



November 8, 2016

Mr. Robert W. Errett
Deputy Secretary
U.S. Securities & Exchange Commission ("SEC")

RE: The October 12, 2016 Release No. 34-79084; File No. SR-BatsBZX-2016-30

Dear Mr. Errett:

In response to the SEC request for comments on whether to approve a proposed rule change to the Bats BZX Exchange BZX rule 14.11(e)(4) to list and trade Winklevoss Bitcoin Shares issued by the Winklevoss Bitcoin Trust, ARK Investment Management ("ARK") asks you to consider the following letter.

To preface, ARK strongly believes in the long-term viability of permissionless blockchains and the cryptocurrencies that ride atop them, including bitcoin, which is the best known and most widely deployed example.¹ ARK has been an SEC registered investment adviser since 2014, employing thematic investing strategies in a range of investment products, including exchange traded funds ("ETFs"). Since ARK's inception, cryptocurrencies have been a focus within our thematic investing. In September of 2015 we became the first public fund manager to invest in bitcoin,² buying Grayscale's Bitcoin Investment Trust (GBTC) through the OTC Markets Group's OTCQX.

We are believers in the capital market's ability to provide investors with accessible and safe exposure to bitcoin, and believe that if done correctly an ETF could become the best vehicle to do so. Bitcoin is less than a decade old, however, so utmost care must be taken in

¹ Bitcoin with a capital "B" is an open source, peer-to-peer network upon which the digital currency bitcoin, with a lower-case "b," is transacted.

² <http://www.prnewswire.com/news-releases/ark-invest-becomes-first-public-fund-manager-to-invest-in-bitcoin-300143030.html>

examining the maturity of the underlying bitcoin markets in addition to the vehicles through which sponsors attempt to bring securitized bitcoin to market.

As a registered investment adviser with five ETFs and extensive capital markets experience, ARK has considered the merits of bringing a bitcoin ETF to market. After thorough examination, we think it would be premature to launch a bitcoin ETF because we do not believe the bitcoin markets are liquid enough to support an open-end fund, or that an ecosystem of institutional grade infrastructure players is yet available to support such a product.

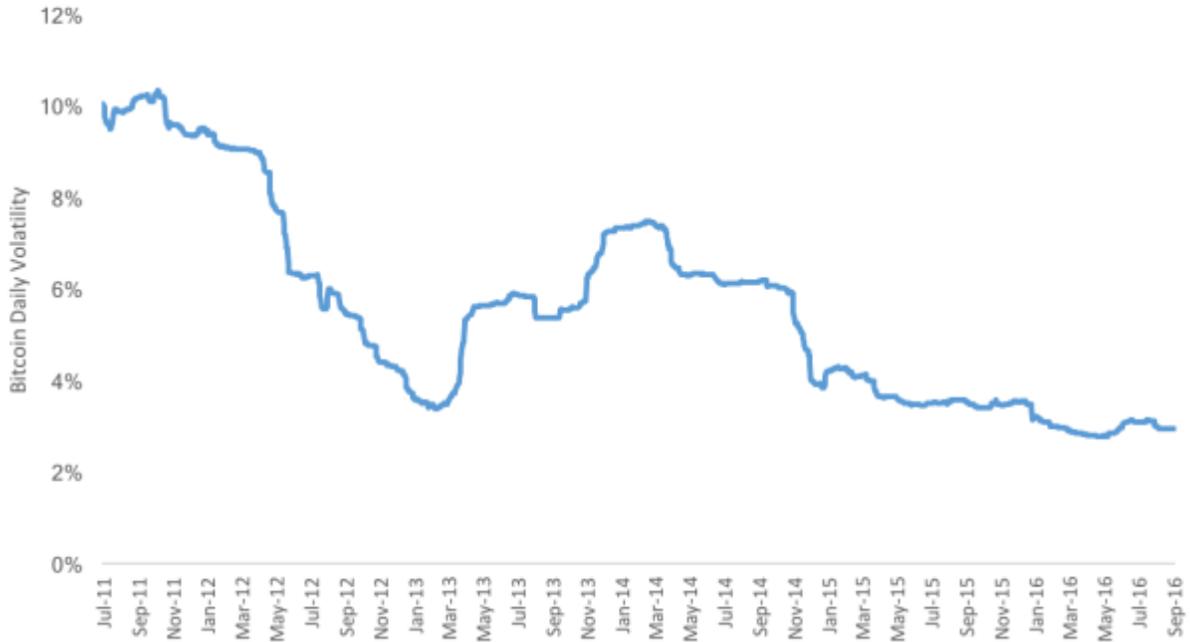
Therefore, in response to the SEC's request for comment on the questions listed below, we submit the following:

1. What are commenters' views about the current stability, resilience, fairness, and efficiency of the markets on which bitcoin are traded?

The standard deviation of returns, also known as volatility, is one of the most common proxies for **stability**. The smaller the standard deviation of returns, the lower the volatility, and therefore the more stable an investment instrument is. Bitcoin's daily volatility has been steadily decreasing over the last five years as shown below.³

³ The *Bitcoin Daily Volatility* line graph is measured by the trailing year standard deviation of bitcoin's daily percent price changes from July 2011 to September 2016. Source: ARK Investment Management LLC, data sourced from CoinDesk.

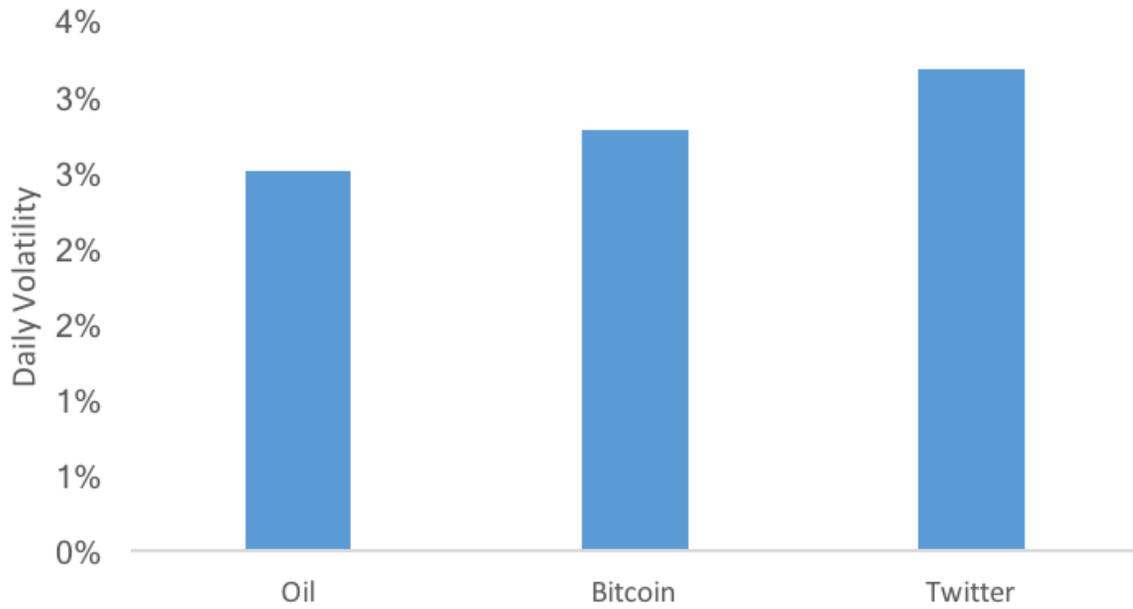
Bitcoin Daily Volatility
Over the Trailing Year



Over the last year bitcoin has been slightly more volatile than oil, but less volatile than Twitter (TWTR), as shown below. Being within this range demonstrates that bitcoin is within the bounds of high-risk investments that are tolerable to capital market investors.⁴

⁴ *Daily Volatility Over the Last Year* is measured by the standard deviation of daily percent price changes for the period from 10/25/2015 to 10/25/2016. Source: ARK Investment Management LLC, data sourced from Bloomberg.

Daily Volatility Over the Last Year



With regards to **resilience**, the recent Bitfinex hack that occurred in early August 2016 is a good example of bitcoin’s resilience. Per CoinDesk price data on July 30, 2016—prior to any information seeping into the market about the hack—the bitcoin price was just above \$650 USD.⁵ When information started to leak about the hack, bitcoin’s price began to decline, which turned into a precipitous drop that momentarily took it below \$500 USD on August 2, 2016.⁶ However, the price rebounded quickly as buyers came into the market to take advantage of the volatility, and the price of bitcoin has now recovered and is above its level before the hack.⁷ Bitcoin’s price behavior pre-and-post the Bitfinex hack indicates a maturing market where investors have a better sense of the asset’s intrinsic value and so stand ready to increase their positions in times of volatility.

⁵ <http://www.coindesk.com/price/>

⁶ <http://www.coindesk.com/bitcoin-drops-12-exchange-hack-amplifies-price-decline/>

⁷ As of November 7, 2016 at 2 pm EST the price was above \$700, per CoinDesk price data.

We believe part of what encouraged investors to buy into bitcoin's drop and support the price was their faith that the underlying blockchain had not been compromised. While the Bitfinex incident was unfortunate, investors quickly understood it did not represent a security flaw within Bitcoin and its blockchain, but rather was an attack on Bitfinex's "hot wallets." A *hot wallet* refers to a bitcoin wallet that has a direct connection to the internet. This is in contrast to *cold storage*, which has a physical gap between the bitcoin storage mechanism and the internet, and is a more secure method for storing large amounts of bitcoin. As an analogy, hot wallets can be thought of as an application functioning on top of the broader operating system that is Bitcoin's blockchain. It is important to understand that just because a faulty application gets hacked (i.e., Bitfinex's hot wallets), doesn't mean the underlying operating system has an associated vulnerability.

With regard to **fairness**, we have no reason to think the bitcoin markets are unfair. There are rumors of Chinese exchanges employing market making bots to boost trading volumes on their exchanges, but we do not think that makes the markets unfair. We believe it actually tightens the spread between the bid and ask, which one could argue benefits investors.

We would not yet consider the bitcoin markets **efficient**. There still exist significant differences in price among the various exchanges, especially among exchanges that offer different fiat currency pairs. China drives much of the volume in the bitcoin markets, and the bitcoin/Chinese Yuan (XBT/CNY) quote is apt to trade at a significant premium to the bitcoin/US Dollar (XBT/USD) quote. For example, the Wall Street Journal reported the premium for bitcoin priced in Chinese yuan was as large as 7.2% this summer.⁸ Large arbitrage opportunities wouldn't exist for long in efficient markets, but they do persist in bitcoin markets.

Part of bitcoin's inefficiency is a function of the nascent bitcoin derivatives market. Derivatives provide investors more ways to hedge against bitcoin's potential price

⁸ <http://www.wsj.com/articles/china-buying-sparks-bitcoin-surge-1464608221>

movements, introduce more volume and liquidity, and generally give the markets more points of information about bitcoin's future prospects, leading to tighter bid/ask spreads. Most derivatives activity within the bitcoin markets is offered by entities outside of the purview of US regulators, like the Bitcoin Mercantile Exchange (BitMEX). While BitMEX appears to be well managed, our understanding is that it has little regulatory oversight, making it largely inaccessible to institutional investors.

Within the United States, TeraExchange offers bitcoin forwards, but as of yet no one offers regulated bitcoin futures. Bitcoin options offered by regulated US entities will hopefully come next, but as of yet we're not aware of any on the horizon. The lack of a robust and regulated derivatives market means market participants do not have a broad basket of tools at their disposal, making hedging difficult, and as a result keeping away many market makers that provide significant liquidity to traditional capital markets. While products may be in development, a full suite of investor tools that will drive market efficiency and eliminate price disparities is likely a couple of years away, at the least.

2. What are commenters' views on whether an asset with the novel and unique properties of a bitcoin is an appropriate underlying asset for a product that will be traded on a national securities exchange?

ARK has little doubt that as bitcoin matures it will someday become an **appropriate underlying asset** for an ETF traded on a national securities exchange. Bitcoin operates upon the longest running and most widely used blockchain in the world. Bitcoin's open source code gave birth to the entire blockchain movement. Per our analysis, its transactions are validated by over \$250 million USD of specialized computers—called miners—that are distributed around the globe and secure Bitcoin from nefarious actors. As network usage grows, the level of capital investment should also grow because the miners supporting the network are economically incentivized via the price of bitcoin and its transaction volume. As innovative use cases grow atop an increasingly secure Bitcoin network, we believe bitcoin will be recognized as the first of its kind in a new asset class that is integral to the global economy.

As to the optics of bitcoin within an ETF, bitcoin is becoming appropriate as an underlying asset. While its reputation was marred initially in the public eye by “sin activities,” researchers from the London School of Economics & Political Science, Deutsche Bundesbank, and the University of Wisconsin have shown through network analytics that Bitcoin is displaying a “sharp progression away from ‘sin’ and toward legitimate enterprises.”⁹

3. What are commenters’ views on the risk of loss via computer hacking posed by such an asset? What are commenters’ views on whether an ETP based on such an asset would be susceptible to manipulation?

As for the risk of loss via a computer **hack**, the risk is no greater than a heist of gold from an investment vehicle, so long as the proper measures are taken to guard the digital keys securing bitcoin. For example, bitcoin keys can be printed on paper and stored in vaults around the world, similar to the way gold can be physically stored. For additional protection, those keys can be split into pieces that are then encrypted (e.g., Shamir’s secret sharing¹⁰) and can be scattered in secure vaults around the world. A thief would need to physically break into a number of different vaults, decrypt the pieces of keys, and assemble them into a workable key to actually move the bitcoin. Such a mechanism is arguably more secure than the storage of gold bars, as the compromise of a single vault can induce loss with gold, whereas in the situation described above multiple vaults would have to be compromised to steal bitcoin. Even in the case of a multiple vault compromise, other security measures can be triggered, such as recovery keys using Secure Bitcoin Vaults.¹¹

4. What are commenters’ views on the manner in which the Trust proposes to value its holdings?

We believe there are more robust ways to value the Trust’s holdings (i.e., bitcoin) than using the spot price of a single exchange, such as Gemini, even if Gemini is using a 4 pm auction

⁹ https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2808762

¹⁰ <http://research.ijais.org/volume6/number2/ijais13-451003.pdf>

¹¹ <http://hackingdistributed.com/2016/02/26/how-to-implement-secure-bitcoin-vaults/>

to bolster price discovery and the assessment of the net asset value (“NAV”).¹² Single bitcoin exchanges are too limited to provide a fair proxy for value. Instead an index of the most reliable exchanges should be used.

Bitcoin trades on a number of exchanges around the world, including in the United States, and most of these exchanges can be considered isolated liquidity pools.¹³ Gemini Exchange typically processes less than 10% of the total volume in the XBT/USD pair, which can be seen below from the Bitcoinity.org screenshot of trailing 30-day trading volumes.¹⁴ Because single exchanges are effectively isolated liquidity pools, they are more vulnerable to manipulation or security breach than the broader market.

Bitcoin exchanges

Timespan: 24h 3d 7d 30d 6m 2y 5y Currency: USD EUR CNY SGD GBP PLN MXN more

	Name	Rank	Volume [BTC]	Spread [%]	Spread 10 BTC [%]	Spread 100 BTC [%]	Volatility (stddev)	Trades per minute
1	Bitfinex	1 4,462	1 258,037	1 0.02	2 0.07	2 0.38	0.79	3.40
2	itBit	2 2,027	82,577	0.10	5 0.13	3 0.52	2 0.61	0.88
3	Bitstamp	3 1,908	4 119,070	0.15	0.28	0.88	0.97	2.73
4	BTC-e	4 1,617	3 132,516	0.16	0.41	1.07	1.05	1 19.44
5	OKCoin	5 1,043	77,824	3 0.02	0.23	1.16	3 0.71	4 3.46
6	GDAX	868	2 134,216	2 0.02	4 0.11	5 0.85	5 0.74	3 8.57
7	Gemini	714	71,317	5 0.03	3 0.09	4 0.55	1 0.58	0.44
8	Kraken	479	35,647	0.21	0.44	1.72	1.05	0.95
9	CEX.IO	420	24,473	0.05	0.84	2.97	0.89	2.75
10	lakeBTC	221	5 97,778	1 0.02	1 0.04	1 0.14	4 0.74	2 9.63

To reduce noise and the potential manipulation of the ETF NAV, it would be more accurate and responsible to use an index comprised of multiple exchanges such as the NYSE’s NYXBT index and TradeBlock’s XBK. Those in the business of making reliable indices should be entrusted with the responsibility of doing so for an ETF. The index provider then provides

¹² <https://gemini.com/blog/introducing-the-first-ever-daily-bitcoin-auction/>

¹³ To transfer funds between exchanges would require sending a transaction using Bitcoin’s blockchain. Depending on the exchange’s policies and state of the Bitcoin network, confirmation and release of funds can take minutes to hours.

¹⁴ Screenshot taken at 2:51 pm EST on Monday, November 7, 2016:

<http://data.bitcoinity.org/markets/exchanges/USD/30d>

the extra oversight of vetting the governance, listings, and market participants of each constituent exchange. We also wonder if using only Gemini's spot price could serve to incentivize Authorized Participants ("APs") and other market participants to direct traffic and flow to Gemini, at the expense of best execution.

5. What are commenters' views regarding whether any potential conflict of interest or other issue might arise due to the relationship between entities such as the Sponsor, the Custodian, and the Gemini Exchange?

ARK believes there are potential conflicts of interest due to the relationship between the Sponsor, the Custodian, and the Gemini Exchange that will either need to be eliminated or mitigated. We would suggest a more robust system of checks and balances, as well as a regular independent third-party review to ensure proper shareholder disclosure and protection.

For example, one can imagine a scenario where the Custodian could lend out bitcoin for profit, similar to "securities lending." Since oversight is provided by the Sponsor, such "securities lending" behavior theoretically could incur more risk than if the Sponsor were an independent third party with nothing to gain from the Custodian's lending activities. In the case that a borrower defaults on the bitcoin that the Custodian has lent out, and the Custodian is not able to cover these losses, the loss could be passed onto shareholders. A robust system of checks and balances is lacking in this interrelated structure, and these checks and balances could be even more critical for an asset class in its infancy. Avoiding weak checks and balances was the impetus for the SEC to examine and amend rules regarding self-custody in the past.¹⁵

ARK also believes a bitcoin ETF Sponsor should be registered as an investment adviser with the SEC, because that requires certain fiduciary and corporate governance standards that protect shareholders. Preferably, sponsors should have a demonstrated level of expertise or track record offering ETFs, since ETFs are still relatively new instruments that require

¹⁵ <https://www.sec.gov/investor/alerts/bulletincustody.htm>

regulatory exemptive relief, as well as significant resources and experience to operate properly. A fund structure that requires a Board of Trustees independent from the Sponsor's Board of Directors would provide further oversight on any potential conflicts of interest or other issues that might arise.

6. What are commenters' views on these recommendations regarding additional security, control, and insurance measures?

Proof of control and **multisig protocols** are both good practices that would bolster shareholder protections. Proof of control is a good example of how bitcoin's digital and transparent nature could increase shareholder trust. For example, shareholders of gold ETFs need to rely on the credibility of auditors, while shareholders of bitcoin ETFs could see with their own eyes on Bitcoin's blockchain the amount of bitcoin owned by the Trust. Such transparency may help ameliorate the potential conflict of interest detailed in Question 5 above. That said, security specialists should be consulted to make sure that the Trust is not opening itself to any vulnerabilities in frequently providing proof of control.

We believe that bitcoin in a hot wallet, or any bitcoin that is accessible via the internet, must be insured. Bitcoin in a hot wallet should be insured because it is accessible remotely, which opens up a number of vectors for attack. An example of bitcoin in a hot wallet for this product may be when an AP sources bitcoin for the Custodian. During this process, there is a period when the bitcoin is within the AP's trading account on a bitcoin exchange, which likely means the bitcoin is exposed to and accessible from the internet. Insuring this bitcoin, which will be a fraction of the total bitcoin under custody for the Trust, is advisable. Many of the most reputable cryptocurrency exchanges follow a similar protocol in which hot wallets are 100% insured, but cold storage is not.

We don't think bitcoin in cold storage necessarily needs to be insured because (1) a properly designed cold storage system is engineered to a point that makes the likelihood of a heist almost zero, and (2) it would be prohibitively expensive. The insurance for existing gold ETFs serves as a precedent for a bitcoin ETF, especially because one can physically

store bitcoin keys in vaults, similar to gold. As explained in the Form 10-K for the fiscal year ended September 30, 2015 for the SPDR Gold Trust (GLD):¹⁶

The Trust does not insure its gold. The Custodian maintains insurance with regard to its business on such terms and conditions as it considers appropriate which does not cover the full amount of gold. The Trust is not a beneficiary of any such insurance and does not have the ability to dictate the existence, nature or amount of coverage. Therefore, Shareholders cannot be assured that the Custodian will maintain adequate insurance or any insurance with respect to the gold held by the Custodian on behalf of the Trust. In addition, the Custodian and the Trustee do not require any direct or indirect subcustodians to be insured or bonded with respect to their custodial activities or in respect of the gold held by them on behalf of the Trust. Consequently, a loss may be suffered with respect to the Trust's gold which is not covered by insurance and for which no person is liable in damages.

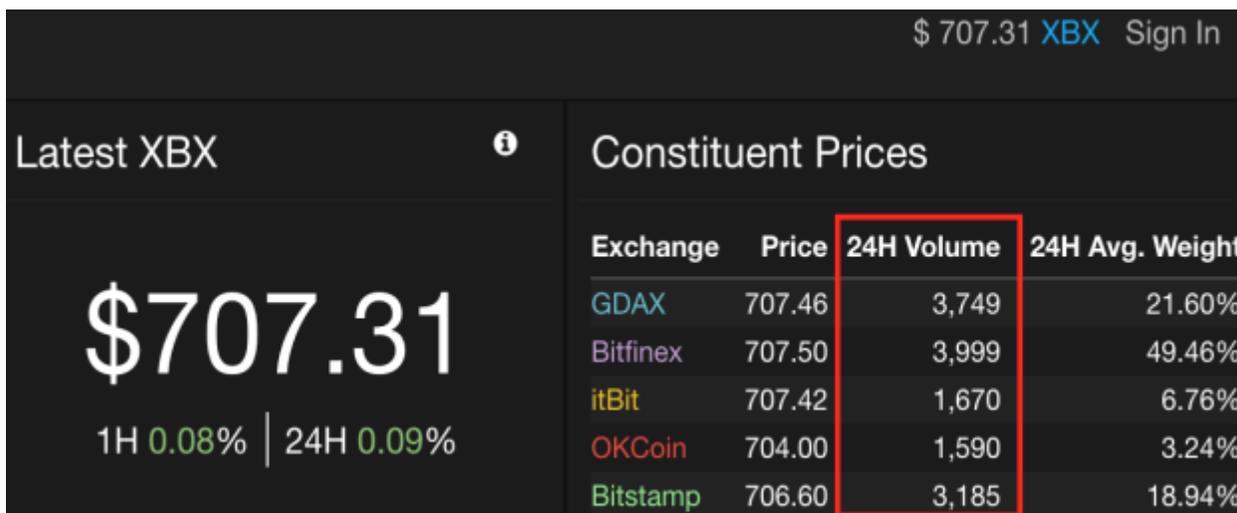
While we understand the fear is high with regard to a bitcoin hack given occurrences like Mt. Gox and Bitfinex, it is important to understand that the bitcoin in those cases was not properly secured. If property security measures are taken then we believe the custody of bitcoin can be as secure as the custody of gold, where precedent was set for not insuring the entirety of assets under custody.

7. What are commenters' views generally with respect to the liquidity and transparency of the bitcoin market, and thus the suitability of bitcoin as an underlying asset for an ETP?

ARK is not sure that there is currently enough liquidity to safely fulfill the demand of a bitcoin ETF. We fear that the theoretically unlimited demand of the open-end fund structure could cause an extreme and potentially destabilizing price spike for bitcoin.

¹⁶<https://www.sec.gov/Archives/edgar/data/1222333/000119312515387033/d62404d10k.htm>

Per Bitcoinity data,¹⁷ average daily trading volume for bitcoin over the last year has been around \$1 billion USD. However, over 90% of that volume occurs in the XBT/CNY pair where there is little regulatory oversight and transparency, and is therefore not accessible to APs trying to source bitcoin for an ETF. A better indicator of volume available to APs that are sourcing bitcoin for a US ETF can be found at TradeBlock, as shown below:¹⁸



TradeBlock strives to be an industry standard for bitcoin indexes, and as a result only uses constituent exchanges with reputable XBT/USD order books. APs will likely only trust a similar selection of exchanges to source bitcoin so that they are compliant with anti-money laundering (AML) and know-your-customer (KYC) requirements, and are comfortable with their account security and information. In the above graphic, which is a proxy for what would be available to APs, 14,193 bitcoin traded in the preceding 24 hours, or slightly more than \$10 million USD. From conversations with traders in the space we have gleaned that a Sponsor could source roughly a hundred bitcoin per hour from a XBT/USD order book, or 2,400 per day, without significantly moving the market. At a price of \$707 per bitcoin, that is \$1.7 million USD per day, which is likely a fraction of the demand that will be created by a bitcoin ETF.

¹⁷ <http://data.bitcoinity.org/markets/volume/30d?c=e&t=a>

¹⁸ Screenshot taken at 3:08 pm EST on Monday, November 7, 2016: <https://tradeblock.com/markets/index>

To assess the potential demand for a newly launched bitcoin ETF, one can use the launch of other commodity based ETFs as a proxy:

- The SPDR Gold Trust (GLD) grew to be a \$1.3 billion USD fund a month after launching in late November 2004.^{19, 20} That required APs to source an average of \$42 million USD worth of gold a day, or 25 times what APs could source from the XBT/USD markets without moving the bitcoin price.
- The iShares Gold Trust (IAU) grew to be a \$658 million USD fund just over a month after launching in late January 2005.^{21,22} That required APs to source an average of \$17 million USD worth of gold a day, or 10 times what APs could source from the XBT/USD markets without moving the bitcoin price.
- The United States Oil Fund (USO) grew to be a \$272 million USD fund a month after launching in April 2006.^{23,24} That required APs to source an average of \$9 million USD worth of assets a day, or 5 times what APs could source from the XBT/USD markets without moving the bitcoin price.

While we can't predict how much demand there will be for a bitcoin ETF, and while it's unlikely to be as large as that for the GLD, we still think it will be problematic for the bitcoin markets, in that it could create demand that is an order of magnitude greater than what could currently be sourced without moving the market.

Such sizeable demand could cause a severe price spike akin to that in November 2013, which could lead to headline risk for all players involved in the issuance of a bitcoin ETF. It could also kick-start a positively reinforcing bubble in the bitcoin markets, where the higher bitcoin's price spikes, the more speculative demand would grow. Without a robust derivatives market for institutional investors to short the underlying asset, or otherwise hedge

¹⁹ <http://www.spdrgoldshares.com/usa/media-information/>

²⁰ Bloomberg data

²¹ <https://www.ishares.com/us/products/239561/ishares-gold-trust-fund>

²² Bloomberg data. Note, only monthly data was available for IAU assets under management in 2005, so the \$658 million is as of 2/28/2005, five weeks after launch.

²³ <http://etf.stock-encyclopedia.com/USO.html>

²⁴ Bloomberg data

their positions, there likely would be little counterbalance to such enthusiasm. APs could then have trouble sourcing bitcoin and hedging their positions, stalling the creation process.

Following a steep ascent and/or descent, bitcoin could experience prolonged volatility that would complicate the situation for the entrepreneurs and companies building businesses atop Bitcoin's blockchain and using bitcoin as a means of exchange. Entities using bitcoin as a means of exchange are important for the maturation of bitcoin as they provide a long-term base of transactional demand for bitcoin, which over time should help to stabilize the currency.

To summarize, we believe the liquidity and volume of bitcoin's trading markets will grow over time, fueled by a better developed derivatives market and wider mainstream acceptance, both of which will then make bitcoin a more suitable underlying asset for an ETF. However, we don't believe the markets are there yet. Launching an ETF now could lead to wild price swings, up or down, that could be harmful to investors and Bitcoin at large.

Concluding Thoughts

In closing, ARK has little doubt that some day bitcoin will be securitized via an ETF. The risk lies in trying to securitize bitcoin in an ETF too early. We are not convinced that the bitcoin markets are ready to handle the potentially outsized demands that an open-end fund would place on the nascent bitcoin ecosystem. We see no reason to rush in securitizing what could be one of the greatest innovations of the 21st Century.

Thank you.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Chris Burniske'.

Chris Burniske, *Blockchain Products Lead*
ARK Investment Management LLC