furthermore, since standard constant product AMMs may not optimally account for decay, they may require more sophisticated approaches to incorporate time. See, for example, a constant power sum invariant setup that incorporates time to maturity in an AMM for a different use case (zero-coupon bond).
[17] See "The Block: B2C2 claims crypto market's first non-deliverable forward".

products, for example by selling short-dated options to collect premium as long as volatility remains elevated.[18]

In addition to perpetual swaps and options vaults, other novel products have emerged in the crypto space both as native developments and as innovations on traditional financial derivatives. For example, Squeeth, a very recent derivative innovation in the crypto currency space, is akin to a perpetual swap tracking the price of ETH to the power of two.[19] It provides options-like exposure without the need to choose strikes or maturity dates and can be used for leveraged exposure on the underlying or hedging of exposure from liquidity provisioning on DeFi protocols like UniswapV3.

[18] As shown in Section 2 of this report, implied volatility, though declining, is still rather high in the crypto space.
[19] See https://squeeth.opyn.co.

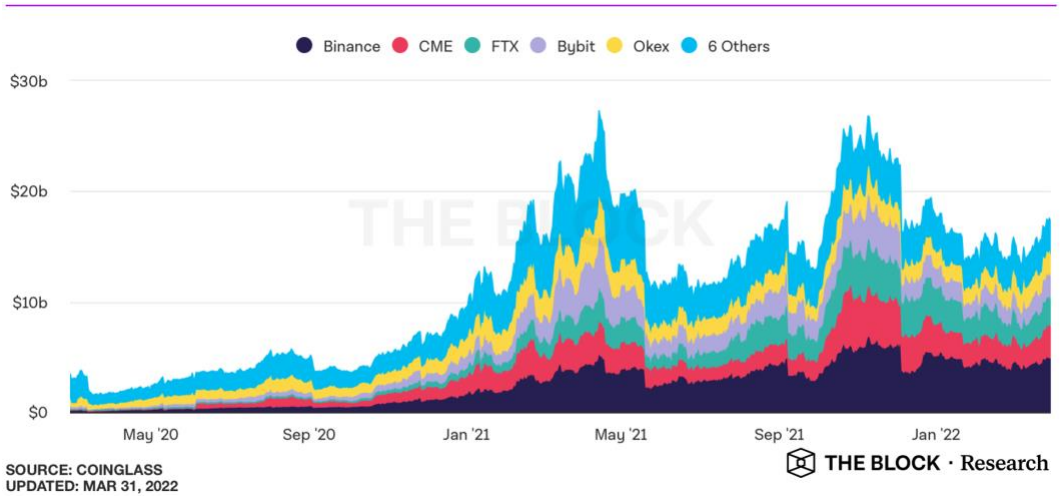
Section 2: State of the Crypto Derivatives Market

Historically, crypto derivative activity has been heavily dominated by futures, including perpetual swaps, based on bitcoin and ether. Combined they exceed 2/3 of the open interest among the top 100 crypto currencies.[20] Therefore, concentrating on these two provides a good idea of overall market developments and trends in the crypto space. In addition to futures and perpetual swaps, crypto options are increasingly adopted. In the following analyses four metrics are used to analyze futures and options with bitcoin or ethereum as underlying: (i) volume, (ii) open interest, (iii) funding rates (futures) and (iv) implied volatility (options).

Open Interest

Open interest in dollar terms measures the notional value of contracts that are held by market participants in active positions. Open interest increases when more contracts are opened than closed on a specific day. Therefore, higher open interest indicates more liquidity and activity in a given contract. Figures 2.1 and 2.2 show the open interest metric for bitcoin and ether **futures**, respectively.

Figure 2.1: Aggregated Open Interest of Bitcoin Futures



The figures (2.1 and 2.2) provide three insights:

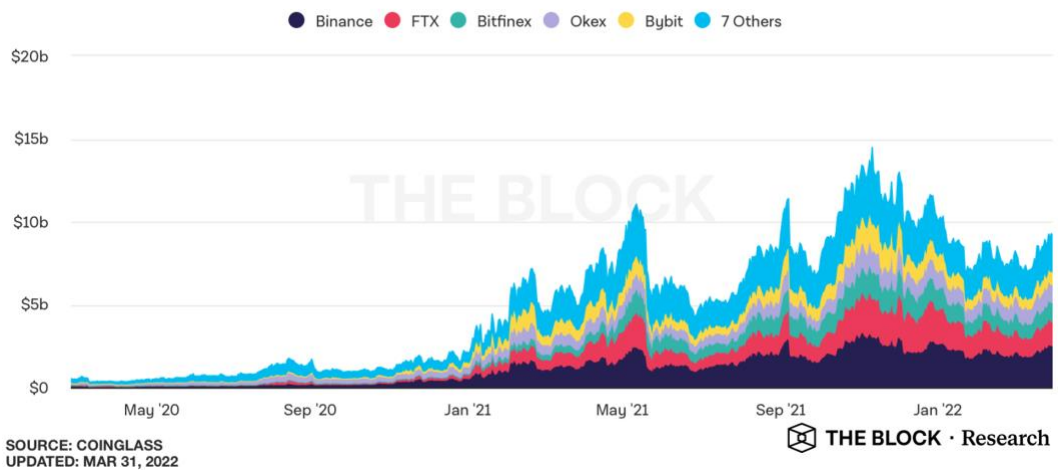
1. Regarding development over time, both time series feature strong growth starting towards the end of 2020 and autumn 2021, with sudden drops in Summer 2021 and Winter 2021. Both time series are highly correlated, featuring a correlation coefficient of 0.93.

2. Second, open interest grew about fivefold and seventeenfold between February 2020 and March 2022 for bitcoin and ether, respectively.

[20] See "Coinglass: Top 100 Crypto Currencies". On 31 March 2022, bitcoin constituted 46%, and ether 22% of the open interest of the top 100 cryptocurrencies, with the third ranked (Solana) making up only 2%.

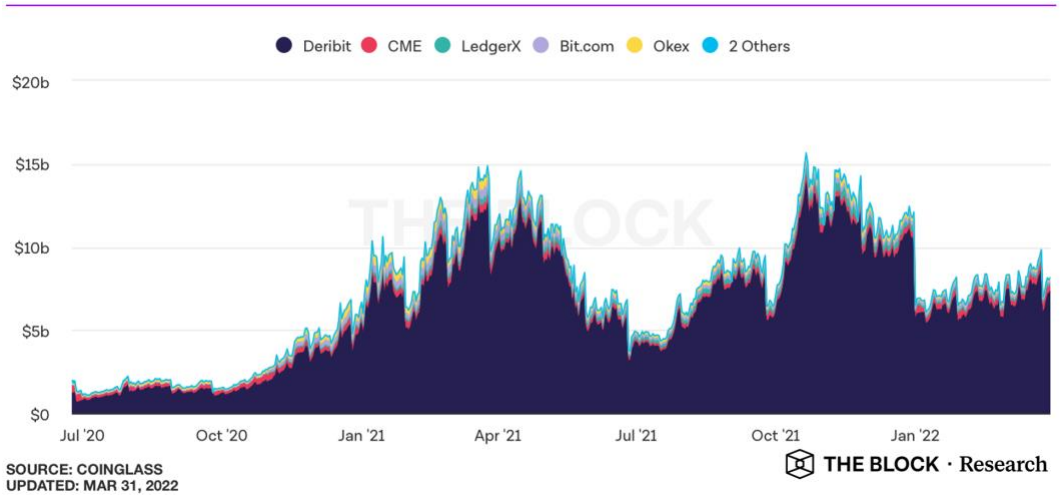
3. Third, Binance is the top crypto derivative exchange for futures as measured by open interest.

Figure 2.2: Aggregated Open Interest of Ether Futures



Next, consider open interest of bitcoin and ether **options** in Figures 2.3 and 2.4, respectively.

Figure 2.3: Aggregated Open Interest of Bitcoin Options

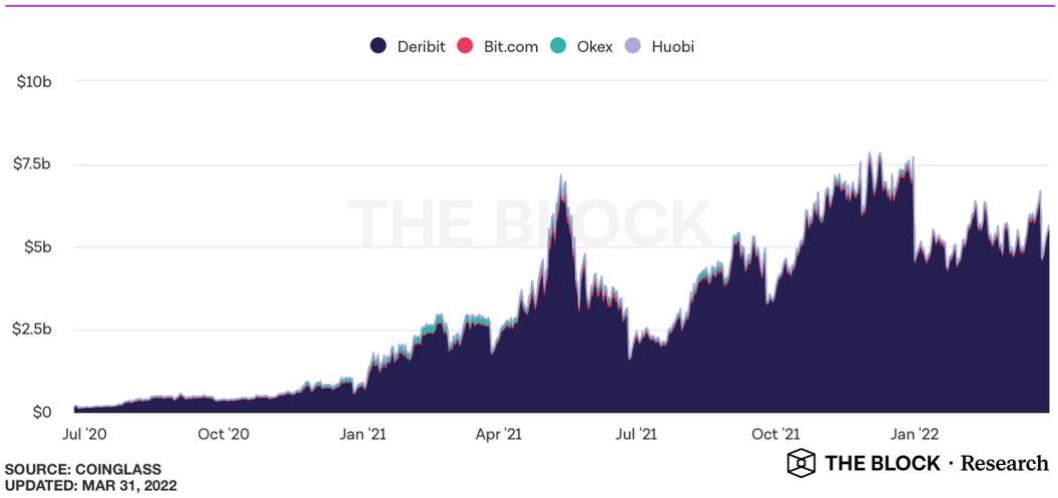


Overall, the development of open interest of options is reflective of the findings in Figures 2.1 and 2.2. Two additional insights can be obtained. First, open interest of futures exceeds that of options, however, this is not by orders of magnitude: the open interest ratios of options to futures are 0.48 and 0.62 for bitcoin and ether, respectively.[21] This open interest ratio of options to futures is different in traditional financial markets, where open interest of options exceeds that of futures. In December 2021 the ratio of open interest for global exchange-traded

[21] Based on data from 31 March 2022.

options to futures was 1.34.[22] If the ratio in the crypto space converges to that in traditional finance, one can expect open interest of options to grow considerably relative to that of futures. Second, Deribit, a centralized exchange featuring mostly institutional traders, covers by far the largest share of crypto option activity. Based on the open interest metric it captures more than 90% of the options markets for bitcoin and ether. Founded in 2016 as the first exchange to offer cash-settled European style bitcoin options it has maintained its first mover advantage ever since.

Figure 2.4: Aggregated Open Interest of Ether Options



It is also interesting to note by how much the above numbers on open interest for crypto options and futures are still dwarfed by the outstanding notional amounts in the traditional finance space (by more than three orders of magnitude). In December 2021 exchange-traded futures and options featured outstanding notional amounts of about $34tn and $46tn, respectively. [23]

Volume

As an additional metric for derivative market activity, trading volume in Dollar terms measures the notional value of contracts that are exchanged between buyers and sellers during a given time period. Each transaction, that is, both opening and closing of positions, counts towards this volume metric. Higher volume indicates more liquidity and activity in a given derivative contract.

Figures 2.5 and 2.6 display the monthly volumes of futures for bitcoin and ether, respectively. Overall, this figure confirms the picture that emerged from the open interest (futures) metric. However, after significantly increasing at the beginning of 2021, average weekly volume has remained more stable relative to the open

[22] See "BIS: Global Exchange-Traded Futures and Options".
[23] See "BIS: Global Exchange-Traded Futures and Options". The global OTC derivatives market even had approximately $610tn in notional amounts outstanding in H1 2021. See "BIS: Global OTC Derivatives Market".

interest metric. Note that volumes are in the trillions, while open interest is in the billions. Higher volume relative to open interest indicates that considerable intra-month trading activity is taking place.

Figure 2.5: Volume of Bitcoin Futures

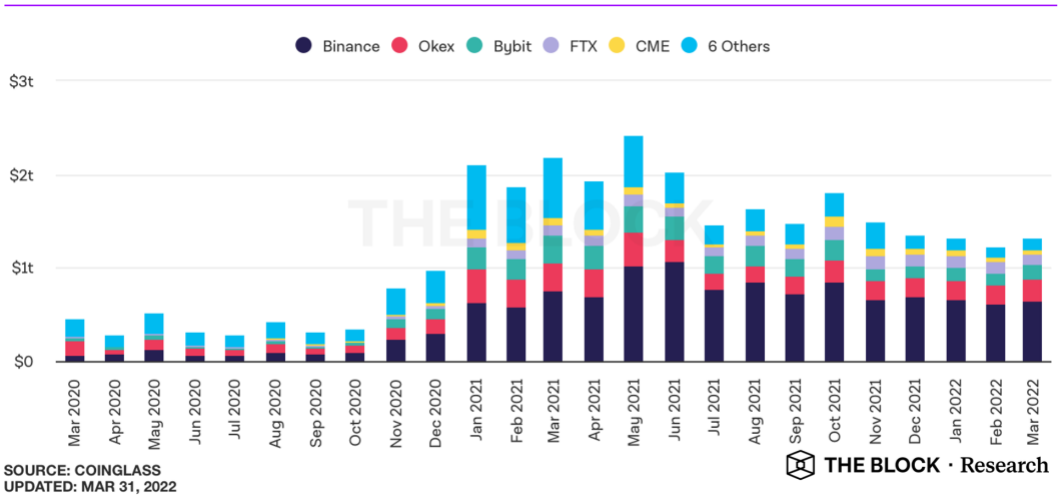
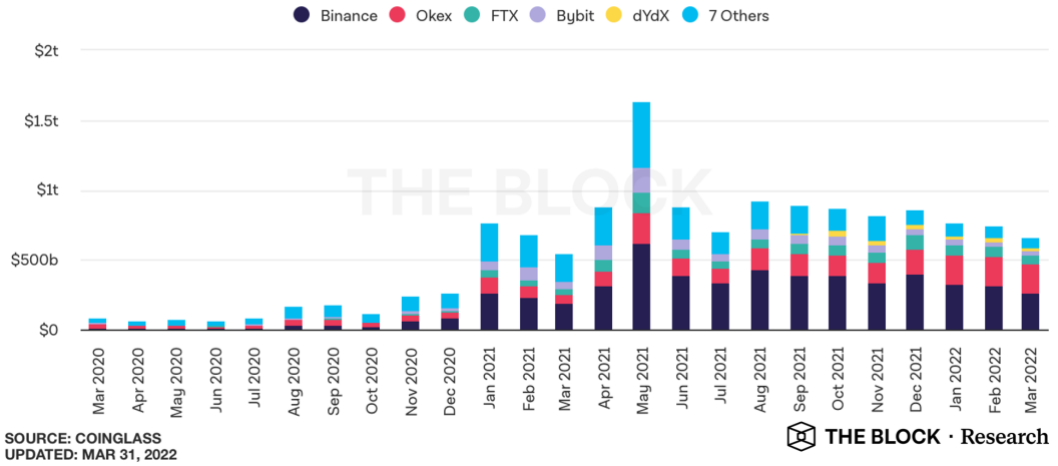


Figure 2.6: Volume of Ether Futures



Both metrics investigated so far, open interest and volume, show that market participants who are considering to move beyond spot markets can carry out sizable trades in the crypto derivative space.

The ratio of derivatives to spot volumes provides insights into how these markets compare. Note that since derivative volumes are expressed in notional terms, that is, the market value of the underlying asset to which the derivative contract gives exposure, one may not really compare like with like when using the derivatives-to-

spot metric.[24] Despite this caveat, which also applies to traditional markets, the metric may be helpful in spotting the general direction into which the market is headed.[25]

Figures 2.7 and 2.8 display the 30 day moving averages of bitcoin and ether volumes to their respective spot market volumes.

Figure 2.7: BTC Volume of Futures to Volume of Spot (30 Day-MA)

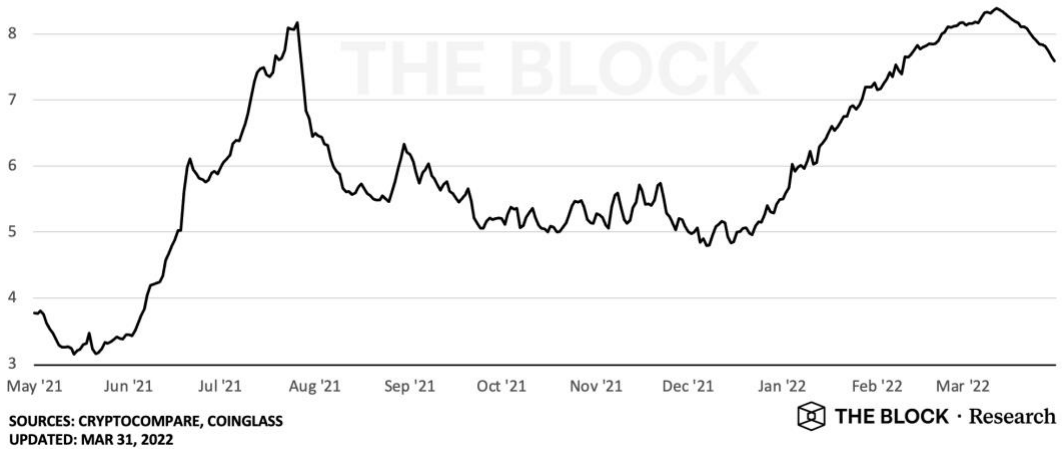
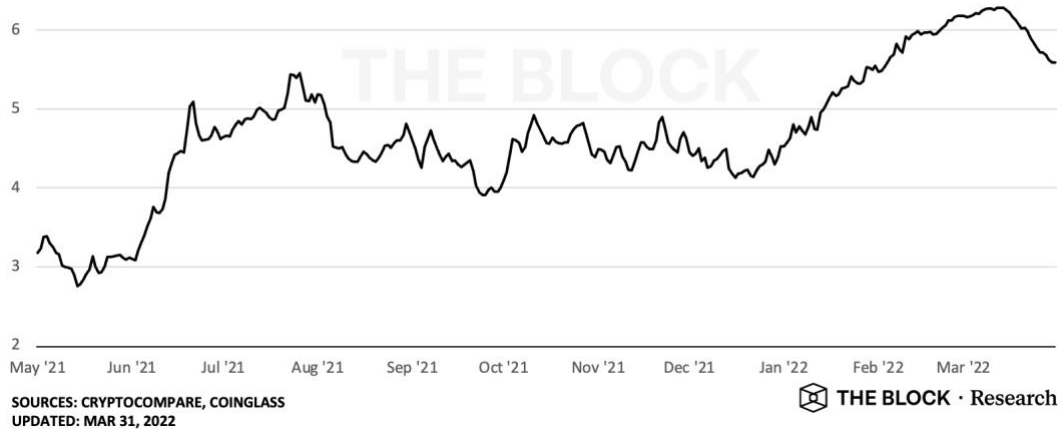


Figure 2.8: Ether Volume of Futures to Volume of Spot (30 Day-MA)



Figures 2.7 and 2.8 show that volumes in the crypto derivatives market increasingly exceed those in the spot market. While the ratio was below 3 in May 2021, it has been increasing to more than 7 for bitcoin and almost 6 for ether. A related factor

[24] For example, notional volumes may include double-counting since traders may simply buy an offsetting contract to close a position. In such a situation the trader's exposure nets zero, while both notionals are counted towards the volume metric.
[25] Also see "Coindesk: Crypto Derivatives: On Misleading Measurements".

to this development, which is also reflective of past developments in traditional financial markets such as foreign exchange or commodities, may be the inflow of institutional capital into the space. Institutions with large assets under management may prefer (or be required by regulators) to participate in crypto markets via (regulated) derivative transactions to benefit from higher capital efficiency, and beneficial tax treatment. Crypto derivatives allow for such economic access without having to hold the underlying. Both factors, higher liquidity in crypto derivative markets and increasing institutional participation, may be interdependent and reinforce each other.

Next, consider the volume of bitcoin and ether **options** in Figures 2.9 and 2.10.

Figure 2.9: Volume of Bitcoin Options

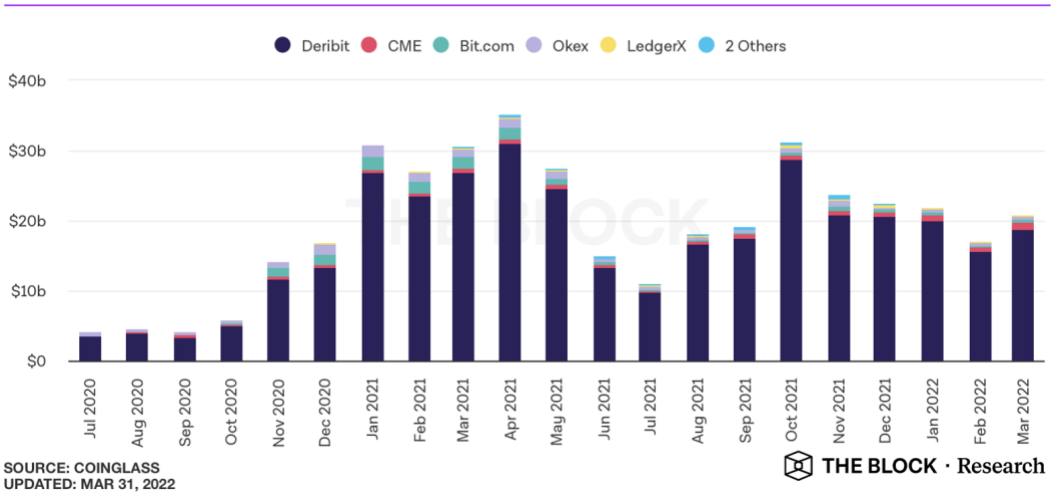
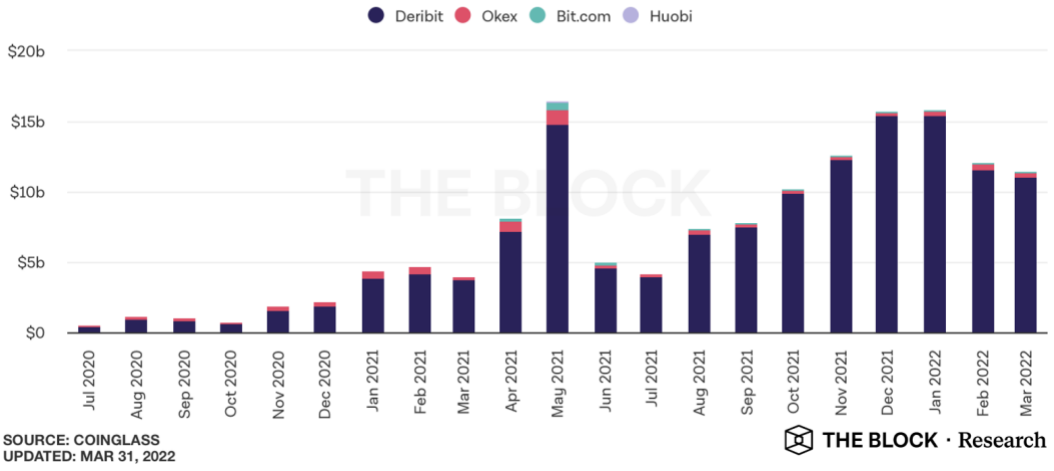


Figure 2.10: Volume of Ether Options



While the volume of options has also grown considerably since July 2020, it is still dwarfed by the volume of futures (Figures 2.5 and 2.6), which is about 60 times that of options. Similar to the open interest-related ratio, the volume of crypto options to futures deviates from the same metric in the traditional financial space,

where volumes in futures exceed those in options by a factor of 3.9.[26] If the volume ratio in the crypto space converged to that in traditional finance, there would be considerable room to grow for volume of options relative to that of futures.

Implied Volatility

Volatility measures the degree of variation in prices over a specified period. For example, a very volatile token features large and frequent price movements over time, whereas a token with low volatility is more stable. Implied volatility measures future expected volatility of an underlying asset based on its option prices. Figures 2.11 and 2.12 display implied volatility for bitcoin and ether, respectively, based on at-the-money options over time.

Figure 2.11: Bitcoin ATM Implied Volatility

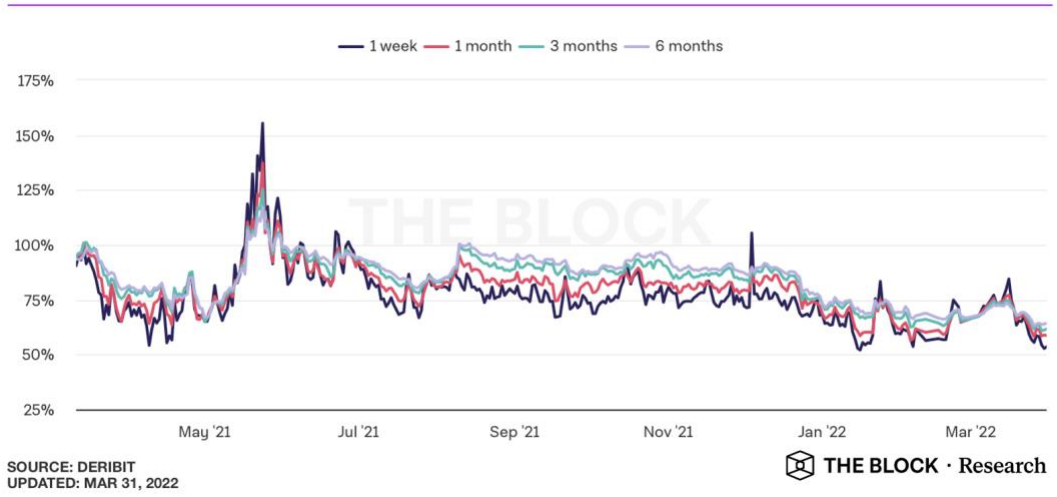


Figure 2.12: Ether ATM Implied Volatility

[26] See "BIS: Global Exchange-Traded Futures and Options".

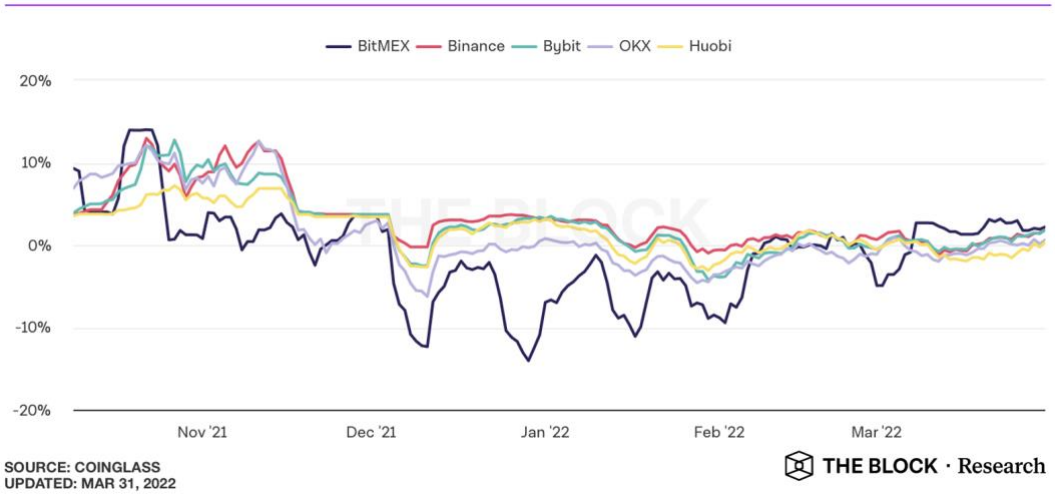
After a peak followed by a market crash in May 2021, volatility has been in a downward trend. Note that implied volatility between 50-100% is still quite high compared to traditional equity markets. For example, the 1-month implied volatility of a tech stock like Meta Platforms, which features a similar market capitalization as bitcoin, has been hovering around 30% since 2015.[27] The decrease in volatility over time may be driven by increasing amounts of liquidity in the crypto space, which ties back to the report's observations on open interest and volume. It may also relate to an influx of sophisticated investors and thereby indicate a degree of market maturation. An influx of institutional investors, which have access to a set of derivative instruments to express sophisticated market bets and proper risk management, may to some extent lead to less volatile markets.

Funding Rates

Perpetual swaps' funding rates can be used to directionally gauge leverage and market sentiment. If a funding rate is positive, long traders pay short traders to incentivize the price of the perpetual swap to align with the underlying's spot price. A consistently high positive funding rate tends to indicate bullish sentiment in the market: Remaining long in a perpetual swap position, which features a positive funding rate, only makes sense if one expects that magnified gains from the leveraged position are higher than the cost of funding – otherwise a non-levered spot position would be cheaper for the same market exposure. In contrast with this, consistently high negative funding rates may be indicative of bearish market sentiment coupled with leverage.

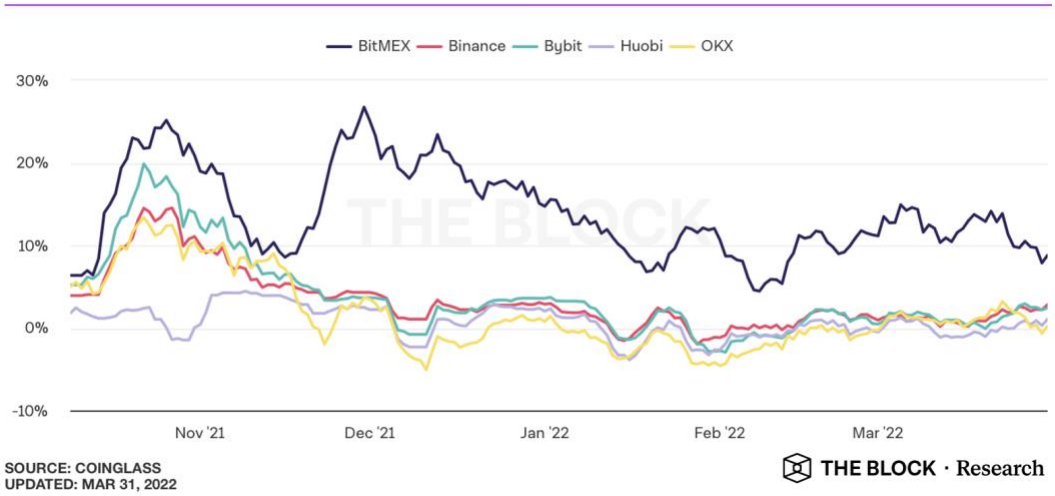
Figures 2.13 and 2.14 display the development of funding rates at major centralized exchanges over time for bitcoin and ether, respectively.

Figure 2.13: Bitcoin Funding Rates (7 Day-MA, APY)



[27] Other notable tech stocks feature slightly higher implied volatilities (30 days), with Tesla floating between 40-60%, Twitter 40-80% and Nvidia 30-50% since 2012.

Figure 2.14: Ether Funding Rates (7 Day-MA, APY)[28]



The figures indicate that after a bullish run-up in Winter 2021 the market cooled down considerably, with double-digit rates decreasing to single digits. High funding rates allow sophisticated investors to be very profitable with market-neutral strategies such as cash and carry. This yield compression may be related to a combination of four factors:

1. Less market exuberance, and assuming a positive correlation between price development and funding rate/basis spread, results in lower funding rates;

2. The ongoing influx of institutional investors may result in lower yield through increasing amounts of capital employed in market neutral strategies such as cash-and-carry, which would in tendency also lower funding rates;

3. Many crypto derivative exchanges like, for example, Binance[29] have lowered the amount of possible leverage, which may also contribute to less volatile markets;[30]

4. The increasing availability of perpetuals that are margined with stablecoins, which do not depreciate in a sell-off, may have a stabilizing influence on the market.

[28] The funding rate at Bitmex is an outlier because it is based on a so-called quanto derivative, in which the underlying is denominated in another currency (the price of ether in USD) than the currency it is settled in (bitcoin). This setup requires to adjust the funding rate for the bitcoin-ether covariance to capture the convexity in terms of USD returns. See " Bitmex: Is the ETHUSD Swap Fairly Priced?" and "Falkenblog: Convexity Explains the High Bitmex Eth Funding Rate".

[29] See "Binance: Updates on Rules of Binance Futures Leverage for New Accounts".

[30] See, for example, "Yale School of Management: How Leverage Turns Market Corrections into Crashes".

Section 3: Derivative Trading Venue Landscape

This section provides an overview of the major exchange venues to trade crypto derivatives. It also sheds light on network liquidity service providers, which help investors by addressing liquidity fragmentation in trading strategies that require deep liquidity across sometimes 'siloed' trading venues. Crypto derivative trading venues can be subdivided into two categories: 1. native/pure-play crypto derivative exchanges, which can be further broken down into centralized and non-custodial ('decentralized') venues, and 2. traditional derivative exchanges. These different venues can be further distinguished along the four dimensions (i) custody, (ii) regulation, (iii) performance, and (iv) nature of transactions (on/off-chain).

Centralized crypto-native venues are usually controlled by a single entity and carry out transactions via highly performant central trade matching engines. While crypto currencies can be sent to a user's designated blockchain address provided by the venue, the exchange takes custody of these funds, and transactions are carried out on an internal system. Therefore, transactions do not take place on-chain and can theoretically be revoked. Centralized crypto-native venues managed to stay below the regulatory radar for a long time, but their growth has led to more recent regulatory scrutiny. While many are not fully regulated in all jurisdictions in which they offer products, most exchanges have implemented know-your-customer (KYC) and anti-money laundering (AML) rules.

On **decentralized crypto-native venues** by contrast, customers remain in control of their assets ('self-custody'), which may however be locked up in smart contracts, from which they can be withdrawn. Transactions are carried out 'on-chain' and are therefore subject to the performance of the host blockchain. This has turned out to be a major obstacle for the development of competitive derivative markets on-chain relative to centralized venues. However, these performance issues can be addressed with newer blockchain technology, such as dYdX's use of StarkWare's layer-2 scaling solution.[31] Decentralized venues are still largely operating in a regulatory void, with neither KYC nor AML rules being implemented.

Traditional derivative exchanges such as the CME do not directly process crypto currency transactions, but provide derivative instruments tied to these markets. Customer funds are held in custody, extensive KYC and AML regulations are implemented, and the venues are fully regulated and licensed.

Table 3.1 displays the major crypto derivative venues.[32]

[31] For further information see "dYdX: What is Layer 2?"

[32] As outlined in the previous section, the crypto derivatives space is largely driven by futures, with bitcoin as the major underlying. Regarding options, the two largest exchanges are Deribit (covering more than 90% in terms of open interest of bitcoin) and CME.

Table 3.1: Major Derivative Exchanges

Venue	Category	BTC Futures Open Interest ($bn)	% Share
Binance	Centralized crypto-native	$4.83	28.2%
CME Group	Traditional	$2.83	16.5%
FTX	Centralized crypto-native	$2.49	14.5%
Bybit	Centralized crypto-native	$2.07	12.1%
Okex	Centralized crypto-native	$1.99	11.6%
Deribit	Centralized crypto-native	$1.09	6.4%
Bitfinex	Centralized crypto-native	$0.61	3.6%
Bitmex	Centralized crypto-native	$0.46	2.7%
Huobi	Centralized crypto-native	$0.36	2.1%
dYdX	Decentralized crypto-native	$0.31	1.8%
kraken	Centralized crypto-native	$0.10	0.6%
Total		**$17.14**	**100.0%**

Data as of 03/31/2022
Note: Includes all firms with > $100 million of open interest per CoinGlass.
Source: CoinGlass

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Most crypto derivative exchanges are centralized crypto-native venues (81.7%), with Binance being the largest in terms of open interest of bitcoin futures ($4.83bn, 28.2% of the sub-group). There are two notable outliers. CME is a traditional exchange venue ranked second with $2.83bn of open interest (16.5% of the sub-group), and dYdX is a decentralized crypto-native exchange venue ranked eleventh with $0.31bn of open interest (1.8% of the sub-group).

Binance was founded in 2017. While it is headquartered in the Cayman Islands, it has been frequently accused of evading regulation by several jurisdictions.[33] Despite these allegations, Binance has grown to be the biggest crypto exchange in terms of open interest.

The **CME** was founded in 2007 and is the world's largest financial derivatives exchange with derivative underlyings including commodities, crypto currencies, energy, foreign exchange, interest rates, metals, and stock indexes. It is incorporated in the US, where it is regulated by the CFTC. At the time of writing, its most successful crypto derivative contracts are the micro bitcoin and ether futures, ranked 31 and 32 in terms of open interest among all CME futures. These

[33] See, for example, "FCA: Consumer Warning on Binance Markets Limited and the Binance Group". Binance has also been put under investigation by the US Department of Justice and the Internal Revenue Service, which investigate money laundering and tax offenses. See "Reuters: Binance under investigation by Justice Department, IRS".

are however still dwarfed by Eurodollar futures, making up each less than 2% of that contract's open interest.

dYdX was founded in 2017. It is a privately held company incorporated in San Francisco, but aims to become fully decentralized in the future with the next protocol version.[34] The company has submitted a notice of exempt offering securities to the SEC,[35] however, does not currently offer its platform to US citizens. While CME and Binance do have KYC and AML mechanisms in place, the nature of open protocols like dYdX 'on-chain' prevents those to be implemented. Hence, growth may be less driven by institutional investors until such procedures can be implemented.

Why Centralized Crypto-Native Venues are Leading the Market

The previous sub-section shows that investors currently favour centralized crypto-native trading venues. This is driven by several advantages relative to decentralized crypto-native and traditional exchanges. With respect to **decentralized crypto-native exchanges**, centralized (crypto-native) venues usually feature

- a better performance in terms of transaction speed and finality, with much more liquidity across a wide range of derivative contracts/underlyings;
- better accessibility, for example when moving funds between venues;[36]
- a known and registered entity, which may help in case of litigation;
- transactions that can be unwound;
- basic KYC and AML rules, though regulatory oversight may still be limited.

All these points are important, in particular for institutional investors, not least to fulfil their fiduciary duties towards their clients.

Traditional exchange venues emerged relatively late and with a limited amount of product offerings in the crypto derivatives space. This may (not least) be due to regulatory uncertainty in an emerging technology. However, on top of that there are several advantages for centralized crypto-native venues, which may make it hard for traditional exchanges to rapidly supplant them in the crypto space:

- Incumbents are very agile in a space which develops extremely fast. For example, exchanges such as Binance frequently provide products for new

[34] See "dYdX: decentralization roadmap". A possible legal framework is explored here.
[35] See "SEC: Notice of exempt offering of securities".
[36] It may be much more involved to bridge funds between decentralized venues that operate on different blockchains than between centralized exchanges.

underlyings – in the first week of March 2022 only, there were four new product listings;[37]

- Margin requirements are lower than on traditional venues (up to 200x leverage is possible on some venues),[38] with the possibility to use the respective crypto underlying as margin.[39] This can be more capital efficient, for example in cash-and-carry strategies.

- Crypto-native exchanges allow for 24/7 trading.

Market Fragmentation and Liquidity Network Service Providers

Market fragmentation can be defined as the degree to which there are price differences between trading venues for homogenous (or similar) assets. Such price differences of fungible/commoditized products are strongly tied to liquidity, which can be broken down into five dimensions:[40]

- Breadth: is the existence of numerous and large liquidity-providing orders, which help minimize price impact ('slippage') of transactions;

- Depth: is the volume available at the narrowest bid-ask spread, that is, the amount that can be traded immediately without slippage;

- Immediacy: is the time required to execute a large order for a given price, measured by the time elapsed between placement and execution;

- Resilience: is the market's capacity to return to a price that is warranted by fundamentals after liquidity has been consumed and the price has moved away from that 'fundamental' equilibrium. Markets which feature faster replenishment of liquidity-providing orders in such a situation are more resilient;

- Width: is the cost to implement a trade for a given bid-ask spread. A narrower bid-ask spread for a given transaction volume leads to a lower cost.

The more liquid assets are along these dimensions and across different exchange venues, the less fragmented markets are, and the better the conditions for implementing (large) trades become. In an optimal situation, liquidity can be aggregated across separate exchange venues, which ensures that the law of one price holds. However, due to market fragmentation, prices in the crypto space

[37] See "Binance: New Cryptocurrency Listings".
[38] See, for example, "Huobi: Trading Rules of Perpetual Swaps". Note that the amount of possible leverage may depend on position size. See "Binance: Leverage and Margin".
[39] For example, FTX allows a list of 125 collateral types, most of which are crypto-native. See "FTX: Non-USD collateral".
[40] See, for example, "IMF: Measuring Liquidity in Financial Markets", or "European Union: Primary and Secondary Equity Markets in the EU".

have been deviating between trading venues even for the most liquid fungible tokens, such as bitcoin. One stark example is the 'Kimchi Premium', which is the gap in bitcoin prices (but also other crypto currencies) in South Korean exchanges relative to other global exchanges. While the Kimchi Premium provides a good example for market fragmentation in crypto currency markets, the liquidity fragmentation takes place in derivative venues.

Market fragmentation can also result from market participants not being able to access certain venues from an integrated account. Currently, for a market participant to move from one trading venue to another may require separate trading accounts and the transfer of assets from one exchange to another, without the possibility of cross-margining. Furthermore, some venues may be not accessible at all. As shown in Section 2 (Figures 2.3 and 2.4), Deribit is by far the most liquid venue for crypto options as measured by open interest and volume. Yet US investors cannot access that platform for regulatory reasons.[41] Instead, they may have to resort to exchanges such as CME, which currently only offers options on bitcoin futures, or turn to individual OTC venues. However, the latter can be much more opaque and result in price discrimination and other inefficiencies.[42] Such market fragmentation makes trading less efficient and may prevent the implementation from large volume trading strategies across venues altogether.

Liquidity Network Service Providers

Liquidity network service providers help investors overcome liquidity fragmentation in crypto markets. Their platforms aim to provide deep liquidity covering multiple time zones through aggregating liquidity from exchanges, proprietary traders, dark pools, market makers and OTC venues. This may result in better liquidity, transparency and pricing. Clients can source the best bids/asks across a number of venues, carry out sizable trades with low slippage, and don't need to move funds between separate accounts.

The service is particularly geared towards clients who carry out large crypto derivative trades, such as institutional investors, who may not have set up the required internal infrastructure required by compliance and regulation. In addition to providing the infrastructure and deep liquidity, liquidity network service providers also ensure clients comply with KYC and AML requirements.

Table 3.2 provides an outline of six leading pioneers, B2C2, Cumberland, FalconX,[43] Galaxy Digital, Genesis, GSR, and SFOX in the liquidity network service provider space for crypto derivatives.

[41] See "Deribit: Restricted countries.
[42] Not least for this reason, regulators have been arguing for trading all standardized OTC derivatives on exchanges. See "IOSCO: Report on Trading of OTC Derivatives".
[43] For a more comprehensive overview on the service offerings of FalconX, which recently became the first CFTC registered crypto currency swap dealer, see "The Block Research: FalconX Company Intelligence".

Table 3.2: Major Derivative Liquidity Network Service Providers

Firm	Est.	HQ	Headcount	Funding ($MM)	Valuation ($BN)	Services
B2C2	2015	London	~125	$37.4	N/A	Crypto liquidity provider servicing 450+ institutions including OTC desks, banks, exchanges, FX brokers, and others
CUMBERLAND	2014	Chicago	~25	$21.2	N/A	Specialized crypto asset trading company providing access to spot, futures, non-deliverable forwards, and bilateral options
FALCONX	2018	USA	~175	327.0	3.75(1)	Digital assets financial services platform facilitating trading, credit, and clearing for institutions
GALAXY DIGITAL	2018	USA	~400	505.0	8.5	Financial services firm offering Trading, Asset Management, Investment Banking, Mining and Principal Investments.
Genesis	2013	USA	~200	N/A	N/A	Integrated platform to trade, borrow, lend, and custody digital assets. Subsidiary of Digital Currency Group.
GSR	2013	London	~275	N/A	N/A	Specializes in providing liquidity, risk management and structured products to global participants in the digital asset ecosystem
SFOX	2014	USA	~50	23.0	N/A	Full-service prime dealer uniting liquidity from over 30 exchanges and OTC desks.

Notes: (1) Falcon X Valuation as of August 2021 fundraise
Source: Company Websites, Crunchbase, The Block Research

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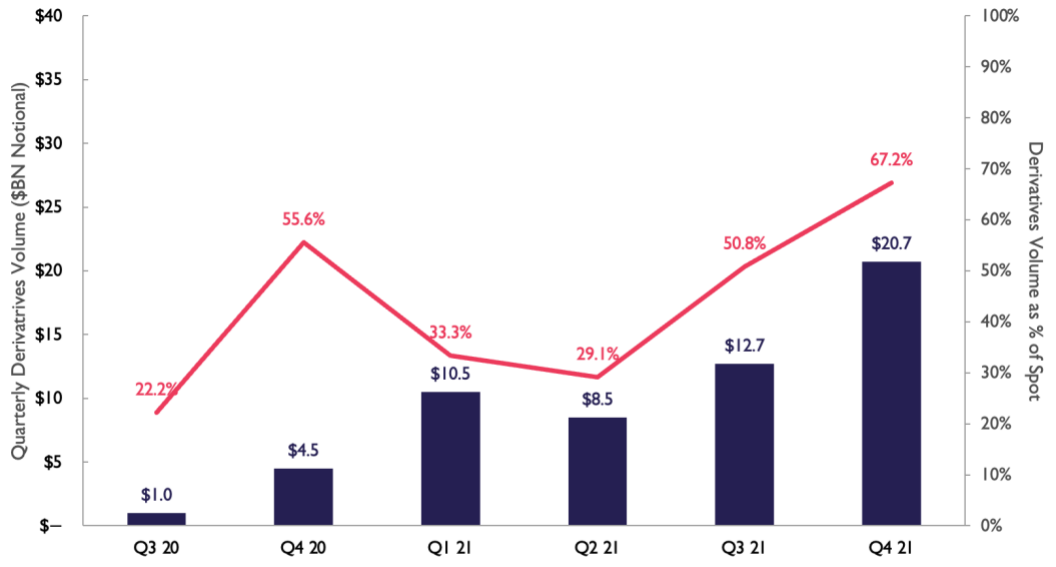
Most of these service providers are private and hence do not disclose how much derivative volume is traded on their platforms. However, some statistics can be found. Genesis Trading for example, which was one of the earliest movers in the OTC trading field and launched its Bitcoin trading desk in 2013, has seen a significant increase in its derivative trading volume over the past quarters. Figure 3.1 displays derivative volume traded on Genesis.

Figure 3.1: Genesis Derivative Volume ($bn) and as % of Spot OTC



Source: Genesis Capital Quarterly Lending Report

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It traded ~$21 billion in notional derivatives in Q4 2021, and its derivatives trading as a percentage of spot OTC trading reached a new all-time high of 67%.[44] While these data are based on an individual company, they broadly reflect the trend of increasing activity in derivatives relative to spot markets.

Growth in crypto derivatives adoption is at the early stages of the adoption cycle. Both traditional and crypto-native venues are building an institutional presence to capture the exponential growth expected to hit this segment of the market. Derivatives give traditional financial firms the ability to gain exposure to the market with lower barriers to entry, and institutional crypto firms are building products to suit their needs.

[44] See "Genesis: Q4 Market Observations".

Section 4: Conclusion and Outlook

The crypto derivatives market has come a long way. Besides establishing key derivatives such as futures and options, which have been used for a long time in traditional financial markets, it features several novel derivatives such as perpetual swaps and options vaults. This shows the innovative prowess of the crypto sector, which cannot be ignored anymore by financial market participants.

Crypto derivative activity has grown tremendously over the past years and exceeds that of spot markets. This increase in liquidity, is not least due to investors' preference for capital efficiency through low transaction costs and leverage. Deep liquidity is conducive to efficient price discovery:[45] In the traditional finance space futures markets often lead price discovery relative to spot markets. Several studies have also shown this phenomenon to be increasingly at play for the bitcoin futures market.[46] This reflects similar developments that took place in traditional financial markets before, where deep and liquid derivative markets lead price discovery of spot markets. What we are witnessing today may be similar to the 70s – an era during which the (financial) futures markets were rapidly developing, far exceeding their agricultural and commodity origins, and later developed an enormous impact on other key markets such as the interest rate (swap) market. The difference this time is the order in which market participants have joined – retail first, then adoption by institutional investors.[47]

The maturation of crypto derivative markets, increasing liquidity and influx of institutional investors may also be factors behind yield and volatility compression in the crypto space, albeit from elevated levels. Both metrics have been trending downwards. It would be interesting to further study how far institutional investors' capital employed in market neutral strategies combined with their preference for capital-efficient derivative instruments are explanatory factors.

The two key developments recurring throughout the report, growth in derivative markets and influx of institutional investors, are likely feeding off each other. If both developments persist in the future, they will drive crypto markets towards further maturation. As a corollary to this – ever increasing market capitalization, market maturation and influx of institutional investors – regulatory bodies cannot ignore the space anymore. There is a flurry of discussion papers and market consultations brought forward from regulators around the world. It currently looks as if regulators still try to find the right balance between taming the freewheeling crypto sector while maintaining its innovative prowess as a future driver of economic growth. However, with increasing regulation, the space will likely become more investable. This bodes well for further strong growth in crypto currency markets, and the derivative segment in particular.

[45] See for example "Review of Economics and Statistics: Price Movements and Price Discovery in Futures and Cash Markets", "Review of Financial Studies: A Further Analysis of the Lead-Lag Relationship Between the Cash Market and Stock Index Futures Market", or "The Journal of Futures Markets: Trading cost and the relative rates of price discovery in stock, futures, and options markets". Also see "Bitwise: Price Discovery in the Modern Bitcoin Market" for further discussion.

[46] See "Bitwise: Price Discovery in the Modern Bitcoin Market".

[47] Also see "The Wall Street Journal: Mainstream Hedge Funds Pour Millions of Dollars Into Crypto".

Disclosures

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