Required fields are shown with yellow backgrounds and asterisks.

Page 1 of * 139

SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549
Form 19b-4

File No. * SR 2023 - * 44
Amendment No. (req. for Amendments *) 1

Filing by NYSE Arca, Inc.

Pursuant to Rule 19b-4 under the Securities Exchange Act of 1934

Initial *	Amendment *	Withdrawal
☐	☑	☐

Section 19(b)(2) *	Section 19(b)(3)(A) *	Section 19(b)(3)(B) *
☑	☐	☐

Pilot	Extension of Time Period for Commission Action *	Date Expires *
☐	☐	

Rule

☐ 19b-4(f)(1)	☐ 19b-4(f)(4)
☐ 19b-4(f)(2)	☐ 19b-4(f)(5)
☐ 19b-4(f)(3)	☐ 19b-4(f)(6)

Notice of proposed change pursuant to the Payment, Clearing, and Settlement Act of 2010

Section 806(e)(1) *	Section 806(e)(2) *
☐	☐

Security-Based Swap Submission pursuant to the Securities Exchange Act of 1934
Section 3C(b)(2) * ☐

Exhibit 2 Sent As Paper Document ☐

Exhibit 3 Sent As Paper Document ☐

Description

Provide a brief description of the action (limit 250 characters, required when Initial is checked *).

Proposal to list and trade shares of the Bitwise Bitcoin ETP Trust

Contact Information

Provide the name, telephone number, and e-mail address of the person on the staff of the self-regulatory organization prepared to respond to questions and comments on the action.

First Name *	David	Last Name *	De Gregorio
Title *	Associate General Counsel, NYSE Group Inc.		
E-mail *	David.DeGregorio@ice.com		
Telephone *	(212) 656-4166	Fax	(212) 656-8101

Signature

Pursuant to the requirements of the Securities Exchange of 1934, NYSE Arca, Inc.
has duty caused this filing to be signed on its behalf by the undersigned thereunto duty authorized.

Date 09/24/2023

By Patrick Troy
(Name *)

(Title *)
Associate General Counsel

NOTE: Clicking the signature block at right will initiate digitally signing the form. A digital signature is as legally binding as a physical signature, and once signed, this form cannot be changed.

Patrick Troy
Digitally signed by Patrick Troy
Date: 2023.09.24 19:49:18 -04'00'

Required fields are shown with yellow backgrounds and astericks.

SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

For complete Form 19b-4 instructions please refer to the EFFS website.

Form 19b-4 Information *

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SEC Sub of Am. 1 NYSE Arca Bitwise

The self-regulatory organization must provide all required information, presented in a clear and comprehensible manner, to enable the public to provide meaningful comment on the proposal and for the Commission to determine whether the proposal is consistent with the Act and applicable rules and regulations under the Act.

Exhibit 1 - Notice of Proposed Rule Change *

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Ex. 1 SEC Sub of Am. 1 NYSE Arca E

The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

Exhibit 1A - Notice of Proposed Rule Change, Security-Based Swap Submission, or Advanced Notice by Clearing Agencies *

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The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

Exhibit 2- Notices, Written Comments, Transcripts, Other Communications

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Copies of notices, written comments, transcripts, other communications. If such documents cannot be filed electronically in accordance with Instruction F, they shall be filed in accordance with Instruction G.

☐ Exhibit Sent As Paper Document

Exhibit 3 - Form, Report, or Questionnaire

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Copies of any form, report, or questionnaire that the self-regulatory organization proposes to use to help implement or operate the proposed rule change, or that is referred to by the proposed rule change.

☐ Exhibit Sent As Paper Document

Exhibit 4 - Marked Copies

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The full text shall be marked, in any convenient manner, to indicate additions to and deletions from the immediately preceding filing. The purpose of Exhibit 4 is to permit the staff to identify immediately the changes made from the text of the rule with which it has been working.

Exhibit 5 - Proposed Rule Text

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The self-regulatory organization may choose to attach as Exhibit 5 proposed changes to rule text in place of providing it in Item I and which may otherwise be more easily readable if provided separately from Form 19b-4. Exhibit 5 shall be considered part of the proposed rule change

Partial Amendment

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If the self-regulatory organization is amending only part of the text of a lengthy proposed rule change, it may, with the Commission's permission, file only those portions of the text of the proposed rule change in which changes are being made if the filing (i.e. partial amendment) is clearly understandable on its face. Such partial amendment shall be clearly identified and marked to show deletions and additions.

1. Text of the Proposed Rule Change

(a) Pursuant to the provisions of Section 19(b)(1) of the Securities Exchange Act of 1934 ("Act"),[1] and Rule 19b-4 thereunder,[2] NYSE Arca, Inc. ("NYSE Arca" or the "Exchange"), proposes to list and trade shares of the Bitwise Bitcoin ETP Trust under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares). This Amendment No. 1 to SR-NYSEArca-2023-44 replaces SR-NYSEArca-2023-44 as originally filed and supersedes such filing in its entirety.

A notice of the proposed rule change for publication in the Federal Register is attached hereto as Exhibit 1.

(b) The Exchange does not believe that the proposed rule change will have any direct effect, or any significant indirect effect, on any other Exchange rule in effect at the time of this filing.

(c) Not applicable.

2. Procedures of the Self-Regulatory Organization

The proposed rule change is being submitted to the Securities and Exchange Commission (the "Commission" or "SEC") by Exchange staff pursuant to authority delegated to it by the NYSE Arca Board of Directors.

The person on the Exchange staff prepared to respond to questions and comments on the proposed rule change is:

David De Gregorio
Associate General Counsel
NYSE Group, Inc.
(212) 656-4166

3. Self-Regulatory Organization's Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change

(a) Purpose

The Exchange proposes to list and trade shares ("Shares") of the Bitwise Bitcoin ETP Trust (the "Trust"),[3] under NYSE Arca Rule 8.201-E, which governs the listing and

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1 15 U.S.C. 78s(b)(1).

2 17 CFR 240.19b-4.

3 The Trust is a Delaware statutory trust that was formerly known as the Bitwise Bitcoin ETF Trust. On October 14, 2021, the Trust filed with the Commission an initial registration statement (the "Registration Statement") on Form S-1 under the Securities Act of 1933 (15 U.S.C. 77a). The description of the operation of the Trust herein is based, in part, on the Registration Statement.

trading of Commodity-Based Trust Shares.[4]

According to the Registration Statement, the Trust will not be registered as an investment company under the Investment Company Act of 1940,[5] and is not required to register thereunder. The Trust is not a commodity pool for purposes of the Commodity Exchange Act.[6]

The Exchange represents that the Shares satisfy the requirements of NYSE Arca Rule 8.201-E and thereby qualify for listing on the Exchange.[7]

Bitwise Bitcoin ETP Trust

Operation of the Trust[8]

The Trust will issue the Shares, which represent units of undivided beneficial ownership of the Trust. The Trust is a Delaware statutory trust and will operate pursuant to a trust agreement (the "Trust Agreement") between Bitwise Investment Advisers, LLC (the "Sponsor" or "Bitwise") and Delaware Trust Company, as the Trust's trustee (the "Trustee"). The Trust will engage a third party custodian to act as the bitcoin custodian for the Trust (the "Bitcoin Custodian") to maintain custody of the Trust's bitcoin assets.[9] The Trust will engage a third party service provider to serve as the administrator, transfer agent, and cash custodian (in such capacities, the "Administrator," the "Transfer Agent," and the "Cash Custodian," respectively).

According to the Registration Statement, the investment objective of the Trust is to seek to provide exposure to the value of bitcoin held by the Trust, less the expenses of the Trust's operations. In seeking to achieve its investment objective, the Trust will hold bitcoin and establish its Net Asset Value ("NAV") at the end of every business day by reference to the CME CF Bitcoin Reference Rate - New York Variant ("CME US Reference Rate").[10]

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4 Commodity-Based Trust Shares are securities issued by a trust that represents investors' discrete identifiable and undivided beneficial ownership interest in the commodities deposited into the trust.

5 15 U.S.C. 80a-1.

6 17 U.S.C. 1.

7 With respect to the application of Rule 10A-3 (17 CFR 240.10A-3) under the Act, the Trust relies on the exemption contained in Rule 10A-3(c)(7).

8 The description of the operation of the Trust, the Shares and the bitcoin market contained herein are based, in part, on the Registration Statement. See note 3, supra.

9 When capitalized, references to "Bitcoin" are to the Bitcoin network or the Bitcoin protocol. When lowercase, references to "bitcoin" are to the digital asset native to the Bitcoin network, which asset is the underlying commodity held by the Trust.

10 The CME US Reference Rate is a daily reference rate of the US Dollar price of one bitcoin, calculated at 4:00 p.m. E.T. The CME US Reference Rate utilizes the same methodology as the CME CF Bitcoin Reference Rate (the "CME UK Reference Rate"), which is calculated at 4:00 p.m. London time and was designed by the CME Group and Crypto Facilities Ltd to facilitate the development of financial products,

Under normal circumstances, the Trust's only asset will be bitcoin, and, under limited circumstances, cash. The Trust will not use derivatives that may subject the Trust to counterparty and credit risks.[11] The Trust will process creations and redemptions in-kind and in exchange for cash, and accrue all ordinary fees (generally management fees) in USD. However, management fee will be paid monthly in bitcoin based on the last business day of the month's CME US Reference Rate. The Trust will purchase or sell bitcoin in response to creations and redemptions and may also sell bitcoin if the Trust liquidates or must pay expenses not contractually assumed by the Sponsor. Financial institutions authorized to create and redeem Shares (each, an "Authorized Participant") will deliver, or cause to be delivered, bitcoin to the Trust (or an equivalent amount of cash) in exchange for Shares of the Trust, and the Trust will deliver bitcoin (or an equivalent amount of cash) to Authorized Participants when those Authorized Participants redeem Shares of the Trust.

Bitcoin, Bitcoin Market, Bitcoin Trading Platforms and Regulation of Bitcoin

The following sections, drawn from the Registration Statement, describe bitcoin, including the historical development of bitcoin and the Bitcoin network, how a person holds bitcoin, how to use bitcoin in transactions, the "exchange" market where bitcoin can be bought, held and sold, and the bitcoin "over-the-counter" ("OTC") market.

Bitcoin

Bitcoin was first described in a white paper released in 2008 and published under the name "Satoshi Nakamoto." The protocol underlying Bitcoin was subsequently released in 2009 as open source software and currently operates on a worldwide network of computers.

The Bitcoin network utilizes a digital asset known as "bitcoin," which can be transferred among parties via the Internet. Unlike other means of electronic payments such as credit card transactions, one of the advantages of bitcoin is that it can be transferred without the use of a central administrator or clearing agency. As a central party is not necessary to administer bitcoin transactions or maintain the bitcoin ledger, the term decentralized is often used in descriptions of bitcoin. Unless it is using a third party service provider, a party transacting in bitcoin is generally not afforded some of the protections that may be

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including the cash settlement of bitcoin futures traded on the Chicago Mercantile Exchange ("CME"). Andrew Paine and William J. Knottenbelt, "Analysis of the CME CF Bitcoin Reference Rate and CME CF Bitcoin Real Time Index," Imperial College Centre for Cryptocurrency Research and Engineering, November 14, 2016, available at https://www.cmegroup.com/trading/files/bitcoin-white-paper.pdf.

[11] The Trust may sell bitcoin and temporarily hold cash as part of a liquidation of the Trust or to pay certain extraordinary expenses not assumed by the Sponsor. Under the Trust Agreement, the Sponsor has agreed to assume the normal operating expenses of the Trust, subject to certain limitations. For example, the Trust will bear any indemnification or litigation liabilities as extraordinary expenses. In addition, the Trust may, from time to time, passively receive, by virtue of holding bitcoin, certain additional digital assets ("IR Assets") or rights to receive IR Assets ("Incidental Rights") through a fork of the Blockchain or an airdrop of assets. The Trust Agreement requires that the Sponsor analyze as soon as possible whether or not such Incidental Rights and IR Assets should be disclaimed. In the event the Sponsor instructs the Bitcoin Custodian to claim such Incidental Rights and IR Assets, it will immediately distribute such Incidental Rights and IR Assets to shareholders of record.

offered by intermediaries.

The first step in using the Bitcoin network for transactions is to download specialized software referred to as a "bitcoin wallet." A user's bitcoin wallet can run on a computer or smartphone, and can be used both to send and to receive bitcoin. Within a bitcoin wallet, a user can generate one or more unique "bitcoin addresses," which are conceptually similar to bank account numbers. After establishing a bitcoin address, a user can send or receive bitcoin from his or her bitcoin address to another user's bitcoin address. Sending bitcoin from one bitcoin address to another is similar in concept to sending a bank wire from one person's bank account to another person's bank account; however, such transactions are not managed by an intermediary and erroneous transactions generally may not be reversed or remedied once sent.

The amount of bitcoin associated with each bitcoin address, as well as each bitcoin transaction to or from such bitcoin address, is transparently reflected in the Bitcoin network's distributed ledger ("Blockchain") and can be viewed by websites that operate as "Blockchain explorers." Copies of the Blockchain exist on thousands of computers on the Bitcoin network throughout the Internet. A user's bitcoin wallet will either contain a copy of the Blockchain or be able to connect with another computer that holds a copy of the Blockchain. The innovative design of the Bitcoin network protocol allows each Bitcoin user to trust that their copy of the Blockchain will generally be updated consistent with each other user's copy.

When a Bitcoin user wishes to transfer bitcoin to another user, the sender must first request a Bitcoin address from the recipient. The sender then uses his or her Bitcoin wallet software to create a proposed transaction that is confirmed and settles when included in the Blockchain. The transaction would reduce the amount of bitcoin allocated to the sender's address and increase the amount allocated to the recipient's address, in each case by the amount of bitcoin desired to be transferred. The transaction is completely digital in nature, similar to a file on a computer, and it can be sent to other computers participating in the Bitcoin network; however, the use of cryptographic verification is believed to prevent the ability to duplicate or counterfeit bitcoin.

Bitcoin Protocol

The Bitcoin protocol is built using open source software allowing for any developer to review the underlying code and suggest changes. There is no official company or group responsible for making modifications to Bitcoin. There are, however, a number of individual developers that regularly contribute to the reference software known as "Bitcoin Core," a specific distribution of Bitcoin software that provides the *de-facto* standard for the Bitcoin protocol.

Significant changes to the Bitcoin protocol are typically accomplished through a so-called "Bitcoin Improvement Proposal" or BIP. Such proposals are generally posted on websites, and the proposals explain technical requirements for the protocol change as well as reasons why the change should be accepted by users. Because Bitcoin has no central authority, updating the reference software's Bitcoin protocol will not immediately change the Bitcoin network's operations. Instead, the implementation of a change is

achieved by users (including transaction validators known as “miners”) downloading and running the updated versions of Bitcoin Core or other Bitcoin software that abides by the new Bitcoin protocol. Users and miners must accept any changes made to the Bitcoin source code by downloading a version of their Bitcoin software that incorporates the proposed modification of the Bitcoin network’s source code. A modification of the Bitcoin network’s source code or protocol is only effective with respect to those Bitcoin users and miners who download it. If an incompatible modification is accepted by a less than overwhelming percentage of users and miners, a division in the Bitcoin network will occur such that one network will run the pre-modification source code and the other network will run the modified source code. Such a division is known as a “fork” in the Bitcoin network.

Bitcoin Transactions

A bitcoin transaction is similar in concept to an irreversible digital check. The transaction contains the sender’s bitcoin address, the recipient’s bitcoin address, the amount of bitcoin to be sent, a transaction fee and the sender’s digital signature. Bitcoin transactions are secured by cryptography known as “public-private key cryptography,” represented by the bitcoin addresses and digital signature in a transaction’s data file. Each Bitcoin network address, or wallet, is associated with a unique “public key” and “private key” pair, both of which are lengthy alphanumeric codes, derived together and possessing a unique relationship.

The use of key pairs is a cornerstone of the Bitcoin network technology. This is because the use of a private key is the only mechanism by which a bitcoin transaction can be signed. If a private key is lost, the corresponding bitcoin is thereafter permanently non-transferable. Moreover, the theft of a private key provides the thief immediate and unfettered access to the corresponding bitcoin. Bitcoin users must therefore understand that in this regard, bitcoin is similar to cash: that is, the person or entity in control of the private key corresponding to a particular quantity of bitcoin has de facto control of the bitcoin.

The public key is visible to the public and analogous to the Bitcoin network address. The private key is a secret and is used to digitally sign a transaction in a way that proves the transaction has been signed by the holder of the public-private key pair, and without having to reveal the private key. A user’s private key must be kept safe in accordance with appropriate controls and procedures to ensure it is used only for legitimate and intended transactions. If an unauthorized third person learns of a user’s private key, that third person could apply the user’s digital signature without authorization and send the user’s bitcoin to their or another bitcoin address, thereby stealing the user’s bitcoin. Similarly, if a user loses his private key and cannot restore such access (e.g., through a backup), the user may permanently lose access to the bitcoin associated with that private key and bitcoin address.

To prevent the possibility of double-spending of bitcoin, each validated transaction is recorded, time stamped and publicly displayed in a “block” in the Blockchain, which is publicly available. Thus, the Bitcoin network provides confirmation against double-spending by memorializing every transaction in the Blockchain, which is publicly

accessible and downloaded in part or in whole by all users of the Bitcoin network software program. Any user may validate, through their Bitcoin wallet or a Blockchain explorer, that each transaction in the Bitcoin network was authorized by the holder of the applicable private key, and Bitcoin network mining software consistent with reference software requirements validates each such transaction before including it in the Blockchain. This cryptographic security ensures that bitcoin transactions may not generally be counterfeited, although it does not protect against the "real world" theft or coercion of use of a Bitcoin user's private key, including the hacking of a Bitcoin user's computer or a service provider's systems.

A Bitcoin transaction between two parties is recorded if included in a valid block added to the Blockchain, when that block is accepted as valid through consensus formation among Bitcoin network participants. A block is validated by confirming the cryptographic hash value included in the block's data and by the block's addition to the longest confirmed Blockchain on the Bitcoin network. For a transaction, inclusion in a block in the Blockchain constitutes a "confirmation" of validity. As each block contains a reference to the immediately preceding block, additional blocks appended to and incorporated into the Blockchain constitute additional confirmations of the transactions in such prior blocks, and a transaction included in a block for the first time is confirmed once against double-spending. This layered confirmation process makes changing historical blocks (and reversing transactions) exponentially more difficult the further back one goes in the Blockchain.

The process by which bitcoin are created and bitcoin transactions are verified is called "mining." To begin mining, a user, or "miner," can download and run a mining "client," which, like regular Bitcoin network software programs, turns the user's computer into a "node" on the Bitcoin network, and in this case has the ability to validate transactions and add new blocks of transactions to the Blockchain.

Miners, through the use of the bitcoin software program, engage in a set of prescribed, complex mathematical calculations in order to verify transactions and compete for the right to add a block of verified transactions to the Blockchain and thereby confirm bitcoin transactions included in that block's data. The miner who successfully "solves" the complex mathematical calculations has the right to add a block of transactions to the Blockchain and is then rewarded by a grant of bitcoin, known as a "coinbase," plus any transaction fees paid for the transactions included in such block. Bitcoin is created and allocated by the Bitcoin network protocol and distributed through mining, subject to a strict, well-known issuance schedule. The supply of bitcoin is programmatically limited to 21 million bitcoin in total. As of June 16, 2023, approximately 19,401,000 bitcoin had been mined.

Confirmed and validated bitcoin transactions are recorded in blocks added to the Blockchain. Each block contains the details of some or all of the most recent transactions that are not memorialized in prior blocks, as well as a record of the award of bitcoin to the miner who added the new block. Each unique block can only be solved and added to the Blockchain by one miner, therefore, all individual miners and mining pools on the Bitcoin network must engage in a competitive process of constantly increasing their computing power to improve their likelihood of solving for new blocks. As more miners

join the Bitcoin network and its processing power increases, the Bitcoin network adjusts the complexity of a block-solving equation to maintain a predetermined pace of adding a new block to the Blockchain approximately every ten minutes.

The Bitcoin Market and Bitcoin Trading Platforms

In addition to using bitcoin to engage in transactions, investors may purchase and sell bitcoin to speculate as to the value of bitcoin in the bitcoin market, or as a long-term investment to diversify their portfolio. The value of bitcoin within the market is determined, in part, by (i) the supply of and demand for bitcoin in the bitcoin market, (ii) market expectations for the expansion of investor interest in bitcoin and the adoption of bitcoin by users, (iii) the number of merchants that accept bitcoin as a form of payment, and (iv) the volume of private end-user-to-end-user transactions.

Although the value of bitcoin is determined by the value that two transacting market participants place on bitcoin through their transaction, the most common means of determining a reference value is by surveying one or more trading platforms where secondary markets for bitcoin exist. The most prominent bitcoin trading platforms are often referred to as "exchanges," although they neither report trade information nor are they regulated in the same way as a national securities exchange. As such, there is some difference in the form, transparency and reliability of trading data from bitcoin trading platforms. Generally speaking, bitcoin data is available from these trading platforms with publicly disclosed valuations for each executed trade, measured against a fiat currency such as the US Dollar or Euro, or against another digital asset (for example, bitcoin trades against the US Dollar are reflected in the "USD-BTC Pair").

Currently, there are many bitcoin trading platforms operating worldwide and trading platforms represent a substantial percentage of bitcoin buying and selling activity, and, therefore, provide large data sets for the market valuation of bitcoin. A bitcoin trading platform provides investors with a way to purchase and sell bitcoin, similar to stock exchanges like the New York Stock Exchange or NASDAQ, which provide ways for investors to buy stocks and bonds in the so-called "secondary market." Unlike stock exchanges, which are regulated to monitor securities trading activity, bitcoin trading platforms are largely regulated as money services businesses (or a foreign regulatory equivalent) and are required to monitor for and detect money-laundering and other illicit financing activities that may take place on their platform. Bitcoin trading platforms operate websites designed to permit investors to open accounts with the trading platform and then purchase and sell bitcoin.

As with conventional stock exchanges, an investor opening a trading account and wishing to transact at a bitcoin trading platform must deposit an accepted government-issued currency into their account, or a previously acquired digital asset. The process of establishing an account with a bitcoin trading platform and trading bitcoin is different from, and should not be confused with, the process of users sending bitcoin from one bitcoin address to another bitcoin address, such as to pay for goods and services. This latter process is an activity that occurs wholly within the confines of the Bitcoin network, while the former is an activity that occurs largely on private websites and databases owned by the trading platform.

In addition to the bitcoin trading platforms that provide spot markets for bitcoin, an OTC trading market has emerged for digital assets. The bitcoin OTC market demonstrates flexibility in terms of quotes, price, size, and other factors. The OTC market has no formal structure and no open-outcry meeting place, and typically involves bilateral agreements on a principal-to-principal basis. Parties engaging in OTC transactions will agree upon a price – often via phone, email, or chat – and then one of the two parties will initiate the transaction. For example, a seller of bitcoin could initiate the transaction by sending the bitcoin to the buyer's bitcoin address. The buyer would then wire US Dollars to the seller's bank account. OTC trading tends to occur in large blocks of bitcoin. All risks and issues related to creditworthiness are between the parties directly involved in the transaction. OTC market participants include institutional entities, such as hedge funds, family offices, private wealth managers, high-net-worth individuals that trade bitcoin on a proprietary basis, and brokers that offer two-sided liquidity for bitcoin.

Beyond the spot bitcoin trading platforms and the OTC market, a number of unregulated bitcoin derivatives trading platforms exist that offer traders the ability to gain leveraged and/or short exposure to the price of bitcoin through perpetual futures, quarterly futures, and other derivative contracts.

Finally, the trading of regulated bitcoin futures contracts launched on the CME in December 2017.[12] A further discussion of the CME bitcoin futures market ("CME Market") is included in the section entitled "The CME Bitcoin Futures Market," below.

Authorized Participants may have the option of purchasing and selling bitcoin used in Creation Unit transactions with the Trust either on bitcoin trading platforms, in the OTC markets, in direct bilateral transactions, or may deliver cash to the Trust in exchange for Creation Units (or may take receipt of cash from the Trust in exchange for the redemption of Creation Units) in which case the Trust will acquire or liquidate the requisite amount of bitcoin with approved bitcoin trading counterparties. In addition, Authorized Participants may utilize futures to hedge bitcoin exposure relating to the purchase and redemption of Creation Units.

The CME Bitcoin Futures Market

The CME Group announced the planned launch of bitcoin futures on October 31, 2017. Trading began on December 17, 2017.[13] Each contract represents five bitcoin and is

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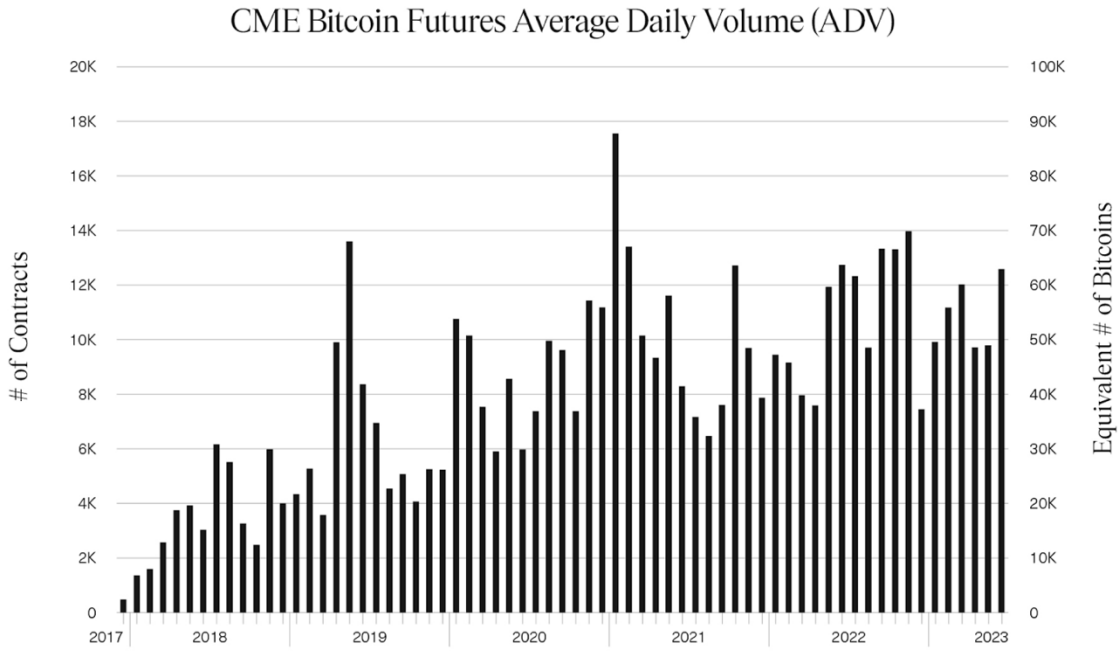
12 See note **Error! Bookmark not defined.**1, infra.

13 See "CME Group Announces Launch of Bitcoin Futures," October 31, 2017, available at https://www.cmegroup.com/media-room/press-releases/2017/10/31/cme_group_announceslaunchofbitcoinfutures.html. At the same time as the launch of the CME Market, the Cboe Futures Exchange, LLC announced and subsequently launched Cboe bitcoin futures. See "CFE to Commence Trading in Cboe Bitcoin (USD) Futures Soon," December 01, 2017, available at cdn.cboe.com/resources/release_notes/2017/Cboe-Bitcoin-USD-Futures-Launch-Notification.pdf. Each future was cash settled, with the CME Market tracking the CME UK Reference Rate and the Cboe bitcoin futures tracking a bitcoin trading platform daily auction price. The Cboe Futures Exchange, LLC subsequently discontinued its bitcoin futures market effective June 2019. "Cboe put the brakes on bitcoin futures," March 15, 2019, available at https://www.reuters.com/article/us-cboe-

based on the CME CF Bitcoin Reference Rate. The contracts trade and settle like other cash settled commodity futures contracts.

Nearly every measurable metric related to bitcoin futures has generally trended up since launch. For example, there were 264,323 bitcoin futures contracts traded in June 2023 (approximately $39.8 billion) compared to 267,495 ($25.1 billion) contracts, 182,369 contracts ($31.7 billion), 131,419 contracts ($6.0 billion), and 167,362 contracts ($9.8 billion) traded in June 2022, June 2021, June 2020, and June 2019, respectively.[14]

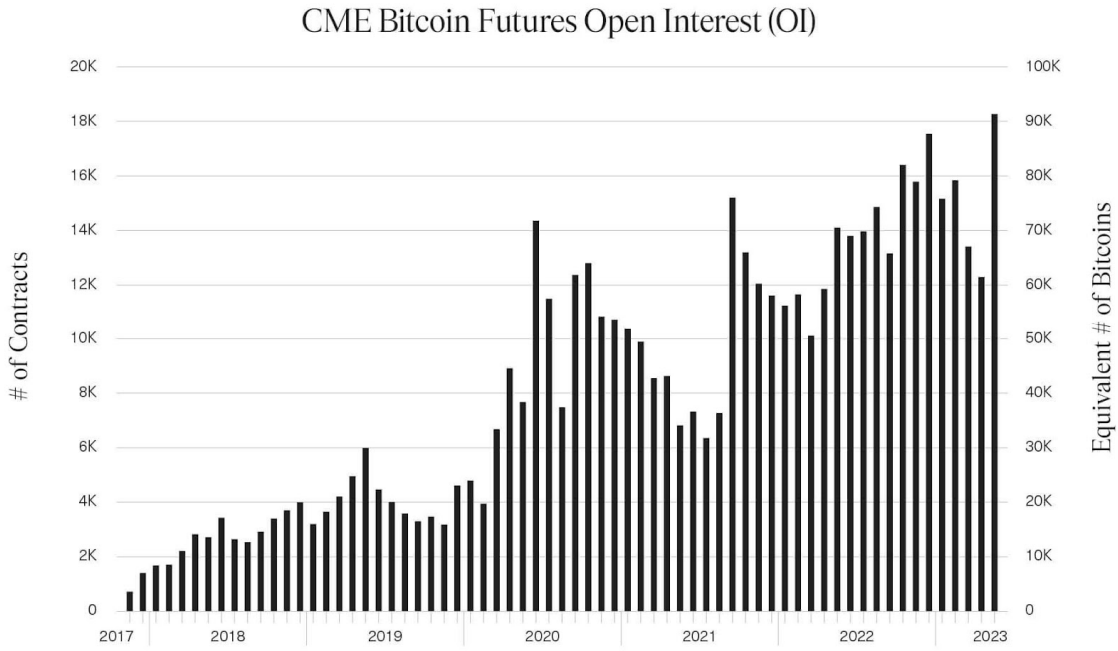


Open interest was 18,264 bitcoin futures contracts in June 2023 (approximately $2.8 billion) compared to 14,108 contracts ($1.3 billion), 6,817 contracts ($1.2 billion), 7,675 contracts ($0.4 billion), and 5,991 contracts ($0.4 billion) in June 2022, June 2021, June 2020, and June 2019, respectively.[15]

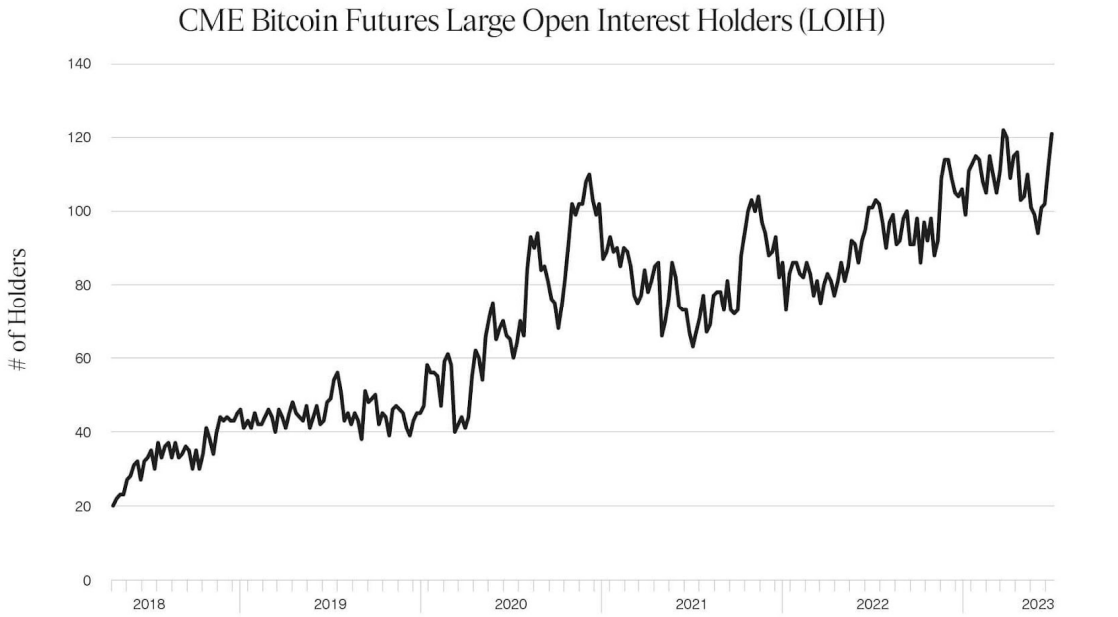
bitcoin/cboe-puts-the-brakes-on-bitcoin-futures-idUSKCN1QW261. The Trust uses the CME US Reference Rate to calculate its NAV.

[14] Data from CME Volume and Average Daily Volume Reports, available at https://www.cmegroup.com/market-data/volume-open-interest.html#volumeTotals.

[15] Data from CME Open Interest Reports, available at https://www.cmegroup.com/market-data/volume-open-interest.html#openInterestTools.



The number of large open interest holders[16] has increased as well, even in the face of heightened bitcoin price volatility, as demonstrated in the figure that follows.



The Commission has previously recognized that the CME bitcoin futures market qualifies

16 A large open interest holder in Bitcoin Futures is an entity that holds at least 25 contracts, which is the equivalent of 125 bitcoin. At a price of approximately $30,705.00 per bitcoin on 6/27/2023, more than 120 firms had outstanding positions of greater than $3.83 million in Bitcoin Futures. Data from The Block, available at https://www.theblock.co/data/crypto-markets/cme-cots/large-open-interest-holders-of-cme-bitcoin-futures.

as a regulated market[17] and that common membership between a listing exchange and a futures market such as the CME in the Intermarket Surveillance Group ("ISG") functions as "the equivalent of a comprehensive surveillance sharing agreement."[18]

Valuation of the Trust's Bitcoin

The CME US Reference Rate, CME UK Reference Rate and CME Bitcoin Real Time Price

According to the Registration Statement, the CME UK Reference Rate was established by the CME Group and Crypto Facilities Ltd. to be used in the creation of financial products tied to bitcoin. The CME UK Reference Rate is fixed once per day at 4:00 p.m. London time, based on the methodology set forth below and applying data from constituent trading platforms ("Constituent Platforms"). The CME US Reference Rate was introduced in February 2021 and is designed to apply the CME UK Reference Rate methodology, but with a fix once per day at 4:00 p.m. Eastern time ("E.T."). Although the CME UK Reference Rate has a longer history and is used to settle bitcoin futures on the CME Market, the Trust has determined to utilize the CME US Reference Rate to establish the NAV because the CME US Reference Rate is calculated as of the same time as the NAV and is based on the same methodology and data sources as the CME UK Reference Rate.

The CME Group and Crypto Facilities Ltd. also publish a continuous real-time bitcoin price index, known as the "CME Bitcoin Real Time Price," using data from the Constituent Platforms.

The CME US Reference Rate, CME UK Reference Rate and CME Bitcoin Real Time Price are administered by Crypto Facilities Ltd., with the selection of Constituent Platforms performed by an oversight committee.[19] A trading platform is eligible to be selected as a Constituent Platform if it facilitates spot trading of bitcoin against the USD-BTC Pair and makes trade data and order data available through an Automatic Programming Interface with sufficient reliability, detail and timeliness. Additional initial and continuing eligibility requirements apply to the Constituent Platforms.

Each of the CME US Reference Rate, which has been calculated and published since February 2022, and CME UK Reference Rate, which has been calculated and published since November 2016, aggregates during a calculation window the trade flow of several

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17 See Bitwise Order, 84 FR at 55410, n. 456 ("the Commission recognizes that the CFTC comprehensively regulates CME ..."). See also Winklevoss Order, 83 FR at 37594 & at note 202; GraniteShares Order 83 FR at 43929; and USBT Order, 85 FR at 12597.

18 See Bitwise Order, 84 FR at 55410, n.456. A list of the current ISG members is available at https://www.isgportal.org.

19 This summary does not represent a complete description of the CME US Reference Rate, the CME UK Reference Rate and CME Bitcoin Real Time Price. Additional information on administration and methodologies, may be found at CF Benchmarks' website, available at https://www.cfbenchmarks.com/data/indices/BRRNY, https://www.cfbenchmarks.com/indices/BRR, and https://www.cfbenchmarks.com/indices/BRTI. The CME US Reference Rate, the CME UK Reference Rate and CME Bitcoin Real Time Price are registered benchmarks under the European Benchmarks Regulation.

spot bitcoin trading platforms into the US Dollar price of one bitcoin as of their respective calculation time. Specifically, the CME US Reference Rate is calculated based on the "Relevant Transactions" (as defined below) of each of its Constituent Platforms, which are currently Bitstamp, Coinbase, Gemini, itBit, Kraken and LMAX, as follows:

1. All Relevant Transactions are added to a joint list, recording the trade price and size for each transaction.

2. The list is partitioned into a number of equally-sized time intervals.

3. For each partition separately, the volume-weighted median trade price is calculated from the trade prices and sizes of all Relevant Transactions. A volume-weighted median differs from a standard median in that a weighting factor, in this case trade size, is factored into the calculation.

4. The CME US Reference Rate or CME UK Reference Rate, as applicable, is then determined by the equally-weighted average of the volume-weighted medians of all partitions.

The CME Bitcoin Real Time Price uses similar data sources, but is calculated once per second based on the weighted mid-price-volume curve, which is a measure of the active bid and ask volume present on a Constituent Platform's order book.

The CME US Reference Rate, CME UK Reference Rate, and CME Bitcoin Real Time Price do not include any bitcoin futures prices in their respective methodologies. A "Relevant Transaction" is any "cryptocurrency versus legal tender spot trade that occurs during the TWAP [Time Weighted Average Price] Period" on a Constituent Platform in the USD-BTC Pair that is reported and disseminated by Crypto Facilities Ltd., as calculation agent for the CME US Reference Rate, CME UK Reference Rate and CME Bitcoin Real Time Price.

Net Asset Value

Under normal circumstances, the Trust's only asset will be bitcoin. The Trust's bitcoin are carried, for financial statement purposes, at fair value, as required by the U.S. generally accepted accounting principles ("GAAP"). The Trust's NAV and NAV per Share will be determined by the Administrator once each Exchange trading day as of 4:00 p.m. E.T., or as soon thereafter as practicable. The Administrator will calculate the NAV by multiplying the number of bitcoin held by the Trust by the CME US Reference Rate for such day, adding any additional receivables and subtracting the accrued but unpaid liabilities of the Trust. The NAV per Share is calculated by dividing the NAV by the number of Shares then outstanding. The Administrator will determine the price of the Trust's bitcoin by reference to the CME US Reference Rate, which is published and calculated as set forth above.

Intraday Trust Value

In order to provide updated pricing information relating to the Shares for use by investors

and market professionals throughout the domestic trading day, the Exchange will calculate and disseminate throughout the core trading session, every 15 seconds each trading day, an intraday trust value ("ITV"). The ITV will be calculated throughout the trading day by using the prior day's holdings at close of business and the most recently reported price level of the CME Bitcoin Real Time Price as reported by Bloomberg, L.P. or another reporting service, or another price of bitcoin derived from updated bids and offers indicative of the spot price of bitcoin. The ITV will be widely disseminated by one or more major market data vendors during the NYSE Arca Core Trading Session.

Creation and Redemption of Shares

The Trust Shares

According to the Registration Statement, the Shares shall represent undivided beneficial ownership of the Trust. The Trust creates and redeems Shares from time to time, but only in one or more Creation Units. A Creation Unit is only made in exchange for delivery to the Trust or the distribution by the Trust of the amount of bitcoin represented by the Creation Unit being created or redeemed, or an equivalent amount of cash, the amount of which is representative of the combined NAV of the number of Shares included in the Creation Units being created or redeemed determined as of 4:00 p.m. E.T. on the day the order to create or redeem Creation Units is properly received. Except when aggregated in Creation Units or under extraordinary circumstances permitted under the Trust Agreement, the Shares are not redeemable securities. A Creation Unit will initially consist of at least 25,000 Shares, but may be subject to change.

Authorized Participants are the only persons that may place orders to create and redeem Creation Units. Authorized Participants must be (i) registered broker-dealers or other securities market participants, such as banks and other financial institutions, that are not required to register as broker-dealers to engage in securities transactions described below, and (ii) Depository Trust Company ("DTC") Participants. To become an Authorized Participant, a person must enter into an Authorized Participant Agreement with the Trust and/or the Trust's marketing agent (the "Marketing Agent").

Creation Procedures

According to the Registration Statement, on any business day, an Authorized Participant may create Shares by placing an order to purchase one or more Creation Units with the Transfer Agent through the Marketing Agent. Such orders are subject to approval by the Marketing Agent and the Transfer Agent. For purposes of processing creation and redemption orders, a "business day" means any day other than a day when the Exchange is closed for regular trading. To be processed on the date submitted, creation orders generally must be placed before 4 p.m. E.T. or the close of regular trading on the Exchange, whichever is earlier, for in-kind orders, but may be required to be placed earlier for cash orders, at the discretion of the Sponsor. The day on which an order is received by the Transfer Agent and approved by the Marketing Agent, is considered the creation order date.

Creation Units are processed either in-kind or in cash. By placing a creation order, an

Authorized Participant agrees to deposit, or cause to be deposited, bitcoin with the Trust by initiating a Bitcoin transaction to a Bitcoin network address identified by the Trust or by depositing an equivalent amount of cash as determined by the product of the amount of bitcoin that is in the same proportion to the total assets of the Trust, net of accrued expenses and other liabilities on the date the order to purchase is properly received, and the CME US Reference Rate price on the creation order date, plus any fees or expenses associated with the acquisition of the bitcoin by the Trust. Prior to the delivery of Creation Units for an in-kind creation order, the Authorized Participant must also have wired to the Transfer Agent the nonrefundable transaction fee due for the creation order. Authorized Participants may not withdraw a creation request. If an Authorized Participant fails to consummate the foregoing, the order may be cancelled.

The total creation deposit amount required to create each Creation Unit is an amount of bitcoin, or an equivalent amount of cash, that is in the same proportion to the total assets of the Trust, net of accrued expenses and other liabilities, on the date the order to purchase is properly received, as the number of Shares to be created under the creation order is in proportion to the total number of Shares outstanding on the date the order is received. The Sponsor causes to be published each business day, prior to the commencement of trading on the Exchange, the amount of bitcoin that will be required to be deposited in exchange for one Creation Unit for such business day.

Redemption Procedures

According to the Registration Statement, the procedures by which an Authorized Participant can redeem one or more Creation Units mirror the procedures for the creation of Creation Units. On any business day, an Authorized Participant may place an order with the Transfer Agent through the Marketing Agent to redeem one or more Creation Units. To be processed on the date submitted, redemption orders generally must be placed before 4 p.m. E.T. or the close of regular trading on the Exchange, whichever is earlier, or earlier if the redemption order is for cash, as determined by the Sponsor. A redemption order will be effective on the date it is received by the Transfer Agent and approved by the Marketing Agent (“Redemption Order Date”). The redemption procedures allow Authorized Participants to redeem Creation Units and do not entitle an individual shareholder to redeem any Shares in an amount less than a Creation Unit, or to redeem Creation Units other than through an Authorized Participant.

The redemption distribution from the Trust will consist of a transfer to the redeeming Authorized Participant, or its agent, of an amount of bitcoin representing the amount of bitcoin held by the Trust evidenced by the Shares being redeemed, or an equivalent amount of cash. The redemption distribution amount is determined in the same manner as the determination of the bitcoin deposit amount discussed above. The Sponsor causes to be published each business day, prior to the commencement of trading on the Exchange, the redemption distribution amount relating to a Creation Unit applicable for such business day.

The redemption distribution due from the Trust will be delivered once the Transfer Agent notifies the Bitcoin Custodian and the Sponsor that the Authorized Participant has delivered the Shares represented by the Creation Units to be redeemed to the Trust’s DTC

account, in the case of an in-kind order. If the Trust's DTC account has not been credited with all of the Shares of the Creation Units to be redeemed, the redemption distribution will be delayed until such time as the Transfer Agent confirms receipt of all such Shares. In the case of a cash redemption order, the Bitcoin Custodian will not transfer the requisite amount of bitcoin as described above to the bitcoin trading counterparty unless and until the requisite amount of cash has been received at the Cash Custodian to fully settle the sale of bitcoin to the bitcoin trading counterparty.

Once the Transfer Agent notifies the Bitcoin Custodian and the Sponsor that the Shares have been received in the Trust's DTC account, the Sponsor will instruct the Bitcoin Custodian to transfer the redemption bitcoin amount from the Trust Bitcoin Account to the Authorized Participant's bitcoin custody account in the case of an in-kind order. By placing a redemption order, an Authorized Participant agrees to receive bitcoin, or an equivalent amount of cash, as described above, less the expenses incurred by the Trust as a result of liquidating the Trust's bitcoin in a sale to an approve bitcoin trading counterparty. If an Authorized Participant fails to consummate the foregoing, the order may be cancelled.

Fee Accrual

According to the Registration Statement, the only ordinary expense of the Trust is expected to be the Sponsor's fee, which shall accrue daily in USD and be payable monthly in bitcoin.

Standard for Approval

Background

To date, the Commission has considered numerous proposed spot bitcoin ETPs,[20]

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[20] See, e.g., Securities Exchange Act Release No. 80206 (Mar. 10, 2017), 82 FR 14076 (March 16, 2017) (SR-BatsBZX-2016-30) (Order Disapproving a Proposed Rule Change, as Modified by Amendments No. 1 and 2, to BZX Rule 14.11(e)(4), Commodity-Based Trust Shares, to List and Trade Shares Issued by the Winklevoss Bitcoin Trust); Securities Exchange Act Release No. 80319 (Mar. 28, 2017), 82 FR 16247 (April 3, 2017) (SR-NYSEArca-2016-101) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, Relating to the Listing and Trading of Shares of the SolidX Bitcoin Trust under NYSE Arca Equities Rule 8.201; Securities Exchange Act Release No. 83723 (July 26, 2018), 83 FR 37579 (August 1, 2018) (SR-BatsBZX-2016-30) (Order Setting Aside Action by Delegated Authority and Disapproving a Proposed Rule Change, as Modified by Amendments No. 1 and 2, to List and Trade Shares of the Winklevoss Bitcoin Trust) ("Winklevoss Order"); Securities Exchange Act Release No. 83904 (Aug. 22, 2018), 83 FR 43934 (August 28, 2018) (SR-NYSEArca-2017-139) (Order Disapproving a Proposed Rule Change to List and Trade the Shares of the ProShares Bitcoin ETF and the ProShares Short Bitcoin ETF); Securities Exchange Act Release No. 83912 (Aug. 22, 2018), 83 FR 43912 (August 28, 2018) (SR-NYSEArca-2018-02) (Order Disapproving a Proposed Rule Change Relating to Listing and Trading of the Direxion Daily Bitcoin Bear 1X Shares, Direxion Daily Bitcoin 1.25X Bull Shares, Direxion Daily Bitcoin 1.5X Bull Shares, Direxion Daily Bitcoin 2X Bull Shares, and Direxion Daily Bitcoin 2X Bear Shares Under NYSE Arca Rule 8.200-E); Securities Exchange Act Release No. 83913 (Aug. 22, 2018), 83 FR 43923 (August 28, 2018) (SR-CboeBZX-2018-001) (Order Disapproving a Proposed Rule Change to List and Trade the Shares of the GraniteShares Bitcoin ETF and the GraniteShares Short Bitcoin ETF ("GraniteShares Order"); Securities Exchange Act Release No. 88284 (February 26, 2020), 85 FR 12595

including prior proposals with respect to the Trust.[21] In each case, the Commission

(March 3, 2020) (Sr-NYSEArca-2019-39) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, to Amend NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) and to List and Trade Shares of the United States Bitcoin and Treasury Investment Trust Under NYSE Arca Rule 8.201-E) ("USBT Order"); Securities Exchange Act Release No. 93559 (Nov. 12, 2021), 86 FR 64539 (Nov. 18, 2021) (SR-CboeBZX-2021-019) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the VanEck Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares, Securities Exchange Act) ("VanEck Order"); Securities Exchange Act Release No. 93700 (Dec. 1, 2021), 86 FR 69322 (Dec. 7, 2021) (SR–CboeBZX–2021–024) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the WisdomTree Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) (''WisdomTree Order''); Securities Exchange Act Release No. 93859 (Dec. 22, 2021), 86 FR 74156 (Dec. 29, 2021) (SR–NYSEArca–2021–31) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the Valkyrie Bitcoin Fund Under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) ("Valkyrie Order"); Securities Exchange Act Release No. 93860 (Dec. 22, 2021), 86 FR 74166 (Dec. 29, 2021) (SR–CboeBZX–2021–029) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the Kryptoin Bitcoin ETF Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("Kryptoin Order"); Securities Exchange Act Release No. 94006 (Jan. 20, 2022), 87 FR 3869 (Jan. 25, 2022) (SR–NYSEArca–2021–37) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the First Trust SkyBridge Bitcoin ETF Trust Under NYSE Arca Rule 8.201– E) ("SkyBridge Order"); Securities Exchange Act Release No. 94080 (Jan. 27, 2022), 87 FR 5527 (Feb. 1, 2022) (SR–CboeBZX–2021–039) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the Wise Origin Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("Wise Origin Order"); Securities Exchange Act Release No. 94395 (Mar. 10, 2022), 87 FR 14932 (Mar. 16, 2022) (SR–NYSEArca–2021–57) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the NYDIG Bitcoin ETF Under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) ("NYDIG Order"); Securities Exchange Act Release No. 94396 (Mar. 10, 2022), 87 FR 14912 (Mar. 16, 2022) (SR–CboeBZX–2021–052) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the Global X Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("Global X Order"); Securities Exchange Act Release No. 94571 (Mar. 31, 2022), 87 FR 20014 (Apr. 6, 2022) (SR–CboeBZX–2021–051) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, To List and Trade Shares of the ARK 21Shares Bitcoin ETF Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("ARK 21Shares Order"); Securities Exchange Act Release No. 94999 (May 27, 2022), 87 FR 33548 (June 2, 2022) (SR–NYSEArca–2021–67) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the One River Carbon Neutral Bitcoin Trust Under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) ("One River Order"); Securities Exchange Act Release No. 95180 (June 29, 2022), 87 FR 40299 (July 6, 2022) (SR–NYSEArca–2021–90) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, To List and Trade Shares of Grayscale Bitcoin Trust under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) ("Grayscale Order"); Securities Excnnage Act Release No. 96011 (Oct. 11, 2022), 87 FR 62466 (Oct. 14, 2022) (SR–CboeBZX–2022–006) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the WisdomTree Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("WisdomTree Order II"); Securities Exchange Act Release No. 96751 (Jan. 26, 2023), 88 FR 6328 (Jan. 31, 2023) (SR–CboeBZX–2021–031) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the ARK 21Shares Bitcoin ETF Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("ARK 21Shares Order II"); Securities Exchange Act Release No. 97102 (Mar. 10, 2023), 88 FR 16055 (Mar. 15, 2023) (SR-CboeBZX-2022-035) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the VanEck Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares)) ("VanEck Order II").

21 See Securities Exchange Act Release No. 87267 (Oct. 9, 2019), 84 FR 55382 (October 16, 2019) (SR-NYSEArca-2019-01) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, Relating to the Listing and Trading of Shares of the Bitwise Bitcoin ETF Trust Under NYSE Arca Rule 8.201-E) ("Bitwise Order") (withdrawn on Jan. 13, 2020 while delegated action was under review by the Commission, see Release No. 90431 (Nov. 13, 2020), 85 FR 73819 (November 19, 2020)); Securities Exchange Act Release No. 95179 (June 29, 2022), 87 FR 40282 (July 6, 2022) (SR-NYSEArca–2021-89)

determined that the filing failed to demonstrate that the proposal was consistent with the requirements of Section 6(b)(5) of the Act[22] and, in particular, the requirement that the rules of a national securities exchange be designed to prevent fraudulent and manipulative acts and practices.

Specifically, although comprehensive surveillance-sharing agreements[23] are not the exclusive means by which a listing exchange can meet its obligations under Section 6(b)(5) of the Act, the Commission has determined that, where a listing exchange cannot establish that other means to prevent fraudulent and manipulative acts and practices are sufficient, the listing exchange must enter into a surveillance-sharing agreement with a regulated market of significant size because "[s]uch agreements provide a necessary deterrent to manipulation because they facilitate the availability of information needed to fully investigate a manipulation if it were to occur."[24]

In the Winklevoss Order, the Commission set forth both the importance and definition of a surveilled, regulated market of significant size, explaining that:

> [For all] commodity-trust ETPs approved to date for listing and trading, there has been in every case at least one significant, regulated market for trading futures on the underlying commodity—whether gold, silver, platinum, palladium, or copper

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(Order Disapproving a Proposed Rule Change To List and Trade Shares of the Bitwise Bitcoin ETP Trust Under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) (("Bitwise Order II").

22 15 U.S.C. 78f(b)(5).

23 The Commission has described a comprehensive surveillance sharing agreement as including an agreement under which a self-regulatory organization may expressly obtain information on (i) market trading activity, (ii) clearing activity and (iii) customer identity, and where existing rules, laws or practices would not impede access to such information. See Letter from Brandon Becker, Director, Division of Market Regulation, Commission, to Gerard D. O'Connell, Chairman, Intermarket Surveillance Group (June 3, 1994), available at https://www.sec.gov/divisions/marketreg/mr-noaction/isg060394.htm ("ISG Letter"). The Commission has emphasized the importance of surveillance sharing agreements, noting that "[s]uch agreements provide a necessary deterrent to manipulation because they facilitate the availability of information needed to fully investigate a manipulation if it were to occur." Securities Exchange Act Release No. 40761 (Dec. 8, 1998), 63 FR 70952, 70954, 70959 (Dec. 22, 1998) (File No. S7-13-98) (Amendment to Rule Filing Requirements for Self-Regulatory Organizations Regarding New Derivative Securities Products) ("NDSP Adopting Release").

24 See Winklevoss Order, 83 FR at 37580. In the Winklevoss Order as well as the Bitwise Order and USBT Order, the Commission determined that the proposing exchange had not established that bitcoin markets were uniquely resistant to fraud or manipulation, which unique resistance might provide protections such that the proposing exchange "would not necessarily need to enter into a surveillance sharing agreement with a regulated significant market." See Winklevoss Order 83 FR at 37591; Bitwise Order 84 FR at 55386; and USBT Order 85 FR at 12597. In all instances, the Commission determined that, while the existing, regulated derivatives markets (including the CME bitcoin futures market) was a regulated market, the proposing exchanges had not demonstrated that the regulated derivatives markets had achieved significant size. See Winklevoss Order, 83 FR at 37601; Bitwise Order 84 FR at 55410; and USBT Order 85 FR at 12597. In short, the Commission determined that a proposing exchange had established neither that it had a surveillance sharing agreement with a group of underlying bitcoin trading platforms, nor that such bitcoin trading platforms constituted regulated markets of significant size with respect to bitcoin. See Winklevoss Order 83 FR 37590-37591; Bitwise Order 84 FR at 55407; and USBT Order 85 FR at 12615.

> — and the ETP listing exchange has entered into surveillance-sharing agreements with, or held Intermarket Surveillance Group membership in common with, that market.[25]

On an illustrative and not exclusive basis, the Commission further defined:

> [T]he terms 'significant market' and 'market of significant size' to include a market (or group of markets) as to which (a) there is a reasonable likelihood that a person attempting to manipulate the ETP would also have to trade on that market to successfully manipulate the ETP, so that a surveillance-sharing agreement would assist the ETP listing market in detecting and deterring misconduct, and (b) it is unlikely that trading in the ETP would be the predominant influence on prices in that market.[26]

In support of the Sponsor's first attempt to satisfy the significant market test in 2019,[27] the Sponsor conducted and presented extensive research into the bitcoin market and published a 226-slide study of its findings.[28] The study asserted that the relative size of the CME bitcoin futures market compared to real size of bitcoin spot markets demonstrated that the CME bitcoin futures market was a market of significant size.

The Commission disagreed, explaining that:

> the evidence that the Sponsor presents regarding the relative size of the bitcoin futures market and the relationship in prices between the spot and futures markets does not … establish the interrelationship between the futures market and the proposed ETP, or directionality of that interrelationship, that would make the bitcoin futures market a "market of significant size" in the context of the proposed ETP.[29]

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25 See Winklevoss Order, 83 FR 37594.

26 Id. The Commission further noted that "[t]here could be other types of ''significant markets'' and ''markets of significant size,'' but this definition is an example that will provide guidance to market participants." See id. This two-prong definition of the term "significant market" will be referred to herein as the "significant market test" with "first prong" referring to the "reasonable likelihood" clause (a) and "second prong" referring to the "predominant influence" clause (b).

27 See Securities Exchange Act Release No. 85093 (Feb. 11, 2019), 84 FR 4589 (Feb. 15, 2019)) (SR-NYSEArca-2019-01) (Notice of Filing of Proposed Rule Change Relating to the Listing and Trading of Shares of the Bitwise Bitcoin ETF Trust Under NYSE Arca Rule 8.201-E).

28 See Bitwise Asset Management, Presentation to the U.S. Securities and Exchange Commission, dated March 19, 2019, attached to Memorandum from the Division of Trading and Markets regarding a March 19, 2019 meeting with representatives of Bitwise Asset Management, Inc., NYSE Arca, Inc., and Vedder Price P.C., available at https://www.sec.gov/comments/sr-nysearca-2019-01/srnysearca201901-5164833-183434.pdf.

29 See Bitwise Order, 84 FR at 55410.

The Commission highlighted the central importance of knowing the directionality ("lead-lag") of the interrelationship between the two venues when determining if a market qualifies as "significant":

> [T]he lead-lag relationship between the bitcoin futures market and the spot market ... is central to understanding whether it is reasonably likely that a would-be manipulator of the ETP would need to trade on the bitcoin futures market to successfully manipulate prices on those spot platforms that feed into the proposed ETP's pricing mechanism. In particular, if the spot market leads the futures market, this would indicate that it would not be necessary to trade on the futures market to manipulate the proposed ETP, even if arbitrage worked efficiently, because the futures price would move to meet the spot price.[30]

In a subsequent application to trade and list the United States Bitcoin and Treasury Investment (USBT), the Commission rejected a different sponsor's attempt to establish through statistical analysis that the CME bitcoin futures market led the bitcoin spot market from a price discovery perspective,[31] noting, among other things, that:

> [T]he Sponsor has not provided sufficient details supporting this conclusion, and unquestioning reliance by the Commission on representations in the record is an insufficient basis for approving a proposed rule change in circumstances where, as here, the proponent's assertion would form such an integral role in the Commission's analysis and the assertion is subject to several challenges. For example, the [s]ponsor has not provided sufficient information explaining its underlying analysis, including detailed information on the analytic methodology used, the specific time period analyzed, or any information that would enable the Commission to evaluate whether the findings are statistically significant or time varying.[32]

In an effort to conduct comprehensive research demonstrating the lead-lag relationship between the CME bitcoin futures market and the spot market while providing sufficient information to the Commission on the data and methodology underlying its analysis, the Sponsor met with the Commission Staff 14 times between January 2020 and August 2021, including members from the divisions of Trading and Markets, Economic Risk and Analysis, and Corporate Finance, to discuss a comprehensive approach to conducting lead-lag analysis. As a result, in October 2021, the Exchange filed another rule proposal

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30 See id. at 55411. See also USBT Order, 85 FR at 12612.

31 See Securities Exchange Act Release No. 86195 (June 25, 2019), 84 FR 31373 (July 1, 2019) (SR-NYSEArca-2019-39) (Notice of Filing of Proposed Rule Change To Amend NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) and To List and Trade Shares of the United States Bitcoin and Treasury Investment Trust Under NYSE Arca Rule 8.201-E) ("USBT Proposal").

32 See USBT Order, 85 FR at 12612.

including a 107-page white paper from the Sponsor which presented the results of this research. The research explored the lead-lag relationship between the CME bitcoin futures market, bitcoin spot market and unregulated bitcoin futures market, and evidenced that the CME bitcoin futures market led the spot market and unregulated bitcoin futures market ("Bitwise Prong One Paper").[33] The Sponsor also submitted a 24-page white paper demonstrating that a new bitcoin ETP is unlikely to become the predominant influence on prices in the CME bitcoin futures market ("Bitwise Prong Two Paper").[34]

The Bitwise Prong One Paper included a survey and validation of bitcoin data sources, a detailed review of existing academic literature on the topic of lead-lag relationships between bitcoin markets, and a rigorous statistical analysis using both Information Share (IS) / Component Share (CS) and Time-Shift Lead-Lag (TSLL) metrics comparing the CME bitcoin futures market against both spot bitcoin platforms and unregulated bitcoin futures platforms. The Bitwise Prong Two paper included an estimation of potential inflows into a spot bitcoin ETP and a statistical evaluation of the impact of historical inflows into other bitcoin investment products on the bitcoin market. In disapproving the Sponsor's proposal for a second time, the Commission noted that

> even accepting at face value the results of Bitwise's statistical analysis of the relationship between the CME bitcoin futures market and the spot market, such results are only part of the "mixed" record on the topic of bitcoin price discovery.[35]

In light of the foregoing, the following discussion will demonstrate that the CME bitcoin futures market is a regulated market of significant size and meets the both prongs of the significant market test. Given the stated limitations on what the Sponsor's analysis alone can demonstrate, the discussion focuses on resolving the "mixed record" in the broad academic literature before turning to the questions the Commission raised regarding the Sponsor's statistical analysis.

> *The Approval of Bitcoin Futures ETPs Registered Under the Securities Act of 1933 Demonstrates that the CME Bitcoin Futures Market Is a Regulated Market of Significant Size Related to Spot Bitcoin for the Purposes of Satisfying Section 6(b)(5) of the Act*

In 2022, the Commission approved rule changes to list and trade shares of two CME bitcoin futures-based ETPs registered under the Securities Act of 1933 (the "Bitcoin

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33 See Matthew Hougan, Hong Kim and Satyajeet Pal, "Price discovery in the modern bitcoin market: Examining lead-lag relationships between the bitcoin spot and bitcoin futures market," June 11, 2021, available at https://static.bitwiseinvestments.com/Bitwise-Bitcoin-ETP-White-Paper-1.pdf.

34 See Matthew Hougan, Hong Kim and Satyajeet Pal, "Is it likely that a US bitcoin ETP, if approved, will become the predominant influence on prices in the CME bitcoin futures market?," June 11, 2021, available at https://static.bitwiseinvestments.com/Bitwise-Bitcoin-ETP-White-Paper-2.pdf.

35 See Bitwise Order II, 87 FR at 40288.

Futures ETPs").[36] Unlike the CME bitcoin futures-based ETFs that began trading in 2021,[37] which are regulated under the Investment Company Act of 1940, the listing exchanges for the Bitcoin Futures ETPs had to satisfy the requirements of Section 6(b)(5) by demonstrating that listing markets had in place a comprehensive surveillance sharing agreement with a regulated market of significant size related to CME bitcoin futures contracts. In approving the applications, the Commission concluded that the CME's surveillances could reasonably be relied upon to capture the effects on the CME bitcoin futures market caused by a person attempting to manipulate the proposed futures ETP by manipulating the price of CME bitcoin.[38]

While the Commission rejected the view that this logic extended to spot bitcoin ETPs,[39] this view was recently rejected by the Court of Appeals for the DC Circuit. In Grayscale Investments LLC v. Securities and Exchange Commission ("Grayscale"), the Court observed:

> Grayscale's proposed bitcoin ETP and the approved bitcoin futures ETPs all track the bitcoin market price, i.e., the spot market price… Grayscale presented uncontested evidence that there is a 99.9 percent correlation between bitcoin's spot market and CME futures contract prices… Because the spot and futures markets for bitcoin are highly related, it stands to reason that manipulation in either market will affect the price of bitcoin futures… To the extent that the price of bitcoin futures might be affected by trading in both the futures and spot markets, the Commission concluded fraud in either market could be detected by surveillance of the CME futures market.[40]

The same reasoning applies to the instant application. Bitcoin futures pricing is based on pricing from spot bitcoin markets. If CME's surveillances can capture the effects of trading on the relevant spot markets on the pricing of bitcoin futures, CME should equally be able to capture the effects of trading on the relevant spot markets on the pricing of spot bitcoin ETPs. The fact that bitcoin futures trade on the CME but spot bitcoin does not is a distinction without difference regarding the matter of whether

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36 See Securities Exchange Act Release No. 94620 (Apr. 6, 2022), 87 FR 21676 (Apr. 12, 2022) (SR-NYSEArca-2021-53) (Order Granting Approval of a Proposed Rule Change, as Modified by Amendment No. 2, To List and Trade Shares of the Teucrium Bitcoin Futures Fund Under NYSE Arca Rule 8.200-E, Commentary .02 (Trust Issued Receipts)) ("Teucrium Order"); Securities Exchange Act Release No. 94853 (May 5, 2022), 87 FR 28848 (May 11, 2022) (SR-NASDAQ- 2021-066) (Order Granting Approval of a Proposed Rule Change, as Modified by Amendment Nos. 1 and 2, To List and Trade Shares of the Valkyrie XBTO Bitcoin Futures Fund Under Nasdaq Rule 5711(g)) ("Valkyrie XBTO Order").

37 The ProShares Bitcoin Strategy ETF ("BITO") launched on October 18, 2021. The Valkyrie Bitcoin Strategy ETF ("BTF") launched on October 21, 2021. The VanEck Bitcoin Strategy ETF ("XBTF") launched on November 15, 2021.

38 See Grayscale Investments, LLC v. SEC, No. 22-1142 (D.C. Cir. Aug. 29, 2023), at 10-11.

39 See, e.g., Bitwise Order II, 87 FR at 40289.

40 See Grayscale Investments, LLC v. SEC, No. 22-1142 (D.C. Cir. Aug. 29, 2023), at 9-10.

surveillance of the CME futures market can be relied upon to detect manipulation occurring in the spot market. It follows that the CME bitcoin futures market is a regulated market of significant size related to spot bitcoin.

The Academic Record Demonstrates that the CME Bitcoin Futures Market Meets the First Prong of the Significant Market Test

The first prong in establishing whether the CME bitcoin futures market constitutes a "market of significant size" is the determination that there is a reasonable likelihood that a person attempting to manipulate the proposed ETP would have to trade on the CME bitcoin futures market to successfully manipulate the ETP. As detailed in the "Background" section above, the Commission explained in previous orders that the lead-lag relationship between the bitcoin futures market and the spot market is "central" to understanding this first prong and making this determination.

The Mixed Academic Record as Presented by the Commission

The Commission has repeatedly cited the "mixed" or "inconclusive" academic record regarding the lead-lag relationship between spot and futures markets as a core reason it believed that the first prong was not met in past disapproval orders. For instance, in the most recent spot bitcoin ETP disapproval order, the Commission provided a long list of disapproval orders where the Commission has commented on this matter:

> As the academic literature and listing exchanges' analyses pertaining to the pricing relationship between the CME bitcoin futures market and spot bitcoin market have developed, the Commission has critically reviewed those materials. See WisdomTree Order II, 87 FR at 62476-77; Grayscale Order, 87 FR at 40311-13; Bitwise Order, 87 FR at 40286-89; ARK 21Shares Order, 87 FR at 20024; Global X Order, 87 FR at 14920; Wise Origin Order, 87 FR at 5535-36, 5539-40; Kryptoin Order, 86 FR at 74176; WisdomTree Order, 86 FR at 69330-32; Previous VanEck Order, 86 FR at 64547-48; USBT Order, 85 FR at 12613.[41]

In order to address all of the Commission's critical questions regarding the mixed academic record, the Sponsor reviewed all eleven disapproval orders referenced above and summarized the critical questions the Commission has raised regarding the mixed academic record across these orders, as follows.

In the USBT Order, VanEck Order, WisdomTree Order, Kryptoin Order, Wise Origin Order, NYDIG Order, Global X Order, and ARK 21Shares Order, the Commission listed out nine academic studies that have evaluated the lead-lag relationship between the bitcoin futures market and the spot market, and provided one-line summaries of the key findings of each paper, as a means of illustrating the mixed nature of the academic

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41 See VanEck Order II, 88 FR at 16065.

record.[42] The text below is drawn from Global X Order, but is repeated in other Orders as well. The studies that found either that the spot market led the futures market or that the leadership was mixed are set forth in bold text. Both paragraph spacing and numbering have been added for clarity. The Commission's one-line summary of the key findings appears in parentheses.

1. **D. Baur & T. Dimpfl, Price discovery in bitcoin spot or futures?, 39 J. Futures Mkts. 803 (2019) (finding that the bitcoin spot market leads price discovery).**

2. **O. Entrop, B. Frijns & M. Seruset, The determinants of price discovery on bitcoin markets, 40 J. Futures Mkts. 816 (2020) (finding that price discovery measures vary significantly over time without one market being clearly dominant over the other)**.

3. **J. Hung, H. Liu & J. Yang, Trading activity and price discovery in Bitcoin futures markets, 62 J. Empirical Finance 107 (2021) (finding that the bitcoin spot market dominates price discovery)**.

4. B. Kapar & J. Olmo, An analysis of price discovery between Bitcoin futures and spot markets, 174 Econ. Letters 62 (2019) (finding that bitcoin futures dominate price discovery).

5. E. Akyildirim, S. Corbet, P. Katsiampa, N. Kellard & A. Sensoy, The development of Bitcoin futures: Exploring the interactions between cryptocurrency derivatives, 34 Fin. Res. Letters 101234 (2020) (finding that bitcoin futures dominate price discovery).

6. A. Fassas, S. Papadamou, & A. Koulis, Price discovery in bitcoin futures, 52 Res. Int'l Bus. Fin. 101116 (2020) (finding that bitcoin futures play a more important role in price discovery).

7. S. Aleti & B. Mizrach, Bitcoin spot and futures market microstructure, 41 J. Futures Mkts. 194 (2021) (finding that relatively more price discovery occurs on the CME as compared to four spot exchanges)**.**

8. J. Wu, K. Xu, X. Zheng & J. Chen, Fractional cointegration in bitcoin spot and futures markets, 41 J. Futures Mkts. 1478 (2021) (finding that CME bitcoin futures dominate price discovery).

9. **C. Alexander & D. Heck, Price discovery in Bitcoin: The impact of unregulated markets, 50 J. Financial Stability 100776 (2020) (finding that, in a multi-dimensional setting, including the main price leaders within futures, perpetuals, and spot markets, CME bitcoin futures have a very minor effect on price discovery; and that faster speed of adjustment and information**

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[42] See USBT Order, 85 FR 12613; VanEck Order, 86 FR at 64547-48; WisdomTree Order, 86 FR at 69330-32; Kryptoin Order, 86 FR at 74176; Wise Origin Order, 87 FR at 5535-36; NYDIG Order, 87 FR 14939; Global X Order, 87 FR at 14920; ARK 21Shares Order, 87 FR at 20024.

absorption occurs on the unregulated spot and derivatives platforms than on CME bitcoin futures).

The Commission has also repeatedly raised doubts about the methodology of two studies finding that the futures market leads the spot market, Kapar and Olmo (2019)[43] and Hu et al. (2020),[44] writing in the USBT Order:

> The Commission notes that two other papers cited by the Sponsor utilize daily spot market prices, as opposed to intraday prices. See Kapar & Olmo; Hu et al. In seeking to draw conclusions regarding which market leads price discovery, studies based on daily price data may not be able to distinguish which market incorporates new information faster, because the time gap between two consecutive observations in the data samples could be longer than the typical information processing time in such markets. The Sponsor has not provided evidence to support the assertion that daily price data is sufficiently able to capture information flows in the bitcoin market.[45]

Furthermore, regarding Hu et al. (2020), the Commission also noted that the analysis included time varying results:

> [F]or a period of time spanning over 20% of the study, prices in the bitcoin spot market led futures market prices. Such time inconsistency in the direction of price discovery could suggest that the market has not yet found its natural equilibrium. Moreover, this period spanned the end of the study period and the record does not include evidence to explain why this would not indicate a shift towards prices in the spot market leading the futures market that would be expected to persist into the future.[46]

Lastly, in Bitwise Order II, the Commission raised the question as to whether classic price discovery metrics like IS/CS could be trusted at all if, as the Sponsor claimed, referencing Robertson and Zhang (2022) and Buccheri et al. (2021), these metrics could produce biased results when the price data used has a high level of sparsity:

> [Bitwise does not] discuss these 10 IS/CS studies in light of Bitwise's acknowledgment that "classic" price discovery metrics

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43 B. Kapar & J. Olmo (2019), "An analysis of price discovery between Bitcoin futures and spot markets," Economics Letters, Elsevier, vol. 174(C), pages 62-64. ("Kapar and Olmo 2019").

44 Y. Hu, Y. Hou & L. Oxley (2020), "What role do futures markets play in Bitcoin pricing? Causality, cointegration and price discovery from a time-varying perspective," 72 Int'l Rev. of Fin. Analysis 101569 ("Hu et al. 2020").

45 See USBT Order, 85 FR at 12613.

46 See id.

> like IS/CS could be misspecified, with potentially biased results, when price data have a high level of sparsity.[47]

The following section aims to comprehensively address all of the above critical questions raised by the Commission.

> *The Sponsor's Response to the Questions Raised by the Commission Regarding the "Mixed" Academic Record*

The Sponsor's prior research (Bitwise Prong One Paper) included a detailed literature review wherein the Sponsor examined 10 academic studies exploring the lead-lag relationship between bitcoin futures and spot markets, writing about each study in detail, and will be referred to as "prior literature review" in this proposal.

Baur and Dimpfl (2019)[48]

As the Sponsor detailed in the prior literature review, Baur and Dimpfl (2019) has a severe methodological flaw that led the CME bitcoin futures market's contribution to price discovery to appear artificially low: The authors conduct their price discovery analysis on a per-lifetime-of-each-contract basis, rather than a standard rolling-front-month-contract basis.

An independent study, Alexander and Heck (2019), explored this issue extensively. The paper begins by using a standard rolling-front-month-contract approach to compare the futures market with the spot market, and concludes that there is a "greater contribution to price discovery from the futures market than the spot market."[49]

The paper specifically notes that this finding contradicts the findings in Baur and Dimpfl (2019), and the authors set about resolving this discrepancy by repeating their original study using Baur and Dimpfl (2019)'s per-lifetime-of-each-contract approach. The authors show that this methodological change reverses their original finding and shows the spot market leading price discovery. The authors conclude by explaining why the per-lifetime-of-each-contract approach is flawed and should not be relied on:

> This apparently leading role of the spot market [using the per-lifetime-of-each-contract approach] is not surprising since, during the first few months after the introduction of a contract, there is always another contract with a nearer maturity where almost all trading activity occurs. So any finding that the spot market

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47 See Bitwise Order II, 87 FR at 40288.

48 D. Baur & T. Dimpfl (2019), "Price discovery in bitcoin spot or futures?," Journal of Futures Markets, 39(7): 803-817 ("Baur and Dimpfl 2019").

49 C. Alexander & D. Heck (2019), Price Discovery, High-Frequency Trading and Jumps in Bitcoin Markets ("Alexander and Heck 2019").

> dominates the price discovery process is merely an artifact of very low trading volumes when the contract is first issued.[50]

As regards the first prong, the question is not whether each individual futures contract leads the spot market, but rather, whether the futures market as a whole leads the spot market. Given this, the rolling-front-month-contract approach, which focuses attention on the contract that attracts the bulk of trading activity at any given time, is the correct approach.

Entrop et al. (2020)[51]

Entrop et al. (2020) evaluates price discovery in the bitcoin market by comparing the CME futures market and Bitstamp, a spot market, from December 2017 to March 2019. The paper finds that the CME futures market led price discovery for the majority of the time period studied.

Despite the fact that the paper finds generally in favor of the futures market leading, the Commission calls out Entrop et al. (2020) in multiple disapproval orders, noting for instance in the USBT Order the paper "finding that price discovery measures vary significantly over time without one market being clearly dominant over the other."[52] The Commission's point draws on the fact that, for the last five months of the 16 month study, the spot market led the futures market in IS/CS measures, and that, for the last two months of the study, it did so in a statistically significant way. The authors of the paper note the significant time variation in market leadership as well.

As with Baur and Dimpfl (2019), this finding is driven by a methodological choice in the study design that introduces an artificial bias against the CME bitcoin futures market: Whereas the vast majority of studies evaluating price discovery in the bitcoin market use actual transaction prices to conduct their analysis, Entrop et al. (2020) uses "midquotes" (or midpoint of the bid-ask spread) in each market. As explored further below, the bias introduced by this methodological decision is exaggerated specifically in the period where leadership swings to the spot market.

The authors justify their non-standard choice to use midquotes instead of transaction prices by pointing to four academic studies, itemizing three specific advantages:

> First, quotes can be updated in the absence of transactions. Second, midquotes mitigate the problem of infrequent trading, which is normally observed in transaction prices. Third, midquotes are not affected by the bid-ask bounce.[53]

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50 See Alexander and Heck 2019.

51 See O. Entrop, B. Frijns & M. Seruset (2020), "The Determinants of Price Discovery on Bitcoin Markets," 40 J. Futures Mkts. 816 ("Entrop et al. 2020").

52 See USBT Order, 85 FR at 12613.

53 See Entrop et al. 2020.

These theoretical advantages, however, must be considered in light of the specific microstructure of the bitcoin markets, and specifically, the sizable difference in "tick size" (or the minimum price change) in the CME bitcoin market compared to the spot market. For CME bitcoin futures contracts, the tick size per contract is $25.00,[54] which equates to $5.00 per bitcoin, while for spot platforms like Bitstamp (the spot platform used in this study), the tick size is typically $0.01.[55]

In a low volatility environment, where the price of bitcoin may trade within a single $5.00 range for a period of time, the midquote on a spot market can update on a tick-by-tick basis as the market price of bitcoin moves up or down within the range. Meanwhile, the midquote on the CME bitcoin futures market will not change at all.

Importantly, this does not mean the CME bitcoin futures market has forfeited price discovery or that it cannot transmit information to other markets. Transactions may occur on the CME bitcoin futures market at either the ask or the bid even as the midquote remains static, depending on whether traders believe the market is likely to rise or fall. By electing to ignore these transactions, Entrop et al. (2020) renders it significantly harder for the CME bitcoin futures market to demonstrate price leadership during low volatility environments. One cannot measure what the eye refuses to see.

There is strong reason to believe that the methodological choice to use midquotes biased the time varying results of this study. The last two months of the study (February and March 2019), where the study showed the spot market leading the futures market in a statistically significant manner, occurred during the depth of the bitcoin bear market. During this period, bitcoin's price hovered below the $4000 mark, rendering the $5 tick size particularly large on a percentage basis, and bitcoin's price volatility was exceptionally low, as observed in Table 3 of the study. The impact is clear: Midquotes were sampled at a 1 minute interval in the study, and amongst the 22,788 and 29,962 CME midquotes sampled for the months of February and March 2019, 80.82% and 84.76% of the data points represented zero change, as observed in Table 4. This was by far the highest ratio of zero change samples in the study. By comparison, in the first two months of the study, only 8.66% and 12.32% of the midquotes sampled at 1 minute intervals from the CME represented zero change.

The Sponsor believes that the results of the last two months, where the percentage of sampled midquotes representing zero change were so high, cannot be relied upon to draw the conclusion that price discovery leadership changed from the futures market to the spot market during that time, and that the academic record should reflect Entrop et al. (2020)'s overall finding that the futures market leads the spot market.

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[54] See CME bitcoin futures contract specs, available at https://www.cmegroup.com/markets/cryptocurrencies/bitcoin/bitcoin.contractSpecs.html.

[55] See Bitstamp tick sizes before changes made in 2022, available at https://blog.bitstamp.net/post/changes-to-tick-sizes/.

Hung et al. (2021)[56]

Hung et al. (2021) does not focus on price discovery between the bitcoin futures market and the spot market. In fact, the word "spot" does not appear in the paper's abstract. Instead, the paper is primarily focused on investigating the relative contributions of different types of traders (e.g. hedgers, retailers, etc.) on price discovery in the bitcoin futures markets, both CME and CBOE, using the Commitments of Traders (COT) data from the CFTC. Its secondary focus is on analyzing price discovery competition between the CME and CBOE bitcoin futures markets, as a way of exploring CBOE's decision to suspend further listings of their bitcoin futures contracts in 2019.

The ancillary nature of the spot vs. futures investigation is worth noting because it may explain why the mathematical oddities in the results of that investigation went unexplored by the authors.

Those results are presented in Table 4 of the paper. The authors use modified information share (MIS), a variant of classic IS, to evaluate price leadership between a single spot platform (Bitstamp) and both the CME and CBOE futures exchanges, for the period between April 10, 2018 and April 30, 2019. The authors divide this period into 56 weeks, and independently calculate the MIS for each week, before presenting it on an average, minimum, and maximum basis. The results show that the spot market led the CME futures market over this time period with an average MIS value of 0.654.

The table, however, also shows a minimum spot market MIS value amongst the 56 data points of 0.000 (a finding that the CME futures market *completely* led the spot market for at least one entire week) and a maximum value of 0.999 (a finding that the spot market *completely* led the CME futures market for at least one entire week).

These maximum and minimum values are extremely unlikely. Price discovery analyses such as MIS are statistical analyses where even a slight bit of randomness in an otherwise clearly lagging price series would still produce some contribution to price discovery. A 0.000 and 0.999 result is an unexplained mathematical oddity hard to comprehend, and even more so as results come at both ends of the spectrum. Amongst all the price discovery academic literature the Sponsor has reviewed — as well as all the papers cited by the Commission — there are no other examples where a full week's worth of data between two time series has resulted in such extreme values. The unprecedented results are both so statistically improbable and so out-of-line with results from other papers that the most likely explanation is that some amount of data errors existed in the price data that went into the analysis.

Unfortunately, the study's spot data provider (bitcoincharts.com) is no longer accessible, and so, it is not possible to check the data. In addition, the paper does not provide any charts or visualizations that would permit the Sponsor to visually inspect price discovery

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[56] This paper was published after the Sponsor completed the academic literature review in the Bitwise Prong One Paper, and therefore was not captured or analyzed in that white paper. See J. Hung, H. Liu & J. Yang, "Trading activity and price discovery in Bitcoin futures markets," 62 J. Empirical Finance 107 (2021) ("Hung et al. 2021").

trends over time and attempt to infer some other explanation for these highly unusual results.

Given the anomalous and statistically unlikely nature of the results, the Sponsor believes that the paper's ancillary findings about price discovery between spot and futures markets cannot be relied upon and should be dismissed.

Alexander and Heck (2020)[57]

Alexander and Heck (2020) stands alone from all other academic papers cited by the Commission in its review of the academic literature by using a "multidimensional" approach to evaluate the source of price discovery leadership in the bitcoin market. That is, rather than using the classic "pairwise" approach to IS/CS price discovery analysis — comparing Exchange A against Exchange B, and then comparing Exchange A against Exchange C, and so on — Alexander and Heck (2020) uses a statistical technique that attempts to compare multiple exchanges simultaneously.

The Commission commented on the findings of Alexander and Heck (2020) in Bitwise Order II, noting that:

> [Alexander & Heck] finds that CME bitcoin futures "have a very minor effect on price discovery," and that "a faster speed of adjustment and information absorption [occurs] on the unregulated spot and derivatives [platforms] than on CME bitcoin futures." Specifically, Alexander & Heck's multidimensional analysis—which simultaneously includes unregulated futures, regulated futures, perpetual futures, and spot markets—finds that CME bitcoin futures have never accounted for more than 9% of price discovery (and unregulated markets collectively account for more than 91% of price discovery), and have always contributed the least to price discovery among all venues considered, except during July 2019.[58]

Expanding beyond the specific finding, the Commission used commentary from this paper to question in general the validity of pairwise, two-dimensional analysis — the type of analysis employed by every other paper the Commission references, as well as the Sponsor's own statistical IS and CS analysis.

Quoting a critique from the paper and adding its own color, the Commission notes:

> [From Alexander and Heck (2020):] "omitting substantial information flows from other markets can produce misleading results....[I]n a two-dimensional model one or other of the

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57 See C. Alexander & D. Heck (2020), "Price Discovery in Bitcoin: The Impact of Unregulated Markets," Journal of Financial Stability, Volume 50, October 2020, Article Number 100776 ("Alexander and Heck 2020").

58 See Bitwise Order II, 87 FR at 40289.

> instruments must necessarily be identified as price leader." In other words, a two-dimensional model might erroneously attribute information share or component share of omitted platforms to one of the two platforms included in the pairwise estimate, because the two shares must necessarily sum up to 100%.[59]

The Sponsor disagrees. To the contrary, the Sponsor believes that the multidimensional study design employed by Alexander and Heck introduces a strong bias against the CME bitcoin futures market that renders the results invalid.

The core issue with multidimensional price discovery analysis, and possibly the reason Alexander and Heck (2020) is the only study to employ it in this context that the Sponsor is aware of, is that when comparing price discovery amongst different category of markets (as in here, regulated futures, unregulated futures, and spot), the question of which markets appear to contribute more to price discovery can be biased by the number of constituent markets from each category.

The reason for this bias is that IS/CS price discovery measures are based on the computation of an implicit "common price" that is derived from the collection of inputted price series. The statistical measures track the shares of contribution made to changes in the common price by each price series. In a multidimensional context, as more alike markets are added, those markets can artificially appear to contribute more to changes in the common price because the common price itself changes with the addition of more markets. For example, if market A objectively leads both market B and and market C, but market B and market C have very similar price series, a multidimensional analysis amongst all three markets can erroneously conclude that market A's movements contributed less to changes in the common price than market B and C, simply because the latter two markets were similar.

Looking at Alexander and Heck (2020) with this understanding, the Sponsor notes that the paper's final analysis compares eight markets in its multidimensional format, and that these eight markets fit into three broad categories: Regulated futures (CME), unregulated futures (Huobi futures, OKEx futures, OKEx perpetuals, and Bitmex perpetuals), and spot (Coinbase, Bitfinex, Bitstamp).[60]

Given these inputs, it is unsurprising — and perhaps even predetermined — that the results of the multidimensional analysis showed that the unregulated futures markets

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59 See id. at 40289.

60 In the paper, Alexander and Heck disaggregate unregulated futures and perpetuals into separate market categories. The Sponsor has grouped them here because the two markets are extremely similar: Both offer derivative exposure to bitcoin and are characterized by their offshore and highly leveraged nature (unregulated derivatives markets often offer traders 10-100X leverage, while regulated futures markets limit leverage to roughly 2-3X). In addition, because all three unregulated derivatives platforms (Huobi, OKEx, Bitmex) have both instruments (futures and perpetuals), it is reasonable to assume that the two instruments likely share a similar base of traders who can easily arbitrage across positions in the two instrument types using shared margin, keeping prices closely aligned.

(with four markets included in the analysis) were found to dominate price discovery, with the three spot markets following, and the one regulated futures market coming in last.

The Sponsor's conclusion that the results of Alexander and Heck (2020) are driven by study design, rather than accurately reflecting the true source of price discovery in the markets, is supported by a paper published by the same authors in the prior year. Alexander and Heck (2019) uses a classic, pairwise, two-dimensional price discovery analysis to compare the CME futures market and the bitcoin spot market (represented by a reconstructed version of BRR which includes transactions from Coinbase and Bitstamp). The study finds that the CME futures market led the spot market.

The two studies generally focus on different time periods, but they overlap for one quarter: Q2 2019. Notably, in the 2019 paper, Alexander and Heck call out the significant leadership demonstrated by the CME market during Q2 2019. Specifically, they note that the Generalized Information Share (GIS) attributed to the CME grew from 56% for the period from December 2017 to March 2019, to 65% when Q2 2019 was added to the analysis. The authors do not provide a discrete GIS value for Q2 2019, but the rise in overall GIS after including the quarter indicates that the GIS for Q2 2019 was likely above 75%.

By comparison, in Alexander and Heck (2020), CME's GIS ranged from 3.23% to 5.83% in Q2 2019, while the combined GIS of the three included spot markets (Coinbase, Bitfinex, Bitstamp) ranged from 41.60% to 50.20%, (the remainder was attributed to unregulated futures markets).[61]

How could the results be so different? CME dominated price discovery in Q2 2019 when compared on a pairwise basis with spot markets, but spot markets had a much larger share of price discovery than the CME when analyzed on a multidimensional basis. The most likely explanation is that the multidimensional analytical approach created a bias in the "common price" by adding three spot markets into the mix compared to just one regulated futures market.

Lastly, Alexander and Heck's critique (and the Commission's concern) that two-dimensional analysis omits information flows from other markets and thereby may generate spurious results is misleading. It is, of course, axiomatically true in isolation that omitting a market from consideration could lead to spurious results. But as long as the two-dimensional analysis includes all potential leading markets, an exhaustive pairwise analysis will ultimately find the market that is leading overall. Put differently, if you can show that Market A leads Market B and also that Market A leads Market C, you can feel confident that Market A leads both Markets B and C. Unfortunately, the same cannot be said for multidimensional analysis, where, as demonstrated by comparing the 2019 and 2020 papers, adding additional "like markets" can influence the "common price" and create spurious results.

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[61] Huobi futures and OKEx perpetuals did not exist in Q2 2019, so the multidimensional analysis starts with just 6 markets: 3 spot markets, 2 unregulated futures markets, and 1 regulated futures market.

The Sponsor believes that the traditional, pairwise approach to price discovery analysis — the dominant approach in the academic literature — is the correct approach for exploring the lead-lag relationship between the bitcoin futures market and the spot market, and the multidimensional approach is mis-specified.

Kapar and Olmo (2019)

Kalpar and Olmo (2019) finds that the CME futures market dominates price discovery when compared to the spot market. The Commission, however, raises a concern about this study's choice to use a daily price sampling period rather than a more frequent sampling period, and questions the validity of the results. This concern also applies to Hu et al. (2020).

The Commission writes in the USBT Order:

> [S]tudies based on daily price data may not be able to distinguish which market incorporates new information faster, because the time gap between two consecutive observations in the data samples could be longer than the typical information processing time in such markets.[62]

The Sponsor believes that the requirement that the "the time gap between two consecutive observations" be shorter than the "information processing time" of the market in question is not supported by the academic literature and is, in fact, directly in contrast to the standard used in all nine academic studies listed by the Commission, as well as all studies that the Sponsor is aware of.

In the Bitwise Prong One Paper, the Sponsor conducted a comprehensive study of bitcoin spot markets and the CME bitcoin futures market using time-shift lead-lag (TSLL) analysis, wherein you shift one time series against another to find the amount of shift that creates the highest correlation between the two series. Using this well-established technique, the Sponsor estimated that the average "lead-lag time" between the CME bitcoin futures market and Coinbase, a spot market, from April 2019 to September 2020, was 2.94 seconds. This can be considered as the time it took, on average, for information to travel between the CME and Coinbase.

If it takes only 2.94 seconds on average for information to travel between the CME and Coinbase, is all price discovery analysis that uses sampling intervals longer than 2.94 seconds unequipped to explore which market leads?

For the nine studies noted by the Commission as constituting the "Mixed Academic Record," the sampling intervals were (in the order in which the papers were cited) 15 minutes, 1 minute, 15 minutes, 1 day, between 1 and 60 minutes, 60 minutes, 5 minute, 1 minute, and 1 minute. This is a wide range of values, ranging from 1 minute to 1 day, but all of them are at least 20X longer than the average lead-lag time that the Sponsor found between the CME futures market and Coinbase.

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62 See USBT Order, 85 FR at 12613.

The record is similar in the broader, non-crypto-related price discovery literature, where minutely, hourly, or daily analyses are common.

Academics still find daily analysis useful, even in markets with fast information processing time, for a reason: Even if the sampling period is longer than the information processing time, at each sampling point, there will still likely be a gap between two markets' prices, and analyzing statistically whether market A's prices move to meet market B's prices or vice versa and which market's price as a result contributes more to the "common price" is still useful in determining which market leads price discovery.

The Sponsor believes that price leadership at a daily interval still illustrates which market bends to meet the other market, and should not be removed from the academic record under consideration.

Hu et al. (2020)

Hu et al (2020) strongly supports the notion that the futures market leads the spot market. Indeed, the abstract of the paper finds that:

> … futures prices Granger cause spot prices and that futures prices dominate the price discovery process.

In Bitwise Order II, however, the Commission wrote that the:

> Hu, Hou & Oxley paper found inconclusive evidence that futures prices lead spot bitcoin prices—in particular, that the months at the end of the paper's sample period showed, using Granger causality methodology, that the spot market was the leading market—and that the record did not include evidence to explain why this would not indicate a shift towards prices in the spot market leading the futures market that would be expected to persist into the future.[63]

The Sponsor believes this is a misreading of the results of the paper.

The primary objective of Hu et al. (2020) is to explore the time-varying nature of the lead-lag relationship between the bitcoin futures market and spot market. In order to do that, the authors use a time-varying version of the Granger causality test developed in Shi et al. (2018).[64] The time-varying Granger causality test has two main variants: the rolling window approach and the recursive evolving approach.

Hu et al. (2020) references that the authors of Shi et al. (2018) explicitly note that the recursive evolving approach is the more accurate approach:

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63 See Bitwise Order II, 87 FR at 40288.

64 S. Shi, P. C. Phillips, & S. Hurn (2018), "Change Detection and the Causal Impact of the Yield Curve," Journal of Time Series Analysis, 39(6), 966–987 ("Shi et al. 2018").

> Simulation experiments compare the efficacy of the proposed test with two other commonly used tests, the forward recursive and the rolling window tests. The results indicate that the recursive evolving approach offers the best finite sample performance, followed by the rolling window algorithm.[65]

Under the lesser of the two approaches — the rolling window algorithm — it is true that CME futures prices are not found to Granger cause spot prices for the last five months of the study. However, under the recursive evolving approach, CME futures prices *ar*e found to Granger cause spot prices for the entire study period, and do so with increasing strength towards the end of the study, as shown in Figure 6 of the study.

How do you resolve the conflict? The authors reference Shi et al. (2018)'s perspective that "the recursive evolving window algorithm provides the most reliable results" and therefore choose to interpret the results based on this method. Indeed, they write conclusively about this topic to avoid any doubt, saying:

> More importantly, given the duration of the Granger-causal episodes and the magnitude of the test statistics in Fig. 5 and Fig. 6, it was found that the strength of Granger causality from the futures prices to spot prices is stronger than vice-versa. From this we conclude that Granger causality runs from the futures market to the spot market. This result further suggests that the CME Bitcoin futures market leads the spot since the former embeds the new information faster than the latter.[66]

The authors' conclusion — based on a deep understanding of the analytical methods used — is that the CME futures prices Granger caused spot prices for the entire period of the study and that the CME futures market conclusively leads the spot market even when examined using time-varying analytical approaches, and the Sponsor finds no reason to question the conclusivity of the study.

Robertson and Zhang (2022)[67] and Buccheri et al. (2021)[68]

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65 See id. at 1.

66 See Hu et al. 2020 at 9.

67 K. Robertson & J. Zhang (2022), Suitable Price Discovery Measurement of Bitcoin Spot and Futures Markets ("Robertson and Zhang 2022").

68 G. Buccheri, G. Bormetti, F. Corsi & F. Lillo (2021), "Comment on: Price Discovery in High Resolution," Journal of Financial Econometrics, Volume 19, Issue 3, Summer 2021, Pages 439–451, ("Buccheri et al. 2021").

In Bitwise Order II, the Commission raised questions regarding a statement the Sponsor made in a February 25, 2022 Comment Letter,[69] discussing two academic papers: *Robertson and Zhang (2022)* and *Buccheri et al. (2021).*

The Sponsor's letter noted that the papers raised questions about the accuracy of traditional price discovery metrics like IS and CS, writing:

> [Robertson and Zhang] note that classic price discovery metrics like Information Share (IS) and Component Share (CS) "face difficulties based on the model assumptions of VECM [the Vector Error Correction Model] when the prices under consideration are asynchronous and/or infrequent." Citing Buccheri et al. (2019), they note that "when prices have a high level of sparsity, the VECM is clearly misspecified and the estimates are potentially biased."[70]

Given the Sponsor's acknowledgement that classic price discovery metrics like IS/CS could be biased by sparsity in price data, the Commission deemed it odd that the Sponsor still drew conclusions from the academic literature without further explanation:

> [Bitwise does not] discuss these 10 IS/CS studies in light of Bitwise's acknowledgment that "classic" price discovery metrics like IS/CS could be misspecified, with potentially biased results, when price data have a high level of sparsity.[71]

Furthermore, the Commission suggested that the Sponsor was implicitly casting doubt on the results of its own IS/CS analysis as well:

> Bitwise's acknowledgement of the [Robertson and Zhang (2022) paper]'s finding that "there is a high level of sparsity in bitcoin data" suggests that, by its own admission, Bitwise's IS/CS approach is misspecified and its estimates potentially biased.[72]

The Sponsor would like to clear up this misunderstanding.

It is indeed true that the CME bitcoin futures market has a high level of sparsity in its transaction data compared to that of spot markets, because CME bitcoin futures contracts have much higher tick sizes ($5 vs. $0.01 per bitcoin on Coinbase) and minimum trade sizes (5 bitcoin vs. 0.00000001 bitcoin on Coinbase).[73] Robertson and Zhang (2022)

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69 The sponsor submitted a comment letter that discusses Robertson and Zhang 2022. See Letter from Katherine Dowling, Matt Hougan, and Paul Fusaro, Bitwise, dated Feb. 25, 2022 ("Bitwise Letter I").

70 See Bitwise Letter I, at 3.

71 See Bitwise Order II, 87 FR at 40288.

72 See id.

73 See CME bitcoin futures contract specs, available at https://www.cmegroup.com/markets/cryptocurrencies/bitcoin/bitcoin.contractSpecs.html; see also Coinbase market specs, available at https://exchange.coinbase.com/markets.

includes a table in the Appendix of their study where the authors quantify this sparsity concretely: For Q1 2021, the average seconds between trades (rounded) was 25 seconds for CME and 1 second for Coinbase.

It is also true that, if one price series of a two-dimensional price discovery analysis has a high degree of sparsity compared to the other price series, the results can be potentially biased. Robertson and Zhang (2022) demonstrates this incredibly clearly through a simulation analysis constructed as below (copied directly from the paper):

> [W]e compare the Coinbase USD market to an artificially modified version of itself using IS and CS every day from Q1 2019 through Q1 2021. The artificial modifications come in two forms: (1) the market's trade times are advanced by 3 seconds to represent a leading market and then (2) a percentage (in 10% increments starting at 10% and ending at 90%) of random trade values is removed to represent leading markets with varying levels of sparsity.[74]

The results of the simulation analysis is that the artificially-leading Coinbase price series is found to lead close to 100% (as expected) when only 10% of the trade values are removed. Then as the percentage of trade values randomly removed increases towards 90%, the price leadership of the artificially-leading Coinbase price series trends down, approaching 0%. With only about 40% of the trade values removed, the leadership actually flips directions, with IS and CS values dropping below 50%. In other words, introducing sparsity into a price series can cause it to appear as if it is lagging the other price series using IS and CS, even when the price series is objectively leading originally. This is the "potential bias" we acknowledged and agreed with the authors of the study on.

It is important to note, however, that this bias *only runs one way*: Against the market with higher data sparsity. As such, the acknowledgement of this statistical bias *does not mean* results cannot be relied on in a situation where the market with higher data sparsity is found to lead price discovery. Quite the contrary.

In all studies comparing the CME bitcoin futures market and spot markets, the CME futures market has a higher degree of sparsity. As a result, in each of these studies, the IS/CS values for the CME bitcoin futures market are biased downwards compared to that of spot markets. This means we can rely on IS/CS results showing the CME futures market leading spot markets, as those results only understate the strength of the CME futures market's price leadership.

Section Summary

The Sponsor does not believe that the academic literature is mixed. Instead, it finds a high degree of consensus amongst well-designed studies showing that the CME futures market leads the spot market. This finding is all-the-more impressive given the high degree of sparsity in the CME bitcoin futures market, which introduces a significant bias

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[74] See Robertson and Zhang 2022, at 14.

against it in traditional price discovery analysis.

As such, the Sponsor believes the academic record clearly demonstrates that the CME bitcoin futures market leads the spot market, and therefore meets the first prong of the significant market test.

The Sponsor's Comprehensive Research Demonstrates that the CME Bitcoin Futures Market Meets Both Prongs of the Significant Market Test

As detailed in the "Background" section, following the first Bitwise disapproval Order, the Sponsor, in an effort to conduct comprehensive research demonstrating both prongs of the significant market test while providing sufficient information to the Commission on the data and methodology underlying its analysis, met with the Commission Staff 14 times between January 2020 and August 2021, including with staff from the Divisions of Trading and Markets, Economic Risk and Analysis, and Corporate Finance, and produced two white papers, one addressing each prong.

The 107-page Bitwise Prong One Paper included a survey and validation of bitcoin data sources, a detailed review of existing academic literature on the topic of lead-lag relationships between bitcoin markets, and a rigorous statistical analysis using both Information Share (IS) / Component Share (CS) and Time-Shift Lead-Lag (TSLL) metrics comparing the CME bitcoin futures market against both spot bitcoin platforms and unregulated bitcoin futures platforms. The 24-page Bitwise Prong Two paper included an analysis of potential inflows into a spot bitcoin ETP and a statistical evaluation of the impact of historical inflows into other bitcoin investment products on the bitcoin market.

Both the Bitwise Prong One Paper and the Bitwise Prong Two Paper were included in full as exhibits in the rule proposal disapproved in Bitwise Order II, and their analyses formed the core arguments around why the Sponsor and the Exchange believed the CME bitcoin futures market had met both prongs of the significant market test. The Commission disagreed with the Sponsor's analyses and listed out five specific disagreements regarding the first prong analysis and three specific disagreements regarding the second prong analysis.

The following sections will comprehensively address all eight disagreements the Commission raised regarding the Sponsor's prior analyses in Bitwise Order II.

The Sponsor's Response to the Disagreements Raised by the Commission Regarding the Sponsor's Prior Analysis of the First Prong of the Significant Market Test

Disagreement 1: The Sponsor's acknowledgement of the concerns raised in Robertson and Zhang (2022) and Buccheri et al. (2021) casts doubt on its own IS/CS results.

The first disagreement raised by the Commission regarding the Sponsor's prior analysis of the first prong focuses on the Sponsor's acknowledgement of certain academic concerns surrounding IS/CS price discovery analysis.

According to the Commission:

> Bitwise's first comment letter acknowledges that "classic" price discovery metrics like IS and CS "face difficulties based on the model assumptions of VECM [the Vector Error Correction Model] when the prices under consideration are asynchronous and/or infrequent,[82] citing an academic study by Buccheri et al.[83] that investigates the difficulties to identifying price discovery with VECM models due to the high sparsity of data in markets that record trades at the sub-millisecond level. Bitwise also acknowledges that, "when prices have a high level of sparsity, the VECM is clearly misspecified and the estimates are potentially biased."[75]

The Commission suggests that this means "by its own admission, Bitwise's IS/CS approach is misspecified and its estimates potentially biased."[76]

The Sponsor disagrees. As detailed earlier in this proposal, in the section under the sub-head "*Robertson and Zhang (2022)*[77] *and Buccheri et al. (2021),*"[78] the bias that sparsity introduces into IS/CS statistics runs in a single direction, punishing the market with the higher level of sparsity. In each and every pairwise investigation in the Sponsor's analysis, the CME bitcoin futures market is the market with the higher level of sparsity. Therefore, the IS/CS price discovery ascribed to the CME bitcoin futures market in each investigation should be considered the lower bound of actual contribution, and that the actual contribution of the CME to price discovery is likely higher than stated.

The fact that IS/CS statistics are biased against markets with higher levels of sparsity does not weaken the Sponsor's argument that the CME bitcoin futures market led other markets from a price discovery perspective. It actually strengthens it.

Disagreement 2: The Sponsor performed its IS, CS and TSLL analysis on a daily basis before the monthly or full-sample averaging was applied and did not adequately explain why daily was the appropriate frequency to calculate intermediate values instead of different frequencies such as intraday.

The second disagreement the Commission raised focused on the Sponsor's use of daily results as intermediate values. Specifically, in its analysis, the Sponsor performed IS, CS and TSLL analysis on a per day basis, and then averaged the daily results both by month and across the full-sample period.

The Commission observed:

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75 See Bitwise Order II, 87 FR at 40288.

76 Id.

77 See Robertson and Zhang 2022.

78 Giuseppe Buccheri et al. (2021), "Comment on: Price Discovery in High Resolution," Journal of Financial Econometrics, Volume 19, Issue 3, Summer 2021, pp. 439–451 ("Buccheri et al. 2021").

> However, neither the Exchange nor Bitwise explains why Bitwise chose a *daily* basis to compute its IS, CS, and TSLL estimates; provides any information about how variable the daily estimates are, before the monthly and/or full-sample averaging was applied; or provides any information on the robustness of the estimates—that is, whether these daily estimates or the statistical significance of the monthly and/or full-sample averages of such daily estimates are sensitive to different choices that Bitwise could have made for the analysis (*e.g.*, to compute intraday estimates).[79]

Price discovery metrics are not "point in time" metrics, but rather, calculations that require statistical analysis over a reasonable period of time. This is why all ten studies in the prior literature review, as well as all subsequent studies noted by the Commission, have evaluated price discovery on either a daily or a generalized "full study period" basis. The Sponsor elected to use the more-frequent daily basis to better capture and display potential time-dependent changes in leadership, as the Commission previously raised questions around this topic. To be clear, evaluating price discovery on an intraday basis would have been completely out-of-consensus compared to all academic studies reviewed by both the Sponsor and the Commission, and it is not clear what conclusions could have been drawn by such analysis since price discovery analysis of time periods that are too short can lead to spurious results.

Additionally, the Sponsor disagrees with the statement that it has not provided "any information on the robustness of the estimates." The Sponsor included statistical significance tests and visual 95% confidence intervals on its monthly results specifically to highlight the robustness of the underlying daily estimates. The Sponsor also provided detailed guidance on its data inputs and methodology—and relied only on publicly available statistical tools—so that any observer with additional questions about the study could easily replicate the results, adjust them to their own specifications, or drill down on any specific potential analytical angle.

Disagreement 3: The Sponsor has not explained why it is reasonably likely that a would-be manipulator would have to trade on the CME to successfully manipulate the proposed ETP when the spot markets still account for 32-47% of price discovery.

The Commission observed:

> [T]he pairwise IS/CS full-sample average results for CME compared to each of the 10 spot platforms ranged between 52.97% (the CS result versus itBit) to 68.03% (the CS result versus Bitstamp). Even accepting these results and their statistical significance at face value, these results suggest that spot bitcoin markets still account for approximately 32%-47% of price discovery. Yet neither Bitwise nor the Exchange has explained why, notwithstanding this amount of price discovery occurring on spot platforms, it is reasonably likely that a would-be manipulator

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[79] See Bitwise Order II, 87 FR at 40288 (emphasis in original).

> would nonetheless have to trade on the CME bitcoin futures market to successfully manipulate the proposed ETP.[80]

The response to this query lies in the words of the Commission itself. Through multiple disapproval orders, the Commission has highlighted the importance of the "lead-lag relationship" between the CME bitcoin futures market and the spot market in satisfying the first prong of the significant market test. For instance, in the Grayscale Order, the Commission wrote:

> The Commission considers the lead/lag relationship between the CME bitcoin futures market and the spot bitcoin market to be central to understanding whether it is reasonably likely that a would-be manipulator of a spot bitcoin ETP would need to trade on the CME bitcoin futures market to successfully manipulate the proposed ETP.[81]

The Commission has also clarified exactly why this lead/lag relationship is so important, writing for instance in the Bitwise Order:

> [I]f the spot market leads the futures market, this would indicate that it would not be necessary to trade on the futures market to manipulate the proposed ETP, even if arbitrage worked efficiently, because the futures price would move to meet the spot price.[82]

The Commission has carried this language through more than a dozen disapproval orders and across multiple years, emphasizing the "central" importance of the "lead-lag relationship" in understanding whether it is reasonably likely that a would-be manipulator would have to trade on the CME bitcoin futures market to successfully manipulate the proposed ETP.

The Commission further clarified that the significant market test does not require the CME market to lead bitcoin spot markets 100% of the time, noting in the Grayscale Order:

> A lead/lag statistical result that CME bitcoin futures prices "lead" spot prices does *not* mean that CME bitcoin futures prices "always" move before spot prices—which would be [an] "obvious" and exploitable arbitrage opportunity…[83]

The Commission is now turning back to the Sponsor to ask why the standard of "leads" having more than 50% of price discovery, is sufficient to satisfy the first prong. The Sponsor's answer can only be that 50% is the uniform academic standard across every

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80 See Bitwise Order II, 87 FR at 40289.

81 See Grayscale Order, 87 FR at 40313.

82 See Bitwise Order, 84 FR at 55411.

83 See id. at 40313.

price discovery paper the Sponsor has reviewed, as well as all academic papers the Commission has referenced, for the standard the Commission has set.

If the Commission believes that the standard for satisfying the first prong should be higher than "leads" (such as, "overwhelmingly leads" or "nearly always leads"), then the Commission should state that. Until then, the analysis will assume that determining whether the CME futures market "leads" or "lags" the spot market is "central" to understanding the first prong and that the Sponsor's IS/CS analysis that applies the academic consensus methodologies in making such determination is valid.

Disagreement 4: The Sponsor's TSLL results show that the extent to which the CME bitcoin futures market "leads" the 10 spot markets has decreased since 2019. The Sponsor has not explained the implication of the CME's decreasing lead time over the identified spot markets, nor why the CME's "lead" time against the spot markets would not be expected to continue to decrease until it lags spot.

The Commission writes:

> [T]aking Bitwise's TSLL results at face value, as Bitwise acknowledges, the extent to which the CME bitcoin futures market "leads" the 10 unregulated spot platforms has decreased since 2019 to the end of Bitwise's sample period in September 2020. This general trend is also observed in the [Robertson and Zhang (2022)] TSLL analysis, which uses a longer sample period (to Q1 2021) and finds that the CME's average "lead" time has "steadily decreased" among all evaluated markets to about one second in Q4 2020 and Q1 2021. The record, however, does not explain the implication of the CME's decreasing lead over the identified spot platforms, nor why the CME's "lead" time against spot platforms would not be expected to continue to decrease throughout 2021 and 2022 until it "lags" spot platforms.[84]

The Sponsor believes that this disagreement reflects a simple misinterpretation of the TSLL analysis.

TSLL analysis is designed to show whether prices on one market lead or lag prices on another market. It achieves this goal by shifting prices forward and backward and finding the shift that produces the highest level of correlation. In this view, a longer lead time is not indicative of a stronger relationship; it is simply indicative of different times it takes for information to travel.

A shorter lead time suggests that there is a faster transmission of information from one market to another. The correct way to interpret the shortening lead time between the CME bitcoin futures market and the spot market is that the rate at which information passes from the CME futures market to the spot market is accelerating.

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[84] See Bitwise Order II, 87 FR at 40289.

There is no indication in the results, however, that the *direction* of information flow is changing; indeed, as the lead times decrease, the confidence intervals also tighten to indicate that the lead times are still statistically significantly above 0. For example, for December 2017 (the first month of the study), CME's lead time against Coinbase is 26.16 seconds with a 95% confidence interval of 12.72 - 39.59 seconds. For September 2020 (the last month of the study), CME's lead time against Coinbase is 2.11 seconds with a 95% confidence interval of 1.77-2.46 seconds.

In the Sponsor's view, the tightening of the lead time between the two markets should only be seen as a sign of market maturation, since information processing time is accelerating, and should if anything strengthen the view that it is reasonably likely that a would-be manipulator would have to trade on the CME bitcoin futures market to manipulate the proposed ETP.

Disagreement 5: The Sponsor's statistical results are all based on pairwise, two-dimensional analysis and the Sponsor has not explained why its results hold in light of the findings and critiques raised in Alexander and Heck (2020).

The Commission stated:

> [A]ll of Bitwise's statistical results—IS, CS, and TSLL—are based on pairwise, two- dimensional analysis… At least one multidimensional approach to price discovery (Alexander & Heck 2020) finds that CME bitcoin futures "have a very minor effect on price discovery," and that "a faster speed of adjustment and information absorption [occurs] on the unregulated spot and derivatives [platforms] than on CME bitcoin futures."… While Bitwise acknowledges the Alexander & Heck 2020 paper… Bitwise neither critiques the multidimensional Alexander & Heck 2020 approach; nor attempts to apply the approach to Bitwise's own data; nor discusses the robustness of Bitwise's two-dimensional methodology in response to the critique in Alexander & Heck 2020 that: "omitting substantial information flows from other markets can produce misleading results....[I]n a two-dimensional model one or other of the instruments must necessarily be identified as price leader."[85]

This criticism was addressed in a prior section of this proposal, under the sub-heading "*Alexander and Heck (2020)"*.

Multidimensional analysis is rare in the literature, particularly when comparing amongst different types of markets, because it introduces bias into the assessment of the common price based on the numbers of markets used from each different type of market, or from similar market types.

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85 See Bitwise Order II, 87 FR at 40289.

An exhaustive pairwise analysis can be relied upon to find the market that is leading overall as long as all potential leading markets are included in the analysis. The same cannot be said for multidimensional analysis due to the aforementioned bias. Given these circumstances, the Sponsor believes that the traditional, pairwise, two-dimensional approach to price discovery analysis is the correct approach for exploring the lead-lag relationship between the CME bitcoin futures market and the spot market.

Section Summary

No single statistical study can answer every question, consider every variable, or use every statistical approach to a given problem.

The Sponsor designed its study — developed over a series of 14 meetings with the Staff — to supplement the broader academic literature investigating price discovery in the bitcoin market. It attempted to be as comprehensive as possible, using all available data and examining all available major trading platforms, including those in spot, regulated futures, and unregulated futures. It used high-quality data providers, conducting a thorough analysis of data providers to find the most accurate data set before beginning its analysis. In an effort to be easily replicable, it detailed its full methodology and used publicly available statistical tools to conduct its analysis. It made these choices in an effort to provide sufficient information to the Commission on the data and methodology underlying its analysis and bring confidence to its results.

The data show convincingly that the CME is the leading source of price discovery, whether evaluated using IS, CS or TSLL, and despite the headwind that the sparsity bias raises against its IS and CS results.

> *The Sponsor's Response to the Disagreements Raised by the Commission Regarding the Sponsor's Prior Analysis of the Second Prong of the Significant Market Test*

Disagreement 1: The Sponsor provides conflicting claims with respect to the demand for a spot bitcoin ETP, which undermines the credibility of Sponsor's estimates for the likely size of such an ETP and the rapidity of inflows into it.

The Commission observed:

> On the one hand, Bitwise downplays potential investor demand, stating that "[w]hile there is interest in a bitcoin ETP," the bitcoin market is "incredibly and increasingly crowded" with options for investors, noting that investors today can buy bitcoin on crypto trading apps, finance apps, through over-the-counter trusts, via bitcoin futures ETFs, and "in many other ways."... On the other hand… Bitwise also highlights that, unlike GBTC, the proposed ETP would allow for daily creations and redemptions; can be expected to "closely track the value of [b]itcoin, and not periodically trade at substantial premiums to and discounts from the value of [b]itcoin"; and would be "professionally managed, SEC-regulated, highly-liquid, fully transparent, and listed on the

> NYSE Arca"; and that "at least some segment" of retail and other investors would benefit from such characteristics and would be "affirmatively disadvantaged" by not having access to it… If, as Bitwise claims, U.S. investors have been and are ever-increasingly investing in bitcoin, and the proposed ETP "would add material protections" that are not currently available through GBTC or otherwise for some segment of investors, and would, unlike GBTC, be available to trade immediately on a national securities exchange with daily creations and redemptions, it is not clear that Bitwise's use of the GBTC historical record of $4.7 billion in inflows is a likely, let alone "aggressive," estimate for first-year inflows into a new spot bitcoin ETP.[86]

It is true that the Sponsor details both the headwinds (increasingly crowded competition with other avenues of accessing bitcoin exposure) and tailwinds (unique investor protections afforded) that a new spot bitcoin ETP will face in raising assets. However, the two claims do not contradict each other. The bitcoin investment market is, in fact, crowded, and a spot bitcoin ETP would be attractive in certain ways. The Sponsor's decision to present both sides of the argument should not undermine the credibility of the Sponsor's estimates, but rather add confidence to those estimates by demonstrating the Sponsor's balanced perspective.

Furthermore, the Commission, other than suggesting minor conflicts amongst claims the Sponsor has made, has not disagreed with the crux of the Sponsor's argument in estimating first-year flows by relying on the close approximation historical examples.

For example, SPDR Gold Shares ETF (GLD) was the fastest growing new commodity-trust ETP ever in history with $3.01 billion in first-year flows. The spot bitcoin ETP will also be a new commodity-trust ETP, occupying the same category. The global above-ground gold market cap was roughly $2.1 trillion when GLD debuted in 2004.[87] By comparison, the global bitcoin market cap was $592 billion as of June 30, 2023.[88] If the new spot bitcoin ETP is assumed to be as successful as GLD, the most successful commodity-trust ETP ever, in terms relative to the market caps of the underlying commodities, the new ETP would gather approximately $849 million in first-year flows. The Sponsor's estimate of $4.7 billion in first-year flows for the new spot bitcoin ETP is over five times the $849 million figure.

While there could be meaningful latent demand built up for a spot bitcoin ETP given its unique investor protections, the Sponsor continues to believe that its estimate of $4.7 billion in first-year flows, which is assuming that the new ETP will be over fives times as

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86 See Bitwise Order II, 87 FR at 40291.

87 Gold market capitalization as of 2004 is calculated by taking the World Gold Council's estimate of above-ground gold stocks in 2004 multiplied by the price of gold as reported by Macrotrends in November 2004.

88 Bitcoin market capitalization as of June 30, 2023 was $592 billion according to Blockchain.com.

successful as GLD, the most successful commodity-trust ETP in history, is a safe estimate and the actual first-year flows is unlikely to exceed that value.

Additionally, the Sponsor's analysis should provide comfort that, even if first-year flows exceed $4.7 billion, it is unlikely that trading in the new ETP will have a "predominant influence" on prices in the CME bitcoin futures market. The Sponsors second prong analysis includes a correlation study where GBTC's $4.7 billion maximum single year flow in 2020 was found to have had a negligible correlation to changes in the spot bitcoin price. While we do not have any bitcoin investment vehicle with a higher single year flow to run historical correlation analysis on, the fact that GBTC's $4.7 billion inflow had almost no correlation to bitcoin prices suggests that there is likely a safe margin of error where a higher first-year flow figure would still not be the predominant influence on prices in the CME bitcoin futures market.

This last point is further reinforced by the fact that the CME bitcoin futures market's trading volume grew around six fold between 2020 (when the correlation analysis was done) and 2023. As noted in "The CME Bitcoin Futures Market" section in this proposal, the CME bitcoin futures contracts traded approximately $39.8 billion in June 2023 compared to $6.0 billion in June 2020. Assuming a relationship between trading volume growth and the amount of flows a market could withstand without its prices being dominated by the influence of such flows, the proposed spot bitcoin ETP could have much more than $4.7 billion in first-year flows — perhaps even six times as much ($28 billion, assuming a linear relationship) — without becoming the predominant influence on prices in the CME bitcoin futures market.

Disagreement 2a: The Sponsor's study examined the correlation of inflows into GBTC, BTCE and BTCC compared to spot bitcoin prices, instead of CME bitcoin futures prices. Given that the Sponsor identifies the CME bitcoin futures market as the relevant regulated market of significant size, the use of spot bitcoin prices for its correlation analysis could render the analysis immaterial.

The Sponsor disagrees that the use of spot prices instead of futures prices could render the correlation analysis immaterial.

In the Grayscale Court's analysis of the second prong, the Court observed that "[b]ecause Grayscale owns no futures contracts, trading in Grayscale can affect the futures market only through the spot market."[89] In other words, when thinking about the potential predominant influence trading in a new spot bitcoin ETP could have on prices in the CME futures market it is erroneous to consider the relationship between the new ETP and the CME futures market in isolation, ignoring the existence of the spot market.

Inflows into a new spot bitcoin ETP will result in purchases of the underlying asset, spot bitcoin. Market participants might attempt to predict the daily inflows into the new ETP and speculate on the CME futures market ahead of time but ultimately they are speculating on how much the inflows could impact the bitcoin market as a whole, and inflows would have to influence both futures and spot markets together to impact prices.

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89 See Grayscale Investments, LLC v. SEC, No. 22-1142 (D.C. Cir. Aug. 29, 2023), at 17-18.

In short, given the tight correlation and arbitrage relationship between the bitcoin futures price and spot price,[90] trading in the new spot bitcoin ETP is unlikely to become a predominant influence on prices in the CME futures market without also becoming a predominant influence on prices in the spot market. Therefore, a correlation analysis of the historical impact of inflows to bitcoin prices should be valid when run on either spot prices and futures prices.

Beyond the argument above around the theoretical validity of using spot prices in the correlation analysis in the context of the second prong, there is also the broader economic reality that, given the high correlation between spot prices and futures prices, the results of the correlation analysis would have been nearly identical. Indeed, the Sponsor ran the same correlation analysis this time between daily/weekly inflows into GBTC in 2020 and daily/weekly price changes in the CME bitcoin futures market and the correlation values were 0.1075 / 0.0771 compared to 0.1087 / 0.0811 in the original analysis when changes in spot prices where used instead.

Disagreement 2b: The Sponsor's correlation analysis does not control for any other factors that may have been affecting spot bitcoin prices during the daily or weekly aggregation periods. Thus, the results do not isolate the statistical relationship between spot bitcoin prices and the factor of interest (i.e., flows into GBTC, BTCE, or BTCC).

The Sponsor believes that this argument is not relevant to the question at hand. The goal of the second prong analysis is to demonstrate that trading in the new ETP will not become the predominant influence on prices in the CME bitcoin futures market *as compared to other influences.* If other factors are perfectly controlled, then the results of the analysis would be moot; any amount of isolated buying or selling in relation to the new ETP would perfectly move bitcoin prices up or down because it is the only influence that was not controlled for in the analysis. As the goal of the correlation analysis is to demonstrate that inflows into the ETP do not overwhelm other factors, presence of other factors is not only valid but necessary.

Disagreement 3: The Sponsor has not explained its analysis on why the second prong would be met when its own estimates still indicate that the new ETP would have 36.5% of the daily trading volume and first-year AUM greater than the all the open interest in the CME bitcoin futures market.

According to the Commission:

> Bitwise's analysis regarding the potential effects of trading in the Shares on CME bitcoin futures prices is vague and conclusory. Bitwise states that it 'believes' that it is unlikely that trading in a new bitcoin ETP will become the predominant influence on prices in the CME bitcoin futures market 'if such trading activity is

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90 As demonstrated in a Comment Letter from Professor Robert E. Whaley of Vanderbilt University, and presented and relied upon as evidence in Grayscale, the CME bitcoin futures market and the spot bitcoin market share a 99.9% correlation.

> substantially smaller than the trading activity on the CME bitcoin futures market.'...
>
> However, an alternative calculation using Bitwise's statistics is that a single bitcoin ETP's average daily trading volume could be approximately 36.5% ($143 million divided by $392 million)—more than one-third—of the size of CME bitcoin futures' average daily trading volume. On top of that, assuming, as Bitwise does, potentially $4.7 billion in first-year inflows, such a spot bitcoin ETP could have AUM that exceeds the value of all open interest in CME bitcoin futures contracts. Bitwise has not directly addressed why, given this relative size of estimated daily trading in the Shares compared with daily trading in CME bitcoin futures contracts, and the relative size of the Trust's estimated AUM itself compared with all open interest in CME bitcoin futures contracts, it is nonetheless unlikely that trading in the proposed ETP would be the predominant influence on prices in the CME bitcoin futures market.[91]

Any analysis related to the second prong is forced to make guesses as to what conditions would make predominant influence "likely" or "unlikely." The Sponsor's *logic* that predominant influence is unlikely "if [the new ETP's] trading activity is substantially smaller than the trading activity on the CME bitcoin futures market" is fundamentally sound and concrete since markets with deeper liquidity can absorb cross-market trades with less price movement.

The actual disagreement, therefore, then is likely less about the logic and more about the threshold at which the logic produces an affirmative interpretation that predominant influence is unlikely. The Sponsor argued that if daily trading in the new ETP is 36.5% of the trading in the CME futures market it is unlikely to become the predominant influence. The Commission questioned if that is sufficient.

Fortunately, the CME bitcoin futures market has matured further since 2020 (the year which our daily trading volume estimates were based upon). Again, as noted in "The CME Bitcoin Futures Market" section in this proposal, the CME bitcoin futures contracts traded approximately $39.8 billion in June 2023 compared to $6.0 billion in June 2020, over a six-fold growth in trading volume. The Sponsor's $142 million daily trading volume estimate of the new ETP was based on the Sponsor's $4.7 billion first-year inflow estimate multiplied by the higher of GLD and GBTC's average ADV/AUM ratio (3.04%), so that estimate remains the same assuming the same first-year inflows to the new ETP. Applying the over six-fold growth in the CME futures market's trading activity to our past estimates, it would mean that the trading activity in the new ETP now would be approximately only 6% of the trading activity in the CME bitcoin futures market. This development should provide a higher degree of confidence that trading in the new ETP is unlikely to be the predominant influence of prices in the CME bitcoin futures market.

With regards to the Commission's concern around the fact that the AUM of the new ETP, based on our $4.7 billion first-year flow estimate, could exceed all open interest in the

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91 See Bitwise Order II, 87 FR at 40291.

CME bitcoin futures market, the Sponsor does not find comparing those two figures relevant to the question at hand. The second prong asks whether *trading* in the new ETP would be unlikely to be the predominant influence on prices, not *assets*. One could interpret "trading" as trading activity in the secondary market or inflows in the secondary market, both of which the Sponsor has analyzed, but AUM is not directly relevant; it is only relevant to the extent that AUM can influence the amount of "trading" that occurs in the ETP, which the Sponsor's analysis captures.

Additionally, AUM is an asset related figure and open interest is a trading related figure. Comparing the two literally and concluding that a market with a higher asset related figure is likely to become the predominant influence on prices on a market with a lower trading related figure is a bit like comparing apples to oranges.

Section Summary

The Sponsor's prior estimates of first-year flows in a new spot bitcoin ETP and prior correlation analysis studying the relationship between inflows into GBTC, BTCE and BTCC and spot bitcoin prices are still valid. Furthermore, in light of the massive growth of trading activity in the CME bitcoin futures market, the Sponsor's analysis that trading in the new spot bitcoin ETP is unlikely to be the predominant influence on prices in the CME bitcoin futures market is even stronger than before.

Availability of Information Regarding the Shares and Bitcoin

The NAV will be disseminated daily to all market participants at the same time. Quotation and last-sale information regarding the Shares will be disseminated through the facilities of the CTA. The ITV will be calculated every 15 seconds throughout the core trading session each trading day, and available through online information services.

The Sponsor will cause information about the Shares to be posted to the Trust's website (https://www.bitwiseinvestments.com/): (i) the NAV and NAV per Share for each Exchange trading day, posted at end of day; (ii) the daily holdings of the Trust, before 9:30 a.m. E.T. on each Exchange trading day; (iii) the Trust's effective prospectus, in a form available for download; and (iv) the Shares' ticker and CUSIP information, along with additional quantitative information updated on a daily basis for the Trust. For example, the Trust's website will include (i) the prior business day's trading volume, the prior business day's reported NAV and closing price, and a calculation of the premium and discount of the closing price or mid-point of the bid/ask spread at the time of NAV calculation ("Bid/Ask Price") against the NAV; and (ii) data in chart format displaying the frequency distribution of discounts and premiums of the daily closing price or Bid/Ask Price against the NAV, within appropriate ranges, for at least each of the four previous calendar quarters. The Trust's website will be publicly available prior to the public offering of Shares and accessible at no charge.

Investors may obtain on a 24-hour basis bitcoin pricing information based on the CME US Reference Rate, CME UK Reference Rate and CME Bitcoin Real Time Price, bitcoin spot market prices and bitcoin futures price from various financial information service providers. Current bitcoin spot market prices are also generally available with bid/ask

spreads from bitcoin trading platforms, including the Constituent Platforms of the CME US Reference Rate.

Trading Halts

With respect to trading halts, the Exchange may consider all relevant factors in exercising its discretion to halt or suspend trading in the Shares of the Trust.[92] Trading in Shares of the Trust will be halted if the circuit breaker parameters in NYSE Arca Rule 7.12-E have been reached. Trading also may be halted because of market conditions or for reasons that, in the view of the Exchange, make trading in the Shares inadvisable.

The Exchange may halt trading during the day in which an interruption to the dissemination of the ITV occurs.[93] If the interruption to the dissemination of the ITV persists past the trading day in which it occurred, the Exchange will halt trading no later than the beginning of the trading day following the interruption. In addition, if the Exchange becomes aware that the NAV with respect to the Shares is not disseminated to all market participants at the same time, it will halt trading in the Shares until such time as the NAV is available to all market participants. The Exchange may also halt trading if the value of the underlying commodity is no longer calculated or available on at least a 15-second delayed basis from a source unaffiliated with the Sponsor, Trust, Bitcoin Custodian or the Exchange or if the Exchange stops providing a hyperlink on its Web site to any such unaffiliated commodity value.

Trading Rules

The Exchange deems the Shares to be equity securities, thus rendering trading in the Shares subject to the Exchange's existing rules governing the trading of equity securities. Shares will trade on the NYSE Arca Marketplace from 4 a.m. to 8 p.m. E.T. in accordance with NYSE Arca Rule 7.34-E (Early, Core, and Late Trading Sessions). The Exchange has appropriate rules to facilitate transactions in the Shares during all trading sessions. As provided in NYSE Arca Rule 7.6-E, the minimum price variation ("MPV") for quoting and entry of orders in equity securities traded on the NYSE Arca Marketplace is $0.01, with the exception of securities that are priced less than $1.00 for which the MPV for order entry is $0.0001.

The Shares will conform to the initial and continued listing criteria under NYSE Arca Rule 8.201-E. The trading of the Shares will be subject to NYSE Arca Rule 8.201-E(g), which sets forth certain restrictions on Equity Trading Permit ("ETP") Holders acting as registered Market Makers in Commodity-Based Trust Shares to facilitate surveillance.[94]

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92 See NYSE Arca Rule 7.12-E.

93 A limit up/limit down condition in the futures market would not be considered an interruption requiring the Trust to be halted.

94 Under NYSE Arca Rule 8.201-E(g), an ETP Holder acting as a registered Market Maker in the Shares is required to provide the Exchange with information relating to its trading in the underlying commodity, related futures or options on futures, or any other related derivatives. Commentary .04 of NYSE Arca Rule 11.3-E requires an ETP Holder acting as a registered Market Maker, and its affiliates, in the Shares to

The Exchange represents that, for initial and continued listing, the Trust will be in compliance with Rule 10A-3 under the Act,[95] as provided by NYSE Arca Rule 5.3-E. A minimum of 100,000 Shares of the Trust will be outstanding at the commencement of trading on the Exchange.

Surveillance

The Exchange represents that trading in the Shares of the Trust will be subject to the existing trading surveillances administered by the Exchange, as well as cross-market surveillances administered by FINRA on behalf of the Exchange, which are designed to detect violations of Exchange rules and applicable federal securities laws.[96] The Exchange represents that these procedures are adequate to properly monitor Exchange trading of the Shares in all trading sessions and to deter and detect violations of Exchange rules and federal securities laws applicable to trading on the Exchange.

The Exchange further represents that it may obtain information regarding trading in the Shares and the CME Market from the CME and other markets and other entities that are members of the ISG or with which the Exchange has in place a comprehensive surveillance sharing agreement.[97] The Exchange or FINRA, on behalf of the Exchange, or both, will communicate as needed regarding trading in the Shares and the CME Market with the CME and other markets and entities that are members of the ISG, and the Exchange or FINRA, on behalf of the Exchange, or both, may obtain trading information regarding trading in the Shares, the CME Market and the underlying commodity, as applicable, from such markets and other entities.

Also, pursuant to NYSE Arca Rule 8.201-E(g), the Exchange is able to obtain information regarding trading in the Shares, bitcoin futures and the underlying bitcoin through ETP Holders acting as registered Market Makers, in connection with such ETP Holders' proprietary or customer trades through ETP Holders which they effect on any relevant market.

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establish, maintain and enforce written policies and procedures reasonably designed to prevent the misuse of any material nonpublic information with respect to such products, any components of the related products, any physical asset or commodity underlying the product, applicable currencies, underlying indexes, related futures or options on futures, and any related derivative instruments (including the Shares). As a general matter, the Exchange has regulatory jurisdiction over its ETP Holders and their associated persons, which include any person or entity controlling an ETP Holder. To the extent the Exchange may be found to lack jurisdiction over a subsidiary or affiliate of an ETP Holder that does business only in commodities or futures contracts , the Exchange could obtain information regarding the activities of such subsidiary or affiliate through surveillance sharing agreements with regulatory organizations of which such subsidiary or affiliate is a member.

95 17 CFR 240.10A-3.

96 FINRA conducts cross-market surveillances on behalf of the Exchange pursuant to a regulatory services agreement. The Exchange is responsible for FINRA's performance under this regulatory services agreement.

97 For a list of current ISG members, see https://isgportal.org/. The Exchange notes that not all components of the Trust may trade on markets that are members of ISG or with which the Exchange has in place a comprehensive surveillance sharing agreement.

In addition, the Exchange has a general policy prohibiting the improper distribution of material, non-public information by its employees.

All statements and representations made in this filing regarding (i) the description of the index, portfolio or referenced asset, (ii) limitations on index or portfolio holdings or reference assets, or (iii) the applicability of Exchange listing rules specified in this rule filing will constitute continued listing requirements for listing the Shares on the Exchange.

The Sponsor has represented to the Exchange that it will advise the Exchange of any failure by the Trust to comply with the continued listing requirements, and, pursuant to its obligations under Section 19(g)(1) of the Act, the Exchange will monitor for compliance with the continued listing requirements. If the Trust is not in compliance with the applicable listing requirements, the Exchange will commence delisting procedures under NYSE Arca Rule 9.2-E(a).

(b) Statutory Basis

The basis under the Act for this proposed rule change is the requirement under Section 6(b)(5)[98] that an exchange have rules that are designed to prevent fraudulent and manipulative acts and practices, to promote just and equitable principles of trade, to remove impediments to, and perfect the mechanism of a free and open market and, in general, to protect investors and the public interest.

The Exchange believes that the proposed rule change is designed to prevent fraudulent and manipulative acts and practices and to protect investors and the public interest in that the Shares will be listed and traded on the Exchange pursuant to the initial and continued listing criteria in NYSE Arca Rule 8.201-E. Further, the Exchange has demonstrated that the proposed rule change satisfies Section 6(b)(5) of the Act by showing that the CME Market is a regulated market of significant size that shares surveillance with the Exchange.

As discussed above, both existing academic literature and the Sponsor's own studies show that the CME Market leads price discovery relative to the bitcoin spot market. As a result, and given that the Sponsor has demonstrated that it is unlikely that trading in the Shares will become the predominant influence upon prices in the CME Market, the CME Market represents a regulated market of significant size related to spot bitcoin, and that there is a reasonable likelihood that a person attempting to manipulate the Shares would also have to trade on that market to successfully manipulate the Shares.

The Exchange has in place surveillance procedures that are adequate to properly monitor trading in the Shares and the CME Market in all trading sessions and to deter and detect attempted manipulation of the Shares or other violations of Exchange rules and applicable federal securities laws. The Exchange or FINRA, on behalf of the Exchange, or both, will communicate as needed regarding trading in the Shares and bitcoin futures with the CME and other markets and other entities that are members of the ISG, and the

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98 15 U.S.C. 78f(b)(5).

Exchange or FINRA, on behalf of the Exchange, or both, may obtain trading information regarding trading in the Shares from such markets and other entities. In addition, the Exchange may obtain information regarding trading in the Shares from markets and other entities that are members of ISG or with which the Exchange has in place a comprehensive surveillance sharing agreement. The Exchange is also able to obtain information regarding trading in the Shares and bitcoin futures or the underlying bitcoin through ETP Holders, in connection with such ETP Holders' proprietary or customer trades which they effect through ETP Holders on any relevant market.

Quotation and last-sale information regarding the Shares will be disseminated through the facilities of the CTA. The Trust's website will also include a form of the prospectus for the Trust that may be downloaded. The website will include the Shares' ticker and CUSIP information, along with additional quantitative information updated on a daily basis for the Trust. The Trust's website will include (i) daily trading volume, the prior business day's reported NAV and closing price, and a calculation of the premium and discount of the closing price or mid-point of the Bid/Ask Price against the NAV; and (ii) data in chart format displaying the frequency distribution of discounts and premiums of the daily closing price or Bid/Ask Price against the NAV, within appropriate ranges, for at least each of the four previous calendar quarters. The Trust's website will be publicly available prior to the public offering of Shares and accessible at no charge.

Trading in Shares of the Trust will be halted if the circuit breaker parameters in NYSE Arca Rule 7.12-E have been reached or because of market conditions or for reasons that, in the view of the Exchange, make trading in the Shares inadvisable.

The proposed rule change is designed to perfect the mechanism of a free and open market and, in general, to protect investors and the public interest in that it will facilitate the listing and trading of a new type of exchange-traded product based on the price of bitcoin that will enhance competition among market participants, to the benefit of investors and the marketplace. As noted above, the Exchange has in place surveillance procedures that are adequate to properly monitor trading in the Shares in all trading sessions and to deter and detect violations of Exchange rules and applicable federal securities laws.

4. Self-Regulatory Organization's Statement on Burden on Competition

The Exchange does not believe that the proposed rule change will impose any burden on competition that is not necessary or appropriate in furtherance of the purpose of the Act. The Exchange notes that the proposed rule change will facilitate the listing and trading of a new type of Commodity-Based Trust Share based on the price of bitcoin that will enhance competition among market participants, to the benefit of investors and the marketplace.

5. Self-Regulatory Organization's Statement on Comments on the Proposed Rule Change Received from Members, Participants or Others

The Exchange has neither solicited nor received written comments on the proposed rule change.

6. Extension of Time Period for Commission Action

The Exchange does not consent at this time to an extension of any time period for Commission action.

7. Basis for Accelerated Effectiveness Pursuant to Section 19(b)(2)

Not applicable.

8. Proposed Rule Change Based on Rules of Another Self-Regulatory Organization or of the Commission

The proposed rule change is not based on the rules of another self-regulatory organization or of the Commission.

9. Security-Based Swap Submissions Filed Pursuant to Section 3C of the Act

Not applicable.

10. Advance Notices Filed Pursuant to Section 806(e) of the Payment, Clearing and Settlement Supervision Act

Not applicable.

11. Exhibits

Exhibit 1 – Form of Notice of Proposed Rule Change for Federal Register.

EXHIBIT 1

SECURITIES AND EXCHANGE COMMISSION
(Release No. 34- ; File No. SR-NYSEARCA-2023-44, Amendment No. 1)

[Date]

Self-Regulatory Organizations; NYSE Arca, Inc.; Notice of Filing of Proposed Rule Change to List and Trade Shares of the Bitwise Bitcoin ETP

Pursuant to Section 19(b)(1)[1] of the Securities Exchange Act of 1934 ("Act")[2] and Rule 19b-4 thereunder,[3] notice is hereby given that, on September 25, 2023, NYSE Arca, Inc. ("NYSE Arca" or the "Exchange") filed with the Securities and Exchange Commission (the "Commission") the proposed rule change as described in Items I, II, and III below, which Items have been prepared by the self-regulatory organization. The Commission is publishing this notice to solicit comments on the proposed rule change from interested persons.

I. Self-Regulatory Organization's Statement of the Terms of Substance of the Proposed Rule Change

The Exchange proposes to list and trade shares of the Bitwise Bitcoin ETP Trust under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares). This Amendment No. 1 to SR-NYSEArca-2023-44 replaces SR-NYSEArca-2023-44 as originally filed and supersedes such filing in its entirety. The proposed rule change is available on the Exchange's website at www.nyse.com, at the principal office of the Exchange, and at the Commission's Public Reference Room.

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1 15 U.S.C. 78s(b)(1).

2 15 U.S.C. 78a.

3 17 CFR 240.19b-4.

II. Self-Regulatory Organization's Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change

In its filing with the Commission, the self-regulatory organization included statements concerning the purpose of, and basis for, the proposed rule change and discussed any comments it received on the proposed rule change. The text of those statements may be examined at the places specified in Item IV below. The Exchange has prepared summaries, set forth in sections A, B, and C below, of the most significant parts of such statements.

A. Self-Regulatory Organization's Statement of the Purpose of, and the Statutory Basis for, the Proposed Rule Change

1. Purpose

The Exchange proposes to list and trade shares ("Shares") of the Bitwise Bitcoin ETP Trust (the "Trust"),[4] under NYSE Arca Rule 8.201-E, which governs the listing and trading of Commodity-Based Trust Shares.[5]

According to the Registration Statement, the Trust will not be registered as an investment company under the Investment Company Act of 1940,[6] and is not required to register thereunder. The Trust is not a commodity pool for purposes of the Commodity Exchange Act.[7]

The Exchange represents that the Shares satisfy the requirements of NYSE Arca Rule 8.201-E and thereby qualify for listing on the Exchange.[8]

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4 The Trust is a Delaware statutory trust that was formerly known as the Bitwise Bitcoin ETF Trust. On October 14, 2021, the Trust filed with the Commission an initial registration statement (the "Registration Statement") on Form S-1 under the Securities Act of 1933 (15 U.S.C. 77a). The description of the operation of the Trust herein is based, in part, on the Registration Statement.

5 Commodity-Based Trust Shares are securities issued by a trust that represents investors' discrete identifiable and undivided beneficial ownership interest in the commodities deposited into the trust.

6 15 U.S.C. 80a-1.

7 17 U.S.C. 1.

8 With respect to the application of Rule 10A-3 (17 CFR 240.10A-3) under the Act, the Trust relies on the exemption contained in Rule 10A-3(c)(7).

Bitwise Bitcoin ETP Trust

Operation of the Trust[9]

The Trust will issue the Shares, which represent units of undivided beneficial ownership of the Trust. The Trust is a Delaware statutory trust and will operate pursuant to a trust agreement (the "Trust Agreement") between Bitwise Investment Advisers, LLC (the "Sponsor" or "Bitwise") and Delaware Trust Company, as the Trust's trustee (the "Trustee"). The Trust will engage a third party custodian to act as the bitcoin custodian for the Trust (the "Bitcoin Custodian") to maintain custody of the Trust's bitcoin assets.[10] The Trust will engage a third party service provider to serve as the administrator, transfer agent, and cash custodian (in such capacities, the "Administrator," the "Transfer Agent," and the "Cash Custodian," respectively).

According to the Registration Statement, the investment objective of the Trust is to seek to provide exposure to the value of bitcoin held by the Trust, less the expenses of the Trust's operations. In seeking to achieve its investment objective, the Trust will hold bitcoin and establish its Net Asset Value ("NAV") at the end of every business day by reference to the CME CF Bitcoin Reference Rate - New York Variant ("CME US Reference Rate").[11]

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9 The description of the operation of the Trust, the Shares and the bitcoin market contained herein are based, in part, on the Registration Statement. See note 4, supra.

10 When capitalized, references to "Bitcoin" are to the Bitcoin network or the Bitcoin protocol. When lowercase, references to "bitcoin" are to the digital asset native to the Bitcoin network, which asset is the underlying commodity held by the Trust.

11 The CME US Reference Rate is a daily reference rate of the US Dollar price of one bitcoin, calculated at 4:00 p.m. E.T. The CME US Reference Rate utilizes the same methodology as the CME CF Bitcoin Reference Rate (the "CME UK Reference Rate"), which is calculated at 4:00 p.m. London time and was designed by the CME Group and Crypto Facilities Ltd to facilitate the development of financial products, including the cash settlement of bitcoin futures traded on the Chicago Mercantile Exchange ("CME"). Andrew Paine and William J. Knottenbelt, "Analysis of the CME CF Bitcoin Reference Rate and CME CF Bitcoin Real Time Index," Imperial College Centre for Cryptocurrency Research and Engineering, November 14, 2016, available at https://www.cmegroup.com/trading/files/bitcoin-white-paper.pdf.

Under normal circumstances, the Trust's only asset will be bitcoin, and, under limited circumstances, cash. The Trust will not use derivatives that may subject the Trust to counterparty and credit risks.[12] The Trust will process creations and redemptions in-kind and in exchange for cash, and accrue all ordinary fees (generally management fees) in USD. However, management fee will be paid monthly in bitcoin based on the last business day of the month's CME US Reference Rate. The Trust will purchase or sell bitcoin in response to creations and redemptions and may also sell bitcoin if the Trust liquidates or must pay expenses not contractually assumed by the Sponsor. Financial institutions authorized to create and redeem Shares (each, an "Authorized Participant") will deliver, or cause to be delivered, bitcoin to the Trust (or an equivalent amount of cash) in exchange for Shares of the Trust, and the Trust will deliver bitcoin (or an equivalent amount of cash) to Authorized Participants when those Authorized Participants redeem Shares of the Trust.

Bitcoin, Bitcoin Market, Bitcoin Trading Platforms and Regulation of Bitcoin

The following sections, drawn from the Registration Statement, describe bitcoin, including the historical development of bitcoin and the Bitcoin network, how a person holds bitcoin, how to use bitcoin in transactions, the "exchange" market where bitcoin can be bought, held and sold, and the bitcoin "over-the-counter" ("OTC") market.

Bitcoin

[12] The Trust may sell bitcoin and temporarily hold cash as part of a liquidation of the Trust or to pay certain extraordinary expenses not assumed by the Sponsor. Under the Trust Agreement, the Sponsor has agreed to assume the normal operating expenses of the Trust, subject to certain limitations. For example, the Trust will bear any indemnification or litigation liabilities as extraordinary expenses. In addition, the Trust may, from time to time, passively receive, by virtue of holding bitcoin, certain additional digital assets ("IR Assets") or rights to receive IR Assets ("Incidental Rights") through a fork of the Blockchain or an airdrop of assets. The Trust Agreement requires that the Sponsor analyze as soon as possible whether or not such Incidental Rights and IR Assets should be disclaimed. In the event the Sponsor instructs the Bitcoin Custodian to claim such Incidental Rights and IR Assets, it will immediately distribute such Incidental Rights and IR Assets to shareholders of record.

Bitcoin was first described in a white paper released in 2008 and published under the name “Satoshi Nakamoto.” The protocol underlying Bitcoin was subsequently released in 2009 as open source software and currently operates on a worldwide network of computers.

The Bitcoin network utilizes a digital asset known as “bitcoin,” which can be transferred among parties via the Internet. Unlike other means of electronic payments such as credit card transactions, one of the advantages of bitcoin is that it can be transferred without the use of a central administrator or clearing agency. As a central party is not necessary to administer bitcoin transactions or maintain the bitcoin ledger, the term decentralized is often used in descriptions of bitcoin. Unless it is using a third party service provider, a party transacting in bitcoin is generally not afforded some of the protections that may be offered by intermediaries.

The first step in using the Bitcoin network for transactions is to download specialized software referred to as a “bitcoin wallet.” A user’s bitcoin wallet can run on a computer or smartphone, and can be used both to send and to receive bitcoin. Within a bitcoin wallet, a user can generate one or more unique “bitcoin addresses,” which are conceptually similar to bank account numbers. After establishing a bitcoin address, a user can send or receive bitcoin from his or her bitcoin address to another user’s bitcoin address. Sending bitcoin from one bitcoin address to another is similar in concept to sending a bank wire from one person’s bank account to another person’s bank account; however, such transactions are not managed by an intermediary and erroneous transactions generally may not be reversed or remedied once sent.

The amount of bitcoin associated with each bitcoin address, as well as each bitcoin transaction to or from such bitcoin address, is transparently reflected in the Bitcoin network’s distributed ledger (“Blockchain”) and can be viewed by websites that operate as “Blockchain explorers.” Copies of the Blockchain exist on thousands of computers on the Bitcoin network

throughout the Internet. A user's bitcoin wallet will either contain a copy of the Blockchain or be able to connect with another computer that holds a copy of the Blockchain. The innovative design of the Bitcoin network protocol allows each Bitcoin user to trust that their copy of the Blockchain will generally be updated consistent with each other user's copy.

When a Bitcoin user wishes to transfer bitcoin to another user, the sender must first request a Bitcoin address from the recipient. The sender then uses his or her Bitcoin wallet software to create a proposed transaction that is confirmed and settles when included in the Blockchain. The transaction would reduce the amount of bitcoin allocated to the sender's address and increase the amount allocated to the recipient's address, in each case by the amount of bitcoin desired to be transferred. The transaction is completely digital in nature, similar to a file on a computer, and it can be sent to other computers participating in the Bitcoin network; however, the use of cryptographic verification is believed to prevent the ability to duplicate or counterfeit bitcoin.

Bitcoin Protocol

The Bitcoin protocol is built using open source software allowing for any developer to review the underlying code and suggest changes. There is no official company or group responsible for making modifications to Bitcoin. There are, however, a number of individual developers that regularly contribute to the reference software known as "Bitcoin Core," a specific distribution of Bitcoin software that provides the *de-facto* standard for the Bitcoin protocol.

Significant changes to the Bitcoin protocol are typically accomplished through a so-called "Bitcoin Improvement Proposal" or BIP. Such proposals are generally posted on websites, and the proposals explain technical requirements for the protocol change as well as

reasons why the change should be accepted by users. Because Bitcoin has no central authority, updating the reference software's Bitcoin protocol will not immediately change the Bitcoin network's operations. Instead, the implementation of a change is achieved by users (including transaction validators known as "miners") downloading and running the updated versions of Bitcoin Core or other Bitcoin software that abides by the new Bitcoin protocol. Users and miners must accept any changes made to the Bitcoin source code by downloading a version of their Bitcoin software that incorporates the proposed modification of the Bitcoin network's source code. A modification of the Bitcoin network's source code or protocol is only effective with respect to those Bitcoin users and miners who download it. If an incompatible modification is accepted by a less than overwhelming percentage of users and miners, a division in the Bitcoin network will occur such that one network will run the pre-modification source code and the other network will run the modified source code. Such a division is known as a "fork" in the Bitcoin network.

Bitcoin Transactions

A bitcoin transaction is similar in concept to an irreversible digital check. The transaction contains the sender's bitcoin address, the recipient's bitcoin address, the amount of bitcoin to be sent, a transaction fee and the sender's digital signature. Bitcoin transactions are secured by cryptography known as "public-private key cryptography," represented by the bitcoin addresses and digital signature in a transaction's data file. Each Bitcoin network address, or wallet, is associated with a unique "public key" and "private key" pair, both of which are lengthy alphanumeric codes, derived together and possessing a unique relationship.

The use of key pairs is a cornerstone of the Bitcoin network technology. This is because the use of a private key is the only mechanism by which a bitcoin transaction can be signed. If a

private key is lost, the corresponding bitcoin is thereafter permanently non-transferable. Moreover, the theft of a private key provides the thief immediate and unfettered access to the corresponding bitcoin. Bitcoin users must therefore understand that in this regard, bitcoin is similar to cash: that is, the person or entity in control of the private key corresponding to a particular quantity of bitcoin has de facto control of the bitcoin.

The public key is visible to the public and analogous to the Bitcoin network address. The private key is a secret and is used to digitally sign a transaction in a way that proves the transaction has been signed by the holder of the public-private key pair, and without having to reveal the private key. A user's private key must be kept safe in accordance with appropriate controls and procedures to ensure it is used only for legitimate and intended transactions. If an unauthorized third person learns of a user's private key, that third person could apply the user's digital signature without authorization and send the user's bitcoin to their or another bitcoin address, thereby stealing the user's bitcoin. Similarly, if a user loses his private key and cannot restore such access (e.g., through a backup), the user may permanently lose access to the bitcoin associated with that private key and bitcoin address.

To prevent the possibility of double-spending of bitcoin, each validated transaction is recorded, time stamped and publicly displayed in a "block" in the Blockchain, which is publicly available. Thus, the Bitcoin network provides confirmation against double-spending by memorializing every transaction in the Blockchain, which is publicly accessible and downloaded in part or in whole by all users of the Bitcoin network software program. Any user may validate, through their Bitcoin wallet or a Blockchain explorer, that each transaction in the Bitcoin network was authorized by the holder of the applicable private key, and Bitcoin network mining software consistent with reference software requirements validates each such transaction before

including it in the Blockchain. This cryptographic security ensures that bitcoin transactions may not generally be counterfeited, although it does not protect against the "real world" theft or coercion of use of a Bitcoin user's private key, including the hacking of a Bitcoin user's computer or a service provider's systems.

A Bitcoin transaction between two parties is recorded if included in a valid block added to the Blockchain, when that block is accepted as valid through consensus formation among Bitcoin network participants. A block is validated by confirming the cryptographic hash value included in the block's data and by the block's addition to the longest confirmed Blockchain on the Bitcoin network. For a transaction, inclusion in a block in the Blockchain constitutes a "confirmation" of validity. As each block contains a reference to the immediately preceding block, additional blocks appended to and incorporated into the Blockchain constitute additional confirmations of the transactions in such prior blocks, and a transaction included in a block for the first time is confirmed once against double-spending. This layered confirmation process makes changing historical blocks (and reversing transactions) exponentially more difficult the further back one goes in the Blockchain.

The process by which bitcoin are created and bitcoin transactions are verified is called "mining." To begin mining, a user, or "miner," can download and run a mining "client," which, like regular Bitcoin network software programs, turns the user's computer into a "node" on the Bitcoin network, and in this case has the ability to validate transactions and add new blocks of transactions to the Blockchain.

Miners, through the use of the bitcoin software program, engage in a set of prescribed, complex mathematical calculations in order to verify transactions and compete for the right to add a block of verified transactions to the Blockchain and thereby confirm bitcoin transactions

included in that block's data. The miner who successfully "solves" the complex mathematical calculations has the right to add a block of transactions to the Blockchain and is then rewarded by a grant of bitcoin, known as a "coinbase," plus any transaction fees paid for the transactions included in such block. Bitcoin is created and allocated by the Bitcoin network protocol and distributed through mining, subject to a strict, well-known issuance schedule. The supply of bitcoin is programmatically limited to 21 million bitcoin in total. As of June 16, 2023, approximately 19,401,000 bitcoin had been mined.

Confirmed and validated bitcoin transactions are recorded in blocks added to the Blockchain. Each block contains the details of some or all of the most recent transactions that are not memorialized in prior blocks, as well as a record of the award of bitcoin to the miner who added the new block. Each unique block can only be solved and added to the Blockchain by one miner, therefore, all individual miners and mining pools on the Bitcoin network must engage in a competitive process of constantly increasing their computing power to improve their likelihood of solving for new blocks. As more miners join the Bitcoin network and its processing power increases, the Bitcoin network adjusts the complexity of a block-solving equation to maintain a predetermined pace of adding a new block to the Blockchain approximately every ten minutes.

The Bitcoin Market and Bitcoin Trading Platforms

In addition to using bitcoin to engage in transactions, investors may purchase and sell bitcoin to speculate as to the value of bitcoin in the bitcoin market, or as a long-term investment to diversify their portfolio. The value of bitcoin within the market is determined, in part, by (i) the supply of and demand for bitcoin in the bitcoin market, (ii) market expectations for the expansion of investor interest in bitcoin and the adoption of bitcoin by users, (iii) the number of merchants that accept bitcoin as a form of payment, and (iv) the volume of private end-user-to-

end-user transactions.

Although the value of bitcoin is determined by the value that two transacting market participants place on bitcoin through their transaction, the most common means of determining a reference value is by surveying one or more trading platforms where secondary markets for bitcoin exist. The most prominent bitcoin trading platforms are often referred to as "exchanges," although they neither report trade information nor are they regulated in the same way as a national securities exchange. As such, there is some difference in the form, transparency and reliability of trading data from bitcoin trading platforms. Generally speaking, bitcoin data is available from these trading platforms with publicly disclosed valuations for each executed trade, measured against a fiat currency such as the US Dollar or Euro, or against another digital asset (for example, bitcoin trades against the US Dollar are reflected in the "USD-BTC Pair").

Currently, there are many bitcoin trading platforms operating worldwide and trading platforms represent a substantial percentage of bitcoin buying and selling activity, and, therefore, provide large data sets for the market valuation of bitcoin. A bitcoin trading platform provides investors with a way to purchase and sell bitcoin, similar to stock exchanges like the New York Stock Exchange or NASDAQ, which provide ways for investors to buy stocks and bonds in the so-called "secondary market." Unlike stock exchanges, which are regulated to monitor securities trading activity, bitcoin trading platforms are largely regulated as money services businesses (or a foreign regulatory equivalent) and are required to monitor for and detect money-laundering and other illicit financing activities that may take place on their platform. Bitcoin trading platforms operate websites designed to permit investors to open accounts with the trading platform and then purchase and sell bitcoin.

As with conventional stock exchanges, an investor opening a trading account and wishing

to transact at a bitcoin trading platform must deposit an accepted government-issued currency into their account, or a previously acquired digital asset. The process of establishing an account with a bitcoin trading platform and trading bitcoin is different from, and should not be confused with, the process of users sending bitcoin from one bitcoin address to another bitcoin address, such as to pay for goods and services. This latter process is an activity that occurs wholly within the confines of the Bitcoin network, while the former is an activity that occurs largely on private websites and databases owned by the trading platform.

In addition to the bitcoin trading platforms that provide spot markets for bitcoin, an OTC trading market has emerged for digital assets. The bitcoin OTC market demonstrates flexibility in terms of quotes, price, size, and other factors. The OTC market has no formal structure and no open-outcry meeting place, and typically involves bilateral agreements on a principal-to-principal basis. Parties engaging in OTC transactions will agree upon a price – often via phone, email, or chat – and then one of the two parties will initiate the transaction. For example, a seller of bitcoin could initiate the transaction by sending the bitcoin to the buyer's bitcoin address. The buyer would then wire US Dollars to the seller's bank account. OTC trading tends to occur in large blocks of bitcoin. All risks and issues related to creditworthiness are between the parties directly involved in the transaction. OTC market participants include institutional entities, such as hedge funds, family offices, private wealth managers, high-net-worth individuals that trade bitcoin on a proprietary basis, and brokers that offer two-sided liquidity for bitcoin.

Beyond the spot bitcoin trading platforms and the OTC market, a number of unregulated bitcoin derivatives trading platforms exist that offer traders the ability to gain leveraged and/or short exposure to the price of bitcoin through perpetual futures, quarterly futures, and other derivative contracts.

Finally, the trading of regulated bitcoin futures contracts launched on the CME in December 2017.[13] A further discussion of the CME bitcoin futures market ("CME Market") is included in the section entitled "The CME Bitcoin Futures Market," below.

Authorized Participants may have the option of purchasing and selling bitcoin used in Creation Unit transactions with the Trust either on bitcoin trading platforms, in the OTC markets, in direct bilateral transactions, or may deliver cash to the Trust in exchange for Creation Units (or may take receipt of cash from the Trust in exchange for the redemption of Creation Units) in which case the Trust will acquire or liquidate the requisite amount of bitcoin with approved bitcoin trading counterparties. In addition, Authorized Participants may utilize futures to hedge bitcoin exposure relating to the purchase and redemption of Creation Units.

The CME Bitcoin Futures Market

The CME Group announced the planned launch of bitcoin futures on October 31, 2017. Trading began on December 17, 2017.[14] Each contract represents five bitcoin and is based on the CME CF Bitcoin Reference Rate. The contracts trade and settle like other cash settled commodity futures contracts.

Nearly every measurable metric related to bitcoin futures has generally trended up since launch. For example, there were 264,323 bitcoin futures contracts traded in June 2023

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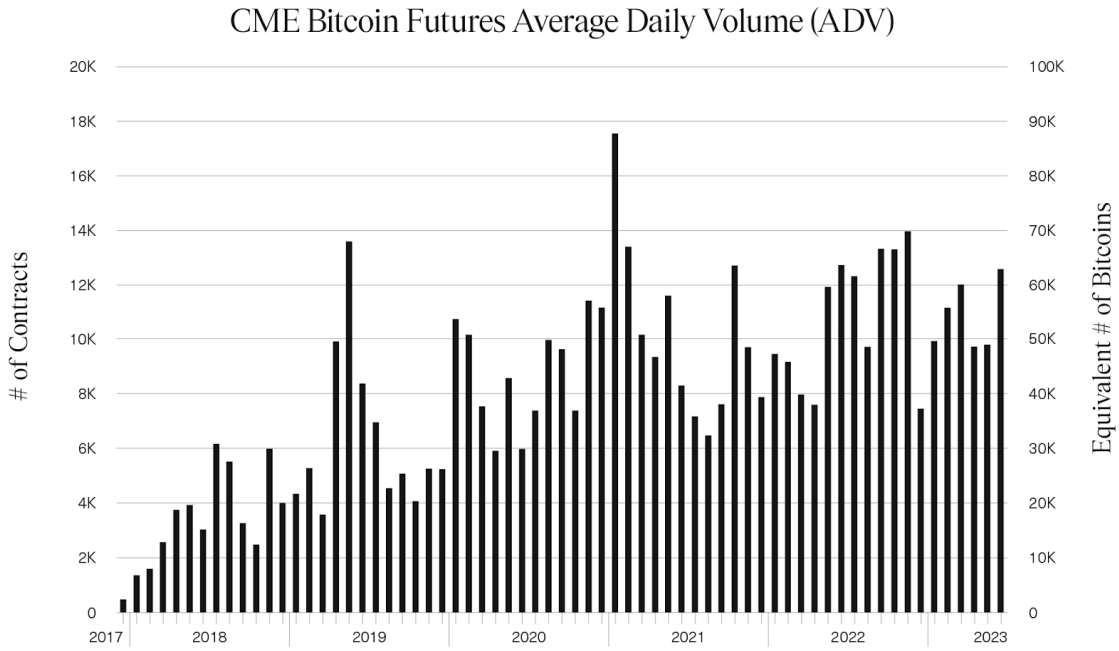
13 See note **Error! Bookmark not defined.**1, infra.

14 See "CME Group Announces Launch of Bitcoin Futures," October 31, 2017, available at https://www.cmegroup.com/media-room/press-releases/2017/10/31/cme_group_announceslaunchofbitcoinfutures.html. At the same time as the launch of the CME Market, the Cboe Futures Exchange, LLC announced and subsequently launched Cboe bitcoin futures. See "CFE to Commence Trading in Cboe Bitcoin (USD) Futures Soon," December 01, 2017, available at cdn.cboe.com/resources/release_notes/2017/Cboe-Bitcoin-USD-Futures-Launch-Notification.pdf. Each future was cash settled, with the CME Market tracking the CME UK Reference Rate and the Cboe bitcoin futures tracking a bitcoin trading platform daily auction price. The Cboe Futures Exchange, LLC subsequently discontinued its bitcoin futures market effective June 2019. "Cboe put the brakes on bitcoin futures," March 15, 2019, available at https://www.reuters.com/article/us-cboe-bitcoin/cboe-puts-the-brakes-on-bitcoin-futures-idUSKCN1QW261. The Trust uses the CME US Reference Rate to calculate its NAV.

(approximately $39.8 billion) compared to 267,495 ($25.1 billion) contracts, 182,369 contracts ($31.7 billion), 131,419 contracts ($6.0 billion), and 167,362 contracts ($9.8 billion) traded in June 2022, June 2021, June 2020, and June 2019, respectively.[15]



Open interest was 18,264 bitcoin futures contracts in June 2023 (approximately $2.8 billion) compared to 14,108 contracts ($1.3 billion), 6,817 contracts ($1.2 billion), 7,675 contracts ($0.4 billion), and 5,991 contracts ($0.4 billion) in June 2022, June 2021, June 2020, and June 2019, respectively.[16]

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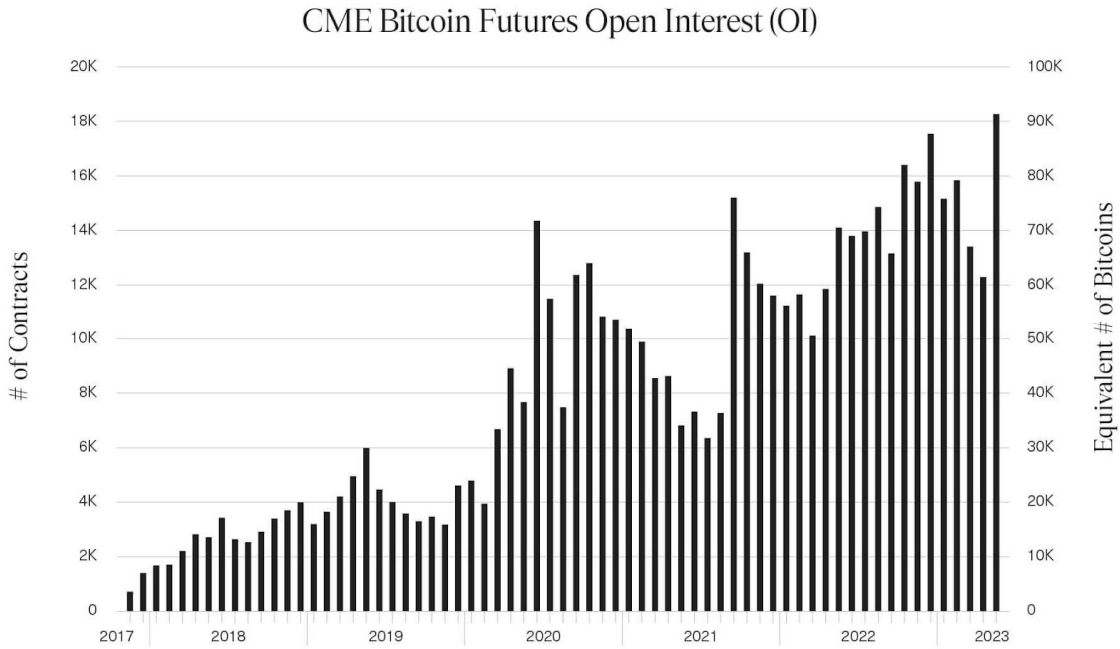
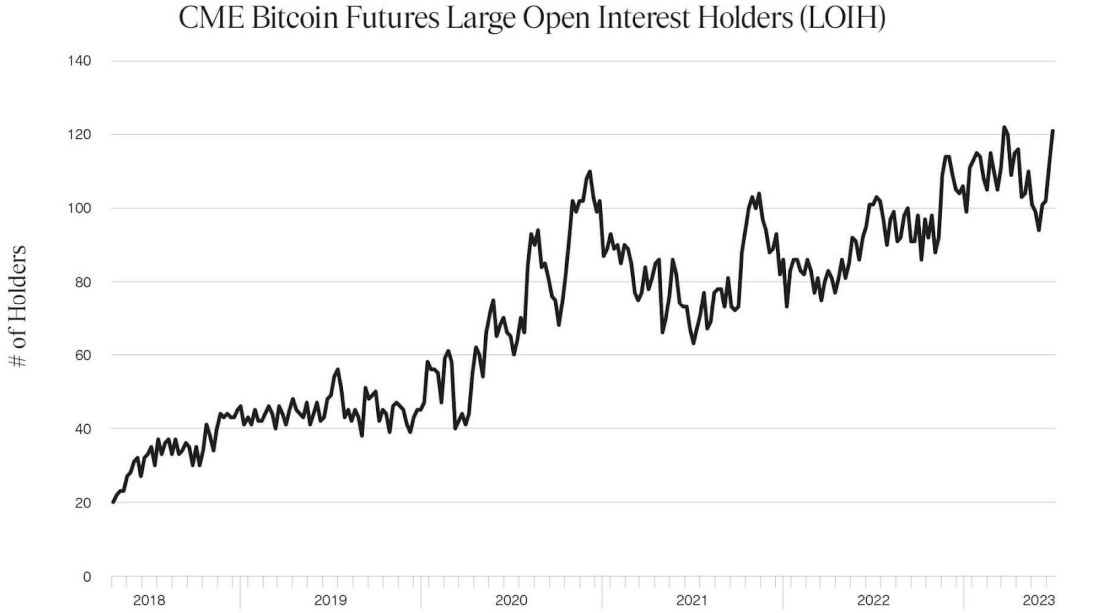
15 Data from CME Volume and Average Daily Volume Reports, available at https://www.cmegroup.com/market-data/volume-open-interest.html#volumeTotals.

16 Data from CME Open Interest Reports, available at https://www.cmegroup.com/market-data/volume-open-interest.html#openInterestTools.



The number of large open interest holders[17] has increased as well, even in the face of heightened bitcoin price volatility, as demonstrated in the figure that follows.



The Commission has previously recognized that the CME bitcoin futures market qualifies

17 A large open interest holder in Bitcoin Futures is an entity that holds at least 25 contracts, which is the equivalent of 125 bitcoin. At a price of approximately $30,705.00 per bitcoin on 6/27/2023, more than 120 firms had outstanding positions of greater than $3.83 million in Bitcoin Futures. Data from The Block, available at https://www.theblock.co/data/crypto-markets/cme-cots/large-open-interest-holders-of-cme-bitcoin-futures.

as a regulated market[18] and that common membership between a listing exchange and a futures market such as the CME in the Intermarket Surveillance Group ("ISG") functions as "the equivalent of a comprehensive surveillance sharing agreement."[19]

Valuation of the Trust's Bitcoin

The CME US Reference Rate, CME UK Reference Rate and CME Bitcoin Real Time Price

According to the Registration Statement, the CME UK Reference Rate was established by the CME Group and Crypto Facilities Ltd. to be used in the creation of financial products tied to bitcoin. The CME UK Reference Rate is fixed once per day at 4:00 p.m. London time, based on the methodology set forth below and applying data from constituent trading platforms ("Constituent Platforms"). The CME US Reference Rate was introduced in February 2021 and is designed to apply the CME UK Reference Rate methodology, but with a fix once per day at 4:00 p.m. Eastern time ("E.T."). Although the CME UK Reference Rate has a longer history and is used to settle bitcoin futures on the CME Market, the Trust has determined to utilize the CME US Reference Rate to establish the NAV because the CME US Reference Rate is calculated as of the same time as the NAV and is based on the same methodology and data sources as the CME UK Reference Rate.

The CME Group and Crypto Facilities Ltd. also publish a continuous real-time bitcoin price index, known as the "CME Bitcoin Real Time Price," using data from the Constituent Platforms.

The CME US Reference Rate, CME UK Reference Rate and CME Bitcoin Real Time

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[18] See Bitwise Order, 84 FR at 55410, n. 456 ("the Commission recognizes that the CFTC comprehensively regulates CME ..."). See also Winklevoss Order, 83 FR at 37594 & at note 202; GraniteShares Order 83 FR at 43929; and USBT Order, 85 FR at 12597.

[19] See Bitwise Order, 84 FR at 55410, n.456. A list of the current ISG members is available at https://www.isgportal.org.

Price are administered by Crypto Facilities Ltd., with the selection of Constituent Platforms performed by an oversight committee.[20] A trading platform is eligible to be selected as a Constituent Platform if it facilitates spot trading of bitcoin against the USD-BTC Pair and makes trade data and order data available through an Automatic Programming Interface with sufficient reliability, detail and timeliness. Additional initial and continuing eligibility requirements apply to the Constituent Platforms.

Each of the CME US Reference Rate, which has been calculated and published since February 2022, and CME UK Reference Rate, which has been calculated and published since November 2016, aggregates during a calculation window the trade flow of several spot bitcoin trading platforms into the US Dollar price of one bitcoin as of their respective calculation time. Specifically, the CME US Reference Rate is calculated based on the "Relevant Transactions" (as defined below) of each of its Constituent Platforms, which are currently Bitstamp, Coinbase, Gemini, itBit, Kraken and LMAX, as follows:

1. All Relevant Transactions are added to a joint list, recording the trade price and size for each transaction.
2. The list is partitioned into a number of equally-sized time intervals.
3. For each partition separately, the volume-weighted median trade price is calculated from the trade prices and sizes of all Relevant Transactions. A volume-weighted median differs from a standard median in that a

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[20] This summary does not represent a complete description of the CME US Reference Rate, the CME UK Reference Rate and CME Bitcoin Real Time Price. Additional information on administration and methodologies, may be found at CF Benchmarks' website, available at https://www.cfbenchmarks.com/data/indices/BRRNY, https://www.cfbenchmarks.com/indices/BRR, and https://www.cfbenchmarks.com/indices/BRTI. The CME US Reference Rate, the CME UK Reference Rate and CME Bitcoin Real Time Price are registered benchmarks under the European Benchmarks Regulation.

weighting factor, in this case trade size, is factored into the calculation.

4. The CME US Reference Rate or CME UK Reference Rate, as applicable, is then determined by the equally-weighted average of the volume-weighted medians of all partitions.

The CME Bitcoin Real Time Price uses similar data sources, but is calculated once per second based on the weighted mid-price-volume curve, which is a measure of the active bid and ask volume present on a Constituent Platform's order book.

The CME US Reference Rate, CME UK Reference Rate, and CME Bitcoin Real Time Price do not include any bitcoin futures prices in their respective methodologies. A "Relevant Transaction" is any "cryptocurrency versus legal tender spot trade that occurs during the TWAP [Time Weighted Average Price] Period" on a Constituent Platform in the USD-BTC Pair that is reported and disseminated by Crypto Facilities Ltd., as calculation agent for the CME US Reference Rate, CME UK Reference Rate and CME Bitcoin Real Time Price.

Net Asset Value

Under normal circumstances, the Trust's only asset will be bitcoin. The Trust's bitcoin are carried, for financial statement purposes, at fair value, as required by the U.S. generally accepted accounting principles ("GAAP"). The Trust's NAV and NAV per Share will be determined by the Administrator once each Exchange trading day as of 4:00 p.m. E.T., or as soon thereafter as practicable. The Administrator will calculate the NAV by multiplying the number of bitcoin held by the Trust by the CME US Reference Rate for such day, adding any additional receivables and subtracting the accrued but unpaid liabilities of the Trust. The NAV per Share is calculated by dividing the NAV by the number of Shares then outstanding. The Administrator will determine the price of the Trust's bitcoin by reference to the CME US

Reference Rate, which is published and calculated as set forth above.

Intraday Trust Value

In order to provide updated pricing information relating to the Shares for use by investors and market professionals throughout the domestic trading day, the Exchange will calculate and disseminate throughout the core trading session, every 15 seconds each trading day, an intraday trust value ("ITV"). The ITV will be calculated throughout the trading day by using the prior day's holdings at close of business and the most recently reported price level of the CME Bitcoin Real Time Price as reported by Bloomberg, L.P. or another reporting service, or another price of bitcoin derived from updated bids and offers indicative of the spot price of bitcoin. The ITV will be widely disseminated by one or more major market data vendors during the NYSE Arca Core Trading Session.

Creation and Redemption of Shares

The Trust Shares

According to the Registration Statement, the Shares shall represent undivided beneficial ownership of the Trust. The Trust creates and redeems Shares from time to time, but only in one or more Creation Units. A Creation Unit is only made in exchange for delivery to the Trust or the distribution by the Trust of the amount of bitcoin represented by the Creation Unit being created or redeemed, or an equivalent amount of cash, the amount of which is representative of the combined NAV of the number of Shares included in the Creation Units being created or redeemed determined as of 4:00 p.m. E.T. on the day the order to create or redeem Creation Units is properly received. Except when aggregated in Creation Units or under extraordinary circumstances permitted under the Trust Agreement, the Shares are not redeemable securities. A Creation Unit will initially consist of at least 25,000 Shares, but may be subject to change.

Authorized Participants are the only persons that may place orders to create and redeem Creation Units. Authorized Participants must be (i) registered broker-dealers or other securities market participants, such as banks and other financial institutions, that are not required to register as broker-dealers to engage in securities transactions described below, and (ii) Depository Trust Company ("DTC") Participants. To become an Authorized Participant, a person must enter into an Authorized Participant Agreement with the Trust and/or the Trust's marketing agent (the "Marketing Agent").

Creation Procedures

According to the Registration Statement, on any business day, an Authorized Participant may create Shares by placing an order to purchase one or more Creation Units with the Transfer Agent through the Marketing Agent. Such orders are subject to approval by the Marketing Agent and the Transfer Agent. For purposes of processing creation and redemption orders, a "business day" means any day other than a day when the Exchange is closed for regular trading. To be processed on the date submitted, creation orders generally must be placed before 4 p.m. E.T. or the close of regular trading on the Exchange, whichever is earlier, for in-kind orders, but may be required to be placed earlier for cash orders, at the discretion of the Sponsor. The day on which an order is received by the Transfer Agent and approved by the Marketing Agent, is considered the creation order date.

Creation Units are processed either in-kind or in cash. By placing a creation order, an Authorized Participant agrees to deposit, or cause to be deposited, bitcoin with the Trust by initiating a Bitcoin transaction to a Bitcoin network address identified by the Trust or by depositing an equivalent amount of cash as determined by the product of the amount of bitcoin that is in the same proportion to the total assets of the Trust, net of accrued expenses and other

liabilities on the date the order to purchase is properly received, and the CME US Reference Rate price on the creation order date, plus any fees or expenses associated with the acquisition of the bitcoin by the Trust. Prior to the delivery of Creation Units for an in-kind creation order, the Authorized Participant must also have wired to the Transfer Agent the nonrefundable transaction fee due for the creation order. Authorized Participants may not withdraw a creation request. If an Authorized Participant fails to consummate the foregoing, the order may be cancelled.

The total creation deposit amount required to create each Creation Unit is an amount of bitcoin, or an equivalent amount of cash, that is in the same proportion to the total assets of the Trust, net of accrued expenses and other liabilities, on the date the order to purchase is properly received, as the number of Shares to be created under the creation order is in proportion to the total number of Shares outstanding on the date the order is received. The Sponsor causes to be published each business day, prior to the commencement of trading on the Exchange, the amount of bitcoin that will be required to be deposited in exchange for one Creation Unit for such business day.

Redemption Procedures

According to the Registration Statement, the procedures by which an Authorized Participant can redeem one or more Creation Units mirror the procedures for the creation of Creation Units. On any business day, an Authorized Participant may place an order with the Transfer Agent through the Marketing Agent to redeem one or more Creation Units. To be processed on the date submitted, redemption orders generally must be placed before 4 p.m. E.T. or the close of regular trading on the Exchange, whichever is earlier, or earlier if the redemption order is for cash, as determined by the Sponsor. A redemption order will be effective on the date it is received by the Transfer Agent and approved by the Marketing Agent (“Redemption Order

Date"). The redemption procedures allow Authorized Participants to redeem Creation Units and do not entitle an individual shareholder to redeem any Shares in an amount less than a Creation Unit, or to redeem Creation Units other than through an Authorized Participant.

The redemption distribution from the Trust will consist of a transfer to the redeeming Authorized Participant, or its agent, of an amount of bitcoin representing the amount of bitcoin held by the Trust evidenced by the Shares being redeemed, or an equivalent amount of cash. The redemption distribution amount is determined in the same manner as the determination of the bitcoin deposit amount discussed above. The Sponsor causes to be published each business day, prior to the commencement of trading on the Exchange, the redemption distribution amount relating to a Creation Unit applicable for such business day.

The redemption distribution due from the Trust will be delivered once the Transfer Agent notifies the Bitcoin Custodian and the Sponsor that the Authorized Participant has delivered the Shares represented by the Creation Units to be redeemed to the Trust's DTC account, in the case of an in-kind order. If the Trust's DTC account has not been credited with all of the Shares of the Creation Units to be redeemed, the redemption distribution will be delayed until such time as the Transfer Agent confirms receipt of all such Shares. In the case of a cash redemption order, the Bitcoin Custodian will not transfer the requisite amount of bitcoin as described above to the bitcoin trading counterparty unless and until the requisite amount of cash has been received at the Cash Custodian to fully settle the sale of bitcoin to the bitcoin trading counterparty.

Once the Transfer Agent notifies the Bitcoin Custodian and the Sponsor that the Shares have been received in the Trust's DTC account, the Sponsor will instruct the Bitcoin Custodian to transfer the redemption bitcoin amount from the Trust Bitcoin Account to the Authorized Participant's bitcoin custody account in the case of an in-kind order. By placing a redemption

order, an Authorized Participant agrees to receive bitcoin, or an equivalent amount of cash, as described above, less the expenses incurred by the Trust as a result of liquidating the Trust's bitcoin in a sale to an approve bitcoin trading counterparty. If an Authorized Participant fails to consummate the foregoing, the order may be cancelled.

Fee Accrual

According to the Registration Statement, the only ordinary expense of the Trust is expected to be the Sponsor's fee, which shall accrue daily in USD and be payable monthly in bitcoin.

Standard for Approval

Background

To date, the Commission has considered numerous proposed spot bitcoin ETPs,[21]

[21] See, e.g., Securities Exchange Act Release No. 80206 (Mar. 10, 2017), 82 FR 14076 (March 16, 2017) (SR-BatsBZX-2016-30) (Order Disapproving a Proposed Rule Change, as Modified by Amendments No. 1 and 2, to BZX Rule 14.11(e)(4), Commodity-Based Trust Shares, to List and Trade Shares Issued by the Winklevoss Bitcoin Trust); Securities Exchange Act Release No. 80319 (Mar. 28, 2017), 82 FR 16247 (April 3, 2017) (SR-NYSEArca-2016-101) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, Relating to the Listing and Trading of Shares of the SolidX Bitcoin Trust under NYSE Arca Equities Rule 8.201; Securities Exchange Act Release No. 83723 (July 26, 2018), 83 FR 37579 (August 1, 2018) (SR-BatsBZX-2016-30) (Order Setting Aside Action by Delegated Authority and Disapproving a Proposed Rule Change, as Modified by Amendments No. 1 and 2, to List and Trade Shares of the Winklevoss Bitcoin Trust) ("Winklevoss Order"); Securities Exchange Act Release No. 83904 (Aug. 22, 2018), 83 FR 43934 (August 28, 2018) (SR-NYSEArca-2017-139) (Order Disapproving a Proposed Rule Change to List and Trade the Shares of the ProShares Bitcoin ETF and the ProShares Short Bitcoin ETF); Securities Exchange Act Release No. 83912 (Aug. 22, 2018), 83 FR 43912 (August 28, 2018) (SR-NYSEArca-2018-02) (Order Disapproving a Proposed Rule Change Relating to Listing and Trading of the Direxion Daily Bitcoin Bear 1X Shares, Direxion Daily Bitcoin 1.25X Bull Shares, Direxion Daily Bitcoin 1.5X Bull Shares, Direxion Daily Bitcoin 2X Bull Shares, and Direxion Daily Bitcoin 2X Bear Shares Under NYSE Arca Rule 8.200-E); Securities Exchange Act Release No. 83913 (Aug. 22, 2018), 83 FR 43923 (August 28, 2018) (SR-CboeBZX-2018-001) (Order Disapproving a Proposed Rule Change to List and Trade the Shares of the GraniteShares Bitcoin ETF and the GraniteShares Short Bitcoin ETF ("GraniteShares Order"); Securities Exchange Act Release No. 88284 (February 26, 2020), 85 FR 12595 (March 3, 2020) (Sr-NYSEArca-2019-39) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, to Amend NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) and to List and Trade Shares of the United States Bitcoin and Treasury Investment Trust Under NYSE Arca Rule 8.201-E) ("USBT Order"); Securities Exchange Act Release No. 93559 (Nov. 12, 2021), 86 FR 64539 (Nov. 18, 2021) (SR-CboeBZX-2021-019) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the VanEck Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares, Securities Exchange Act) ("VanEck Order"); Securities Exchange Act Release No. 93700 (Dec. 1, 2021), 86 FR 69322 (Dec. 7, 2021) (SR–CboeBZX–2021–024) (Order Disapproving a Proposed Rule Change To List

including prior proposals with respect to the Trust.[22] In each case, the Commission determined that the filing failed to demonstrate that the proposal was consistent with the requirements of

and Trade Shares of the WisdomTree Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) (''WisdomTree Order''); Securities Exchange Act Release No. 93859 (Dec. 22, 2021), 86 FR 74156 (Dec. 29, 2021) (SR–NYSEArca–2021–31) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the Valkyrie Bitcoin Fund Under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) ("Valkyrie Order"); Securities Exchange Act Release No. 93860 (Dec. 22, 2021), 86 FR 74166 (Dec. 29, 2021) (SR–CboeBZX–2021–029) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the Kryptoin Bitcoin ETF Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("Kryptoin Order"); Securities Exchange Act Release No. 94006 (Jan. 20, 2022), 87 FR 3869 (Jan. 25, 2022) (SR–NYSEArca–2021–37) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the First Trust SkyBridge Bitcoin ETF Trust Under NYSE Arca Rule 8.201– E) ("SkyBridge Order"); Securities Exchange Act Release No. 94080 (Jan. 27, 2022), 87 FR 5527 (Feb. 1, 2022) (SR–CboeBZX–2021–039) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the Wise Origin Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("Wise Origin Order"); Securities Exchange Act Release No. 94395 (Mar. 10, 2022), 87 FR 14932 (Mar. 16, 2022) (SR–NYSEArca–2021–57) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the NYDIG Bitcoin ETF Under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) ("NYDIG Order"); Securities Exchange Act Release No. 94396 (Mar. 10, 2022), 87 FR 14912 (Mar. 16, 2022) (SR–CboeBZX–2021–052) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the Global X Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("Global X Order"); Securities Exchange Act Release No. 94571 (Mar. 31, 2022), 87 FR 20014 (Apr. 6, 2022) (SR–CboeBZX–2021–051) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, To List and Trade Shares of the ARK 21Shares Bitcoin ETF Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("ARK 21Shares Order"); Securities Exchange Act Release No. 94999 (May 27, 2022), 87 FR 33548 (June 2, 2022) (SR–NYSEArca–2021–67) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the One River Carbon Neutral Bitcoin Trust Under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) ("One River Order"); Securities Exchange Act Release No. 95180 (June 29, 2022), 87 FR 40299 (July 6, 2022) (SR–NYSEArca–2021–90) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, To List and Trade Shares of Grayscale Bitcoin Trust under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) ("Grayscale Order"); Securities Excnnage Act Release No. 96011 (Oct. 11, 2022), 87 FR 62466 (Oct. 14, 2022) (SR–CboeBZX–2022–006) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the WisdomTree Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("WisdomTree Order II"); Securities Exchange Act Release No. 96751 (Jan. 26, 2023), 88 FR 6328 (Jan. 31, 2023) (SR–CboeBZX–2021–031) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the ARK 21Shares Bitcoin ETF Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares) ("ARK 21Shares Order II"); Securities Exchange Act Release No. 97102 (Mar. 10, 2023), 88 FR 16055 (Mar. 15, 2023) (SR-CboeBZX-2022-035) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the VanEck Bitcoin Trust Under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares)) ("VanEck Order II").

[22] See Securities Exchange Act Release No. 87267 (Oct. 9, 2019), 84 FR 55382 (October 16, 2019) (SR-NYSEArca-2019-01) (Order Disapproving a Proposed Rule Change, as Modified by Amendment No. 1, Relating to the Listing and Trading of Shares of the Bitwise Bitcoin ETF Trust Under NYSE Arca Rule 8.201-E) ("Bitwise Order") (withdrawn on Jan. 13, 2020 while delegated action was under review by the Commission, see Release No. 90431 (Nov. 13, 2020), 85 FR 73819 (November 19, 2020)); Securities Exchange Act Release No. 95179 (June 29, 2022), 87 FR 40282 (July 6, 2022) (SR-NYSEArca–2021-89) (Order Disapproving a Proposed Rule Change To List and Trade Shares of the Bitwise Bitcoin ETP Trust Under NYSE Arca Rule 8.201–E (Commodity-Based Trust Shares)) ((“Bitwise Order II”).

Section 6(b)(5) of the Act[23] and, in particular, the requirement that the rules of a national securities exchange be designed to prevent fraudulent and manipulative acts and practices.

Specifically, although comprehensive surveillance-sharing agreements[24] are not the exclusive means by which a listing exchange can meet its obligations under Section 6(b)(5) of the Act, the Commission has determined that, where a listing exchange cannot establish that other means to prevent fraudulent and manipulative acts and practices are sufficient, the listing exchange must enter into a surveillance-sharing agreement with a regulated market of significant size because "[s]uch agreements provide a necessary deterrent to manipulation because they facilitate the availability of information needed to fully investigate a manipulation if it were to occur."[25]

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23 15 U.S.C. 78f(b)(5).

24 The Commission has described a comprehensive surveillance sharing agreement as including an agreement under which a self-regulatory organization may expressly obtain information on (i) market trading activity, (ii) clearing activity and (iii) customer identity, and where existing rules, laws or practices would not impede access to such information. See Letter from Brandon Becker, Director, Division of Market Regulation, Commission, to Gerard D. O'Connell, Chairman, Intermarket Surveillance Group (June 3, 1994), available at https://www.sec.gov/divisions/marketreg/mr-noaction/isg060394.htm ("ISG Letter"). The Commission has emphasized the importance of surveillance sharing agreements, noting that "[s]uch agreements provide a necessary deterrent to manipulation because they facilitate the availability of information needed to fully investigate a manipulation if it were to occur." Securities Exchange Act Release No. 40761 (Dec. 8, 1998), 63 FR 70952, 70954, 70959 (Dec. 22, 1998) (File No. S7-13-98) (Amendment to Rule Filing Requirements for Self-Regulatory Organizations Regarding New Derivative Securities Products) ("NDSP Adopting Release").

25 See Winklevoss Order, 83 FR at 37580. In the Winklevoss Order as well as the Bitwise Order and USBT Order, the Commission determined that the proposing exchange had not established that bitcoin markets were uniquely resistant to fraud or manipulation, which unique resistance might provide protections such that the proposing exchange "would not necessarily need to enter into a surveillance sharing agreement with a regulated significant market." See Winklevoss Order 83 FR at 37591; Bitwise Order 84 FR at 55386; and USBT Order 85 FR at 12597. In all instances, the Commission determined that, while the existing, regulated derivatives markets (including the CME bitcoin futures market) was a regulated market, the proposing exchanges had not demonstrated that the regulated derivatives markets had achieved significant size. See Winklevoss Order, 83 FR at 37601; Bitwise Order 84 FR at 55410; and USBT Order 85 FR at 12597. In short, the Commission determined that a proposing exchange had established neither that it had a surveillance sharing agreement with a group of underlying bitcoin trading platforms, nor that such bitcoin trading platforms constituted regulated markets of significant size with respect to bitcoin. See Winklevoss Order 83 FR 37590-37591; Bitwise Order 84 FR at 55407; and USBT Order 85 FR at 12615.

In the Winklevoss Order, the Commission set forth both the importance and definition of a surveilled, regulated market of significant size, explaining that:

> [For all] commodity-trust ETPs approved to date for listing and trading, there has been in every case at least one significant, regulated market for trading futures on the underlying commodity—whether gold, silver, platinum, palladium, or copper — and the ETP listing exchange has entered into surveillance-sharing agreements with, or held Intermarket Surveillance Group membership in common with, that market.[26]

On an illustrative and not exclusive basis, the Commission further defined:

> [T]he terms 'significant market' and 'market of significant size' to include a market (or group of markets) as to which (a) there is a reasonable likelihood that a person attempting to manipulate the ETP would also have to trade on that market to successfully manipulate the ETP, so that a surveillance-sharing agreement would assist the ETP listing market in detecting and deterring misconduct, and (b) it is unlikely that trading in the ETP would be the predominant influence on prices in that market.[27]

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[26] See Winklevoss Order, 83 FR 37594.

[27] Id. The Commission further noted that "[t]here could be other types of ''significant markets'' and ''markets of significant size,'' but this definition is an example that will provide guidance to market participants." See id. This two-prong definition of the term "significant market" will be referred to herein as the "significant market test" with "first prong" referring to the "reasonable likelihood" clause (a) and "second prong" referring to the "predominant influence" clause (b).

In support of the Sponsor's first attempt to satisfy the significant market test in 2019,[28] the Sponsor conducted and presented extensive research into the bitcoin market and published a 226-slide study of its findings.[29] The study asserted that the relative size of the CME bitcoin futures market compared to real size of bitcoin spot markets demonstrated that the CME bitcoin futures market was a market of significant size.

The Commission disagreed, explaining that:

> the evidence that the Sponsor presents regarding the relative size of the bitcoin futures market and the relationship in prices between the spot and futures markets does not … establish the interrelationship between the futures market and the proposed ETP, or directionality of that interrelationship, that would make the bitcoin futures market a "market of significant size" in the context of the proposed ETP.[30]

The Commission highlighted the central importance of knowing the directionality ("lead-lag") of the interrelationship between the two venues when determining if a market qualifies as "significant":

> [T]he lead-lag relationship between the bitcoin futures market and the spot market ... is central to understanding whether it is

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28 See Securities Exchange Act Release No. 85093 (Feb. 11, 2019), 84 FR 4589 (Feb. 15, 2019)) (SR-NYSEArca-2019-01) (Notice of Filing of Proposed Rule Change Relating to the Listing and Trading of Shares of the Bitwise Bitcoin ETF Trust Under NYSE Arca Rule 8.201-E).

29 See Bitwise Asset Management, Presentation to the U.S. Securities and Exchange Commission, dated March 19, 2019, attached to Memorandum from the Division of Trading and Markets regarding a March 19, 2019 meeting with representatives of Bitwise Asset Management, Inc., NYSE Arca, Inc., and Vedder Price P.C., available at https://www.sec.gov/comments/sr-nysearca-2019-01/srnysearca201901-5164833-183434.pdf.

30 See Bitwise Order, 84 FR at 55410.

> reasonably likely that a would-be manipulator of the ETP would need to trade on the bitcoin futures market to successfully manipulate prices on those spot platforms that feed into the proposed ETP's pricing mechanism. In particular, if the spot market leads the futures market, this would indicate that it would not be necessary to trade on the futures market to manipulate the proposed ETP, even if arbitrage worked efficiently, because the futures price would move to meet the spot price.[31]

In a subsequent application to trade and list the United States Bitcoin and Treasury Investment (USBT), the Commission rejected a different sponsor's attempt to establish through statistical analysis that the CME bitcoin futures market led the bitcoin spot market from a price discovery perspective,[32] noting, among other things, that:

[T]he Sponsor has not provided sufficient details supporting this conclusion, and unquestioning reliance by the Commission on representations in the record is an insufficient basis for approving a proposed rule change in circumstances where, as here, the proponent's assertion would form such an integral role in the Commission's analysis and the assertion is subject to several challenges. For example, the [s]ponsor has not provided sufficient information explaining its underlying analysis, including detailed information on the analytic methodology used, the specific time period analyzed, or any information that would enable the Commission to evaluate whether the findings are

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31 See id. at 55411. See also USBT Order, 85 FR at 12612.

32 See Securities Exchange Act Release No. 86195 (June 25, 2019), 84 FR 31373 (July 1, 2019) (SR-NYSEArca-2019-39) (Notice of Filing of Proposed Rule Change To Amend NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) and To List and Trade Shares of the United States Bitcoin and Treasury Investment Trust Under NYSE Arca Rule 8.201-E) ("USBT Proposal").

statistically significant or time varying.[33]

In an effort to conduct comprehensive research demonstrating the lead-lag relationship between the CME bitcoin futures market and the spot market while providing sufficient information to the Commission on the data and methodology underlying its analysis, the Sponsor met with the Commission Staff 14 times between January 2020 and August 2021, including members from the divisions of Trading and Markets, Economic Risk and Analysis, and Corporate Finance, to discuss a comprehensive approach to conducting lead-lag analysis. As a result, in October 2021, the Exchange filed another rule proposal including a 107-page white paper from the Sponsor which presented the results of this research. The research explored the lead-lag relationship between the CME bitcoin futures market, bitcoin spot market and unregulated bitcoin futures market, and evidenced that the CME bitcoin futures market led the spot market and unregulated bitcoin futures market ("Bitwise Prong One Paper").[34] The Sponsor also submitted a 24-page white paper demonstrating that a new bitcoin ETP is unlikely to become the predominant influence on prices in the CME bitcoin futures market ("Bitwise Prong Two Paper").[35]

The Bitwise Prong One Paper included a survey and validation of bitcoin data sources, a detailed review of existing academic literature on the topic of lead-lag relationships between bitcoin markets, and a rigorous statistical analysis using both Information Share (IS) / Component Share (CS) and Time-Shift Lead-Lag (TSLL) metrics comparing the CME bitcoin

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33 See USBT Order, 85 FR at 12612.

34 See Matthew Hougan, Hong Kim and Satyajeet Pal, "Price discovery in the modern bitcoin market: Examining lead-lag relationships between the bitcoin spot and bitcoin futures market," June 11, 2021, available at https://static.bitwiseinvestments.com/Bitwise-Bitcoin-ETP-White-Paper-1.pdf.

35 See Matthew Hougan, Hong Kim and Satyajeet Pal, "Is it likely that a US bitcoin ETP, if approved, will become the predominant influence on prices in the CME bitcoin futures market?," June 11, 2021, available at https://static.bitwiseinvestments.com/Bitwise-Bitcoin-ETP-White-Paper-2.pdf.

futures market against both spot bitcoin platforms and unregulated bitcoin futures platforms. The Bitwise Prong Two paper included an estimation of potential inflows into a spot bitcoin ETP and a statistical evaluation of the impact of historical inflows into other bitcoin investment products on the bitcoin market. In disapproving the Sponsor's proposal for a second time, the Commission noted that

> even accepting at face value the results of Bitwise's statistical analysis of the relationship between the CME bitcoin futures market and the spot market, such results are only part of the "mixed" record on the topic of bitcoin price discovery.[36]

In light of the foregoing, the following discussion will demonstrate that the CME bitcoin futures market is a regulated market of significant size and meets the both prongs of the significant market test. Given the stated limitations on what the Sponsor's analysis alone can demonstrate, the discussion focuses on resolving the "mixed record" in the broad academic literature before turning to the questions the Commission raised regarding the Sponsor's statistical analysis.

The Approval of Bitcoin Futures ETPs Registered Under the Securities Act of 1933 Demonstrates that the CME Bitcoin Futures Market Is a Regulated Market of Significant Size Related to Spot Bitcoin for the Purposes of Satisfying Section 6(b)(5) of the Act

In 2022, the Commission approved rule changes to list and trade shares of two CME bitcoin futures-based ETPs registered under the Securities Act of 1933 (the "Bitcoin Futures

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[36] See Bitwise Order II, 87 FR at 40288.

ETPs").[37] Unlike the CME bitcoin futures-based ETFs that began trading in 2021,[38] which are regulated under the Investment Company Act of 1940, the listing exchanges for the Bitcoin Futures ETPs had to satisfy the requirements of Section 6(b)(5) by demonstrating that listing markets had in place a comprehensive surveillance sharing agreement with a regulated market of significant size related to CME bitcoin futures contracts. In approving the applications, the Commission concluded that the CME's surveillances could reasonably be relied upon to capture the effects on the CME bitcoin futures market caused by a person attempting to manipulate the proposed futures ETP by manipulating the price of CME bitcoin.[39]

While the Commission rejected the view that this logic extended to spot bitcoin ETPs,[40] this view was recently rejected by the Court of Appeals for the DC Circuit. In Grayscale Investments LLC v. Securities and Exchange Commission ("Grayscale"), the Court observed:

> Grayscale's proposed bitcoin ETP and the approved bitcoin futures ETPs all track the bitcoin market price, i.e., the spot market price… Grayscale presented uncontested evidence that there is a 99.9 percent correlation between bitcoin's spot market and CME futures contract prices… Because the spot and futures markets for bitcoin are highly related, it stands to reason that manipulation in

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37 See Securities Exchange Act Release No. 94620 (Apr. 6, 2022), 87 FR 21676 (Apr. 12, 2022) (SR-NYSEArca-2021-53) (Order Granting Approval of a Proposed Rule Change, as Modified by Amendment No. 2, To List and Trade Shares of the Teucrium Bitcoin Futures Fund Under NYSE Arca Rule 8.200-E, Commentary .02 (Trust Issued Receipts)) ("Teucrium Order"); Securities Exchange Act Release No. 94853 (May 5, 2022), 87 FR 28848 (May 11, 2022) (SR-NASDAQ- 2021-066) (Order Granting Approval of a Proposed Rule Change, as Modified by Amendment Nos. 1 and 2, To List and Trade Shares of the Valkyrie XBTO Bitcoin Futures Fund Under Nasdaq Rule 5711(g)) ("Valkyrie XBTO Order").

38 The ProShares Bitcoin Strategy ETF ("BITO") launched on October 18, 2021. The Valkyrie Bitcoin Strategy ETF ("BTF") launched on October 21, 2021. The VanEck Bitcoin Strategy ETF ("XBTF") launched on November 15, 2021.

39 See Grayscale Investments, LLC v. SEC, No. 22-1142 (D.C. Cir. Aug. 29, 2023), at 10-11.

40 See, e.g., Bitwise Order II, 87 FR at 40289.

> either market will affect the price of bitcoin futures… To the extent that the price of bitcoin futures might be affected by trading in both the futures and spot markets, the Commission concluded fraud in either market could be detected by surveillance of the CME futures market.[41]

The same reasoning applies to the instant application. Bitcoin futures pricing is based on pricing from spot bitcoin markets. If CME's surveillances can capture the effects of trading on the relevant spot markets on the pricing of bitcoin futures, CME should equally be able to capture the effects of trading on the relevant spot markets on the pricing of spot bitcoin ETPs. The fact that bitcoin futures trade on the CME but spot bitcoin does not is a distinction without difference regarding the matter of whether surveillance of the CME futures market can be relied upon to detect manipulation occurring in the spot market. It follows that the CME bitcoin futures market is a regulated market of significant size related to spot bitcoin.

The Academic Record Demonstrates that the CME Bitcoin Futures Market Meets the First Prong of the Significant Market Test

The first prong in establishing whether the CME bitcoin futures market constitutes a "market of significant size" is the determination that there is a reasonable likelihood that a person attempting to manipulate the proposed ETP would have to trade on the CME bitcoin futures market to successfully manipulate the ETP. As detailed in the "Background" section above, the Commission explained in previous orders that the lead-lag relationship between the bitcoin futures market and the spot market is "central" to understanding this first prong and making this determination.

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41 See Grayscale Investments, LLC v. SEC, No. 22-1142 (D.C. Cir. Aug. 29, 2023), at 9-10.

The Mixed Academic Record as Presented by the Commission

The Commission has repeatedly cited the "mixed" or "inconclusive" academic record regarding the lead-lag relationship between spot and futures markets as a core reason it believed that the first prong was not met in past disapproval orders. For instance, in the most recent spot bitcoin ETP disapproval order, the Commission provided a long list of disapproval orders where the Commission has commented on this matter:

> As the academic literature and listing exchanges' analyses pertaining to the pricing relationship between the CME bitcoin futures market and spot bitcoin market have developed, the Commission has critically reviewed those materials. See WisdomTree Order II, 87 FR at 62476-77; Grayscale Order, 87 FR at 40311-13; Bitwise Order, 87 FR at 40286-89; ARK 21Shares Order, 87 FR at 20024; Global X Order, 87 FR at 14920; Wise Origin Order, 87 FR at 5535-36, 5539-40; Kryptoin Order, 86 FR at 74176; WisdomTree Order, 86 FR at 69330-32; Previous VanEck Order, 86 FR at 64547-48; USBT Order, 85 FR at 12613.[42]

In order to address all of the Commission's critical questions regarding the mixed academic record, the Sponsor reviewed all eleven disapproval orders referenced above and summarized the critical questions the Commission has raised regarding the mixed academic record across these orders, as follows.

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[42] See VanEck Order II, 88 FR at 16065.

In the USBT Order, VanEck Order, WisdomTree Order, Kryptoin Order, Wise Origin Order, NYDIG Order, Global X Order, and ARK 21Shares Order, the Commission listed out nine academic studies that have evaluated the lead-lag relationship between the bitcoin futures market and the spot market, and provided one-line summaries of the key findings of each paper, as a means of illustrating the mixed nature of the academic record.[43] The text below is drawn from Global X Order, but is repeated in other Orders as well. The studies that found either that the spot market led the futures market or that the leadership was mixed are set forth in bold text. Both paragraph spacing and numbering have been added for clarity. The Commission's one-line summary of the key findings appears in parentheses.

1. D. Baur & T. Dimpfl, Price discovery in bitcoin spot or futures?, 39 J. Futures Mkts. 803 (2019) (finding that the bitcoin spot market leads price discovery).
2. O. Entrop, B. Frijns & M. Seruset, The determinants of price discovery on bitcoin markets, 40 J. Futures Mkts. 816 (2020) (finding that price discovery measures vary significantly over time without one market being clearly dominant over the other).
3. J. Hung, H. Liu & J. Yang, Trading activity and price discovery in Bitcoin futures markets, 62 J. Empirical Finance 107 (2021) (finding that the bitcoin spot market dominates price discovery).
4. B. Kapar & J. Olmo, An analysis of price discovery between Bitcoin futures and spot markets, 174 Econ. Letters 62 (2019) (finding that bitcoin futures dominate price discovery).

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[43] See USBT Order, 85 FR 12613; VanEck Order, 86 FR at 64547-48; WisdomTree Order, 86 FR at 69330-32; Kryptoin Order, 86 FR at 74176; Wise Origin Order, 87 FR at 5535-36; NYDIG Order, 87 FR 14939; Global X Order, 87 FR at 14920; ARK 21Shares Order, 87 FR at 20024.

5. E. Akyildirim, S. Corbet, P. Katsiampa, N. Kellard & A. Sensoy, The development of Bitcoin futures: Exploring the interactions between cryptocurrency derivatives, 34 Fin. Res. Letters 101234 (2020) (finding that bitcoin futures dominate price discovery).
6. A. Fassas, S. Papadamou, & A. Koulis, Price discovery in bitcoin futures, 52 Res. Int'l Bus. Fin. 101116 (2020) (finding that bitcoin futures play a more important role in price discovery).
7. S. Aleti & B. Mizrach, Bitcoin spot and futures market microstructure, 41 J. Futures Mkts. 194 (2021) (finding that relatively more price discovery occurs on the CME as compared to four spot exchanges).
8. J. Wu, K. Xu, X. Zheng & J. Chen, Fractional cointegration in bitcoin spot and futures markets, 41 J. Futures Mkts. 1478 (2021) (finding that CME bitcoin futures dominate price discovery).
9. C. Alexander & D. Heck, Price discovery in Bitcoin: The impact of unregulated markets, 50 J. Financial Stability 100776 (2020) (finding that, in a multi-dimensional setting, including the main price leaders within futures, perpetuals, and spot markets, CME bitcoin futures have a very minor effect on price discovery; and that faster speed of adjustment and information absorption occurs on the unregulated spot and derivatives platforms than on CME bitcoin futures).

The Commission has also repeatedly raised doubts about the methodology of two studies finding that the futures market leads the spot market, Kapar and Olmo (2019)[44] and Hu et al. (2020),[45] writing in the USBT Order:

> The Commission notes that two other papers cited by the Sponsor utilize daily spot market prices, as opposed to intraday prices. See Kapar & Olmo; Hu et al. In seeking to draw conclusions regarding which market leads price discovery, studies based on daily price data may not be able to distinguish which market incorporates new information faster, because the time gap between two consecutive observations in the data samples could be longer than the typical information processing time in such markets. The Sponsor has not provided evidence to support the assertion that daily price data is sufficiently able to capture information flows in the bitcoin market.[46]

Furthermore, regarding Hu et al. (2020), the Commission also noted that the analysis included time varying results:

> [F]or a period of time spanning over 20% of the study, prices in the bitcoin spot market led futures market prices. Such time inconsistency in the direction of price discovery could suggest that

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44 B. Kapar & J. Olmo (2019), "An analysis of price discovery between Bitcoin futures and spot markets," Economics Letters, Elsevier, vol. 174(C), pages 62-64. ("Kapar and Olmo 2019").

45 Y. Hu, Y. Hou & L. Oxley (2020), "What role do futures markets play in Bitcoin pricing? Causality, cointegration and price discovery from a time-varying perspective," 72 Int'l Rev. of Fin. Analysis 101569 ("Hu et al. 2020").

46 See USBT Order, 85 FR at 12613.

> the market has not yet found its natural equilibrium. Moreover, this period spanned the end of the study period and the record does not include evidence to explain why this would not indicate a shift towards prices in the spot market leading the futures market that would be expected to persist into the future.[47]

Lastly, in Bitwise Order II, the Commission raised the question as to whether classic price discovery metrics like IS/CS could be trusted at all if, as the Sponsor claimed, referencing Robertson and Zhang (2022) and Buccheri et al. (2021), these metrics could produce biased results when the price data used has a high level of sparsity:

> [Bitwise does not] discuss these 10 IS/CS studies in light of Bitwise's acknowledgment that "classic" price discovery metrics like IS/CS could be misspecified, with potentially biased results, when price data have a high level of sparsity.[48]

The following section aims to comprehensively address all of the above critical questions raised by the Commission.

The Sponsor's Response to the Questions Raised by the Commission Regarding the "Mixed" Academic Record

The Sponsor's prior research (Bitwise Prong One Paper) included a detailed literature review wherein the Sponsor examined 10 academic studies exploring the lead-lag relationship between bitcoin futures and spot markets, writing about each study in detail, and will be referred to as "prior literature review" in this proposal.

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47 See id.

48 See Bitwise Order II, 87 FR at 40288.

Baur and Dimpfl (2019)[49]

As the Sponsor detailed in the prior literature review, Baur and Dimpfl (2019) has a severe methodological flaw that led the CME bitcoin futures market's contribution to price discovery to appear artificially low: The authors conduct their price discovery analysis on a per-lifetime-of-each-contract basis, rather than a standard rolling-front-month-contract basis.

An independent study, Alexander and Heck (2019), explored this issue extensively. The paper begins by using a standard rolling-front-month-contract approach to compare the futures market with the spot market, and concludes that there is a "greater contribution to price discovery from the futures market than the spot market."[50]

The paper specifically notes that this finding contradicts the findings in Baur and Dimpfl (2019), and the authors set about resolving this discrepancy by repeating their original study using Baur and Dimpfl (2019)'s per-lifetime-of-each-contract approach. The authors show that this methodological change reverses their original finding and shows the spot market leading price discovery. The authors conclude by explaining why the per-lifetime-of-each-contract approach is flawed and should not be relied on:

> This apparently leading role of the spot market [using the per-lifetime-of-each-contract approach] is not surprising since, during the first few months after the introduction of a contract, there is always another contract with a nearer maturity where almost all trading activity occurs. So any finding that the spot market

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49 D. Baur & T. Dimpfl (2019), "Price discovery in bitcoin spot or futures?," Journal of Futures Markets, 39(7): 803-817 ("Baur and Dimpfl 2019").

50 C. Alexander & D. Heck (2019), Price Discovery, High-Frequency Trading and Jumps in Bitcoin Markets ("Alexander and Heck 2019").

> dominates the price discovery process is merely an artifact of very low trading volumes when the contract is first issued.[51]

As regards the first prong, the question is not whether each individual futures contract leads the spot market, but rather, whether the futures market as a whole leads the spot market. Given this, the rolling-front-month-contract approach, which focuses attention on the contract that attracts the bulk of trading activity at any given time, is the correct approach.

Entrop et al. (2020)[52]

Entrop et al. (2020) evaluates price discovery in the bitcoin market by comparing the CME futures market and Bitstamp, a spot market, from December 2017 to March 2019. The paper finds that the CME futures market led price discovery for the majority of the time period studied.

Despite the fact that the paper finds generally in favor of the futures market leading, the Commission calls out Entrop et al. (2020) in multiple disapproval orders, noting for instance in the USBT Order the paper "finding that price discovery measures vary significantly over time without one market being clearly dominant over the other."[53] The Commission's point draws on the fact that, for the last five months of the 16 month study, the spot market led the futures market in IS/CS measures, and that, for the last two months of the study, it did so in a statistically significant way. The authors of the paper note the significant time variation in market leadership as well.

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51 See Alexander and Heck 2019.

52 See O. Entrop, B. Frijns & M. Seruset (2020), "The Determinants of Price Discovery on Bitcoin Markets," 40 J. Futures Mkts. 816 ("Entrop et al. 2020").

53 See USBT Order, 85 FR at 12613.

As with Baur and Dimpfl (2019), this finding is driven by a methodological choice in the study design that introduces an artificial bias against the CME bitcoin futures market: Whereas the vast majority of studies evaluating price discovery in the bitcoin market use actual transaction prices to conduct their analysis, Entrop et al. (2020) uses "midquotes" (or midpoint of the bid-ask spread) in each market. As explored further below, the bias introduced by this methodological decision is exaggerated specifically in the period where leadership swings to the spot market.

The authors justify their non-standard choice to use midquotes instead of transaction prices by pointing to four academic studies, itemizing three specific advantages:

> First, quotes can be updated in the absence of transactions. Second, midquotes mitigate the problem of infrequent trading, which is normally observed in transaction prices. Third, midquotes are not affected by the bid-ask bounce.[54]

These theoretical advantages, however, must be considered in light of the specific microstructure of the bitcoin markets, and specifically, the sizable difference in "tick size" (or the minimum price change) in the CME bitcoin market compared to the spot market. For CME bitcoin futures contracts, the tick size per contract is $25.00,[55] which equates to $5.00 per bitcoin, while for spot platforms like Bitstamp (the spot platform used in this study), the tick size is typically $0.01.[56]

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54 See Entrop et al. 2020.

55 See CME bitcoin futures contract specs, available at https://www.cmegroup.com/markets/cryptocurrencies/bitcoin/bitcoin.contractSpecs.html.

56 See Bitstamp tick sizes before changes made in 2022, available at https://blog.bitstamp.net/post/changes-to-tick-sizes/.

In a low volatility environment, where the price of bitcoin may trade within a single $5.00 range for a period of time, the midquote on a spot market can update on a tick-by-tick basis as the market price of bitcoin moves up or down within the range. Meanwhile, the midquote on the CME bitcoin futures market will not change at all.

Importantly, this does not mean the CME bitcoin futures market has forfeited price discovery or that it cannot transmit information to other markets. Transactions may occur on the CME bitcoin futures market at either the ask or the bid even as the midquote remains static, depending on whether traders believe the market is likely to rise or fall. By electing to ignore these transactions, Entrop et al. (2020) renders it significantly harder for the CME bitcoin futures market to demonstrate price leadership during low volatility environments. One cannot measure what the eye refuses to see.

There is strong reason to believe that the methodological choice to use midquotes biased the time varying results of this study. The last two months of the study (February and March 2019), where the study showed the spot market leading the futures market in a statistically significant manner, occurred during the depth of the bitcoin bear market. During this period, bitcoin's price hovered below the $4000 mark, rendering the $5 tick size particularly large on a percentage basis, and bitcoin's price volatility was exceptionally low, as observed in Table 3 of the study. The impact is clear: Midquotes were sampled at a 1 minute interval in the study, and amongst the 22,788 and 29,962 CME midquotes sampled for the months of February and March 2019, 80.82% and 84.76% of the data points represented zero change, as observed in Table 4. This was by far the highest ratio of zero change samples in the study. By comparison, in the first two months of the study, only 8.66% and 12.32% of the midquotes sampled at 1 minute intervals from the CME represented zero change.

The Sponsor believes that the results of the last two months, where the percentage of sampled midquotes representing zero change were so high, cannot be relied upon to draw the conclusion that price discovery leadership changed from the futures market to the spot market during that time, and that the academic record should reflect Entrop et al. (2020)'s overall finding that the futures market leads the spot market.

Hung et al. (2021)[57]

Hung et al. (2021) does not focus on price discovery between the bitcoin futures market and the spot market. In fact, the word "spot" does not appear in the paper's abstract. Instead, the paper is primarily focused on investigating the relative contributions of different types of traders (e.g. hedgers, retailers, etc.) on price discovery in the bitcoin futures markets, both CME and CBOE, using the Commitments of Traders (COT) data from the CFTC. Its secondary focus is on analyzing price discovery competition between the CME and CBOE bitcoin futures markets, as a way of exploring CBOE's decision to suspend further listings of their bitcoin futures contracts in 2019.

The ancillary nature of the spot vs. futures investigation is worth noting because it may explain why the mathematical oddities in the results of that investigation went unexplored by the authors.

Those results are presented in Table 4 of the paper. The authors use modified information share (MIS), a variant of classic IS, to evaluate price leadership between a single spot platform (Bitstamp) and both the CME and CBOE futures exchanges, for the period between April 10, 2018 and April 30, 2019. The authors divide this period into 56 weeks, and

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[57] This paper was published after the Sponsor completed the academic literature review in the Bitwise Prong One Paper, and therefore was not captured or analyzed in that white paper. See J. Hung, H. Liu & J. Yang, "Trading activity and price discovery in Bitcoin futures markets," 62 J. Empirical Finance 107 (2021) ("Hung et al. 2021").

independently calculate the MIS for each week, before presenting it on an average, minimum, and maximum basis. The results show that the spot market led the CME futures market over this time period with an average MIS value of 0.654.

The table, however, also shows a minimum spot market MIS value amongst the 56 data points of 0.000 (a finding that the CME futures market *completely* led the spot market for at least one entire week) and a maximum value of 0.999 (a finding that the spot market *completely* led the CME futures market for at least one entire week).

These maximum and minimum values are extremely unlikely. Price discovery analyses such as MIS are statistical analyses where even a slight bit of randomness in an otherwise clearly lagging price series would still produce some contribution to price discovery. A 0.000 and 0.999 result is an unexplained mathematical oddity hard to comprehend, and even more so as results come at both ends of the spectrum. Amongst all the price discovery academic literature the Sponsor has reviewed — as well as all the papers cited by the Commission — there are no other examples where a full week's worth of data between two time series has resulted in such extreme values. The unprecedented results are both so statistically improbable and so out-of-line with results from other papers that the most likely explanation is that some amount of data errors existed in the price data that went into the analysis.

Unfortunately, the study's spot data provider (bitcoincharts.com) is no longer accessible, and so, it is not possible to check the data. In addition, the paper does not provide any charts or visualizations that would permit the Sponsor to visually inspect price discovery trends over time and attempt to infer some other explanation for these highly unusual results.

Given the anomalous and statistically unlikely nature of the results, the Sponsor believes that the paper's ancillary findings about price discovery between spot and futures markets cannot be relied upon and should be dismissed.

Alexander and Heck (2020)[58]

Alexander and Heck (2020) stands alone from all other academic papers cited by the Commission in its review of the academic literature by using a "multidimensional" approach to evaluate the source of price discovery leadership in the bitcoin market. That is, rather than using the classic "pairwise" approach to IS/CS price discovery analysis —comparing Exchange A against Exchange B, and then comparing Exchange A against Exchange C, and so on — Alexander and Heck (2020) uses a statistical technique that attempts to compare multiple exchanges simultaneously.

The Commission commented on the findings of Alexander and Heck (2020) in Bitwise Order II, noting that:

> [Alexander & Heck] finds that CME bitcoin futures "have a very minor effect on price discovery," and that "a faster speed of adjustment and information absorption [occurs] on the unregulated spot and derivatives [platforms] than on CME bitcoin futures." Specifically, Alexander & Heck's multidimensional analysis—which simultaneously includes unregulated futures, regulated futures, perpetual futures, and spot markets—finds that CME bitcoin futures have never accounted for more than 9% of price

[58] See C. Alexander & D. Heck (2020), "Price Discovery in Bitcoin: The Impact of Unregulated Markets," Journal of Financial Stability, Volume 50, October 2020, Article Number 100776 ("Alexander and Heck 2020").

> discovery (and unregulated markets collectively account for more than 91% of price discovery), and have always contributed the least to price discovery among all venues considered, except during July 2019.[59]

Expanding beyond the specific finding, the Commission used commentary from this paper to question in general the validity of pairwise, two-dimensional analysis — the type of analysis employed by every other paper the Commission references, as well as the Sponsor's own statistical IS and CS analysis.

Quoting a critique from the paper and adding its own color, the Commission notes:

> [From Alexander and Heck (2020):] "omitting substantial information flows from other markets can produce misleading results....[I]n a two-dimensional model one or other of the instruments must necessarily be identified as price leader." In other words, a two-dimensional model might erroneously attribute information share or component share of omitted platforms to one of the two platforms included in the pairwise estimate, because the two shares must necessarily sum up to 100%.[60]

The Sponsor disagrees. To the contrary, the Sponsor believes that the multidimensional study design employed by Alexander and Heck introduces a strong bias against the CME bitcoin futures market that renders the results invalid.

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59 See Bitwise Order II, 87 FR at 40289.

60 See id. at 40289.

The core issue with multidimensional price discovery analysis, and possibly the reason Alexander and Heck (2020) is the only study to employ it in this context that the Sponsor is aware of, is that when comparing price discovery amongst different category of markets (as in here, regulated futures, unregulated futures, and spot), the question of which markets appear to contribute more to price discovery can be biased by the number of constituent markets from each category.

The reason for this bias is that IS/CS price discovery measures are based on the computation of an implicit "common price" that is derived from the collection of inputted price series. The statistical measures track the shares of contribution made to changes in the common price by each price series. In a multidimensional context, as more alike markets are added, those markets can artificially appear to contribute more to changes in the common price because the common price itself changes with the addition of more markets. For example, if market A objectively leads both market B and and market C, but market B and market C have very similar price series, a multidimensional analysis amongst all three markets can erroneously conclude that market A's movements contributed less to changes in the common price than market B and C, simply because the latter two markets were similar.

Looking at Alexander and Heck (2020) with this understanding, the Sponsor notes that the paper's final analysis compares eight markets in its multidimensional format, and that these eight markets fit into three broad categories: Regulated futures (CME), unregulated futures (Huobi futures, OKEx futures, OKEx perpetuals, and Bitmex perpetuals), and spot (Coinbase, Bitfinex, Bitstamp).[61]

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[61] In the paper, Alexander and Heck disaggregate unregulated futures and perpetuals into separate market categories. The Sponsor has grouped them here because the two markets are extremely similar: Both offer derivative exposure to bitcoin and are characterized by their offshore and highly leveraged nature (unregulated derivatives markets often offer traders 10-100X leverage, while regulated futures markets

Given these inputs, it is unsurprising — and perhaps even predetermined — that the results of the multidimensional analysis showed that the unregulated futures markets (with four markets included in the analysis) were found to dominate price discovery, with the three spot markets following, and the one regulated futures market coming in last.

The Sponsor's conclusion that the results of Alexander and Heck (2020) are driven by study design, rather than accurately reflecting the true source of price discovery in the markets, is supported by a paper published by the same authors in the prior year. Alexander and Heck (2019) uses a classic, pairwise, two-dimensional price discovery analysis to compare the CME futures market and the bitcoin spot market (represented by a reconstructed version of BRR which includes transactions from Coinbase and Bitstamp). The study finds that the CME futures market led the spot market.

The two studies generally focus on different time periods, but they overlap for one quarter: Q2 2019. Notably, in the 2019 paper, Alexander and Heck call out the significant leadership demonstrated by the CME market during Q2 2019. Specifically, they note that the Generalized Information Share (GIS) attributed to the CME grew from 56% for the period from December 2017 to March 2019, to 65% when Q2 2019 was added to the analysis. The authors do not provide a discrete GIS value for Q2 2019, but the rise in overall GIS after including the quarter indicates that the GIS for Q2 2019 was likely above 75%.

By comparison, in Alexander and Heck (2020), CME's GIS ranged from 3.23% to 5.83% in Q2 2019, while the combined GIS of the three included spot markets (Coinbase, Bitfinex,

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limit leverage to roughly 2-3X). In addition, because all three unregulated derivatives platforms (Huobi, OKEx, Bitmex) have both instruments (futures and perpetuals), it is reasonable to assume that the two instruments likely share a similar base of traders who can easily arbitrage across positions in the two instrument types using shared margin, keeping prices closely aligned.

Bitstamp) ranged from 41.60% to 50.20%, (the remainder was attributed to unregulated futures markets).[62]

How could the results be so different? CME dominated price discovery in Q2 2019 when compared on a pairwise basis with spot markets, but spot markets had a much larger share of price discovery than the CME when analyzed on a multidimensional basis. The most likely explanation is that the multidimensional analytical approach created a bias in the "common price" by adding three spot markets into the mix compared to just one regulated futures market.

Lastly, Alexander and Heck's critique (and the Commission's concern) that two-dimensional analysis omits information flows from other markets and thereby may generate spurious results is misleading. It is, of course, axiomatically true in isolation that omitting a market from consideration could lead to spurious results. But as long as the two-dimensional analysis includes all potential leading markets, an exhaustive pairwise analysis will ultimately find the market that is leading overall. Put differently, if you can show that Market A leads Market B and also that Market A leads Market C, you can feel confident that Market A leads both Markets B and C. Unfortunately, the same cannot be said for multidimensional analysis, where, as demonstrated by comparing the 2019 and 2020 papers, adding additional "like markets" can influence the "common price" and create spurious results.

The Sponsor believes that the traditional, pairwise approach to price discovery analysis — the dominant approach in the academic literature — is the correct approach for exploring the lead-lag relationship between the bitcoin futures market and the spot market, and the multidimensional approach is mis-specified.

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[62] Huobi futures and OKEx perpetuals did not exist in Q2 2019, so the multidimensional analysis starts with just 6 markets: 3 spot markets, 2 unregulated futures markets, and 1 regulated futures market.

Kapar and Olmo (2019)

Kalpar and Olmo (2019) finds that the CME futures market dominates price discovery when compared to the spot market. The Commission, however, raises a concern about this study's choice to use a daily price sampling period rather than a more frequent sampling period, and questions the validity of the results. This concern also applies to Hu et al. (2020).

The Commission writes in the USBT Order:

> [S]tudies based on daily price data may not be able to distinguish which market incorporates new information faster, because the time gap between two consecutive observations in the data samples could be longer than the typical information processing time in such markets.[63]

The Sponsor believes that the requirement that the "the time gap between two consecutive observations" be shorter than the "information processing time" of the market in question is not supported by the academic literature and is, in fact, directly in contrast to the standard used in all nine academic studies listed by the Commission, as well as all studies that the Sponsor is aware of.

In the Bitwise Prong One Paper, the Sponsor conducted a comprehensive study of bitcoin spot markets and the CME bitcoin futures market using time-shift lead-lag (TSLL) analysis, wherein you shift one time series against another to find the amount of shift that creates the highest correlation between the two series. Using this well-established technique, the Sponsor estimated that the average "lead-lag time" between the CME bitcoin futures market and Coinbase, a spot market, from April 2019 to September 2020, was 2.94 seconds. This can be

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[63] See USBT Order, 85 FR at 12613.

considered as the time it took, on average, for information to travel between the CME and Coinbase.

If it takes only 2.94 seconds on average for information to travel between the CME and Coinbase, is all price discovery analysis that uses sampling intervals longer than 2.94 seconds unequipped to explore which market leads?

For the nine studies noted by the Commission as constituting the "Mixed Academic Record," the sampling intervals were (in the order in which the papers were cited) 15 minutes, 1 minute, 15 minutes, 1 day, between 1 and 60 minutes, 60 minutes, 5 minute, 1 minute, and 1 minute. This is a wide range of values, ranging from 1 minute to 1 day, but all of them are at least 20X longer than the average lead-lag time that the Sponsor found between the CME futures market and Coinbase.

The record is similar in the broader, non-crypto-related price discovery literature, where minutely, hourly, or daily analyses are common.

Academics still find daily analysis useful, even in markets with fast information processing time, for a reason: Even if the sampling period is longer than the information processing time, at each sampling point, there will still likely be a gap between two markets' prices, and analyzing statistically whether market A's prices move to meet market B's prices or vice versa and which market's price as a result contributes more to the "common price" is still useful in determining which market leads price discovery.

The Sponsor believes that price leadership at a daily interval still illustrates which market bends to meet the other market, and should not be removed from the academic record under consideration.

Hu et al. (2020)

Hu et al (2020) strongly supports the notion that the futures market leads the spot market. Indeed, the abstract of the paper finds that:

> … futures prices Granger cause spot prices and that futures prices dominate the price discovery process.

In Bitwise Order II, however, the Commission wrote that the:

> Hu, Hou & Oxley paper found inconclusive evidence that futures prices lead spot bitcoin prices—in particular, that the months at the end of the paper's sample period showed, using Granger causality methodology, that the spot market was the leading market—and that the record did not include evidence to explain why this would not indicate a shift towards prices in the spot market leading the futures market that would be expected to persist into the future.[64]

The Sponsor believes this is a misreading of the results of the paper.

The primary objective of Hu et al. (2020) is to explore the time-varying nature of the lead-lag relationship between the bitcoin futures market and spot market. In order to do that, the authors use a time-varying version of the Granger causality test developed in Shi et al. (2018).[65] The time-varying Granger causality test has two main variants: the rolling window approach and the recursive evolving approach.

Hu et al. (2020) references that the authors of Shi et al. (2018) explicitly note that the recursive evolving approach is the more accurate approach:

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64 See Bitwise Order II, 87 FR at 40288.

65 S. Shi, P. C. Phillips, & S. Hurn (2018), "Change Detection and the Causal Impact of the Yield Curve," Journal of Time Series Analysis, 39(6), 966–987 ("Shi et al. 2018").

> Simulation experiments compare the efficacy of the proposed test with two other commonly used tests, the forward recursive and the rolling window tests. The results indicate that the recursive evolving approach offers the best finite sample performance, followed by the rolling window algorithm.[66]

Under the lesser of the two approaches — the rolling window algorithm — it is true that CME futures prices are not found to Granger cause spot prices for the last five months of the study. However, under the recursive evolving approach, CME futures prices *are* found to Granger cause spot prices for the entire study period, and do so with increasing strength towards the end of the study, as shown in Figure 6 of the study.

How do you resolve the conflict? The authors reference Shi et al. (2018)'s perspective that "the recursive evolving window algorithm provides the most reliable results" and therefore choose to interpret the results based on this method. Indeed, they write conclusively about this topic to avoid any doubt, saying:

> More importantly, given the duration of the Granger-causal episodes and the magnitude of the test statistics in Fig. 5 and Fig. 6, it was found that the strength of Granger causality from the futures prices to spot prices is stronger than vice-versa. From this we conclude that Granger causality runs from the futures market to the spot market. This result further suggests that the CME Bitcoin

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66 See id. at 1.

> futures market leads the spot since the former embeds the new information faster than the latter.[67]

The authors' conclusion — based on a deep understanding of the analytical methods used — is that the CME futures prices Granger caused spot prices for the entire period of the study and that the CME futures market conclusively leads the spot market even when examined using time-varying analytical approaches, and the Sponsor finds no reason to question the conclusivity of the study.

Robertson and Zhang (2022)[68] *and Buccheri et al. (2021)*[69]

In Bitwise Order II, the Commission raised questions regarding a statement the Sponsor made in a February 25, 2022 Comment Letter,[70] discussing two academic papers: *Robertson and Zhang (2022)* and *Buccheri et al. (2021).*

The Sponsor's letter noted that the papers raised questions about the accuracy of traditional price discovery metrics like IS and CS, writing:

> [Robertson and Zhang] note that classic price discovery metrics like Information Share (IS) and Component Share (CS) "face difficulties based on the model assumptions of VECM [the Vector Error Correction Model] when the prices under consideration are asynchronous and/or infrequent." Citing Buccheri et al. (2019),

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67 See Hu et al. 2020 at 9.

68 K. Robertson & J. Zhang (2022), Suitable Price Discovery Measurement of Bitcoin Spot and Futures Markets ("Robertson and Zhang 2022").

69 G. Buccheri, G. Bormetti, F. Corsi & F. Lillo (2021), "Comment on: Price Discovery in High Resolution," Journal of Financial Econometrics, Volume 19, Issue 3, Summer 2021, Pages 439–451, ("Buccheri et al. 2021").

70 The sponsor submitted a comment letter that discusses Robertson and Zhang 2022. See Letter from Katherine Dowling, Matt Hougan, and Paul Fusaro, Bitwise, dated Feb. 25, 2022 ("Bitwise Letter I").

> they note that "when prices have a high level of sparsity, the VECM is clearly misspecified and the estimates are potentially biased."[71]

Given the Sponsor's acknowledgement that classic price discovery metrics like IS/CS could be biased by sparsity in price data, the Commission deemed it odd that the Sponsor still drew conclusions from the academic literature without further explanation:

> [Bitwise does not] discuss these 10 IS/CS studies in light of Bitwise's acknowledgment that "classic" price discovery metrics like IS/CS could be misspecified, with potentially biased results, when price data have a high level of sparsity.[72]

Furthermore, the Commission suggested that the Sponsor was implicitly casting doubt on the results of its own IS/CS analysis as well:

> Bitwise's acknowledgement of the [Robertson and Zhang (2022) paper]'s finding that "there is a high level of sparsity in bitcoin data" suggests that, by its own admission, Bitwise's IS/CS approach is misspecified and its estimates potentially biased.[73]

The Sponsor would like to clear up this misunderstanding.

It is indeed true that the CME bitcoin futures market has a high level of sparsity in its transaction data compared to that of spot markets, because CME bitcoin futures contracts have much higher tick sizes ($5 vs. $0.01 per bitcoin on Coinbase) and minimum trade sizes (5 bitcoin

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71 See Bitwise Letter I, at 3.

72 See Bitwise Order II, 87 FR at 40288.

73 See id.

vs. 0.00000001 bitcoin on Coinbase).[74] Robertson and Zhang (2022) includes a table in the Appendix of their study where the authors quantify this sparsity concretely: For Q1 2021, the average seconds between trades (rounded) was 25 seconds for CME and 1 second for Coinbase.

It is also true that, if one price series of a two-dimensional price discovery analysis has a high degree of sparsity compared to the other price series, the results can be potentially biased. Robertson and Zhang (2022) demonstrates this incredibly clearly through a simulation analysis constructed as below (copied directly from the paper):

> [W]e compare the Coinbase USD market to an artificially modified version of itself using IS and CS every day from Q1 2019 through Q1 2021. The artificial modifications come in two forms: (1) the market's trade times are advanced by 3 seconds to represent a leading market and then (2) a percentage (in 10% increments starting at 10% and ending at 90%) of random trade values is removed to represent leading markets with varying levels of sparsity.[75]

The results of the simulation analysis is that the artificially-leading Coinbase price series is found to lead close to 100% (as expected) when only 10% of the trade values are removed. Then as the percentage of trade values randomly removed increases towards 90%, the price leadership of the artificially-leading Coinbase price series trends down, approaching 0%. With only about 40% of the trade values removed, the leadership actually flips directions, with IS and

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74 See CME bitcoin futures contract specs, available at https://www.cmegroup.com/markets/cryptocurrencies/bitcoin/bitcoin.contractSpecs.html; see also Coinbase market specs, available at https://exchange.coinbase.com/markets.

75 See Robertson and Zhang 2022, at 14.

CS values dropping below 50%. In other words, introducing sparsity into a price series can cause it to appear as if it is lagging the other price series using IS and CS, even when the price series is objectively leading originally. This is the "potential bias" we acknowledged and agreed with the authors of the study on.

It is important to note, however, that this bias *only runs one way*: Against the market with higher data sparsity. As such, the acknowledgement of this statistical bias *does not mean* results cannot be relied on in a situation where the market with higher data sparsity is found to lead price discovery. Quite the contrary.

In all studies comparing the CME bitcoin futures market and spot markets, the CME futures market has a higher degree of sparsity. As a result, in each of these studies, the IS/CS values for the CME bitcoin futures market are biased downwards compared to that of spot markets. This means we can rely on IS/CS results showing the CME futures market leading spot markets, as those results only understate the strength of the CME futures market's price leadership.

Section Summary

The Sponsor does not believe that the academic literature is mixed. Instead, it finds a high degree of consensus amongst well-designed studies showing that the CME futures market leads the spot market. This finding is all-the-more impressive given the high degree of sparsity in the CME bitcoin futures market, which introduces a significant bias against it in traditional price discovery analysis.

As such, the Sponsor believes the academic record clearly demonstrates that the CME bitcoin futures market leads the spot market, and therefore meets the first prong of the significant market test.

The Sponsor's Comprehensive Research Demonstrates that the CME Bitcoin Futures Market Meets Both Prongs of the Significant Market Test

As detailed in the "Background" section, following the first Bitwise disapproval Order, the Sponsor, in an effort to conduct comprehensive research demonstrating both prongs of the significant market test while providing sufficient information to the Commission on the data and methodology underlying its analysis, met with the Commission Staff 14 times between January 2020 and August 2021, including with staff from the Divisions of Trading and Markets, Economic Risk and Analysis, and Corporate Finance, and produced two white papers, one addressing each prong.

The 107-page Bitwise Prong One Paper included a survey and validation of bitcoin data sources, a detailed review of existing academic literature on the topic of lead-lag relationships between bitcoin markets, and a rigorous statistical analysis using both Information Share (IS) / Component Share (CS) and Time-Shift Lead-Lag (TSLL) metrics comparing the CME bitcoin futures market against both spot bitcoin platforms and unregulated bitcoin futures platforms. The 24-page Bitwise Prong Two paper included an analysis of potential inflows into a spot bitcoin ETP and a statistical evaluation of the impact of historical inflows into other bitcoin investment products on the bitcoin market.

Both the Bitwise Prong One Paper and the Bitwise Prong Two Paper were included in full as exhibits in the rule proposal disapproved in Bitwise Order II, and their analyses formed the core arguments around why the Sponsor and the Exchange believed the CME bitcoin futures market had met both prongs of the significant market test. The Commission disagreed with the Sponsor's analyses and listed out five specific disagreements regarding the first prong analysis and three specific disagreements regarding the second prong analysis.

The following sections will comprehensively address all eight disagreements the Commission raised regarding the Sponsor's prior analyses in Bitwise Order II.

The Sponsor's Response to the Disagreements Raised by the Commission Regarding the Sponsor's Prior Analysis of the First Prong of the Significant Market Test

Disagreement 1: The Sponsor's acknowledgement of the concerns raised in Robertson and Zhang (2022) and Buccheri et al. (2021) casts doubt on its own IS/CS results.

The first disagreement raised by the Commission regarding the Sponsor's prior analysis of the first prong focuses on the Sponsor's acknowledgement of certain academic concerns surrounding IS/CS price discovery analysis.

According to the Commission:

> Bitwise's first comment letter acknowledges that "classic" price discovery metrics like IS and CS "face difficulties based on the model assumptions of VECM [the Vector Error Correction Model] when the prices under consideration are asynchronous and/or infrequent,[82] citing an academic study by Buccheri et al.[83] that investigates the difficulties to identifying price discovery with VECM models due to the high sparsity of data in markets that record trades at the sub-millisecond level. Bitwise also acknowledges that, "when prices have a high level of sparsity, the VECM is clearly misspecified and the estimates are potentially biased."[76]

[76] See Bitwise Order II, 87 FR at 40288.

The Commission suggests that this means "by its own admission, Bitwise's IS/CS approach is misspecified and its estimates potentially biased."[77]

The Sponsor disagrees. As detailed earlier in this proposal, in the section under the sub-head "*Robertson and Zhang (2022)*[78] *and Buccheri et al. (2021),*" 79 the bias that sparsity introduces into IS/CS statistics runs in a single direction, punishing the market with the higher level of sparsity. In each and every pairwise investigation in the Sponsor's analysis, the CME bitcoin futures market is the market with the higher level of sparsity. Therefore, the IS/CS price discovery ascribed to the CME bitcoin futures market in each investigation should be considered the lower bound of actual contribution, and that the actual contribution of the CME to price discovery is likely higher than stated.

The fact that IS/CS statistics are biased against markets with higher levels of sparsity does not weaken the Sponsor's argument that the CME bitcoin futures market led other markets from a price discovery perspective. It actually strengthens it.

Disagreement 2: The Sponsor performed its IS, CS and TSLL analysis on a daily basis before the monthly or full-sample averaging was applied and did not adequately explain why daily was the appropriate frequency to calculate intermediate values instead of different frequencies such as intraday.

The second disagreement the Commission raised focused on the Sponsor's use of daily results as intermediate values. Specifically, in its analysis, the Sponsor performed IS, CS and

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77 Id.

78 See Robertson and Zhang 2022.

79 Giuseppe Buccheri et al. (2021), "Comment on: Price Discovery in High Resolution," Journal of Financial Econometrics, Volume 19, Issue 3, Summer 2021, pp. 439–451 ("Buccheri et al. 2021").

TSLL analysis on a per day basis, and then averaged the daily results both by month and across the full-sample period.

The Commission observed:

> However, neither the Exchange nor Bitwise explains why Bitwise chose a *daily* basis to compute its IS, CS, and TSLL estimates; provides any information about how variable the daily estimates are, before the monthly and/or full-sample averaging was applied; or provides any information on the robustness of the estimates—that is, whether these daily estimates or the statistical significance of the monthly and/or full-sample averages of such daily estimates are sensitive to different choices that Bitwise could have made for the analysis (*e.g.*, to compute intraday estimates).[80]

Price discovery metrics are not "point in time" metrics, but rather, calculations that require statistical analysis over a reasonable period of time. This is why all ten studies in the prior literature review, as well as all subsequent studies noted by the Commission, have evaluated price discovery on either a daily or a generalized "full study period" basis. The Sponsor elected to use the more-frequent daily basis to better capture and display potential time-dependent changes in leadership, as the Commission previously raised questions around this topic. To be clear, evaluating price discovery on an intraday basis would have been completely out-of-consensus compared to all academic studies reviewed by both the Sponsor and the Commission, and it is not clear what conclusions could have been drawn by such analysis since price discovery analysis of time periods that are too short can lead to spurious results.

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[80] See Bitwise Order II, 87 FR at 40288 (emphasis in original).

Additionally, the Sponsor disagrees with the statement that it has not provided "any information on the robustness of the estimates." The Sponsor included statistical significance tests and visual 95% confidence intervals on its monthly results specifically to highlight the robustness of the underlying daily estimates. The Sponsor also provided detailed guidance on its data inputs and methodology—and relied only on publicly available statistical tools—so that any observer with additional questions about the study could easily replicate the results, adjust them to their own specifications, or drill down on any specific potential analytical angle.

Disagreement 3: The Sponsor has not explained why it is reasonably likely that a would-be manipulator would have to trade on the CME to successfully manipulate the proposed ETP when the spot markets still account for 32-47% of price discovery.

The Commission observed:

> [T]he pairwise IS/CS full-sample average results for CME compared to each of the 10 spot platforms ranged between 52.97% (the CS result versus itBit) to 68.03% (the CS result versus Bitstamp). Even accepting these results and their statistical significance at face value, these results suggest that spot bitcoin markets still account for approximately 32%-47% of price discovery. Yet neither Bitwise nor the Exchange has explained why, notwithstanding this amount of price discovery occurring on spot platforms, it is reasonably likely that a would-be manipulator would nonetheless have to trade on the CME bitcoin futures market to successfully manipulate the proposed ETP.[81]

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[81] See Bitwise Order II, 87 FR at 40289.

The response to this query lies in the words of the Commission itself. Through multiple disapproval orders, the Commission has highlighted the importance of the "lead-lag relationship" between the CME bitcoin futures market and the spot market in satisfying the first prong of the significant market test. For instance, in the Grayscale Order, the Commission wrote:

> The Commission considers the lead/lag relationship between the CME bitcoin futures market and the spot bitcoin market to be central to understanding whether it is reasonably likely that a would-be manipulator of a spot bitcoin ETP would need to trade on the CME bitcoin futures market to successfully manipulate the proposed ETP.[82]

The Commission has also clarified exactly why this lead/lag relationship is so important, writing for instance in the Bitwise Order:

> [I]f the spot market leads the futures market, this would indicate that it would not be necessary to trade on the futures market to manipulate the proposed ETP, even if arbitrage worked efficiently, because the futures price would move to meet the spot price.[83]

The Commission has carried this language through more than a dozen disapproval orders and across multiple years, emphasizing the "central" importance of the "lead-lag relationship" in understanding whether it is reasonably likely that a would-be manipulator would have to trade on the CME bitcoin futures market to successfully manipulate the proposed ETP.

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82 See Grayscale Order, 87 FR at 40313.

83 See Bitwise Order, 84 FR at 55411.

The Commission further clarified that the significant market test does not require the CME market to lead bitcoin spot markets 100% of the time, noting in the Grayscale Order:

> A lead/lag statistical result that CME bitcoin futures prices "lead" spot prices does *not* mean that CME bitcoin futures prices "always" move before spot prices—which would be [an] "obvious" and exploitable arbitrage opportunity…[84]

The Commission is now turning back to the Sponsor to ask why the standard of "leads" having more than 50% of price discovery, is sufficient to satisfy the first prong. The Sponsor's answer can only be that 50% is the uniform academic standard across every price discovery paper the Sponsor has reviewed, as well as all academic papers the Commission has referenced, for the standard the Commission has set.

If the Commission believes that the standard for satisfying the first prong should be higher than "leads" (such as, "overwhelmingly leads" or "nearly always leads"), then the Commission should state that. Until then, the analysis will assume that determining whether the CME futures market "leads" or "lags" the spot market is "central" to understanding the first prong and that the Sponsor's IS/CS analysis that applies the academic consensus methodologies in making such determination is valid.

Disagreement 4: The Sponsor's TSLL results show that the extent to which the CME bitcoin futures market "leads" the 10 spot markets has decreased since 2019. The Sponsor has not explained the implication of the CME's decreasing lead time over the identified spot markets, nor why the CME's "lead" time against the spot markets would not be expected to continue to decrease until it lags spot.

The Commission writes:

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84 See id. at 40313.

> [T]aking Bitwise's TSLL results at face value, as Bitwise acknowledges, the extent to which the CME bitcoin futures market "leads" the 10 unregulated spot platforms has decreased since 2019 to the end of Bitwise's sample period in September 2020. This general trend is also observed in the [Robertson and Zhang (2022)] TSLL analysis, which uses a longer sample period (to Q1 2021) and finds that the CME's average "lead" time has "steadily decreased" among all evaluated markets to about one second in Q4 2020 and Q1 2021. The record, however, does not explain the implication of the CME's decreasing lead over the identified spot platforms, nor why the CME's "lead" time against spot platforms would not be expected to continue to decrease throughout 2021 and 2022 until it "lags" spot platforms.[85]

The Sponsor believes that this disagreement reflects a simple misinterpretation of the TSLL analysis.

TSLL analysis is designed to show whether prices on one market lead or lag prices on another market. It achieves this goal by shifting prices forward and backward and finding the shift that produces the highest level of correlation. In this view, a longer lead time is not indicative of a stronger relationship; it is simply indicative of different times it takes for information to travel.

A shorter lead time suggests that there is a faster transmission of information from one market to another. The correct way to interpret the shortening lead time between the CME

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85 See Bitwise Order II, 87 FR at 40289.

bitcoin futures market and the spot market is that the rate at which information passes from the CME futures market to the spot market is accelerating.

There is no indication in the results, however, that the *direction* of information flow is changing; indeed, as the lead times decrease, the confidence intervals also tighten to indicate that the lead times are still statistically significantly above 0. For example, for December 2017 (the first month of the study), CME's lead time against Coinbase is 26.16 seconds with a 95% confidence interval of 12.72 - 39.59 seconds. For September 2020 (the last month of the study), CME's lead time against Coinbase is 2.11 seconds with a 95% confidence interval of 1.77-2.46 seconds.

In the Sponsor's view, the tightening of the lead time between the two markets should only be seen as a sign of market maturation, since information processing time is accelerating, and should if anything strengthen the view that it is reasonably likely that a would-be manipulator would have to trade on the CME bitcoin futures market to manipulate the proposed ETP.

Disagreement 5: The Sponsor's statistical results are all based on pairwise, two-dimensional analysis and the Sponsor has not explained why its results hold in light of the findings and critiques raised in Alexander and Heck (2020).

The Commission stated:

> [A]ll of Bitwise's statistical results—IS, CS, and TSLL—are based on pairwise, two- dimensional analysis… At least one multidimensional approach to price discovery (Alexander & Heck 2020) finds that CME bitcoin futures "have a very minor effect on price discovery," and that "a faster speed of adjustment and information absorption [occurs] on the unregulated spot and

> derivatives [platforms] than on CME bitcoin futures."… While Bitwise acknowledges the Alexander & Heck 2020 paper… Bitwise neither critiques the multidimensional Alexander & Heck 2020 approach; nor attempts to apply the approach to Bitwise's own data; nor discusses the robustness of Bitwise's two-dimensional methodology in response to the critique in Alexander & Heck 2020 that: "omitting substantial information flows from other markets can produce misleading results....[I]n a two-dimensional model one or other of the instruments must necessarily be identified as price leader."[86]

This criticism was addressed in a prior section of this proposal, under the sub-heading "*Alexander and Heck (2020)*".

Multidimensional analysis is rare in the literature, particularly when comparing amongst different types of markets, because it introduces bias into the assessment of the common price based on the numbers of markets used from each different type of market, or from similar market types.

An exhaustive pairwise analysis can be relied upon to find the market that is leading overall as long as all potential leading markets are included in the analysis. The same cannot be said for multidimensional analysis due to the aforementioned bias. Given these circumstances, the Sponsor believes that the traditional, pairwise, two-dimensional approach to price discovery analysis is the correct approach for exploring the lead-lag relationship between the CME bitcoin futures market and the spot market.

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[86] See Bitwise Order II, 87 FR at 40289.

Section Summary

No single statistical study can answer every question, consider every variable, or use every statistical approach to a given problem.

The Sponsor designed its study — developed over a series of 14 meetings with the Staff — to supplement the broader academic literature investigating price discovery in the bitcoin market. It attempted to be as comprehensive as possible, using all available data and examining all available major trading platforms, including those in spot, regulated futures, and unregulated futures. It used high-quality data providers, conducting a thorough analysis of data providers to find the most accurate data set before beginning its analysis. In an effort to be easily replicable, it detailed its full methodology and used publicly available statistical tools to conduct its analysis. It made these choices in an effort to provide sufficient information to the Commission on the data and methodology underlying its analysis and bring confidence to its results.

The data show convincingly that the CME is the leading source of price discovery, whether evaluated using IS, CS or TSLL, and despite the headwind that the sparsity bias raises against its IS and CS results.

The Sponsor's Response to the Disagreements Raised by the Commission Regarding the Sponsor's Prior Analysis of the Second Prong of the Significant Market Test

Disagreement 1: The Sponsor provides conflicting claims with respect to the demand for a spot bitcoin ETP, which undermines the credibility of Sponsor's estimates for the likely size of such an ETP and the rapidity of inflows into it.

The Commission observed:

> On the one hand, Bitwise downplays potential investor demand, stating that "[w]hile there is interest in a bitcoin ETP," the bitcoin market is "incredibly and increasingly crowded" with options for

investors, noting that investors today can buy bitcoin on crypto trading apps, finance apps, through over-the-counter trusts, via bitcoin futures ETFs, and "in many other ways."... On the other hand… Bitwise also highlights that, unlike GBTC, the proposed ETP would allow for daily creations and redemptions; can be expected to "closely track the value of [b]itcoin, and not periodically trade at substantial premiums to and discounts from the value of [b]itcoin"; and would be "professionally managed, SEC-regulated, highly-liquid, fully transparent, and listed on the NYSE Arca"; and that "at least some segment" of retail and other investors would benefit from such characteristics and would be "affirmatively disadvantaged" by not having access to it… If, as Bitwise claims, U.S. investors have been and are ever-increasingly investing in bitcoin, and the proposed ETP "would add material protections" that are not currently available through GBTC or otherwise for some segment of investors, and would, unlike GBTC, be available to trade immediately on a national securities exchange with daily creations and redemptions, it is not clear that Bitwise's use of the GBTC historical record of $4.7 billion in inflows is a likely, let alone "aggressive," estimate for first-year inflows into a new spot bitcoin ETP.[87]

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87 See Bitwise Order II, 87 FR at 40291.

It is true that the Sponsor details both the headwinds (increasingly crowded competition with other avenues of accessing bitcoin exposure) and tailwinds (unique investor protections afforded) that a new spot bitcoin ETP will face in raising assets. However, the two claims do not contradict each other. The bitcoin investment market is, in fact, crowded, and a spot bitcoin ETP would be attractive in certain ways. The Sponsor's decision to present both sides of the argument should not undermine the credibility of the Sponsor's estimates, but rather add confidence to those estimates by demonstrating the Sponsor's balanced perspective.

Furthermore, the Commission, other than suggesting minor conflicts amongst claims the Sponsor has made, has not disagreed with the crux of the Sponsor's argument in estimating first-year flows by relying on the close approximation historical examples.

For example, SPDR Gold Shares ETF (GLD) was the fastest growing new commodity-trust ETP ever in history with $3.01 billion in first-year flows. The spot bitcoin ETP will also be a new commodity-trust ETP, occupying the same category. The global above-ground gold market cap was roughly $2.1 trillion when GLD debuted in 2004.[88] By comparison, the global bitcoin market cap was $592 billion as of June 30, 2023.[89] If the new spot bitcoin ETP is assumed to be as successful as GLD, the most successful commodity-trust ETP ever, in terms relative to the market caps of the underlying commodities, the new ETP would gather approximately $849 million in first-year flows. The Sponsor's estimate of $4.7 billion in first-year flows for the new spot bitcoin ETP is over five times the $849 million figure.

While there could be meaningful latent demand built up for a spot bitcoin ETP given its unique investor protections, the Sponsor continues to believe that its estimate of $4.7 billion in

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[88] Gold market capitalization as of 2004 is calculated by taking the World Gold Council's estimate of above-ground gold stocks in 2004 multiplied by the price of gold as reported by Macrotrends in November 2004.

[89] Bitcoin market capitalization as of June 30, 2023 was $592 billion according to Blockchain.com.

first-year flows, which is assuming that the new ETP will be over fives times as successful as GLD, the most successful commodity-trust ETP in history, is a safe estimate and the actual first-year flows is unlikely to exceed that value.

Additionally, the Sponsor's analysis should provide comfort that, even if first-year flows exceed $4.7 billion, it is unlikely that trading in the new ETP will have a "predominant influence" on prices in the CME bitcoin futures market. The Sponsors second prong analysis includes a correlation study where GBTC's $4.7 billion maximum single year flow in 2020 was found to have had a negligible correlation to changes in the spot bitcoin price. While we do not have any bitcoin investment vehicle with a higher single year flow to run historical correlation analysis on, the fact that GBTC's $4.7 billion inflow had almost no correlation to bitcoin prices suggests that there is likely a safe margin of error where a higher first-year flow figure would still not be the predominant influence on prices in the CME bitcoin futures market.

This last point is further reinforced by the fact that the CME bitcoin futures market's trading volume grew around six fold between 2020 (when the correlation analysis was done) and 2023. As noted in "The CME Bitcoin Futures Market" section in this proposal, the CME bitcoin futures contracts traded approximately $39.8 billion in June 2023 compared to $6.0 billion in June 2020. Assuming a relationship between trading volume growth and the amount of flows a market could withstand without its prices being dominated by the influence of such flows, the proposed spot bitcoin ETP could have much more than $4.7 billion in first-year flows — perhaps even six times as much ($28 billion, assuming a linear relationship) — without becoming the predominant influence on prices in the CME bitcoin futures market.

Disagreement 2a: The Sponsor's study examined the correlation of inflows into GBTC, BTCE and BTCC compared to spot bitcoin prices, instead of CME bitcoin futures prices. Given that the Sponsor identifies the CME bitcoin futures market as the relevant regulated market of

significant size, the use of spot bitcoin prices for its correlation analysis could render the analysis immaterial.

The Sponsor disagrees that the use of spot prices instead of futures prices could render the correlation analysis immaterial.

In the Grayscale Court's analysis of the second prong, the Court observed that "[b]ecause Grayscale owns no futures contracts, trading in Grayscale can affect the futures market only through the spot market."[90] In other words, when thinking about the potential predominant influence trading in a new spot bitcoin ETP could have on prices in the CME futures market it is erroneous to consider the relationship between the new ETP and the CME futures market in isolation, ignoring the existence of the spot market.

Inflows into a new spot bitcoin ETP will result in purchases of the underlying asset, spot bitcoin. Market participants might attempt to predict the daily inflows into the new ETP and speculate on the CME futures market ahead of time but ultimately they are speculating on how much the inflows could impact the bitcoin market as a whole, and inflows would have to influence both futures and spot markets together to impact prices. In short, given the tight correlation and arbitrage relationship between the bitcoin futures price and spot price,[91] trading in the new spot bitcoin ETP is unlikely to become a predominant influence on prices in the CME futures market without also becoming a predominant influence on prices in the spot market. Therefore, a correlation analysis of the historical impact of inflows to bitcoin prices should be valid when run on either spot prices and futures prices.

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90 See Grayscale Investments, LLC v. SEC, No. 22-1142 (D.C. Cir. Aug. 29, 2023), at 17-18.

91 As demonstrated in a Comment Letter from Professor Robert E. Whaley of Vanderbilt University, and presented and relied upon as evidence in Grayscale, the CME bitcoin futures market and the spot bitcoin market share a 99.9% correlation.

Beyond the argument above around the theoretical validity of using spot prices in the correlation analysis in the context of the second prong, there is also the broader economic reality that, given the high correlation between spot prices and futures prices, the results of the correlation analysis would have been nearly identical. Indeed, the Sponsor ran the same correlation analysis this time between daily/weekly inflows into GBTC in 2020 and daily/weekly price changes in the CME bitcoin futures market and the correlation values were 0.1075 / 0.0771 compared to 0.1087 / 0.0811 in the original analysis when changes in spot prices where used instead.

> *Disagreement 2b: The Sponsor's correlation analysis does not control for any other factors that may have been affecting spot bitcoin prices during the daily or weekly aggregation periods. Thus, the results do not isolate the statistical relationship between spot bitcoin prices and the factor of interest (i.e., flows into GBTC, BTCE, or BTCC).*
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> The Sponsor believes that this argument is not relevant to the question at hand. The goal of the second prong analysis is to demonstrate that trading in the new ETP will not become the predominant influence on prices in the CME bitcoin futures market *as compared to other influences.* If other factors are perfectly controlled, then the results of the analysis would be moot; any amount of isolated buying or selling in relation to the new ETP would perfectly move bitcoin prices up or down because it is the only influence that was not controlled for in the analysis. As the goal of the correlation analysis is to demonstrate that inflows into the ETP do not overwhelm other factors, presence of other factors is not only valid but necessary.
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> *Disagreement 3: The Sponsor has not explained its analysis on why the second prong would be met when its own estimates still indicate that the new ETP would have 36.5% of the daily trading volume and first-year AUM greater than the all the open interest in the CME bitcoin futures market.*

According to the Commission:

> Bitwise's analysis regarding the potential effects of trading in the Shares on CME bitcoin futures prices is vague and conclusory. Bitwise states that it 'believes' that it is unlikely that trading in a new bitcoin ETP will become the predominant influence on prices in the CME bitcoin futures market 'if such trading activity is substantially smaller than the trading activity on the CME bitcoin futures market.'...
>
> However, an alternative calculation using Bitwise's statistics is that a single bitcoin ETP's average daily trading volume could be approximately 36.5% ($143 million divided by $392 million)—more than one-third—of the size of CME bitcoin futures' average daily trading volume. On top of that, assuming, as Bitwise does, potentially $4.7 billion in first-year inflows, such a spot bitcoin ETP could have AUM that exceeds the value of all open interest in CME bitcoin futures contracts. Bitwise has not directly addressed why, given this relative size of estimated daily trading in the Shares compared with daily trading in CME bitcoin futures contracts, and the relative size of the Trust's estimated AUM itself compared with all open interest in CME bitcoin futures contracts, it is nonetheless unlikely that trading in the proposed ETP would be the predominant influence on prices in the CME bitcoin futures market.[92]

Any analysis related to the second prong is forced to make guesses as to what conditions would make predominant influence "likely" or "unlikely." The Sponsor's *logic* that predominant

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92 See Bitwise Order II, 87 FR at 40291.

influence is unlikely "if [the new ETP's] trading activity is substantially smaller than the trading activity on the CME bitcoin futures market" is fundamentally sound and concrete since markets with deeper liquidity can absorb cross-market trades with less price movement.

The actual disagreement, therefore, then is likely less about the logic and more about the threshold at which the logic produces an affirmative interpretation that predominant influence is unlikely. The Sponsor argued that if daily trading in the new ETP is 36.5% of the trading in the CME futures market it is unlikely to become the predominant influence. The Commission questioned if that is sufficient.

Fortunately, the CME bitcoin futures market has matured further since 2020 (the year which our daily trading volume estimates were based upon). Again, as noted in "The CME Bitcoin Futures Market" section in this proposal, the CME bitcoin futures contracts traded approximately $39.8 billion in June 2023 compared to $6.0 billion in June 2020, over a six-fold growth in trading volume. The Sponsor's $142 million daily trading volume estimate of the new ETP was based on the Sponsor's $4.7 billion first-year inflow estimate multiplied by the higher of GLD and GBTC's average ADV/AUM ratio (3.04%), so that estimate remains the same assuming the same first-year inflows to the new ETP. Applying the over six-fold growth in the CME futures market's trading activity to our past estimates, it would mean that the trading activity in the new ETP now would be approximately only 6% of the trading activity in the CME bitcoin futures market. This development should provide a higher degree of confidence that trading in the new ETP is unlikely to be the predominant influence of prices in the CME bitcoin futures market.

With regards to the Commission's concern around the fact that the AUM of the new ETP, based on our $4.7 billion first-year flow estimate, could exceed all open interest in the CME

bitcoin futures market, the Sponsor does not find comparing those two figures relevant to the question at hand. The second prong asks whether *trading* in the new ETP would be unlikely to be the predominant influence on prices, not *assets*. One could interpret "trading" as trading activity in the secondary market or inflows in the secondary market, both of which the Sponsor has analyzed, but AUM is not directly relevant; it is only relevant to the extent that AUM can influence the amount of "trading" that occurs in the ETP, which the Sponsor's analysis captures.

Additionally, AUM is an asset related figure and open interest is a trading related figure. Comparing the two literally and concluding that a market with a higher asset related figure is likely to become the predominant influence on prices on a market with a lower trading related figure is a bit like comparing apples to oranges.

Section Summary

The Sponsor's prior estimates of first-year flows in a new spot bitcoin ETP and prior correlation analysis studying the relationship between inflows into GBTC, BTCE and BTCC and spot bitcoin prices are still valid. Furthermore, in light of the massive growth of trading activity in the CME bitcoin futures market, the Sponsor's analysis that trading in the new spot bitcoin ETP is unlikely to be the predominant influence on prices in the CME bitcoin futures market is even stronger than before.

Availability of Information Regarding the Shares and Bitcoin

The NAV will be disseminated daily to all market participants at the same time. Quotation and last-sale information regarding the Shares will be disseminated through the facilities of the CTA. The ITV will be calculated every 15 seconds throughout the core trading session each trading day, and available through online information services.

The Sponsor will cause information about the Shares to be posted to the Trust's website

(https://www.bitwiseinvestments.com/): (i) the NAV and NAV per Share for each Exchange trading day, posted at end of day; (ii) the daily holdings of the Trust, before 9:30 a.m. E.T. on each Exchange trading day; (iii) the Trust's effective prospectus, in a form available for download; and (iv) the Shares' ticker and CUSIP information, along with additional quantitative information updated on a daily basis for the Trust. For example, the Trust's website will include (i) the prior business day's trading volume, the prior business day's reported NAV and closing price, and a calculation of the premium and discount of the closing price or mid-point of the bid/ask spread at the time of NAV calculation ("Bid/Ask Price") against the NAV; and (ii) data in chart format displaying the frequency distribution of discounts and premiums of the daily closing price or Bid/Ask Price against the NAV, within appropriate ranges, for at least each of the four previous calendar quarters. The Trust's website will be publicly available prior to the public offering of Shares and accessible at no charge.

Investors may obtain on a 24-hour basis bitcoin pricing information based on the CME US Reference Rate, CME UK Reference Rate and CME Bitcoin Real Time Price, bitcoin spot market prices and bitcoin futures price from various financial information service providers. Current bitcoin spot market prices are also generally available with bid/ask spreads from bitcoin trading platforms, including the Constituent Platforms of the CME US Reference Rate.

Trading Halts

With respect to trading halts, the Exchange may consider all relevant factors in exercising its discretion to halt or suspend trading in the Shares of the Trust.[93] Trading in Shares of the Trust will be halted if the circuit breaker parameters in NYSE Arca Rule 7.12-E have been

[93] See NYSE Arca Rule 7.12-E.

reached. Trading also may be halted because of market conditions or for reasons that, in the view of the Exchange, make trading in the Shares inadvisable.

The Exchange may halt trading during the day in which an interruption to the dissemination of the ITV occurs.[94] If the interruption to the dissemination of the ITV persists past the trading day in which it occurred, the Exchange will halt trading no later than the beginning of the trading day following the interruption. In addition, if the Exchange becomes aware that the NAV with respect to the Shares is not disseminated to all market participants at the same time, it will halt trading in the Shares until such time as the NAV is available to all market participants. The Exchange may also halt trading if the value of the underlying commodity is no longer calculated or available on at least a 15-second delayed basis from a source unaffiliated with the Sponsor, Trust, Bitcoin Custodian or the Exchange or if the Exchange stops providing a hyperlink on its Web site to any such unaffiliated commodity value.

Trading Rules

The Exchange deems the Shares to be equity securities, thus rendering trading in the Shares subject to the Exchange's existing rules governing the trading of equity securities. Shares will trade on the NYSE Arca Marketplace from 4 a.m. to 8 p.m. E.T. in accordance with NYSE Arca Rule 7.34-E (Early, Core, and Late Trading Sessions). The Exchange has appropriate rules to facilitate transactions in the Shares during all trading sessions. As provided in NYSE Arca Rule 7.6-E, the minimum price variation ("MPV") for quoting and entry of orders in equity securities traded on the NYSE Arca Marketplace is $0.01, with the exception of securities that are priced less than $1.00 for which the MPV for order entry is $0.0001.

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94 A limit up/limit down condition in the futures market would not be considered an interruption requiring the Trust to be halted.

The Shares will conform to the initial and continued listing criteria under NYSE Arca Rule 8.201-E. The trading of the Shares will be subject to NYSE Arca Rule 8.201-E(g), which sets forth certain restrictions on Equity Trading Permit ("ETP") Holders acting as registered Market Makers in Commodity-Based Trust Shares to facilitate surveillance.[95] The Exchange represents that, for initial and continued listing, the Trust will be in compliance with Rule 10A-3 under the Act,[96] as provided by NYSE Arca Rule 5.3-E. A minimum of 100,000 Shares of the Trust will be outstanding at the commencement of trading on the Exchange.

Surveillance

The Exchange represents that trading in the Shares of the Trust will be subject to the existing trading surveillances administered by the Exchange, as well as cross-market surveillances administered by FINRA on behalf of the Exchange, which are designed to detect violations of Exchange rules and applicable federal securities laws.[97] The Exchange represents that these procedures are adequate to properly monitor Exchange trading of the Shares in all trading sessions and to deter and detect violations of Exchange rules and federal securities laws

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95 Under NYSE Arca Rule 8.201-E(g), an ETP Holder acting as a registered Market Maker in the Shares is required to provide the Exchange with information relating to its trading in the underlying commodity, related futures or options on futures, or any other related derivatives. Commentary .04 of NYSE Arca Rule 11.3-E requires an ETP Holder acting as a registered Market Maker, and its affiliates, in the Shares to establish, maintain and enforce written policies and procedures reasonably designed to prevent the misuse of any material nonpublic information with respect to such products, any components of the related products, any physical asset or commodity underlying the product, applicable currencies, underlying indexes, related futures or options on futures, and any related derivative instruments (including the Shares). As a general matter, the Exchange has regulatory jurisdiction over its ETP Holders and their associated persons, which include any person or entity controlling an ETP Holder. To the extent the Exchange may be found to lack jurisdiction over a subsidiary or affiliate of an ETP Holder that does business only in commodities or futures contracts , the Exchange could obtain information regarding the activities of such subsidiary or affiliate through surveillance sharing agreements with regulatory organizations of which such subsidiary or affiliate is a member.

96 17 CFR 240.10A-3.

97 FINRA conducts cross-market surveillances on behalf of the Exchange pursuant to a regulatory services agreement. The Exchange is responsible for FINRA's performance under this regulatory services agreement.

applicable to trading on the Exchange.

The Exchange further represents that it may obtain information regarding trading in the Shares and the CME Market from the CME and other markets and other entities that are members of the ISG or with which the Exchange has in place a comprehensive surveillance sharing agreement.[98] The Exchange or FINRA, on behalf of the Exchange, or both, will communicate as needed regarding trading in the Shares and the CME Market with the CME and other markets and entities that are members of the ISG, and the Exchange or FINRA, on behalf of the Exchange, or both, may obtain trading information regarding trading in the Shares, the CME Market and the underlying commodity, as applicable, from such markets and other entities.

Also, pursuant to NYSE Arca Rule 8.201-E(g), the Exchange is able to obtain information regarding trading in the Shares, bitcoin futures and the underlying bitcoin through ETP Holders acting as registered Market Makers, in connection with such ETP Holders' proprietary or customer trades through ETP Holders which they effect on any relevant market.

In addition, the Exchange has a general policy prohibiting the improper distribution of material, non-public information by its employees.

All statements and representations made in this filing regarding (i) the description of the index, portfolio or referenced asset, (ii) limitations on index or portfolio holdings or reference assets, or (iii) the applicability of Exchange listing rules specified in this rule filing will constitute continued listing requirements for listing the Shares on the Exchange.

The Sponsor has represented to the Exchange that it will advise the Exchange of any failure by the Trust to comply with the continued listing requirements, and, pursuant to its

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98 For a list of current ISG members, see https://isgportal.org/. The Exchange notes that not all components of the Trust may trade on markets that are members of ISG or with which the Exchange has in place a comprehensive surveillance sharing agreement.

obligations under Section 19(g)(1) of the Act, the Exchange will monitor for compliance with the continued listing requirements. If the Trust is not in compliance with the applicable listing requirements, the Exchange will commence delisting procedures under NYSE Arca Rule 9.2-E(a).

2. Statutory Basis

The basis under the Act for this proposed rule change is the requirement under Section 6(b)(5)[99] that an exchange have rules that are designed to prevent fraudulent and manipulative acts and practices, to promote just and equitable principles of trade, to remove impediments to, and perfect the mechanism of a free and open market and, in general, to protect investors and the public interest.

The Exchange believes that the proposed rule change is designed to prevent fraudulent and manipulative acts and practices and to protect investors and the public interest in that the Shares will be listed and traded on the Exchange pursuant to the initial and continued listing criteria in NYSE Arca Rule 8.201-E. Further, the Exchange has demonstrated that the proposed rule change satisfies Section 6(b)(5) of the Act by showing that the CME Market is a regulated market of significant size that shares surveillance with the Exchange.

As discussed above, both existing academic literature and the Sponsor's own studies show that the CME Market leads price discovery relative to the bitcoin spot market. As a result, and given that the Sponsor has demonstrated that it is unlikely that trading in the Shares will become the predominant influence upon prices in the CME Market, the CME Market represents a regulated market of significant size related to spot bitcoin, and that there is a reasonable likelihood that a person attempting to manipulate the Shares would also have to trade on that

[99] 15 U.S.C. 78f(b)(5).

market to successfully manipulate the Shares.

The Exchange has in place surveillance procedures that are adequate to properly monitor trading in the Shares and the CME Market in all trading sessions and to deter and detect attempted manipulation of the Shares or other violations of Exchange rules and applicable federal securities laws. The Exchange or FINRA, on behalf of the Exchange, or both, will communicate as needed regarding trading in the Shares and bitcoin futures with the CME and other markets and other entities that are members of the ISG, and the Exchange or FINRA, on behalf of the Exchange, or both, may obtain trading information regarding trading in the Shares from such markets and other entities. In addition, the Exchange may obtain information regarding trading in the Shares from markets and other entities that are members of ISG or with which the Exchange has in place a comprehensive surveillance sharing agreement. The Exchange is also able to obtain information regarding trading in the Shares and bitcoin futures or the underlying bitcoin through ETP Holders, in connection with such ETP Holders' proprietary or customer trades which they effect through ETP Holders on any relevant market.

Quotation and last-sale information regarding the Shares will be disseminated through the facilities of the CTA. The Trust's website will also include a form of the prospectus for the Trust that may be downloaded. The website will include the Shares' ticker and CUSIP information, along with additional quantitative information updated on a daily basis for the Trust. The Trust's website will include (i) daily trading volume, the prior business day's reported NAV and closing price, and a calculation of the premium and discount of the closing price or mid-point of the Bid/Ask Price against the NAV; and (ii) data in chart format displaying the frequency distribution of discounts and premiums of the daily closing price or Bid/Ask Price against the NAV, within appropriate ranges, for at least each of the four previous calendar

quarters. The Trust's website will be publicly available prior to the public offering of Shares and accessible at no charge.

Trading in Shares of the Trust will be halted if the circuit breaker parameters in NYSE Arca Rule 7.12-E have been reached or because of market conditions or for reasons that, in the view of the Exchange, make trading in the Shares inadvisable.

The proposed rule change is designed to perfect the mechanism of a free and open market and, in general, to protect investors and the public interest in that it will facilitate the listing and trading of a new type of exchange-traded product based on the price of bitcoin that will enhance competition among market participants, to the benefit of investors and the marketplace. As noted above, the Exchange has in place surveillance procedures that are adequate to properly monitor trading in the Shares in all trading sessions and to deter and detect violations of Exchange rules and applicable federal securities laws.

B. Self-Regulatory Organization's Statement on Burden on Competition

The Exchange does not believe that the proposed rule change will impose any burden on competition that is not necessary or appropriate in furtherance of the purpose of the Act. The Exchange notes that the proposed rule change will facilitate the listing and trading of a new type of Commodity-Based Trust Share based on the price of bitcoin that will enhance competition among market participants, to the benefit of investors and the marketplace.

C. Self-Regulatory Organization's Statement on Comments on the Proposed Rule Change Received from Members, Participants, or Others

No written comments were solicited or received with respect to the proposed rule change.

III. Date of Effectiveness of the Proposed Rule Change and Timing for Commission Action

Within 45 days of the date of publication of this notice in the Federal Register or within such longer period up to 90 days (i) as the Commission may designate if it finds such longer

period to be appropriate and publishes its reasons for so finding or (ii) as to which the self-regulatory organization consents, the Commission will:

(A) by order approve or disapprove the proposed rule change, or

(B) institute proceedings to determine whether the proposed rule change should be disapproved.

IV. Solicitation of Comments

Interested persons are invited to submit written data, views, and arguments concerning the foregoing, including whether the proposed rule change is consistent with the Act. Comments may be submitted by any of the following methods:

Electronic comments:

- Use the Commission's Internet comment form (http://www.sec.gov/rules/sro.shtml); or
- Send an e-mail to rule-comments@sec.gov. Please include File Number SR-NYSEARCA-2023-44 on the subject line.

Paper comments:

- Send paper comments in triplicate to: Secretary, Securities and Exchange Commission, 100 F Street, NE, Washington, DC 20549-1090.

All submissions should refer to File Number SR-NYSEARCA-2023-44. This file number should be included on the subject line if e-mail is used. To help the Commission process and review your comments more efficiently, please use only one method. The Commission will post all comments on the Commission's Internet website (http://www.sec.gov/rules/sro.shtml). Copies of the submission, all subsequent amendments, all written statements with respect to the proposed rule change that are filed with the Commission, and all written communications relating to the

proposed rule change between the Commission and any person, other than those that may be withheld from the public in accordance with the provisions of 5 U.S.C. 552, will be available for website viewing and printing in the Commission's Public Reference Room, 100 F Street, NE, Washington, DC 20549 on official business days between the hours of 10:00 a.m. and 3:00 p.m. Copies of the filing also will be available for inspection and copying at the principal office of the Exchange. All comments received will be posted without change. Persons submitting comments are cautioned that we do not redact or edit personal identifying information from comment submissions. You should submit only information that you wish to make available publicly. All submissions should refer to File Number SR-NYSEARCA-2023-44 and should be submitted on or before [insert date 21 days from publication in the Federal Register].

For the Commission, by the Division of Trading and Markets, pursuant to delegated authority.[100]

J. Matthew DeLesDernier,
Deputy Secretary.

[100] 17 CFR 200.30-3(a)(12).