BITCOIN EXCHANGE TRADED FUNDS:

An Overview of a Potentially Flawed Investment Vehicle

by

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ABSTRACT

Bitcoin has generated much interest from the financial community throughout its life and utilization as a crypto-currency. In the continual advancement of the market, financiers and fund managers have explored the opportunities of developing investment vehicles utilizing Bitcoin, with multiple firms competing to develop a Bitcoin Exchange Traded Fund traded in the United States. However, under much speculation, the Securities and Exchange Commission (SEC) has denied multiple requests for fund managers to develop a Bitcoin ETF for the financial market.

The thesis essay explores the feasibility of utilizing Bitcoin in a fund investment vehicle such as a Bitcoin Exchange Traded Fund (ETF). The paper explores the qualitative and quantitative factors that may impact a Bitcoin Exchange Traded Fund's performance. Qualitative factors are used to explore utilizing research related to Bitcoin and Exchange Traded Funds' history and structure and analyzing proposals by financial firms and SEC responses to those proposals, and analyzing the Bitcoin market and systemic risks. Finally, an analysis of historical data and potential market drivers is utilized to confirm claims by the financial firms and the SEC.

The findings indicated that Bitcoin would be challenging to generate return for fund managers. Its risk factors create extra constraints for Bitcoin funds to operate in with no signs of mitigation in the future. Moreover, the volatility and unpredictability of Bitcoin are also caused by the lack of market drivers for the fund. Essentially in its current state, its lack of remedies for its risk factors has caused Bitcoin to be unfeasible to be placed in an Exchange Traded Fund and would place financial firms and its investors at risks.

1) INTRODUCTION

Bitcoin has always held a mixed opinion publicly and financially. Investors and the public have continued to debate the viability of Bitcoin and other crypto-currency counterparts as an asset in the future. Investors bullish on Bitcoin have described it as the future medium of exchange and an asset with endless potential. Bearish individuals have criticized it for its lack of market drivers and its price instability overtime.

Despite sentiments, financial firms have also shown equal interest in the potential of Bitcoin. Multiple firms have sent numerous requests to the Securities and Exchange Commission (SEC) with the potential of being the first to develop a Bitcoin ETF. The SEC has responded on numerous occasions of its stance against the instrument's development.

In this thesis, the topic of the feasibility of Bitcoin being placed under the active management of a closed-end fund, an Exchange-Traded Fund (ETF), is explored. In research, the topic's research has largely been empirical and qualitative due to the lack of data and the lack of Bitcoin funds to base qualitative and quantitative analyses. The thesis uses previous research and existing data to understand the risk factors and how a Bitcoin fund may perform.

To start, Bitcoin and Exchange Traded Funds needed to be explored at a historical and structural level. An analysis of monetary theory is used to understand the status of Bitcoin as a currency in the economy. Furthermore, attempts by financial firms to instate Bitcoin ETFs will be analyzed as well, especially the creativity of financial firms to subvert the SEC regulations. The SEC's findings are analyzed and confirmed with a quantitative analysis of Bitcoin and Bitcoin fund market characteristics.

A quantitative analysis was also performed to confirm the SEC's findings and the financial community's market. Both parties' statements needed comparison with already existing data to clarify the SEC's sentiments and sentiment of investors. Furthermore, the analysis will also attempt to determine if there are market drivers and determine the potential of volatility carrying over to a Bitcoin Fund vehicle. Volatility will be calculated utilizing standard methods of statistics and Standard Normal Distribution. Least Squares Regression and Pearson Correlation will also be utilized to test the market drivers. Both tests of volatility and correlations have developed a fascinating picture and a better understanding of Bitcoin's behaviors as an asset. By analyzing all of the fund's features, one theme became deeply apparent: Bitcoin funds would be as risky an investment as Bitcoin itself.

2) LITERATURE REVIEW

HISTORY OF BITCOIN & BLOCKCHAIN

Bitcoin and its system have had a 12-13 year life-span with rapid and sporadic growth throughout its life. Furthermore, it has been continued to be regarded as notorious while also being praised as an evolution of the transactional exchange structure. Especially in its early stages, it has reflected this mixed perception by the public.

In 2008, the anonymous programmer Satoshi Nakomoto conceptualized and invented Bitcoin. His primary goal was to develop a peer-to-peer electronic cash system that would not rely on a trusted third party. The new system would allow any transaction to be directly processed between sending and receiving parties and be verified by the peer-to-peer network. In turn, the system would combat the double-spending problem and pushes to combat a fiat banking system's weakest point: trust. (Corradi and Hofner, 194)

As Bitcoin became developed, it became notorious for being used by criminal networks. The primary issue behind this was the misuse of the digital asset and its structure. Bitcoin was used in conjunction with the TOR browser to trade for illegal products. Illegal services such as Silk Road were eventually sought and shut down by federal agencies. (Corradi and Hofner, 195)

Despite its early shortcomings, Bitcoin has grown massively in price throughout its lifetime. As time progressed, Bitcoin began to gain even wider exposure, and the price continued to grow. In 2017, Bitcoin's price rose meteorically to $19,783 on December 17th. Since then, Bitcoin has been regarded widely as a volatile commodity, in which its price increases and decreases rapidly.

STRUCTURE OF BITCOIN & BLOCK-CHAIN ASSETS

Bitcoin was designed and conceptualized by Satoshi Nakamoto in his thesis "Bitcoin: A Peer-to-Peer Electronic Cash System" to produce a more efficient and secure system of transactions.

In 2008, Satoshi Nakamoto's block-chain concept was designed to be "an electronic payment system based on cryptographic proof instead of trust." (Nakamoto, 1) Nakamoto's concept's primary goal was to remove the deficiency of "trust" and reduce the possibility of reversing transactions by making it computationally impractical. This would, in theory, protect sellers from fraud and routine escrow mechanisms to protect buyers. With this goal in mind, Nakamoto conceptualized Bitcoin's framework.

Bitcoin's structure is based around cryptography, and its mechanism is centered on solving its puzzle. The system uses decentralized nodes to add new transactions (blocks) to the

block-chain. For each additional block, the block-chain is extended, creating a decentralized ledger.
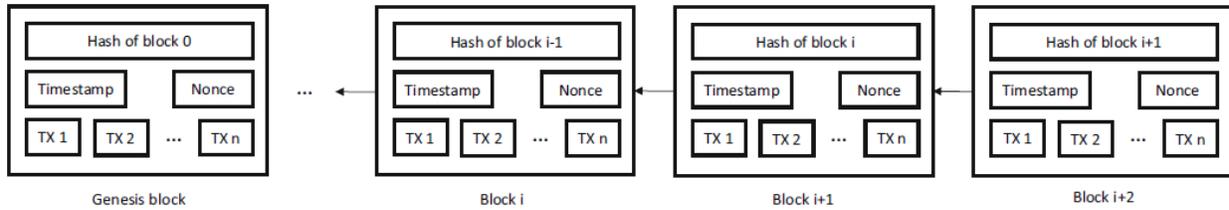
Source: Zhenq, 4

Each block contains a timestamp hash value identifying its parent block and a nonce (a generated, random number that verifies the hash). Hash values are unique and immediately change with the block-chain, which helps reduce the chances of fraud. No block-chain ledger can be added unless there is a consensus between all of the blocks; if the majority of the blocks agree with the validity of the transactions in the block, it is added to the ledger.

The consensus mechanism ensures that no transactions are valid. Once the validation is confirmed, the transactions are stored in a block. Once the block is confirmed and stored for a set period of time, it is transferred to the ledger and cannot be changed. (M. Nofer et al. 2017)

HISTORY OF EXCHANGE TRADED FUNDS

Exchange-Traded Funds are considered to be relatively new investment vehicles on the financial markets. However, their popularity and reputation are regarded highly among investors and financiers.

Exchange-Traded Funds were developed as "an investment vehicle… that typically seeks to track the performance of a specific index." (Lettau & Madhavan 135) Before their inception, investors had the option of trusts or closed-end funds to participate in index trading. However, neither of them resembles the current structure of an ETF.

In 1973, after reviewing academic research of passive investing, Wells Fargo Bank and American National Bank both launched index mutual funds for their institutional customers. Two years later, on December 31st, 1975, John Bogle launched the first public index mutual fund called the "First Index Investment Trust." The First Index Investment Trust tracked the S&P 500 and grew from $11 million to $100 billion in assets (from 1973 to 1999).

Interest in index-managed trading funds continued to grow by investors throughout the latter half of the 20th century. In 1989, the first true attempt in developing an Exchange-Traded Fund occurred with the launch of Index Participation Shares for the S&P 500. However, it was soon relegated to the futures exchange after a ruling by a federal court in Chicago, stating that it functioned too similar to a futures contract.

In 1990, the Toronto 35 Index Participation Units (TIPs 35) was launched as a warehouse, receipt-based instrument that tracked the TSE-35 Index. On January 22, 1993, State Street Global Investors released the S&P 500 Trust ETF (SPDR or "Spider" for short), the first American Exchange Traded Fund. However, TIPs 35 and SPDR were not actively managed. The first actively managed fund was not released until 2008. Since the inception of SPDR, Exchange-Traded Funds continued to grow exponentially throughout their short-lifespan.

STRUCTURE OF EXCHANGE TRADED FUNDS

Exchange-Traded Funds are securities that are structured around managing an underlying portfolio of securities or other assets. These assets are held by the issuing fund, which may include individual stocks, bonds, cash, commodities, derivatives, or any tradable asset. (Friedman)

Exchange-Traded Funds also are a type of regulated investment fund that share characteristics with an index mutual fund and a closed-end fund. ETFs resemble a mutual fund

for the following reasons: 1) holds a basket of securities designed to replicate the returns of a securities index, 2) has lower fees than comparable actively-managed mutual funds, and 3) is required to permit daily redemptions at the current value of its holdings. They also resemble a closed-end fund since they trade on an exchange throughout a trading day. (Friedman)

Exchange-Traded Funds vary in structure but are based on a single architecture.

Source: Friedman
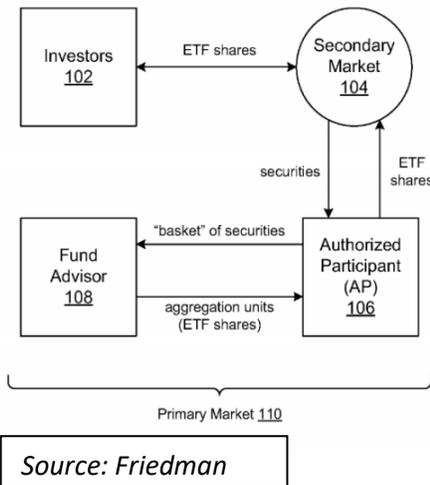
Exchange-Traded Funds hold a portfolio of assets but cannot interact with the market directly. Exchange-Traded Fund Asset managers create legal agreements with one or multiple Authorized Participants (usually large financial institutions or specialized market-makers) to interact with the market on their behalf. ETF Asset managers issue shares with the Authorized Participants in creation units in exchange for a basket of securities or cash.

To adjust for supply-and-demand, the ETF is adjusted using the creation/redemption mechanism. Creation is the term for increasing the supply of ETF shares, while "redemptions" is the term for decreasing shares outstanding of the ETF. (Lettau & Madhavan, 137)

By using this structure, the Exchange Traded Fund acts as an intermediary for investors and the capital market and provides investors with a lower cost, efficient, and available opportunity to index-trade.

BITCOIN ANALYZED UNDER MONETARY THEORY

Metallist Theory

Nakamoto envisioned Bitcoin with the goal to produce a more efficient and reduce the transactional cost of money. Along with using the idea of using a crowd consensus mechanism and cryptography to ensure accuracy, all details of the Bitcoin concept indicate Nakamoto envisioned a modern-interpretation of the Metallist theory.

Metallism is the economic theory that the concept of monies and markets are derived from need. Markets were constructed based on the needs of individuals to participate in commercial transactions with monies as the mediums of exchange. Money was created to fulfill the goal of efficient exchange by reducing transactional costs. The process of reducing transactional cost was performed through money being treated as a commodity through its connection to the value of the precious metal. (Katsari 245) Furthermore, due to exchange utilizing a single medium, transactions are viewed through the exchange value of a single commodity, which reduces the transaction cost as well as increases the efficiency of exchange.

Bitcoin is partly aligned with the goal of Metallism by decreasing transactional cost through creating more efficient exchanges through utilizing the crowd-consensus mechanism and removing financial intermediaries. Furthermore, the decentralized structure allows it to function democratically in means of exchange. The intrinsic value of the currency is determined by the interactions of exchange in the market utilizing Bitcoin. However, Bitcoin also partly does not align with Metallist theory in several areas. One issue is that it is not backed by any specific commodity and is a fiat currency. In conclusion, Bitcoin aligns with many core principles stated in Metallist theory but has difficulty fulfilling multiple areas.

Modern Monetary Theory

Metallism focuses on the belief that money was created as a medium of efficient exchange and reducing the number of intermediaries in that exchange. As Bitcoin's design removes the need for intermediaries, it is apparent it aligns more with Metallist theory. However, in neo-classical and modern economic theories, Bitcoin is deemed to be inefficient and ineffective in an economic sense.

Under Modern Monetary Theory, Bitcoin does not align well with the expected function of a currency. Modern Monetary Theory is a heterodox theory that advances many theories of economics from the neo-classical era and advancement on Innes, Keynes, Lerner, Minsky, and Godley. (Juniper, 1) Furthermore, Modern Monetary Theory is a widely accepted approach to understanding fiat currencies' function in the modern economy.

Under Modern Monetary Theory, a sovereign government can utilize a currency to manipulate the performance of the economy. It stipulates that there are five cornerstones: 1) a sovereign government is the sole supplier of a national currency, 2) legislation enables spending while taxes neither place a limit nor specify spending, 3) sovereign governments can borrow at its discretion for the public spending, 4) a huge and growing national debt is beneficial to the economy under controlled/contained inflation, and 5) the utilization of the blogosphere. (Brady, 1) Under the five cornerstones, it further emphasizes that the government is the sole supplier of a currency, has direct regulatory authority over the currency in quantitative utilization, and is utilized for the benefit of the public.

However, Bitcoin struggles to fulfill this theory. Under Modern Monetary Theory, it is difficult to be applied to the theory as a currency. Under the first cornerstone, Bitcoin does not fulfill this cornerstone. As stipulated in theory, a sovereign government only holds a single national currency. Bitcoin functions without a government body and is not considered a singular,

national currency by any sovereign government. As it does not function with a government body, it also does not fulfill the second, third, and fourth cornerstones. As Bitcoin is not regulated by any government body, it is also not used for public spending and is to be utilized to borrow by a sovereign government. Furthermore, as it cannot be used for either, it also cannot be utilized to control inflation as well. While Bitcoin remains popular and applies to the fifth cornerstone of MMT, the blogosphere, the lack of regulatory bodies overseeing Bitcoin indicates that it cannot be considered a currency. As such, under MMT, it can only be considered an investment vehicle.

SUMMARY OF ANALYSIS

In both analyses, Bitcoin does not qualify as a currency, especially in its applicability to the economy. However, Bitcoin shares conceptual similarities to the transactional nature of currency in Metallist theory. According to Nakamoto, "the cost of mediation increases transaction costs, limiting the minimum practical transaction size…and there is a broader cost in the loss of ability to make non-reversible payments…" (Nakamoto, 1) Bitcoin takes the approach that attempts to create more efficient transactions, a goal in which Metallism states a currency performs. However, Bitcoin is fiat without the backing of any commodity, not fulfilling the theory in its entirety.

Bitcoin also does not fulfill the theory and functions of currencies in Modern Monetary Theory. Bitcoin is solely a fiat vehicle and only fulfills only one of the five cornerstones listed. Under the monetary theory, Bitcoin can be classified more as an investment vehicle than a currency. Essentially, Bitcoin takes some inspiration from Metallism and the classical school of economics. However, there are very minimal similarities to the neo-classical and modern schools of economics, and its applicability can be considered minimal. Essentially, Bitcoin does not fit

the theory that it could be considered a form of money in the economy. However, it does have inspiration and similar goals to money in Metallist theory.

BITCOIN IN FUND INVESTMENT VEHICLES

SEC STANCE ON BIT-COIN ASSET CLASS EXCHANGE TRADED FUNDS

Financial firms throughout recent years have attempted to create financial derivatives solely based on the crypto-currency asset class. However, the Securities and Exchange Commission has rejected that possibility citing "its manipulability, volatility, and absence of surveillance" in 2017. (Chandler 2019)

Background of Proposal

The SEC's stance came after a review of a proposal filed by *Bats BZX Exchange (BZX)* to change the "Winklevoss Bitcoin Trust" rules in 2016. Since BZX has filed a proposal of a rule change, the commission needed to review if it is compliant with legal requirements.

BZX proposed to list and trade shares of the Winklevoss Bitcoin Trust as "Commodity-Based Trust Shares" on the stock exchange. The trust would only hold bitcoins as an asset and would be secured by the trust custodian, Gemini Trust Company LLC. The Trust would issue and redeem shares in baskets of 100,000 and only to authorized participants.

Reasons behind Denial

The SEC commission denied the proposal from *Bats BZX Exchange* on the primary basis that there is a lack of surveillance-sharing agreements and that the Bitcoin market is unregulated.

According to the SEC, they emphasize the importance of surveillance-sharing agreements between national securities exchanges and the significant markets. The SEC believes this is necessary to detect and deter manipulative conduct, and it has rules to prevent fraudulent and manipulative acts and practices.

Furthermore, since Bitcoin and Bitcoin-derivatives are not on regulated markets, BZX cannot enter surveillance-sharing agreements with said markets. As a result, the commission found that the proposed rule change would not be consistent with the Exchange Act and would result in the lack of protection of investors and the public interest. (SEC, *Bats BZX*, 2)

The commission also based their findings on the relative age of Bitcoin being in its early stages of development and is largely unregulated. Once a form of regulated Bitcoin market emerges, the SEC is likely not to consider requests for Bitcoin Exchange Traded Funds.

<u>GRAYSCALE BITCOIN TRUST</u>

While the SEC commission has denied numerous attempts of establishing Bitcoin and Bitcoin-derivatives through closed-end funds, financial firms have attempted to utilize crypto-currency assets into other investment vehicles with a similar purpose. On September 13, 2013, Grayscale Bitcoin Trust (GBTC), formerly known as Bitcoin Investment Trust, was formed utilizing Bit-Coin assets as a commodity. (SEC, *GBTC Proposal*, 64) On January 21, 2020, Grayscale Bitcoin Trust was authorized by the commission to become the first digital currency investment vehicle to attain the status of a reporting company by the SEC.

The Grayscale Bitcoin Trust tracks Bitcoin through multiple Bitcoin exchanges and attempts to track the underlying value of Bitcoin. Grayscale Bitcoin Trust functions similarly to a closed-end fund and an exchange-traded fund. Furthermore, it was conceptualized and designed to emulate the structure of an exchange-traded fund.

Grayscale Bitcoin Trust performs this issuing basket from time to time in exchange for Bitcoin. Similar to an ETF, it issues baskets of securities and manages a fund of Bitcoin. Furthermore, the sponsor of the fund has administrative power over how much Bitcoin is

purchased and sold by the trust. The trust only holds one digital asset, Bitcoin. (SEC, *GBTC Proposal,* 64)

The structure of the Grayscale Bitcoin Trust also has other shortcomings. In the fund's information statement, the firm listed many risk factors related to digital assets and emphasizes the infancy of its technology is the cause. Furthermore, any developments to the system may have an adverse effect on the fund. According to the fund's management, "the value of an investment in the Shares depends on the development and the acceptance of the Bitcoin network." (SEC, *GBTC Proposal,* 10) It also acknowledges the security risks of Bitcoin caused by its infancy, especially regarding its source code. Essentially, investment vehicles, such as ETFs, cannot guarantee that they can avoid or mitigate the risk factors of Bitcoin and crypto-currency.

RISK FACTORS OF BITCOIN ASSETS

As Bitcoin has been regarded as a risky crypto-currency by the SEC and many investors throughout, it is equally important to qualify and understand each risk factor when deciding to invest. Many of the risk factors that Bitcoin suffers from are primarily caused by the lack of oversight and regulating bodies to manage the system, as well as the infancy of the technology.

For non-crypto currencies, the majority have the oversight of central banks or reserves to ensure the stability of the currency. For example, for the United States Dollar, the United States government utilizes the Federal Reserve to perform quantitative easing and other instruments at hand to ensure economic and currency stability. However, Bitcoin relies on its blockchain mechanism and the dynamic of supply and demand. As a result, this has numerous spikes in volatility and currency price throughout its lifetime, which will be discussed in the market analysis section.

Concurrently, the infancy of its technology and continuous development has also caused other concerns regarding the security of portfolios, a concern that is both expressed by the SEC and Grayscale. Furthermore, the security risks, especially from hacking, have been widespread throughout cryptocurrency life.

In a research article by Daniel Goldsmith, Kim Grauer, and Yonah Shmalo, they analyzed the Blockchain process's flaws and quantified the system's hacking networks. One primary issue is that it has opened the opportunity for nefarious activities. Its public nature has no requirement for verification of identity in the process of address creation, and there is no limit to the number of bitcoin addresses that can be created. To capitalize on its anonymity, criminals exploit these characteristics to move funds and avoid detection from law enforcement. That opportunity for the nefarious has continued to spread to other nefarious acts due to the anonymity. (Goldsmith, 1-2)

The hacking of portfolios has remained the most notorious of crimes throughout the cryptocurrency markets and exchanges. According to Goldsmith, Grauer, and Shmalo, "Hackers have stolen $1.7 billion worth of cryptocurrency from exchanges since 2011." (Goldsmith, 2) As stated prior, entities managing Bitcoin portfolios worry about the potential hacking risks of Bitcoin. In an already established fund such as the Grayscale Bitcoin Trust, the fund management has stated that there is minimal that can be taken when a cryptocurrency portfolio is hacked. While there remain methods to track criminals post hacking from government agencies, the security risks of Bitcoin are purely unique to its nature as a digital asset, and its infancy has caused numerous obstacles for mitigating fraud.

3) MARKET ANALYSIS

<u>Historical Data:</u>

Introduction:

In a historical analysis of Bitcoin, many concerns are apparent in an analysis of the duration of the digital asset. The primary concern is the volatility of Bitcoin and its feasibility as a stable investment. Bitcoin will be compared

BTC Price in USD: 10/1/2013 to 12/31/2019

12/17/2017 - $19,166.98

Source Data: *Coindesk*

with the Grayscale Bitcoin Trust to see if it is more stable than other assets. In essence, this further raises the question of whether the volatility of BTC will affect the ability of fund managers to track Bitcoin properly.

Volatility - BTC:

Bitcoin has held the reputation of volatility throughout its existence. Its reputation has also been proven in many instances throughout its existence. Furthermore, Bitcoin continues to be volatile in digital asset exchanges. In historical prices, Bitcoin has shown numerous fluctuations. On 12/17/2017, Bitcoin reached the peak price of $19,166.98, and its price has continued to fluctuate since.

Furthermore, in the computation of standard deviation and variance throughout its lifetime, its values also indicate volatility in Bitcoin throughout its life on the exchange. Variance computations

BTC:USD - CURRENCY LIFE	
Mean	$3,234.87
Variance	$14,307,622.13
Standard Dev.	$3,782.54

BTC:USD - 5 YEARS	
Mean	$3,918.11
Variance	$15,576,886.67
Standard Dev.	$3,946.76

BTC:USD - 3 YEARS	
Mean	$4,835.24
Variance	$15,309,362.49
Standard Dev.	$3,912.36

BTC:USD - 1 YEAR	
Mean	$7,360.33
Variance	$7,042,858.36
Standard Dev.	$2,653.84

Source: CoinDesk (Data), Kagan Shaw (Assessment)

of the time-indices of Life-time, five years, three years, and one year have indicated have ranged

from 95586.72% to 442193.57% of the arithmetic mean. This indicates that the price of Bitcoin

has varied from 95596.72% to 442193.57% of the arithmetic mean, also proof of its volatility.

Furthermore, its standard deviation has shown a similar indication of

volatility. Also, between the time-indices presented in the variance *Source: CoinDesk (Data), Kagan Shaw (Assessment)*

computations, standard deviations were computed to 36% to 116% from the arithmetic mean.

Both the variance and the standard deviation have shown ample proof that Bitcoin is volatile.

Its volatility has also brought the question of its probability of change. To compute the

probability of price change, the data will be quantified utilizing Standard Normal Distribution.

Ideally, if the lower the probability of change between scenarios will indicate that the asset is

less volatile. In the computations from currency life (10/1/2013 to 12/31/2019), five years

(10/1/2014 to 12/31/2019), three years (10/1/2016 to 12/31/2019), and one year (01/01/2019 to

12/31/2019), the testing scenarios have indicated that there is a high probability of change

between all scenarios.

NORM. STAND. DIST: 10/1/2013 to 12/31/2019				
+/- 10%	+/- 30%	+/- 50%	+/- 70%	+/- 90%
3.41%	10.12%	16.55%	22.53%	27.93%

NORM. STAND. DIST: 10/1/2016 to 12/31/2019				
+/- 10%	+/- 30%	+/- 50%	+/- 70%	+/- 90%
11.44%	18.82%	25.52%	31.35%	36.23%

NORM. STAND. DIST: 10/1/2014 to 12/31/2019				
+/- 10%	+/- 30%	+/- 50%	+/- 70%	+/- 90%
3.95%	11.71%	19.02%	25.64%	31.42%

NORM. STAND. DIST: 10/1/2019 to 12/31/2019				
+/- 10%	+/- 30%	+/- 50%	+/- 70%	+/- 90%
10.92%	29.73%	41.72%	47.39%	49.37%

Source: CoinDesk (Data), Kagan Shaw (Assessment)

In an analysis of a positive or negative percentage of change by increments of 10, the

probability of change has continued to remain consistently high in each scenario. Furthermore, it

is also equally apparent that its volatility has grown drastically from long-term to short-term.

Comparing its lifetime probabilities to its most recent period of a single year, the probability of

an increase or decrease across the board had increased 176% to 320% from long-term to short-term. Standard Normal Distribution has indicated that the short-term and long-term probability of change is not only high but has increased drastically throughout its lifetime.

In all analyses, Bitcoin has been proven to be a very volatile asset and it is equally apparent that volatility has continued to be high in all analyses. A potential cause for the volatility is the lack of oversight or market factors. As Bitcoin's value is solely determined by the common consensus of its traders, it lacks the mechanisms to regulate the value or market characteristics of the crypto-currency. Furthermore, it is also possible that the supply and demand relationship has a direct impact on the value and volatility as well. This will be tested utilizing linear regression and Pearson Correlation Analysis.

CORRELATION ANALYSIS

In this analysis, Pearson Correlation Analysis will be utilized to determine the effect of other assets in tandem with Bitcoin. There will be three scenarios that will be determined: Bitcoin to Trading Volume, GBTC to Bitcoin, and GBTC to Bitcoin Trading Volume.

BTC to Trading Volume:

Bitcoin and its trading volume are being tested to determine whether fluctuations between trading volumes have a substantial impact on its price performance. This is also a test to determine how much the crowd-consensus mechanism of Bitcoin.

The analysis produced the result that Bitcoin has a negative correlation with its Volume with a coefficient of **-0.40394**. Being below -0.5 indicates a weak negative correlation between its volume and its value. This indicates that there is an inverse relationship between Bitcoin and its trading volume.
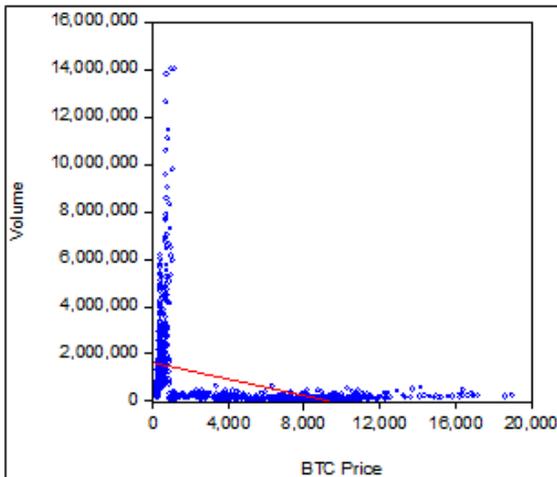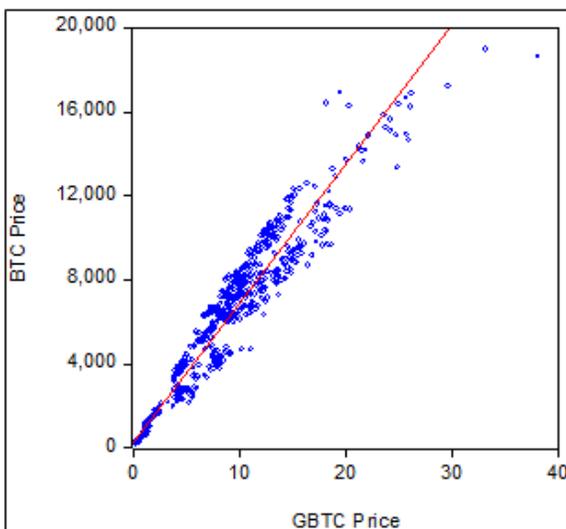
Source: CoinDesk (Data), Kagan Shaw (Assessment), E-Views

While there is some inverse relationship between its price and trading volume, there are a couple of conclusions that can be drawn. Bitcoin has some correlation with its trading volume, indicating that a spike in trading volume can have a significant impact on its price. Furthermore, since the correlation is weak, it indicates that the crowd consensus mechanism does not have as much of an impact on its price. Essentially, while its trading volume does impact its prices, it is also equally apparent that the supposed determinants of the price of Bitcoin still create uncertainty.

GBTC to BTC:

Since Grayscale Bitcoin Trust is an established fund emulating the structure of an ETF, it is a prime candidate for the correlation analysis to determine the effectiveness of tracking Bitcoin.
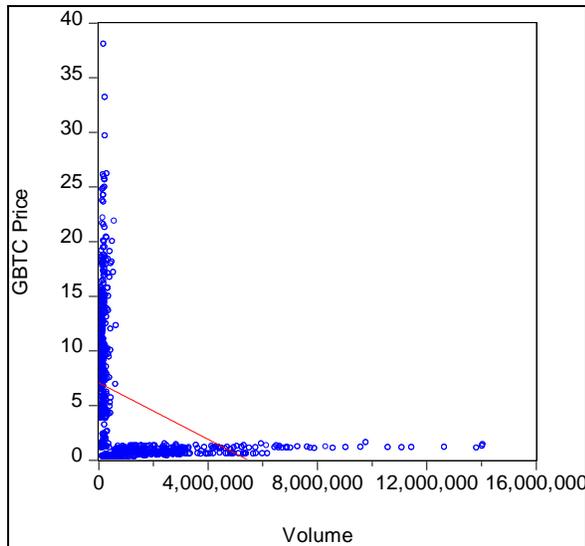

Source: CoinDesk (Data), Kagan Shaw (Assessment), Yahoo Finance (Data), E-Views

In the correlation analysis between Bitcoin and Grayscale Bitcoin Trust, there is a very strong positive correlation between the two variables with a coefficient of **0.97459,** within the range of .7 to 1.0. Furthermore, this correlation is so strong and indicates that they are parallel with each other.

It can be concluded that the fund is effectively tracking Bitcoin. However, with Bitcoin's volatility, its strength in correlation shows that every fluctuation

in Bitcoin has an equal impact on the fluctuation of GBTC. Furthermore, as it is a positive correlation, a sharp decline in the price of Bitcoin will likely have a near equal drop in the price of GBTC.
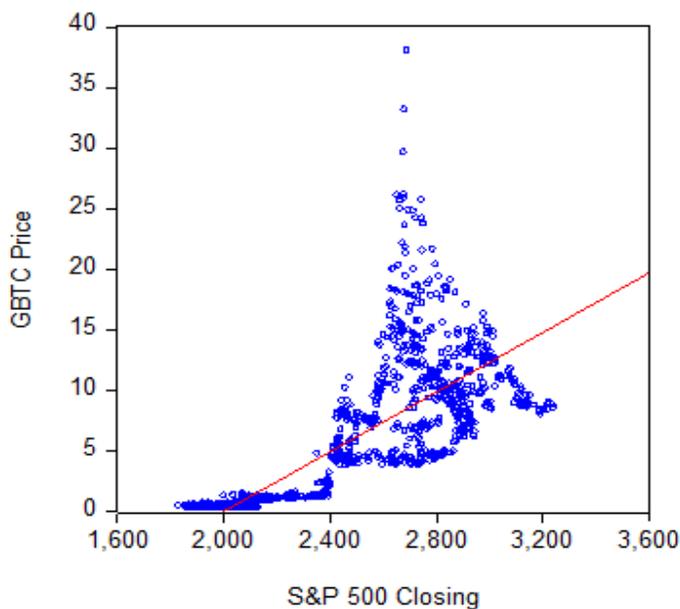
GBTC: BTC Trading Volume:

Source: CoinDesk (Data), Kagan Shaw (Assessment), Yahoo Finance (Data), E-Views

The scenario analyzes the correlation between GBTC and the trading volume of Bitcoin. This analysis is intended to determine if there is a correlation between the price movement of Grayscale Bitcoin Trust and the Bitcoin Trading Volume. It determines whether there is a similar correlation between Bitcoin and its Trading Volume and to quantify if there is significance.

The analysis computed a similar coefficient to the previous analysis between Bitcoin and its Trading Volume, **-0.3811,** and indicates a weak negative correlation between both Bitcoin prices and its Trading Volume.

S&P 500: GBTC Price

The analysis between the S&P 500 and GBTC Price will test whether or not there is a correlation between the closing prices of the S&P 500 and GBTC. This will test if there is the possibility of the market having an impact on the fund. The coefficient of **0.7519 i**ndicates a positive correlation between the price of the S&P 500 and GBTC.

Source: CoinDesk (Data), Kagan Shaw (Assessment),
Yahoo Finance (Data), E-Views

The analysis shows that there is a strong correlation between the GBTC and the equity market. Essentially, there is potential that the price movement of the overall stock market will affect the prices of the Grayscale Bitcoin Trust.

S&P 500: Bitcoin Price
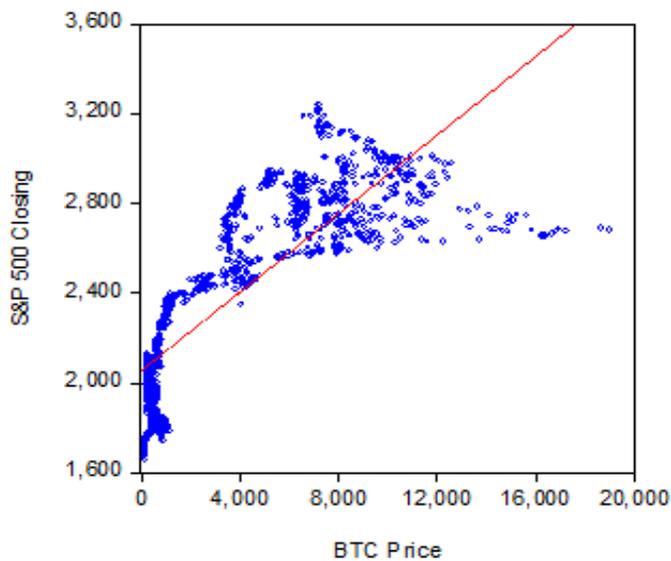
Source: Yahoo Finance (Data) ,Kagan Shaw
(Assessment)

The final scenario is meant to determine the potential correlation between the price of the S&P 500 and the price of Bitcoin. This asset will analyze the potential relationship between the price of Bitcoin and the overall stock market.

The analysis outputted a coefficient of **0.8751,** a strong positive correlation. This indicates that there may be a potential correlation between the stock market and the price of Bitcoin.

Conclusion of Analysis:

The correlation results indicate that the Grayscale Bitcoin Trust is very similar in correlation with Bitcoin price movement and its trading volume. The very strong positive correlation indicates that it reacts parallel to Bitcoin price increases and decreases. Furthermore, it also shares similar coefficients in analyses between the scenarios of price movement and trading volume. Essentially, Grayscale Bitcoin Trust is closely correlated with Bitcoin.

As it is closely correlated, it is also apparent that a Bitcoin ETF will be affected by Bitcoin volatility. Bitcoin volatility has indicated unpredictability and high probabilities of sharp increases and decreases in price, as noted in the previous analysis. Since GBTC has been strongly affected by the volatility, it shows that a Bitcoin ETF most likely will not mitigate volatility risk in the digital asset. It also creates the debate of whether it is more cost-effective to own Bitcoin with similar benefits.

Furthermore, the strong positive correlations between Bitcoin Prices, GBTC, and the S&P 500 also indicate that there is a possible relationship between Bitcoin and the stock market. The relationship between GBTC and the stock market is understandable as it is traded on the OTC Pink market. However, there are question marks with Bitcoin Prices and the stock market since there is supposedly no correlation between the two. The result further raises questions on the dependent variables and lack of understanding of the market variables of Bitcoin.

LINEAR REGRESSION ANALYSIS

The Pearson Correlation analysis indicated that there is minimal correlation between Bitcoin and its trading volume. However, in another analysis, Bitcoin and Grayscale Bitcoin Trust prices share a strong positive correlation. Utilizing Least Squares Regression, the Pearson Correlation outputs will be further analyzed and tested to confirm the findings.

BTC_PRICE = C(1)*BTC_VOLUME + C(2)*GBTC_PRICE + C(3)

BTC_PRICE = -8.81142666614e-05*BTC_VOLUME + 653.938331228*GBTC_PRICE + 390.173916874

This scenario analyzes the potential relationship between Bitcoin Price, Bitcoin Trading Volume, and Grayscale Bitcoin Trust prices. It is also equally important to assess the impact of Bitcoin's Price compared to the other variables.

The negative coefficient produced disproves that there is a correlation between BTC Price and BTC Volume. The coefficient, **-8.81142666614e-05,** proves there is very little correlation between the Bitcoin Price and Bitcoin's trading volume. It does not substantiate the Pearson Correlation Analysis and disproves a correlation between Bitcoin Prices and Trading Volume.

However, the analysis between Bitcoin Price and GBTC Price proves that there is a correlation between them. The coefficient, **653.938331228,** proves there is a strong positive correlation between Bitcoin Price and Grayscale Bitcoin Trust Price, substantiating the Pearson Correlation Analysis.

The scenario infers the following as a result:

1) There is minimal correlation between Bitcoin Price and its trading volume, indicating Bitcoin's volatility and lack of market factors.

2) The price of Bitcoin has a direct, parallel impact on the share price of GBTC.

In conclusion, the price volatility of Bitcoin translates directly into the price of GBTC, effectively translating the risk of Bitcoin to GBTC.

S&P 500 Closing Price: BTC Price: GBTC Price

SP500_CLOSE = C(1)*BITCOIN_CLOSING_PRICE + C(2)*GBTC_PRICE + C(3)

SP500_CLOSE = 0.175741001446*BITCOIN_CLOSING_PRICE - 70.6487555966*GBTC_PRICE + 2162.18777323

The analysis also tests the correlation analyses between Bitcoin Price, Grayscale Bitcoin Trust's Price, and the closing price of the S&P 500. The closing price of the S&P 500 will be used as the dependent variable for this analysis.

Between the S&P 500 and Bitcoin Price, the analysis calculated a coefficient of **0.175741001446**. The coefficient indicates that there is minimal correlation between the S&P 500 and Bitcoin's Price. The finding disproves that there is a positive correlation between the equity market and Bitcoin. This further proves that Bitcoin functions solely on the crowd-consensus mechanism and lacks influence from typical market factors.

Comparing the GBTC Price and the S&P 500 closing price, there is a strong negative correlation between the two variables, outputting a coefficient of **- 70.6487555966**. This conflicts with the Pearson Correlation Analysis, which indicated minimal correlation. This is a further indication that the volatility of Bitcoin translates to the price of GBTC and the lack of market drivers.

This linear regression infers **no correlation** between Bitcoin Price, the S&P 500, and the inherent market. Furthermore, the linear regression also infers that GBTC has similar volatility to Bitcoin and lacks market drivers as well. In conclusion, this further proves that Bitcoin is a volatile asset that lacks strong market drivers to assist in predicting price movement.

SUMMARY OF FINDINGS

Through the analysis of historical data and potential market drivers of Bitcoin, it is very apparent that the inherent risk factors of Bitcoin will likely carry over to a Bitcoin ETF. In quantifying volatility through understanding its variance, standard deviation, and Standard Normal

Distribution, Bitcoin has had very strong volatility throughout its history. Furthermore, its high probability of change further emphasizes that volatility.

However, as volatility is equally sentiment to unpredictability, leading to the question of whether Bitcoin can be tracked. Through Pearson Correlation and Least Squares Regression, Bitcoin has minimal market drivers, and its price is unpredictable. As Bitcoin price does not correlate with its trading volume, the digital asset's supply and demand dynamic is sporadic and does not assist in predicting Bitcoin price movement. Other potential market factors indicate that Bitcoin has minimal correlations with its other market factors, indicating that Bitcoin price is completely free-floating impacted purely by demand.

Established Bitcoin Funds have the goal of tracking Bitcoin and maximizing return. Grayscale Bitcoin Trust indicates that the task can be accomplished as it does strongly correlate with Bitcoin prices. However, this strong correlation and the fact that the fund holds a portfolio of solely Bitcoin would likely cause the Bitcoin fund to inherit that unpredictability and risk. Ideally, a fund would attempt to mitigate that risk.

To sum, Bitcoin and its inherent nature of having minimal market drivers cause it to be inherently risky in a systemic nature. The systemic risk of Bitcoin in the market dynamics will likely negatively impact a Bitcoin ETF, potentially causing difficulty to fund managers to generate a return from the asset.

4) CONCLUSION:

Under the current circumstances at the time of the drafting of this thesis, Bitcoin is too risky to be placed into an Exchange Traded Fund. Furthermore, if a Bitcoin ETF is created, it will be likely as risky as solely in Bitcoin.

In monetary theory, Bitcoin does not qualify as a currency as it hardly meets the majority of qualifications of classical, neo-classical, and modern monetary theory. The circumstances indicate that cryptocurrency overall can be only considered as an investment vehicle. Furthermore, the structure of Bitcoin has similar inspirations to the ideas of Metallism, with Nakamoto's goal of creating more efficient transactional exchanges.

Furthermore, the Securities and Exchange Commission's concern of Bitcoin Funds entering the market is also equally justified. Financial firms such as Grayscale have acknowledged and have shown concern for the risk factors of Bitcoin. Furthermore, Grayscale has stated that their Bitcoin trust fund still suffers from the same risks as investors holding Bitcoin and that the losses will have a direct negative impact on investors. Especially with portfolio vulnerability and hacking in recent years, it is very apparent that this trend will continue to hinder investors.

In the analysis of historical data, Bitcoin has remained volatile throughout its lifetime with multiple spikes in price. In Standard Normal Distribution, all scenarios of probability further emphasized its volatility. Furthermore, in correlation and least squares, established Bitcoin funds such as Grayscale Bitcoin Trust have a strong correlation with Bitcoin. As Bitcoin is already unpredictable and Bitcoin funds track the cryptocurrency, the correlation infers that the volatility and unpredictability of Bitcoin price movements will impact a Bitcoin ETF.

To reiterate, there is clear and obvious evidence that placing Bitcoin in a fund would not mitigate the already present risk factors to investors. Investing in a Bitcoin Fund would bear equal risk on the investors as investing in Bitcoin. If one does have an interest in investing in a Bitcoin ETF, investing in Bitcoin itself less complicated option. While investing in Bitcoin is not ideal, further research into the topic may further add to. As time progresses and the financial market changes, it is very likely, we may see a fund. Until any indications of mitigating the systemic risk s

of Bitcoin, it is inadvisable for fund managers to develop a fund and for investors to purchase

shares in an ETF.

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