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CRYPTO DERIVATIVES

What to expect in a fast-changing market

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INTRODUCTION

The year 2019 has been a busy one for crypto derivatives. Some existing exchanges have posted record volumes. Over-the-counter (OTC) trading desks are announcing new custom offerings and nearly half a dozen startup exchanges are planning U.S. launches with exchange-traded derivatives that put a twist on existing derivatives markets, both in crypto and in other asset categories.

Cryptocurrency purists may see crypto derivatives as a kind of contradiction in terms. Bitcoin is designed to be transferred peer to peer, without intermediaries like the brokers, exchanges and clearinghouses that characterize derivatives markets. Its supply is designed to be constrained absolutely, to 21 million units; derivatives enable trading volume beyond the supply of an underlying asset. However, crypto assets may be well suited to derivatives. This paper will go over some of the ways in which that is so.

Institutional investors may wonder whether it's responsible to dabble in an asset as volatile as bitcoin, where markets are manipulable, fundamentals are lacking and regulation may be immature. If the underlying asset is too dangerous to hold, how much shakier is a levered derivative built atop it? This paper will answer questions about what makes crypto assets different from other categories of derivatives.

Anyone who gets over these hurdles will be wondering how to approach crypto derivatives markets. This paper will go over what's available today, both in regulated and lightly regulated markets. We'll also cover the context in which today's offerings sprung up, and into which new derivatives products are emerging. For more papers like this one, introducing crypto assets to professional investors, please visit coindesk.com/intro-to-crypto-investment. You can email the author at galen@coindesk.com.

CRYPTO ASSET DERIVATIVES' POTENTIAL BENEFITS TO INVESTORS

Growth in derivatives can be understood as a byproduct of growing institutional interest in crypto assets. To understand why, let's focus on bitcoin. There are three factors that make derivatives especially attractive to investors in bitcoin.

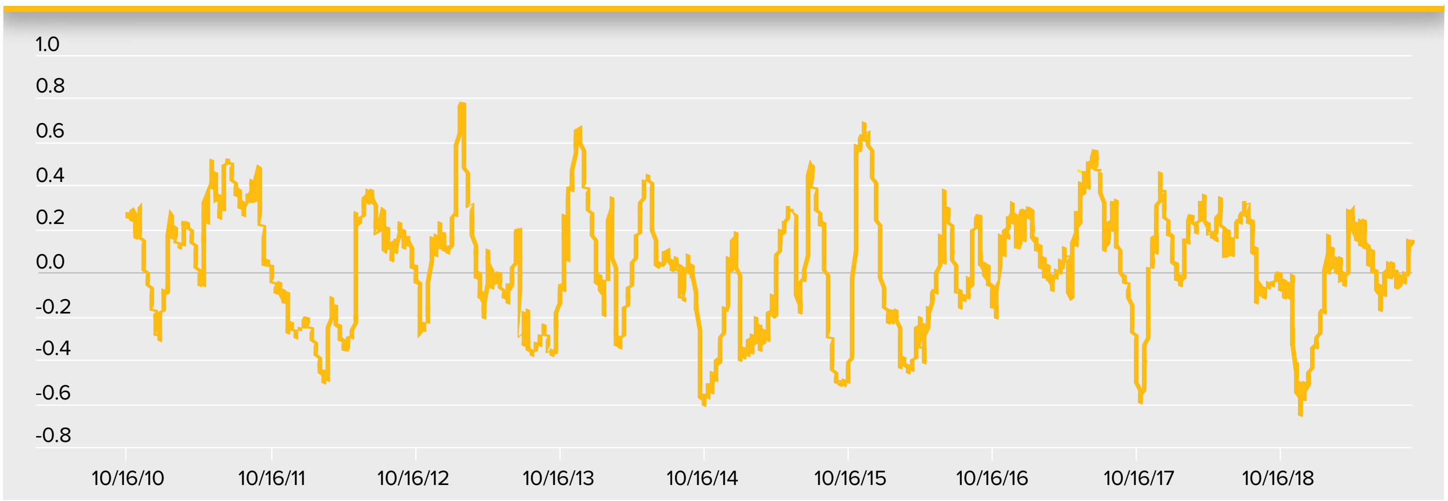
Custody

Bitcoin is a digital bearer instrument. This quality is at the heart of its innovation: bitcoin is the first all-digital asset, where ownership can be proved without recourse to a central authority. There is no title and no recourse in the event of loss or theft. The operational requirements of safe crypto asset custody are new, posing questions that for asset managers can become obstacles.[1] Derivatives, to the extent they offer exposure to cryptocurrencies without the need to custody the asset, offer a potential way around these operational obstacles.

Supply

Unlike almost any other asset in the world, bitcoin's supply is strictly limited. It draws its value from a "deflationary monetary policy" that sets a supply cap programmatically at 21 million BTC. Bitcoin can be fractionalized out to eight decimal places, or 100 millionth of a bitcoin. This provides some assurance against any concern that bitcoin might become too valuable to trade, but it doesn't address a possible scenario in which trading volume increases, but the price remains stagnant. To date, bitcoin's price and trading volume are inconsistently correlated. (See Figure 1.) Derivatives expand the capacity of bitcoin markets, allowing value to flow into synthetic assets built upon the underlying 21 million coins.

Figure 1: Bitcoin's price won't necessarily keep pace with volume
90-day correlation, bitcoin price vs. volume



Source: coinmetrics.io, retrieved Sept. 11, 2019. Volume data is Coinmetrics' adjusted daily native units transferred metric.

Risk management

Taking a long position in bitcoin is a speculative bet on an entirely new category of assets. Some day, bitcoin may become a "safe haven" investment, but today it looks more like a risk-on asset.[2] Derivatives provide opportunities to hedge that risk and, on the other side of the risk spectrum, opportunities to double down on it via leveraged trade.

1 Galen Moore, "Custody: Crypto Assets' Unique Challenge and Opportunity," *CoinDesk Research,* August 2019

2 Galen Moore, "Is Bitcoin a Safe Haven?" *CoinDesk Research,* August 2019

HOW ARE CRYPTO DERIVATIVES DIFFERENT?

Consistency is part of what makes derivatives attractive: for example, futures contracts backed by one kind of commodity may trade much like futures in other markets, though the underlying commodities behave very differently. This makes derivatives a useful onramp for investors who are unfamiliar with crypto, a new asset category.

However, there are some differences between crypto derivatives and other categories of derivatives. Here is a brief primer on features of crypto derivatives that may be unfamiliar to traders used to established derivatives markets.

Unknown fundamentals

Crypto derivatives are different because the fundamentals of the underlying asset are not understood. Investors who trade crypto derivatives have probably never before seen a derivatives market that operates without an understanding of underlying fundamentals. Potential analytical methods are worth studying, but so far the prices of bitcoin and other crypto assets appear to move more on momentum than on fundamentals. For example, a trader new to commodities futures can make a quick study of the supply and demand dynamics driving the price of the underlying. No such entry-level analysis exists in bitcoin or other crypto assets, where fundamentals, if they have been established, are yet to be widely accepted.

Controlled supply

In commodities derivatives markets, investors analyze fluctuations in supply and demand of the underlying commodity. Any number of factors influence the annual supply of wheat, gold or oil. Bitcoin's supply schedule is controlled: it is programmed to hew to a fixed schedule, whether one computer is mining it or 100,000.[3]

Unnatural hedges

Crypto assets don't necessarily have the same "natural hedgers" as commodities do. For example, gold miners use futures to lock in prices that will cover their expected costs. Bitcoin also has "miners," who run the computing infrastructure that powers its network. However, the bitcoin mining business is different from commodities production. For one thing, the price of bitcoin is more volatile than any known commodity.[4]

The operating environment in the nascent crypto-mining industry is also tremendously volatile – an order of magnitude more so than traditional mining. The chart on the following page shows how much "hash rate," or computing power, bitcoin miners are putting into the network, which is a proxy for their operating expenditure, and compares that to growth in mining op-ex. Using some of the most efficient mining equipment advertised today,[5] 2018's average hash rate would equate to about 463 kw/h of electricity consumed each second.

For the first time, a digital commodity is under production. Its producers, the miners, are among those using derivatives to hedge against declines in price, but their operating activity does not follow established patterns in physical commodities, and therefore their hedging behavior in derivatives markets may not, either.

3 "Controlled Supply," *Bitcoin Wiki,* retrieved Sept. 17, 2019

4 Galen Moore and Noelle Acheson, "Crypto in Context: The Social and Technical Underpinnings of an Emerging Asset Category," *CoinDesk Research,* July 2019

5 Daniel Palmer, "Bitmain Ramps up Power and Efficiency With New Bitcoin Mining Machine," *CoinDesk,* September 9, 2019

Figure 2: “Mining” ain’t what it used to be
Global mining industry op-ex and bitcoin mining hash rate, 2016-2018

Source: BTC.com (retrieved Sept. 16, 2019) and PwC, “Mine 2018: Tempting Times”

The Wild East

The largest lit exchanges operating today in crypto derivatives are based in Asia and are lightly regulated compared to competitors regulated by U.S. or E.U. governments. Factors that set them apart from regulated operators include direct access to the exchange for both retail and institutional investors, and the availability of leverage up to 100X.

Perpetual swaps

One of the most popular products in crypto asset derivatives is the perpetual swap, reportedly invented by BitMEX, a lightly regulated crypto derivatives exchange based in Asia.[6] If not entirely unique to crypto assets, the popularity of these perpetual swaps is certainly not replicated in any other asset class. Unlike futures, perpetual swaps do not have a closing date. They settle to an index periodically (on BitMEX settlement occurs every eight hours), letting traders maintain their positions without rolling them over.

24/7 markets

Unlike most derivatives markets, crypto derivatives indexes pull data from markets that are open 24 hours a day, seven days a week.

6 Paul Amery, “The Wild World of Crypto Derivatives,” *New Money Review,* June 26, 2019

WHAT'S AVAILABLE TODAY

As discussed above, crypto derivatives offer a variety of investment possibilities: a more familiar way to custody a buy-and-hold strategy; hedges against long positions in a volatile asset category; leverage to increase exposure in a supply-constrained market. This section deals with the markets and products that exist today to answer those needs.

Product overview

Here is a brief overview of the categories of crypto asset derivatives that are available to investors, at this writing.

Exchange-traded products

Crypto asset derivatives are compelling in part because of their ability to provide exposure to bitcoin and other crypto assets via regulated markets and familiar financial instruments. Several offerings today may not be "derivatives" per se, but answer that demand. In Europe, bitcoin-backed exchange-traded notes (ETNs) have been available since at least 2015.[7] So far, efforts in the U.S. to replace such synthetic derivatives with an Exchange-Traded Fund have not met with regulatory approval. In the meantime, Grayscale Investments' Bitcoin Trust (GBTC), another synthetic derivative that tracks the price of bitcoin, is open to accredited investors and trades on OTC markets.

Custom derivatives OTC

OTC trading represents an extraordinarily large share of crypto markets activity--as much as 60 to 65 percent, by some estimates.[8] OTC desks, some with minimum trades in the six figures, offer a number of bespoke derivatives products to clients, potentially including options, swaps, forwards and, where legal, contracts for difference.

Futures and forwards

Notional volume in standardized futures and forwards contracts is dominated by a handful of lightly regulated exchanges, mostly based in Asia. In the U.S., regulated bitcoin futures are available through the CME, and a handful of startups are preparing to offer alternative bitcoin futures under CFTC regulations.

Perpetual swaps

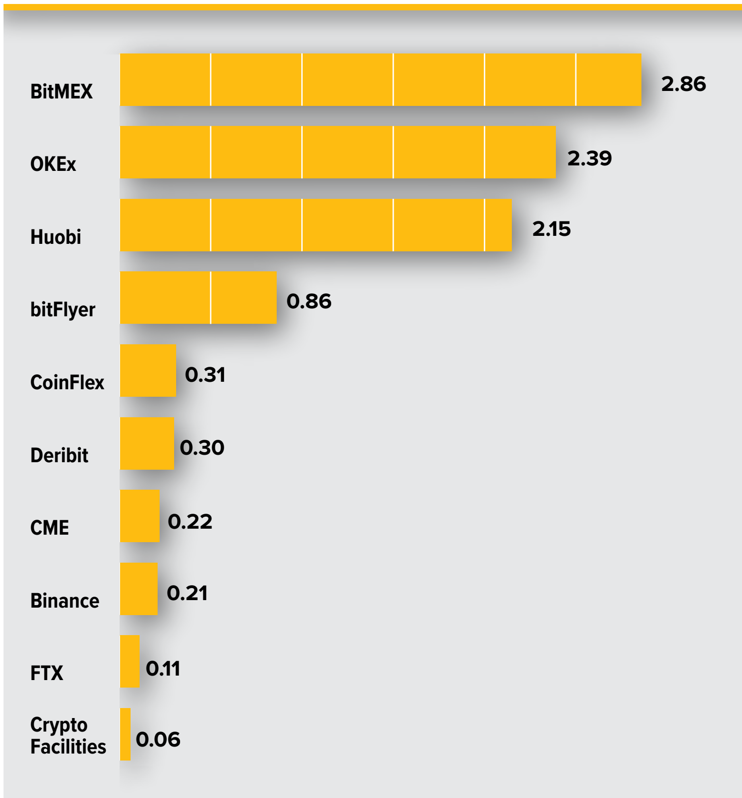
Reportedly invented by BitMEX, an Asia-based derivatives exchange, perpetual swaps act like futures, but do not have a closing date; instead, longs and shorts settle to the index periodically, in cash.

7 Yessi Bello Perez, "Sweden's Nasdaq Exchange Approves Bitcoin-based ETN," *CoinDesk*, April 29, 2019

8 "Institutional Crypto-Trading Platforms: Blockchain Meets Block Trade," Aite Group, May 21, 2019

Figure 3: The largest bitcoin futures exchanges

BTC futures and perpetuals, 30-day average reported volume (US$ billions), Aug. 20–Sept. 29



- [BitMEX] offers perpetual swaps and futures contracts with up to 100X leverage. It is headquartered in Hong Kong and domiciled in the Seychelles.
- [OKEx] offers futures contracts with up to 20X leverage. It is headquartered in Hong Kong and domiciled in Malta.
- [HuobiDM] offers futures contracts with up to 20X leverage. It is headquartered and domiciled in Singapore.
- [BitFlyer] offers up to 5X leverage. It is headquartered and domiciled in Japan.
- [CoinFlex] offers futures contracts with up to 20X leverage. It is headquartered in Hong Kong and domiciled in the Seychelles.
- [CME Group] offers futures contracts with up to 2.7X leverage.[a] It is headquartered and domiciled in the U.S.
- [Deribit] offers perpetual contracts, futures contracts and "European-style" options, with up to 100X leverage. It is headquartered and domiciled in the Netherlands, but not subject to Dutch financial regulations.[b]
- [Crypto Facilities] (now Kraken Futures) offers futures contracts with up to 50X leverage. It is headquartered and domiciled in the U.K.

a "CME Bitcoin Futures FAQ," retrieved August 12, 2019.

b Alastair Marsh, "Cryptocurrency Exchange Introduces Block Trading for Derivatives," Bloomberg, August 22, 2019

Source: Skew.com

Volume in crypto derivatives is apparently dominated by BitMEX, Huobi and OKEx, all lightly regulated, Asia-based exchanges. Volumes reported by Huobi and OKEx have been repeatedly called into question,[9] but there is no doubt that all three of these exchanges have attracted significant retail investor activity and have proven useful to liquidity providers and others who need nimble hedging strategies.

However, their regulatory status raises potential counterparty risks. For example, do the exchanges trade on their own account? How much of their revenue comes from forced liquidations? Unlike regulated U.S. or European entities, these exchanges are not clearinghouses, instead using a mixture of apportioned winnings and insurance funds to ensure that winners get paid, which raises questions about certainty of settlement and may make them unsuitable for inclusion in a broader portfolio strategy. They are unlikely to ever prove viable options for asset managers investing client funds.

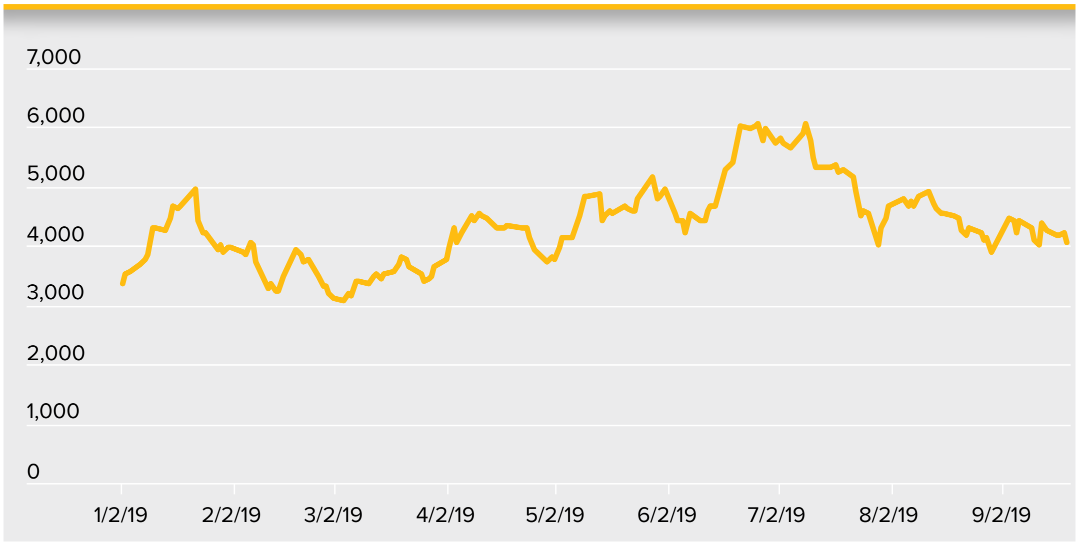
9 Teddy Fusaro and Matt Hougan, "Presentation to the U.S. Securities and Exchange Commission," *BitWise Asset Management,* September 17, 2019

THE REGULATED NEWCOMERS

As in other areas of crypto, regulated derivatives exchanges are followers, coming behind lightly regulated or unregulated venues. Institutional products have been preceded by offerings marketed to retail investors. In December 2017, two large derivatives exchanges in the U.S., the CME and Cboe, launched bitcoin futures markets approved by the CFTC. Their move was closely watched as an introduction of legitimacy and an on-ramp for institutions into a market that had grown up with minimal regulation.

Uptake was anemic at first.[10] The near-simultaneous roll-out of derivatives on CME and on its rival, Cboe, coincided with bitcoin's all-time high and the beginning of a bear market that saw bitcoin's price fall 83 percent, according to the CoinDesk Bitcoin Price Index.

Figure 4: Growing Interest in Bitcoin Futures
CME Bitcoin Futures open intererst (contracts) versus time



Source: Bloomberg

In May of this year, as bitcoin started to pull out of the 2018 market slump, average trading volumes in CME's bitcoin futures hit new highs, reaching 13,600 contracts, or $515 million (68,000 BTC) in notional value.[11] CME may have benefited when Cboe shut down a competing product in Q2, but its volume figures show a growing market for bitcoin futures.

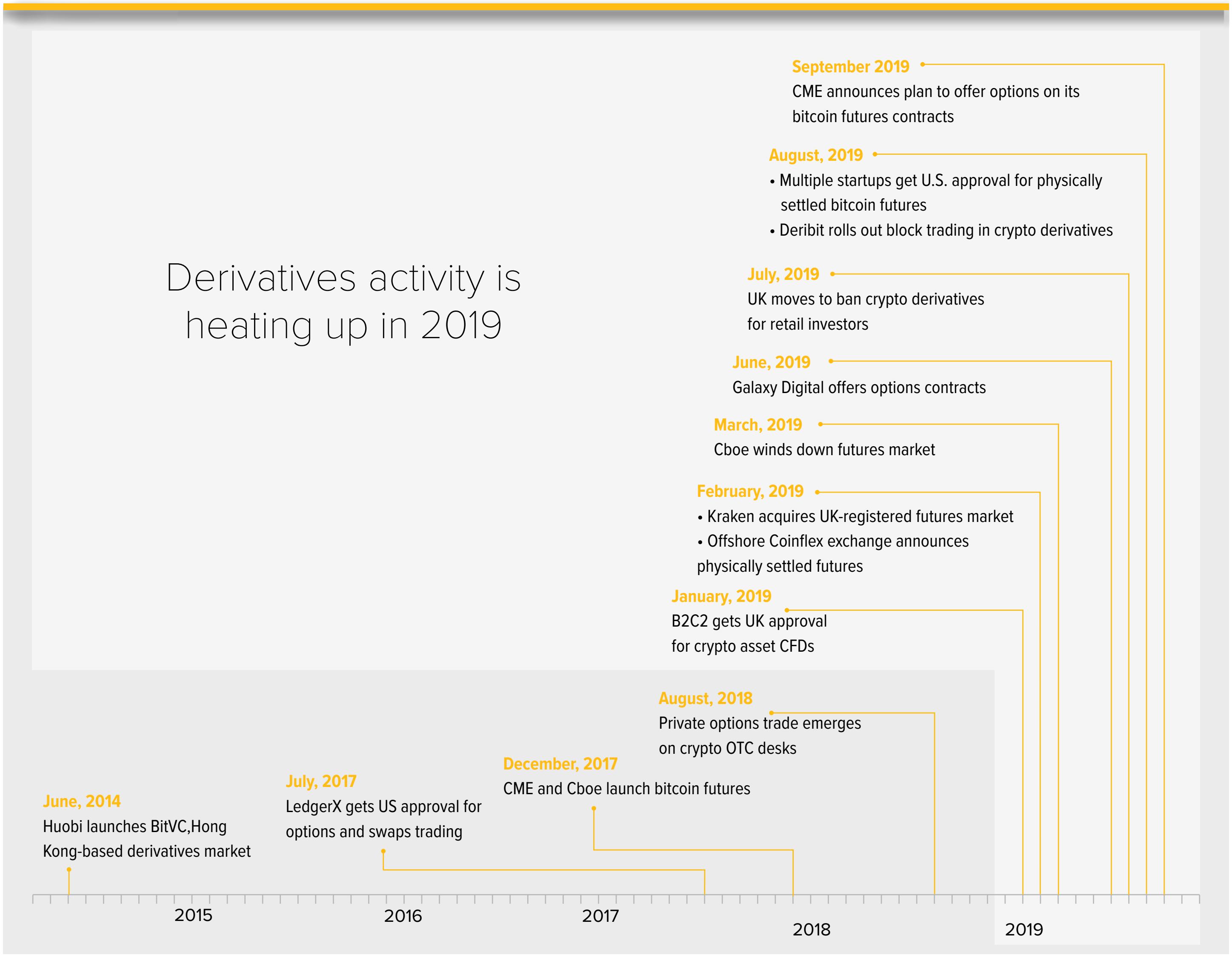
In the months leading up to CME's May breakout, OTC desks were quietly serving crypto clients with derivatives through the bearish "crypto winter." Private options trading emerged in late summer 2018, fueled by a supply-side need for cash among firms that were naturally long bitcoin and other crypto assets.[12] Over-the-counter (OTC) desks at Akuna Capital in Chicago and QCP Capital in Singapore led the emerging trade, followed later by Galaxy Digital of New York.

10 Gertrude Chavez-Dreyfuss, et al., "Exchange Giant CME's Bitcoin Futures Get Tepid Take-up in Debut," *Reuters*, December 17, 2017

11 Sebastian Sinclair, "May Was Best Month for CME Bitcoin Futures Volume Since 2017," *CoinDesk*, June 7, 2019

12 Alastair Marsh "Crypto Survivors Find a Rare Lifeline," *Bloomberg*, February 12, 2019

Figure 5: A timeline of derivatives offerings



Source: Compiled by CoinDesk

Sidebar: Why did Cboe fail?

When regulated futures first came to bitcoin trading in the U.S., in the fourth quarter of 2017, there were two entrants: CME Group and Cboe Global Markets. In March, Cboe announced it would list no new bitcoin futures contracts.[a] It's tempting to view Cboe's capitulation as a signal of weak demand for bitcoin futures. The truth is traders preferred CME's product. The outcome of a cash-settled future is manipulable in a thinly traded underlying asset like bitcoin, where large buy or sell orders could move the price enough to alter the outcome of a futures trade. Cboe's product relied on pricing data from just one source: the Gemini Auction, conducted daily by Gemini Trust Company, a New York-based digital asset exchange and custodian. CME, on the other hand, aggregates data from multiple spot exchanges.[b]

a Marc Hochstein, "Cboe Exchange Puts Brakes on Bitcoin Futures Listing," *CoinDesk*, March 14, 2019

b "Bitcoin Pricing Product Frequently Asked Questions," CME Group, retrieved August 13 2019

While U.S. newcomers have moved through the regulatory process, new offerings in the U.K. have come to market faster. In February 2019, Kraken, a U.S.-based spot exchange, acquired Crypto Facilities, a U.K. firm, in order to offer a futures market regulated by the British Financial Conduct Authority (FCA). Crypto Facilities operates a regulated futures exchange, and provides bitcoin reference rates to CME Group.

A month earlier, B2C2 OTC, a London-based OTC desk, got FCA approval to offer its clients contracts for difference (CFDs), a type of derivative that allows traders to take long and short positions on margin with no expiration date. CFDs are a non-standardized product, provided by OTC desks, and are not yet permitted under U.S. financial regulations.

Questions about market surveillance dog efforts to create new derivatives offerings in crypto assets.[13] With standards such as tick size not yet established in a market fragmented across dozens of exchanges, and the potential for new patterns and anomalies indicative of manipulation, regulators face challenges in defining the transparency required in markets that provide index data.[14]

13 Laura Shin, "All Things Crypto Regulation With Jake Chervinsky," Audio blog post, *Unchained*, August 6, 2019

14 Noelle Acheson, "Who's Watching? Crypto Market Surveillance and Why It Matters," Audio webinar, *CoinDesk*, June 26, 2019

FORTHCOMING OFFERINGS

No fewer than five startups have been preparing to come to market with a CFTC-regulated product that all have a feature in common: physically settled bitcoin futures. One firm outside U.S. jurisdiction, CoinFlex (Seychelles), already offers physical settlement.[15] Physically settled futures may provide an antidote to alleged price manipulation in bitcoin spot markets, by eliminating the ability to engineer the outcome of a contract by bidding the index price up or down.

CoinFlex competes against unregulated exchanges like BitMEX. If any of the companies below are successful in delivering a physically settled futures contract, it will be the first to do so under U.S. financial regulation. At this writing, it remains to be seen whether investors will prefer physical settlement in crypto assets.

- **Bakkt**, a subsidiary of NYSE parent Intercontinental Exchange (ICE), is preparing in September 2019 to roll out a derivatives trading venue that will include physically settled bitcoin futures, including a daily contract that settles in T+2, which presents the possibility of a derivative that could be used either as a spot equivalent, or, taking advantage of its T+2 settlement to build a forward curve and continue to roll the contracts, as an instrument not unlike the BitMEX perpetual swap.
- **ErisX**, an indirect subsidiary of Eris Exchange, which has offered trading in interest rate swap futures, is preparing to offer a market for physically settled bitcoin futures.
- **LedgerX** offers a regulated venue for trading bitcoin swaps and options; it is preparing to match orders in physically settled bitcoin futures, pending regulatory approval.
- **Seed CX** is preparing to offer trading in physically settled bitcoin margin swaps.
- **Tassat** (fka TrueDigital) is preparing to offer trading in physically settled bitcoin swaps and other derivatives.

Regulatory challenges

At this writing, crypto futures exchange operators face challenges getting CFTC approval for physically settled bitcoin futures. The regulatory challenge for these would-be crypto futures exchanges is threefold:

- One, **futures**, which are standardized products that trade openly on exchanges, are more tightly regulated than swaps, their bespoke and over-the-counter cousins.
- Two, **physical settlement** requires a “warehouse” for the digital asset. Certifying the security of this warehouse is a novel exercise for the CFTC and has been an obstacle for some would-be providers.[16]
- Three, **retail investors:** some exchanges propose to offer products to retail investors, which is a departure from the norm in most derivatives markets.

15 Deribit, a derivatives market based in the Netherlands, settles contracts in cash, paid in bitcoin. It does not offer physically settled contracts, contrary to an earlier version of this paper.

16 John McCrank, “Bakkt Says Bitcoin Futures Testing to Begin in July,” *Reuters*, June 13, 2019

CONCLUSION

Crypto assets represent a new form of investment and ownership. For the first time, there is a digital "real asset," in which valuation does not depend on cash flows, and in which title is not administered through any intermediary. How these innovative qualities will be useful is not yet fully understood. What is known is that they have presented opportunities for returns and volatility, uncorrelated with other asset categories.

As a new form of investment, crypto assets also present problems for those seeking exposure to this opportunity. The operational aspects of managing crypto asset investments may appear different from anything investors are used to. Derivatives may hold solutions to some of those operational challenges. The emergence of regulated derivatives markets—the introduction of new products and venues, and the growth of existing ones—is part of the maturation of the crypto asset category.

It remains to be seen if, through derivatives, crypto assets will impact the broader financial system in a similarly positive way. Crypto assets emerged in isolation from global finance, as an alternative to established systems. As adoption increases, this alternate financial system may become more integrated with established structures. Derivatives clearinghouses are some of the arenas in which this integration is happening today.

Contagion in the 2008 financial crisis resulted from money managers selling to raise liquidity to satisfy margin calls on credit default swaps and other OTC derivatives.[17] If crypto assets like bitcoin become tied into global financial markets through derivatives, a similar kind of contagion could spread from a crypto crash.

Bitcoin was founded as a response to boom-bust cycles in the global economy.[18] If it grows to the potential that some investors believe it can reach,[19] how ironic to think that it could contribute to the causes of another economic crisis.

Special thanks for insights and data to Max Boonen of B2C2, Clint Cox of Crypto Futura Fund, Emmanuel Goh and Tim Noat of Skew, Dan Matuszewski, Rumi Morales of Outlier Ventures, Timo Schlaefer of Kraken Futures, Yinfeng Shao of Reciprocity Trading, and Brian Tehako of Hehmeyer Trading & Investments.

17 Michael Greenberger, "The Role of Derivatives in the Financial Crisis," U.S. Senate Financial Crisis Inquiry Commission testimony, June 10, 2010

18 "Genesis Block," Bitcoin Wiki, retrieved September 17, 2019

19 Helen Partz, "$250K Price Prediction Is Now 'Conservative,' Says Tim Draper," *CoinTelegraph*, September 16, 2019