



# CRA Insights: Finance

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## Exchange Traded Crypto Assets

### Introduction

From a peak of \$68,790 in November 2021, Bitcoin prices dropped by 72% in a span of nine months, dipping as low as \$18,967 in July 2022.<sup>1</sup> Other cryptocurrencies also experienced a similar decline in prices in the first half of 2022. The recent collapse of the algorithmic stablecoin TerraUSD and ensuing lawsuits have further exposed the vulnerabilities underlying crypto markets.<sup>2</sup> A turbulent crypto ecosystem, fraught with its novel risks, has invited increased monitoring from regulators keen to prevent financial contagion and ensure investor protection.<sup>3</sup>

A potential for fraud and manipulative practices has been a deciding factor in the Securities and Exchange Commission's (SEC) denial of Exchanged Traded Funds (ETFs) which physically hold cryptocurrencies to operate in the United States.<sup>4</sup> However, the SEC has approved futures-based cryptocurrency ETFs, as futures-based products might provide stronger investor protections.<sup>5</sup>

The first US Bitcoin-linked ETF, the ProShares Bitcoin Strategy ETF (ticker symbol BITO), was launched on October 19, 2021, at a time when Bitcoin prices were soaring above \$65,000.<sup>6,7</sup> The ETF does not hold spot Bitcoin, but holds a *long* position in the Chicago Mercantile Exchange's (CME) Bitcoin futures offering (ticker symbol BTC), which is designed to track the value of Bitcoin. BITO allows investors to benefit from an increase in the price of Bitcoin without any direct exposure to the actual cryptocurrency.

<sup>1</sup> "Cryptocurrency Prices, Charts and Market Capitalizations." CoinMarketCap, n.d. <https://coinmarketcap.com/>.

<sup>2</sup> Frankel, Alison. "Collapse of Stablecoin TerraUSD Sparks Bold 'Scheme Liability' Suit." Reuters, June 21, 2022. <https://www.reuters.com/legal/transactional/collapse-stablecoin-terrausd-sparks-bold-scheme-liability-suit-2022-06-21/>. ; Knight, Oliver, and CoinDesk. "Over 2,000 Terra Investors Say False Marketing Is What Caused Them to Lose Their Money." Fortune Media IP Limited, June 13, 2022. <https://fortune.com/2022/06/13/binance-us-over-2000-terra-investors-say-false-marketing-is-what-caused-them-to-lose-their-money/>.

<sup>3</sup> Speech by Brainard, Lael, Vice Chair of the Board of Governors of the Federal Reserve System. "Crypto-Assets and Decentralized Finance through a Financial Stability Lens." July 8, 2022. <https://www.federalreserve.gov/newsevents/speech/brainard20220708a.htm>.

<sup>4</sup> Securities and Exchange Commission Release Number 34-95180; File No. SR-NYSEArca-2021-90. June 29, 2022. <https://www.sec.gov/rules/sro/nysearca/2022/34-95180.pdf>.

<sup>5</sup> "SEC Approves Bitcoin Futures ETF, Opening Crypto to Wider Investor Base." CoinDesk, October 15, 2021. <https://www.coindesk.com/policy/2021/10/15/sec-approves-bitcoin-etf-opening-crypto-to-wider-investor-base/>.

<sup>6</sup> "BITO Bitcoin Strategy ETF." ProShares, n.d. [https://www.proshares.com/strategies/bitcoin/?gclid=EAlaIqobChMI-4rqou7S-AIVAXLnCh3MSAsKEAAYASAAEgBhVd\\_BwE](https://www.proshares.com/strategies/bitcoin/?gclid=EAlaIqobChMI-4rqou7S-AIVAXLnCh3MSAsKEAAYASAAEgBhVd_BwE).

<sup>7</sup> "Cryptocurrency Prices, Charts and Market Capitalizations." CoinMarketCap, n.d. <https://coinmarketcap.com/>.

In a timely fashion, ProShares launched the first US *short* Bitcoin-linked ETF (ticker symbol BITI) on June 21, 2022 amidst a plummeting crypto market. BITI, in contrast to BITO, affords investors a way to profit from declines in the price of Bitcoin.<sup>8</sup>

These ETFs increase the ease with which a broad group of investors – with varying levels of sophistication and regulatory requirements – can obtain exposure to crypto assets. However, an expanded investor base and multiple levels of asset separation between the ETFs and the underlying cryptocurrency create the risk of disputes and litigation if ETF prices do not move as investors expect.

In this *Insights* piece, we provide an overview of a stack of exchange traded crypto assets – cryptocurrency ETFs, crypto derivatives, and spot cryptocurrencies. We also show that open interest and volume traded of the CME's Bitcoin futures offering peaked around the BITO ETF launch.

## The asset stack

### ETFs

Cryptocurrency ETFs track the performance of an underlying cryptocurrency and can be purchased or sold on an exchange. These ETFs can be spot-based (i.e., invest directly in the actual cryptocurrency) or futures-based (i.e. have a position in a futures contract – a derivative of the spot cryptocurrency).

Canada's Purpose Bitcoin ETF was the world's first physically settled Bitcoin ETF that began trading on the Toronto Stock Exchange on February 18, 2021.<sup>9</sup> Similar to Bitcoin ETFs, spot-based ETFs linked to other cryptocurrencies also exist. For example, Canada's 3iQ CoinShares Ether ETF has been trading on the Toronto Stock Exchange since April 23, 2021.<sup>10</sup> In the United States, spot-based ETFs have not yet received regulatory approval from the SEC. However, several futures-based Bitcoin ETFs have won the SEC's approval.

The first SEC-approved Bitcoin ETF was BITO, which tracks the CME's BTC futures contract. BITO is listed on the NYSE Arca exchange, and can be traded using a brokerage account, which removes the need for a crypto exchange account or wallet. BITO doesn't directly invest in Bitcoin but obtains Bitcoin exposure by entering into long positions in near-term CME BTC futures contracts. Additionally, it invests in short-term cash instruments such as US Treasury Bills and Repurchase Agreements. BITO expands and contracts its liquid pool of cash-equivalents as the price of Bitcoin increases and decreases, respectively.<sup>11</sup>

The ProShares BITI ETF, the sister ETF to BITO, is designed to deliver daily investment results corresponding to the inverse (-1x) of the daily performance of the S&P CME Bitcoin Futures Index, which measures the performance of the CME Bitcoin futures market.<sup>12</sup> Other examples of futures-

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<sup>8</sup> "BITI Short Bitcoin Strategy ETF." ProShares, n.d. <https://www.proshares.com/our-etfs/leveraged-and-inverse/bit/>.

<sup>9</sup> Padanyi, Matt. "Purpose Investments Launches World's First Bitcoin ETF, Invested Directly in the Digital Asset." Purpose Investments Inc., February 18, 2021. <https://www.globenewswire.com/news-release/2021/02/18/2177751/0/en/Purpose-Investments-Launches-World-s-First-Bitcoin-ETF-Invested-Directly-in-the-Digital-Asset.html>.

<sup>10</sup> Akhtar, Tanzeel. "Canada's 4th Ether ETF, From 3iQ and CoinShares, Begins Trading on the TSX." CoinDesk, September 14, 2021. <https://www.coindesk.com/markets/2021/04/23/canadas-4th-ether-etf-from-3iq-and-coinshares-begins-trading-on-the-tsx/>.

<sup>11</sup> BIS Quarterly Review, December 2021. Todorov, Karamfil. "Launch of the First US Bitcoin ETF: Mechanics, Impact, and Risks." The Bank for International Settlements, December 6, 2021. [https://www.bis.org/publ/qtrpdf/r\\_qt2112t.htm](https://www.bis.org/publ/qtrpdf/r_qt2112t.htm).

<sup>12</sup> Hewes, Tucker. "Proshares to Launch the First U.S. Short Bitcoin-Linked ETF on June 21." Business Wire, June 20, 2022. <https://www.businesswire.com/news/home/20220620005101/en/ProShares-to-Launch-the-First-U.S.-Short-Bitcoin-Linked-ETF-on-June-21>.

based crypto ETFs available to trade in the US include the Valkyrie Bitcoin Strategy ETF and VanEck Bitcoin Strategy ETF.<sup>13</sup>

A review by the Bank for International Settlements (BIS) explains that a futures-based ETF can affect futures prices in various ways.<sup>14</sup> First, when an ETF buys futures contracts in response to inflows, it may push futures prices up, and when it sells futures contracts in response to outflows, it may push futures prices down. This behavior is called flow rebalancing. Second, as the ETF begins to sell futures contracts before expiration, their prices may fall, and as the ETF then repurchases longer-dated futures contracts, their prices may increase. This mechanism is called calendar rebalancing. The price impacts from calendar and flow rebalancing in the futures market may then carry over to the spot market due to investors' hedging activity.<sup>15</sup> Furthermore, the BIS warns that a futures-based ETF may amplify volatility in prices and create risks for investors if the fund holds a large share of the futures market, similar to the spike observed in the VIX volatility index in February 2018.<sup>16</sup>

Conversely, a rise in the spot price of Bitcoin may not result in a similar increase in the value of an ETF holding positions in Bitcoin futures contracts. Funds that trade futures contracts may not have direct exposure to the contracts' underlying assets and futures markets can sometimes underperform the underlying spot assets that they are supposed to track.<sup>17</sup> The cost of rolling futures contracts from one month to the next can also be a cause for concern as it can result in a divergence between the performance of the ETFs and the underlying cryptocurrency.<sup>18</sup>

## Crypto derivatives

Cryptocurrency derivatives are secondary contracts that draw value from an underlying cryptocurrency such as Bitcoin, Ether, or other altcoins. Common crypto derivatives include futures, options, and perpetual contracts (which do not have an expiration date). These derivatives primarily trade on exchanges, such as the CME and Binance, however, over-the-counter (OTC) bespoke crypto derivative transactions are also evolving. For example, Goldman Sachs recently became one of the first major US banks to execute an OTC cash-settled Bitcoin option trade.<sup>19</sup>

In the United States, the Commodity Futures Trading Commission (CFTC) has regulatory authority over most categories of derivatives transactions.<sup>20</sup> Bitcoin futures offered by the CME were among the first crypto derivative contracts to gain CFTC approval.<sup>21</sup> Other exchanges that have gained CFTC approval to offer some crypto derivatives include Bitnomial and FTX US Derivatives. Unlike

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<sup>13</sup> Curry, Benjamin. "Best Bitcoin ETFs Of 2022." Edited by John Schmidt. Forbes Media LLC. , June 1, 2022. <https://www.forbes.com/advisor/investing/cryptocurrency/best-bitcoin-etfs/>.

<sup>14</sup> BIS Quarterly Review, December 2021. Todorov, Karamfil. "Launch of the First US Bitcoin ETF: Mechanics, Impact, and Risks." The Bank for International Settlements, December 6, 2021. [https://www.bis.org/publ/qtrpdf/r\\_qt2112t.htm](https://www.bis.org/publ/qtrpdf/r_qt2112t.htm).

<sup>15</sup> BIS Quarterly Review, December 2021. Todorov, Karamfil. "Launch of the First US Bitcoin ETF: Mechanics, Impact, and Risks." The Bank for International Settlements, December 6, 2021. [https://www.bis.org/publ/qtrpdf/r\\_qt2112t.htm](https://www.bis.org/publ/qtrpdf/r_qt2112t.htm).

<sup>16</sup> Franck, Thomas. "Obscure security linked to stock volatility plummets 80% after hours, sparking worries of bigger market effect." CNBC LLC., February 5, 2018. <https://www.cnbc.com/2018/02/05/xiv-exchange-traded-security-linked-to-volatility-plummets-80-percent.html>.

<sup>17</sup> "Funds Trading in Bitcoin Futures – Investor Bulletin." U.S. Securities and Exchange Commission, June 10, 2021. [https://www.sec.gov/oiea/investor-alerts-and-bulletins/ib\\_fundstrading](https://www.sec.gov/oiea/investor-alerts-and-bulletins/ib_fundstrading).

<sup>18</sup> Huang, Vicky Ge. "ETF That Bets Against Bitcoin to Launch." Wall Street Journal, June 20, 2022. <https://www.wsj.com/articles/etf-that-bets-against-bitcoin-to-launch-11655683379>.

<sup>19</sup> "Galaxy Digital Facilitates Goldman Sachs's First OTC Crypto Options Trade." Q4 Inc., March 21, 2022. <https://investor.galaxydigital.io/news/news-details/2022/Galaxy-Digital-Facilitates-Goldman-Sachs-First-OTC-Crypto-Options-Trade/default.aspx>.

<sup>20</sup> "Digital Assets Primer." CFTC, December 2020.

<sup>21</sup> CFTC Press Release Number 7654-17. "CFTC Statement on Self-Certification of Bitcoin Products by CME, CFE and Cantor Exchange." CFTC, December 1, 2017. <https://www.cftc.gov/PressRoom/PressReleases/7654-17>.

the CME's cash-settled BTC futures offering, these exchanges offer crypto futures that are physically-settled, i.e., investors receive the actual cryptocurrency when the contract expires.<sup>22</sup>

Exchanges like Binance, BitMEX, and Kraken, among others, also offer crypto derivatives such as Bitcoin and Ether futures and perpetual futures. However, these exchanges have not yet received regulatory approval to offer derivatives trading in the US or to offer commodity derivatives to US traders. These exchanges have also faced some scrutiny from the CFTC. For example, since March 2021, the CFTC has been probing Binance over concerns that it allowed US residents to trade derivatives and has also made allegations of insider trading and market manipulation.<sup>23</sup> A \$100 million civil monetary penalty was imposed on BitMEX and a \$30 million penalty was imposed on its three co-founders stemming from an October 2020 CFTC enforcement action related to illegal operation.<sup>24,25</sup> The CFTC also charged Kraken for illegally offering margined retail commodity transactions in digital assets and failing to register as a futures commission merchant, imposing a \$1.25 million penalty in September 2021.<sup>26</sup>

### Spot cryptocurrencies

The spot market for cryptocurrencies is dominated by Bitcoin which, as of July 2022, accounts for approximately 41% of the total cryptocurrency market capitalization.<sup>27</sup> Alternative coins like Ether and BNB which power the Ethereum and Binance ecosystems, respectively, and stablecoins like Tether and USDC, with values pegged to the US Dollar (USD), are other common cryptocurrencies. One such cryptocurrency, TerraUSD, was a popular algorithmic stablecoin that collapsed in May 2022 when its value got de-pegged from the US Dollar.<sup>28</sup> Binance, FTX, and Coinbase Exchange are among the larger centralized exchanges which facilitate the trading of spot cryptocurrencies. Spot trading can also occur on decentralized exchanges (DEXs), such as Uniswap. DEXs use smart contracts to define the price of digital assets and provide liquidity. A centralized exchange relies on professional traders and financial institutions to be liquidity providers, whereas in a DEX any entity could provide liquidity which gets pooled into smart contracts – these smart contracts are commonly referred to as “liquidity pools.”<sup>29</sup>

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<sup>22</sup> De, Nikhilesh. “CFTC Approves Bitnomial to Offer Futures Contracts Settled in Real Bitcoin.” CoinDesk, September 14, 2021. <https://www.coindesk.com/markets/2020/04/20/cftc-approves-bitnomial-to-offer-futures-contracts-settled-in-real-bitcoin/>. ; Young, Joseph. “LedgerX Exchange Launches Physically Settled Bitcoin Mini Futures.” Cointelegraph, September 8, 2020. <https://cointelegraph.com/news/ledgerx-exchange-launches-physically-settled-bitcoin-mini-futures>.

<sup>23</sup> Nishant, Niket. “Binance Probed by CFTC over Whether U.S. Residents Made Trades: Bloomberg News.” Reuters, March 12, 2021. <https://www.reuters.com/article/us-binance-investigation-cftc-idUSKBN2B4100>. ; Schoenberg, Tom. “U.S.’s Binance Probe Expands to Examine Possible Insider Trading.” Bloomberg L.P., September 17, 2021. <https://www.bloomberg.com/news/articles/2021-09-17/u-s-s-binance-probe-expands-to-examine-possible-insider-trading>.

<sup>24</sup> CFTC Press Release Number 8412-21. “Federal Court Orders BitMEX to Pay \$100 Million for Illegally Operating a Cryptocurrency Trading Platform and Anti-Money Laundering Violations.” CFTC, August 10, 2021. <https://www.cftc.gov/PressRoom/PressReleases/8412-21>.

<sup>25</sup> CFTC Press Release Number 8522-22. “Federal Court Orders BitMEX’s Three Co-Founders to Pay a Total of \$30 Million for Illegally Operating a Cryptocurrency Derivatives Trading Platform and Anti-Money Laundering Violations.” CFTC, May 5, 2022. <https://www.cftc.gov/PressRoom/PressReleases/8522-22>.

<sup>26</sup> CFTC Press Release Number 8433-21. “CFTC Imposes A \$1.25 Million Penalty against Kraken for Offering Illegal Off-Exchange Digital Asset Trading and Failing to Register as Required.” CFTC, September 28, 2021. <https://www.cftc.gov/PressRoom/PressReleases/8433-21>

<sup>27</sup> As of July 30, 2022. “Global Cryptocurrency Market Charts.” CoinMarketCap, n.d. <https://coinmarketcap.com/charts/>.

<sup>28</sup> Hern, Alex, and Dan Milmo. “Q&A: The Collapse of Terra and What It Could Mean beyond Crypto.” Guardian News & Media Limited, May 16, 2022. <https://www.theguardian.com/technology/2022/may/16/qa-the-collapse-of-terra-and-what-it-could-mean-beyond-crypto>.

<sup>29</sup> Sergeenkov, Andrey. “What Is an Automated Market Maker?” CoinDesk, March 9, 2022. <https://www.coindesk.com/learn/2021/08/20/what-is-an-automated-market-maker/>.

Centralized exchanges generally have more active users than DEXs, hence higher liquidity. Liquidity can also differ across centralized exchanges. For example, Binance is ranked higher in terms of spot liquidity compared to Coinbase Exchange.<sup>30</sup> Liquidity and volume in the crypto derivatives market is also different from that of the underlying spot market: derivatives volume in June 2022 was \$2.75 trillion representing 66% of the total crypto market, exceeding the total spot volume of approximately \$1.41 trillion.<sup>31</sup>

In addition to liquidity and volume, asset prices also differ across spot and futures markets. CME BTC futures typically trade at a premium to the spot price and the CME allows market participants to execute a basis trade, known as Basis Trade at Index Close (BTIC).<sup>32</sup> CME BTC futures are cash-settled by reference to the CME CF Bitcoin Reference Rate (BRR) at 4:00 PM London time on the expiration date of the contract. The BRR aggregates the trade flow of constituent Bitcoin spot exchanges during a specific calculation window into a once-a-day reference rate of the US Dollar price of Bitcoin.<sup>33</sup> Constituent exchanges include Bitstamp, Coinbase, Gemini, itBit, LMAX Digital, and Kraken.<sup>34</sup> Figure 1 compares the daily BRR to the daily closing price of the near-term CME BTC futures contract from October 2021 through July 2022. While the two prices mostly move in tandem, the price levels are not identical, and deviations of more than 5% were observed on certain days during the period – the BRR is calculated several hours prior to the closing futures price, thus the deviations could possibly reflect intraday changes in Bitcoin prices.<sup>35</sup>

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<sup>30</sup> As of August 1, 2022. "Top Cryptocurrency Spot Exchanges." CoinMarketCap, n.d. <https://coinmarketcap.com/rankings/exchanges/>.

<sup>31</sup> "Exchange Review - June 2022." CryptoCompare, July 14, 2022. <https://data.cryptocompare.com/reports/exchange-review-june-2022>.

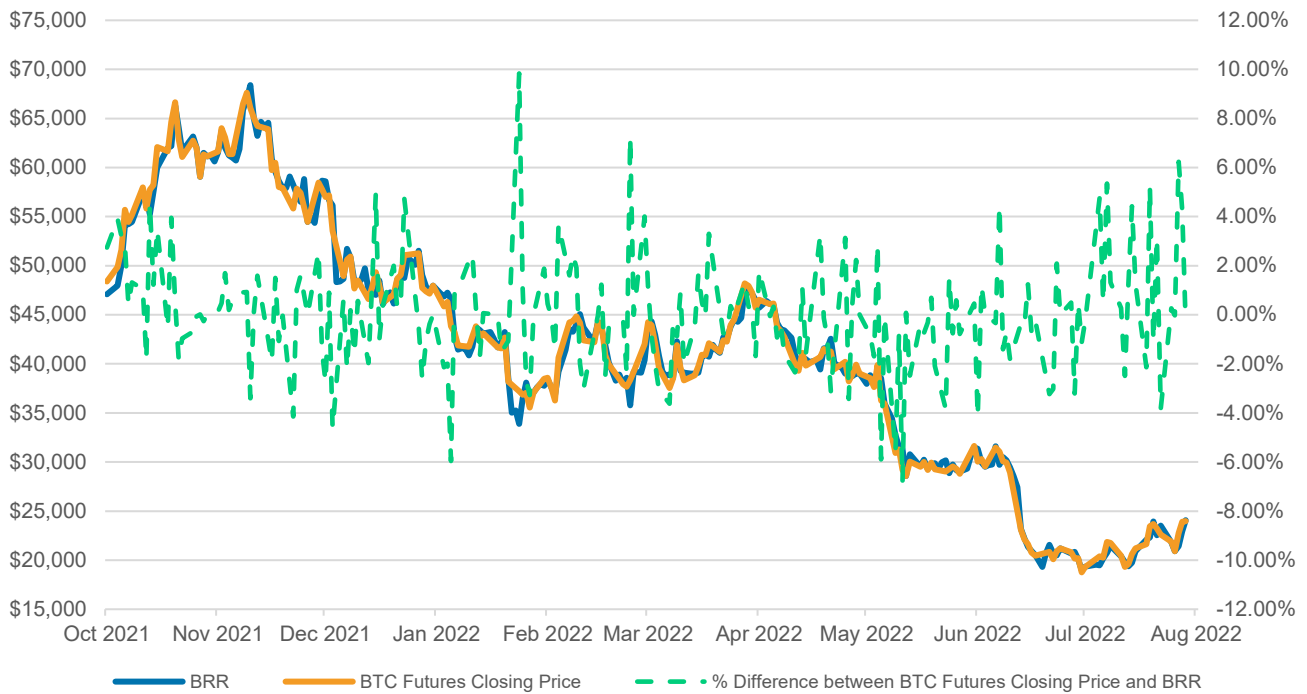
<sup>32</sup> Shah, Payal. "For Crypto Traders, A Signal to Watch and a New Way to Trade." CME Group. <https://www.cmegroup.com/openmarkets/finance/Cryptocurrency/for-crypto-traders--a-signal-to-watch-and-a-new-way-to-trade.html>

<sup>33</sup> "Bitcoin Pricing Product Frequently Asked Questions." CME Group Inc., May 14, 2017. <https://www.cmegroup.com/education/bitcoin/frequently-asked-questions.html>.

<sup>34</sup> "CME CF Cryptocurrency Pricing Products." CF Benchmarks, 2020. <https://docs-cfbenchmarks.s3.amazonaws.com/CME+CF+Constituent+Exchanges.pdf>.

<sup>35</sup> CME BTC futures closing price data from Eikon is at 21:35 GMT, approximately 5.5 – 6.5 hours before the BRR calculation time, depending on the daylight savings calendar.

**Figure 1: BRR vs. CME BTC futures closing price<sup>36</sup>**



The BRR helps increase liquidity and transparency across the asset stack, affording large institutions the ability to create regulated Bitcoin derivative products with reduced tracking error. This, in turn, promotes adoption of the BRR among market makers of regulated financial products, creating positive network effects for the full ecosystem relying on the BRR, such as futures contracts and ETFs tied to those futures contracts.<sup>37</sup>

### **CME BTC futures and BITO: Open interest and volume traded**

In this section, we analyze the open interest and volume traded of the CME BTC futures contracts alongside the shares outstanding and volume traded of the BITO ETF. Since the BITI ETF was launched only recently in June 2022, we do not include it in our analysis.

Following the launch of the BITO ETF, CME surpassed Binance to become the world's largest Bitcoin futures trading venue, accounting for 22% of the total global futures open interest.<sup>38,39</sup> Figure 2 shows that the open interest in CME BTC futures increased from 12,000 contracts in January 2021 to

<sup>36</sup> CME Futures and BRR data from Eikon. Percentage difference is calculated as  $(\text{Futures Price} - \text{BRR}) / \text{BRR}$ . CME BTC futures closing price corresponds to the near-term futures contract.

<sup>37</sup> Odeluga, Ken. "How the BRR Liquidity Complex Empowers Big Banks to Create Regulated Bitcoin Products." CF Benchmarks, September 2, 2021. <https://blog.cfbenchmarks.com/how-the-brr-liquidity-complex-empowers-big-banks-to-create-regulated-bitcoin-products/>.

<sup>38</sup> "CME Takes over as Largest Bitcoin Futures Exchange as Bito Pushes Limits." CoinDesk, October 22, 2021. <https://www.coindesk.com/markets/2021/10/22/cme-becomes-largest-bitcoin-futures-exchange-as-bito-nears-position-limits/>.

<sup>39</sup> As of April 2022, CME has fallen down to the 3rd largest futures exchange by Open Interest, surpassed by both Binance (1st) and Bybit (2nd). Ledesma, Lyllah. "Bybit Replaces CME as No. 2 Bitcoin Futures Exchange by Open Interest." CoinDesk Latest Headlines RSS. CoinDesk, April 14, 2022. <https://www.coindesk.com/markets/2022/04/14/bybit-replaces-cme-as-no-2-bitcoin-futures-exchange-by-open-interest/>.

approximately 16,500 contracts in October 2021 (an increase of 38%) following the launch of BITO.<sup>40</sup> BITO's outstanding share capital increased from 30 million shares in October 2021 to 54 million shares in July 2022.

**Figure 2: Open interest in CME BTC futures and BITO ETF shares outstanding<sup>41</sup>**

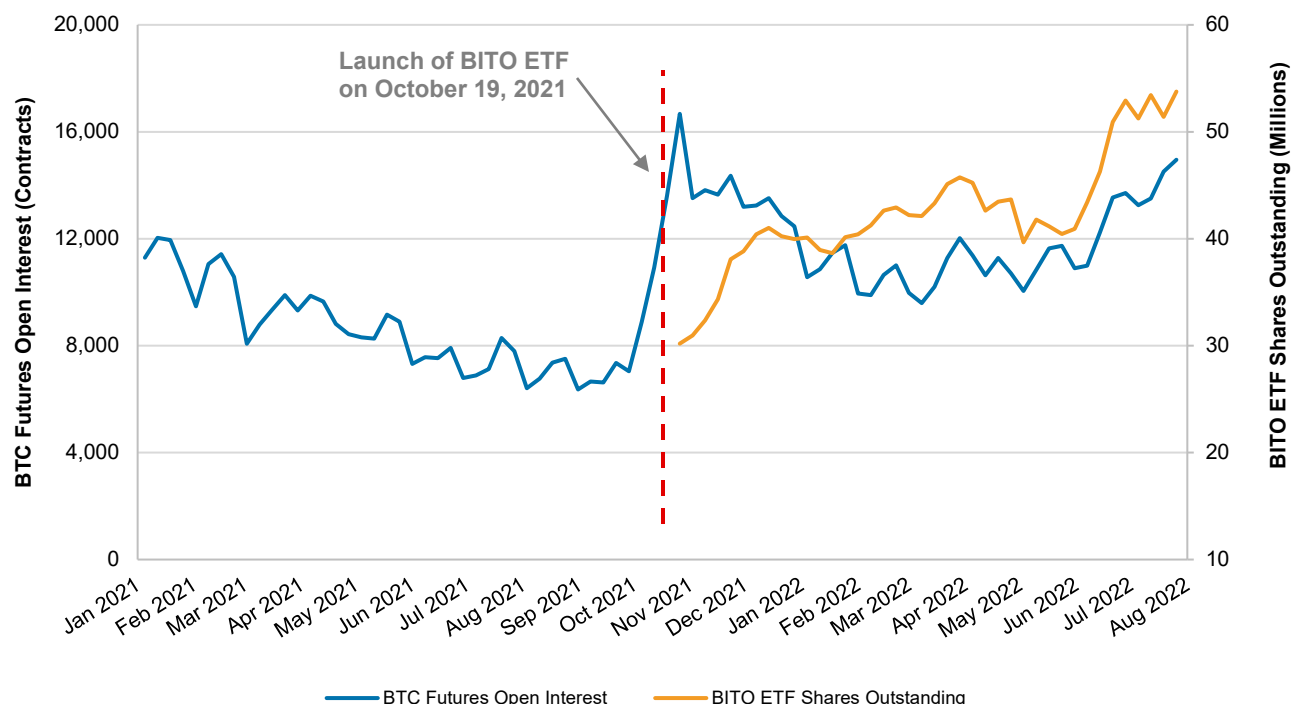


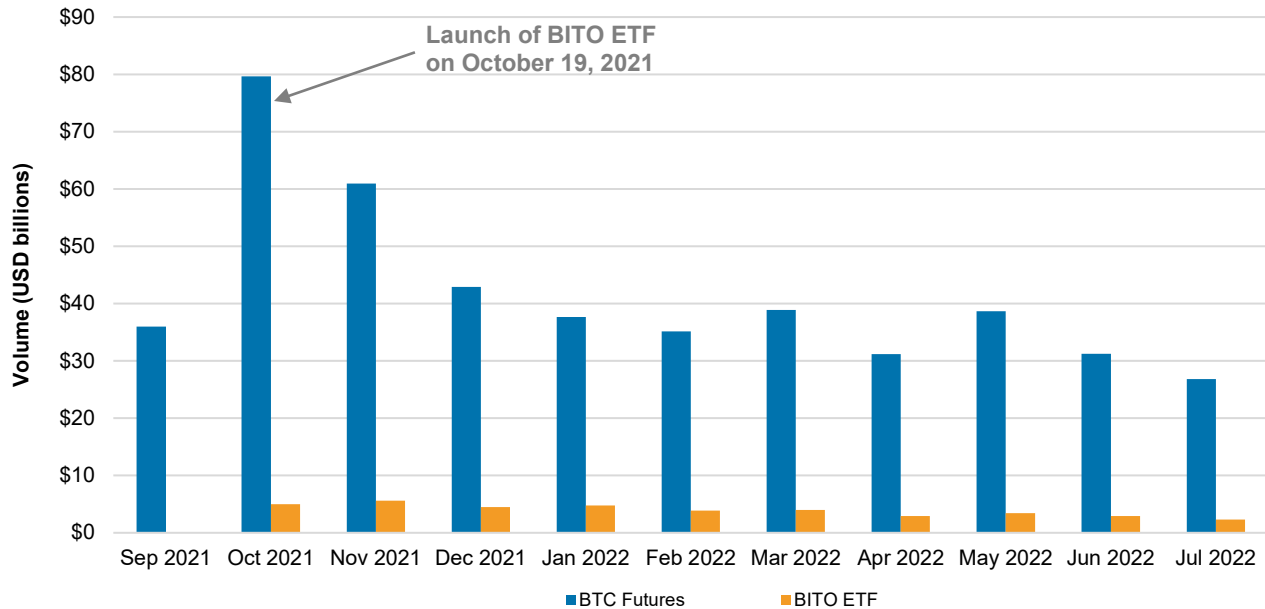
Figure 3 displays the USD volume traded of all active CME BTC futures contracts and the BITO ETF for each month between September 2021 and July 2022.<sup>42</sup> In September 2021, prior to the launch of BITO, total BTC futures volume was approximately \$36 billion. For the month of October 2021, when the BITO ETF was launched, CME futures volume reached a peak of \$79.7 billion. Futures volume declined over the following months, dropping to \$60.9 billion by November 2021 and \$35.1 billion by February 2022, less than half of the October 2021 volume. BITO trading volume is dwarfed by the market for BTC futures, peaking at \$5.6 billion in November 2021, the first full month it was live, and dropping below \$3 billion by June 2022, as Bitcoin prices continued to decline.

<sup>40</sup> The CFTC defines open interest as "...the total of all futures and/or option contracts entered into and not yet offset by a transaction, by delivery, by exercise, etc." "Explanatory Notes." CFTC, n.d. <https://www.cftc.gov/MarketReports/CommitmentsofTraders/ExplanatoryNotes/index.htm>.

<sup>41</sup> CFTC Commitment of Traders data, BITO ETF shares outstanding data from S&P Capital IQ, CRA analysis.

<sup>42</sup> Trading days are weekdays. CME futures markets close on Friday at 4 p.m. CT which is the end of the Friday trading day, and open on Sunday at 5 p.m. CT, which is the start of trading for the Monday trading day.

**Figure 3: CME BTC futures and BITO ETF monthly volume traded<sup>43</sup>**



## In conclusion

In this *Insights*, we have outlined the asset stack of three related exchange traded crypto assets – ETFs, derivatives and spot cryptocurrencies. We have also shown how these assets interact and how volume in futures and ETFs, for example, can relate. Investors, such as arbitrageurs, will have the ability to and the incentive to trade across the three asset classes. As a result, litigation involving cryptocurrencies may require an analysis of the interactions between the various marketplaces, instruments and how investors use them. CRA has deep experience in analyzing trading and prices from sets of markets that are related, including cash, futures, and derivatives. CRA also has experience studying investor claims involving complex instruments and in developing financial markets.

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<sup>43</sup> BITO ETF and CME BTC Futures Trade Volume data from Eikon, CRA analysis. Futures trade volume calculated as (Close Price in USD \* Total Daily Volume in Contracts \* 5). CME BTC futures have a contract size of 5 bitcoins. Daily trading volume is aggregated by month.



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