

The Effects of Bitcoin Futures on Bitcoin Market

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Abstract. In the five years after the launch of bitcoin futures, academics and investors' perceptions have shifted from the early view that they raise the risk of bitcoin to the present acceptance of their ability to serve as derivatives. This change indicates that bitcoin futures have the potential to improve. What influences the bitcoin market has received from bitcoin futures is investigated in this paper. The introduction of bitcoin futures has offered a feasible hedging strategy for bitcoin investors, enhanced the stability and information effectiveness of the bitcoin market, also eased the investment barrier for bitcoin, based on study and comparison of previous research on bitcoin futures. However, because bitcoin futures are the novel type of futures contract, the market is complicated, and investors prefer to trade unregulated futures, whereas regulated futures are traded in considerably lesser quantities due to position limitations. Exchanges that regulate bitcoin futures should consider changing their contract positions to allow more investors to engage in trading while obtaining regulatory protections in to enable the bitcoin futures market to develop more maturely in the future.

Keywords: Bitcoin futures; Bitcoin; Hedging; Volatility.

1. Introduction

1.1 Background

Bitcoin, as one of the most traded cryptocurrency products today, has plagued investors with its high risk and barrier to entry, but the launch of bitcoin futures has changed this scenario. Bitcoin futures, as a bitcoin derivative, have had significant effect on the bitcoin market since its introduction in 2017. The massive drop of bitcoin prices in early 2018 put bitcoin futures in a disadvantageous position initially, but after five years of trading, their beneficial influence on the bitcoin market is gradually being recognised by the academic and investment community. As a comparatively new derivative, the bitcoin futures market is not mature and has shortcomings that need to be improved, such as the weaker performance of regulated futures compared to unregulated futures. It is important to investigate the impact of bitcoin futures on the bitcoin market in order to find solutions which will help the bitcoin futures to become more developed in the future and continue to provide positive influences on the bitcoin market.

1.2 Related research

Corbet et al. studied the feasibility of Bitcoin futures introduction to solve the issue that Bitcoin cannot be defined as a currency. The authors discovered through their analysis that even though the emergence of bitcoin futures has increased the volatility of bitcoin in the spot market, the futures are unable to serve as an effective hedging instrument, and investors in the spot market are the real drivers of price discovery. Consequently, the authors found that bitcoin futures have no impact on the conclusion that bitcoin is considered as a speculative asset instead of a currency [1]. Akyildirim et al. investigated the establishment period around two new futures contracts related to bitcoin performance by using high-frequency analysis. According to the authors' analysis, the fraud and regulatory uneasiness of the industry have an obvious impact on pricing. Moreover, the breakpoints in efficiency analysis show that compared to the spot market, Bitcoin futures are more dominant in price discovery [2]. Guo investigated bitcoin futures price volatility. By studying the price volatility structure of bitcoin futures, the author determined bitcoin futures' volatility will decline as maturity arrives. This phenomena is the inverse of the Samuelson effect, which is frequent in commodities markets. By adjusting Schwartz and Smith's stochastic multifactor model, the standard model, the authors

observed that when explaining bitcoin futures' volatility, the standard model presents high ability in process. When compared to other commodity futures, the specifications of bitcoin futures are clearly different. As a result, the authors contend that the bitcoin futures market is unique from the traditional commodities futures market [3].

Kapar and Olmo provide an analysis of Bitcoin futures and the spot market for price discovery. The author analyzed bitcoin spot and futures prices from December 2017 to May 2018 and measured Hasbrouck's information share and Gonzalo and Granger's common factor component, thereby quantifying how two markets contribute to price discovery. The authors argue that the bitcoin futures market provides dominant effects on price discovery. Furthermore, a common factor provided by a weighted combination of spot and futures markets can drive both market prices. The authors observe that deviations from the equilibrium conditions of the futures and spot logarithms are predictive of bitcoin spot prices, but not of futures prices. [4]. Liu et al. observed that during the year following bitcoin futures' introduction, bitcoin's price consistently declined by 80% after a short rise. The authors hypothesized that there was a significant negative correlation between bitcoin futures and bitcoin, and a nonsignificant or positive correlation with the other seven major cryptocurrencies. When the price of bitcoin fell sharply, the other cryptocurrencies remained positive returns, so the authors argue that the introduction of bitcoin futures was responsible for the collapse in the price of bitcoin. [5]. Kim et al. investigated the effect of bitcoin futures on bitcoin's intraday volatility based on minutes price movements of five popular cryptocurrency exchanges. The authors use the discrete Fourier transform for detailed analysis and find that while the introduction of bitcoin futures increases the volatility of the bitcoin market, the stability over time is higher than before the introduction of futures [6]. Köchling et al. examined the effect of the introduction of bitcoin futures on market price efficiency and observed that bitcoin futures have enhanced the information efficiency of bitcoin, which has not been observed for other cryptocurrencies. The authors analyzed that bitcoin futures reduce the difficulty of investors to enter the market, hence the results observed by the authors are similar to the observations in mature stock markets [7].

Baur et al. studied how bitcoin futures will give useful information for discovering bitcoin prices. The author applied Hasbrouck, Gonzalo, and Granger's information-sharing methodology to discover that because the global spot market for bitcoin has higher trading volume and longer trading times, the spot price of Bitcoin leads the futures price, while the futures market in the U.S. was relatively limited. [8]. Hung et al. studied how trading activity affects price discovery in the bitcoin futures market. The authors found that trades from hedgers contributed to the efficiency of the futures market because they had a positive correlation with the modified information share of the CME and CBOE futures markets. While trades from retail investors disrupted the stability of the market as they had negative correlations with the CME futures prices, speculators had both positive and negative effects on the bitcoin futures prices. Moreover, the authors argue that compared to CBOE's bitcoin futures, CME's bitcoin futures presented a considerable capacity on bitcoin price discovery, which can be considered a reasonable explanation for why CBOE decided to quit bitcoin futures market at 2019 [9]. Sebastião and Godinho investigated whether bitcoin futures can be used as a good hedging tool for cryptocurrencies investment. The authors analyzed hedging properties by using CBOE bitcoin futures trades within a few months of launch and showed that bitcoin futures can provide effective hedging for bitcoin while also serving to hedge other major cryptocurrencies [10].

1.3 Objective

The objective of this paper is to examine the influence on the bitcoin market of bitcoin futures. The second section introduces bitcoin futures and their trading patterns. In the third section, bitcoin futures are examined separately in terms of risk hedging, stability, ease of market entrance, and information efficiency. The fourth section discusses current bitcoin futures issues, investing purposes, and suggestions for future bitcoin futures improvements.

2. Bitcoin Futures Introduction And Trading Mechanism

In end of 2017, the Chicago Board Options Exchange and the Chicago Mercantile Exchange announced that they were formally launching bitcoin futures contract into market. Before the bitcoin futures existed, bitcoin trading was only conducted through trading venues of spot markets around the world. The emergence of bitcoin futures has allowed more investors to access the market through exchanges. That has largely expanded the size of the bitcoin investor base.

As an emerging financial derivative, bitcoin futures are similar to traditional futures contracts. Two counterparties agree to trade a certain amount of the underlying asset, known as bitcoin, at certain prices on a certain date. The overall trading process is performed on an exchange and the gains and losses of the trade are determined by the underlying price on the expiration date. When the underlying price is lower than the futures price, the long position loses and the short position gains, and vice versa. However, the difference between bitcoin futures and traditional futures is that traditional futures typically utilize U.S. dollars to trade the underlying commodity, while bitcoin futures utilize bitcoin to trade the U.S. dollar.

Based on investors' predictions of the future price of bitcoin, they can use bitcoin futures to trade long or short for purposes of hedging risk, speculation, or arbitrage.

3. How the Bitcoin Market Has Been Affected by Bitcoin Futures

To investigate the effect that the bitcoin market received from bitcoin futures' introduction, this paper has analyzed different factors in terms of risk hedging, stability, ease of market entry and information efficiency.

3.1 Risk hedging

As a new type of futures contract, bitcoin futures have been introduced for a shorter period than other types of futures, but its basic feature is similar to other futures, to hedge price risks by price locking. As a high-volatility investment product, the price of bitcoin can rise and plummet due to multiple factors. When some countries change their attitude to bitcoin or news of hackers attacking bitcoin exchanges could have a huge influence on bitcoin's price. That makes bitcoin holders and bitcoin miners must bear high risks associated with price changes during the trading process. As bitcoin futures's launching, bitcoin investors are able to headge those risk by trading this new derivative.

As one of the initial issuers of bitcoin futures, CBOE bitcoin futures exhibit effective hedging capabilities on an intra-day scope. And when the bitcoin spot market price drops significantly, bitcoin futures can reduce losses for investors [10]. Although the CBOE decided to exit the bitcoin futures market in 2019, its ability to hedge bitcoin price risk can be proof that bitcoin futures are useful for investors to hedge their risk and have a positive impact on the bitcoin market. Additionally, when comparing CME and CBOE, the two initial issuers of bitcoin futures, the higher trading volume of CME bitcoin futures reduces its liquidity risk, and since CME bitcoin futures are priced by using prices from four bitcoin exchanges, while CBOE bitcoin futures are priced only by the Gemini exchange, these factors lead to CME bitcoin futures having superior price discovery ability [9]. One of the common strategies for hedging with bitcoin futures is for bitcoin miners to protect their assets by shorting bitcoin futures contracts and locking in future trading prices, which enables them to determine earnings in advance and hedge bitcoin's price volatility.

3.2 Stability

As a financial derivative of bitcoin, the most direct effect that the bitcoin market obtained from the introduction of bitcoin futures is reflected in the changes in bitcoin's stability. At year end 2017, the beginning of the advent of bitcoin futures, Bitcoin's price has attained the highest peak in its history after experienced long-term bullish trend, and in the following year, the price of bitcoin continued to fall by 80%. Since the bitcoin price collapse was very close to the time of the start of

bitcoin futures issuance, and the bitcoin price continued to fall during the short period after the bitcoin futures introduction, some scholars have analyzed that there is a significant negative correlation between bitcoin futures and bitcoin [5]. Nevertheless, some scholars argue that cryptocurrencies, as a type of highly speculative financial product, are in an obvious bubble phase during their substantial price increase. Bitcoin has been in the bubble phase since its price rose above \$1000 [11]. Because the bitcoin spot price had been rising sharply in trend for several years until the advent of bitcoin futures, this phenomenon can be explained that the bitcoin price was overvalued and in the bubble period. Ultimately, the introduction of bitcoin futures contributed to the collapse of the bubble due to the price discovery ability, which caused the price of bitcoin to drop significantly. Although bitcoin futures indeed enhanced the volatility of bitcoin in the early stages of the introduction, over the six months following the launch, bitcoin's volatility reverted to a similar level as before the launch of bitcoin futures. As Figure 1 shows, the price of bitcoin gradually recovered in price volatility about three months after the advent of bitcoin futures, and the volatility range has not changed significantly over the following two years. Moreover, based on the analysis of bitcoin volatility, which found that bitcoin futures would improve the stability of bitcoin as time passed [6].

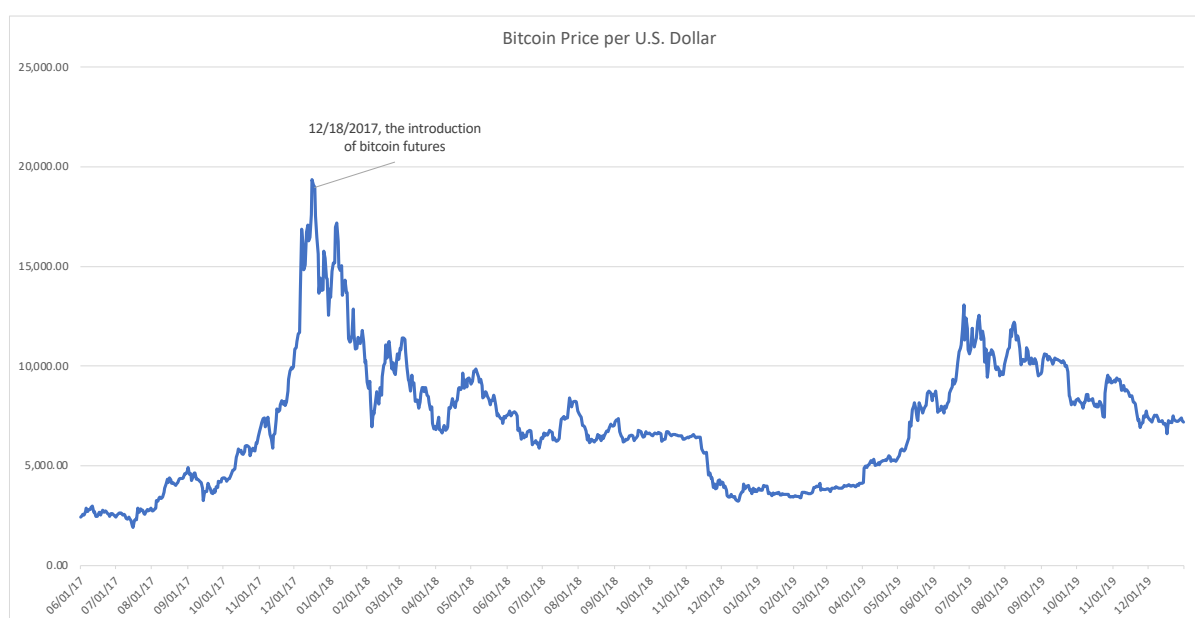


Fig. 1 The bitcoin price between 06/01/2017 to 12/31/2019

3.3 Ease of market entry and information efficiency

Since the unique decentralized network of the Bitcoin market has made it difficult to ensure regulation, which has led to major bitcoin trades only being conducted among retail investors without the participation of institutional investors [12]. The launch of bitcoin futures has provided an effective shorting strategy for bitcoin investment while reducing the difficulty for investors to enter the bitcoin market because bitcoin futures exchanges address the concerns of institutional investors about the lack of regulation. In contrast to the speculative purpose of retail investors, the market role of institutional investors can be considered as a hedger. By using the modified information share model researchers found that hedgers' trading behavior has a positive correlation with modified information share in the bitcoin futures market. That indicates that their trading behavior has contributed to the effectiveness of the bitcoin futures market. [9]. Because of the participation of institutional investors, the structure of investors in the bitcoin futures market has shifted from mainly speculators trading to a combination of speculators and hedgers, which has improved the effectiveness of the futures market. Furthermore, by calculating and comparing the p-values of the Hurst exponents for bitcoin in the period both before and after the bitcoin futures launch, the results show that bitcoin's p-values before bitcoin futures' introduction rejected seven of nine null hypothesis features, while after the advent of the bitcoin futures, bitcoin's p-values cannot reject any feature of null hypothesis [7]. This change

demonstrates how the efficiency of the bitcoin market has been certainly strengthened by introduction of bitcoin futures.

4. Bitcoin Futures' Existing Shortcomings And Potential Improvement In The Future

4.1 Limitations of regulated and unregulated futures

Compared to traditional futures, regulated bitcoin futures are not able to provide the same level of capability to investors. In general, futures have the ability for risk hedging, price discovery, and providing regulatory control. Although the bitcoin futures introduction offered regulated exchanges and the feasibility of bitcoin risk hedging strategies for investors, during the years after introduction, regulated bitcoin futures have not exhibited satisfactory performance on price discovery. This outcome is partly caused by bitcoin futures market's massive structure. After bitcoin futures were being introduced in end 2017, the structure of the bitcoin futures market has changed significantly, as the contracts have changed from initially being traded under CME and CBOE regulation to now multiple unregulated contracts being traded simultaneously with regulated contracts in the futures market. The price discovery ability of regulated bitcoin futures is quite lower than that of unregulated bitcoin futures, such as BitMEX and Huobi, two unregulated bitcoin futures that have significantly higher price discovery ability than CME futures. That result is mainly due to the trading volume gap between the two types of futures and the limitations of regulated futures. The unregulated bitcoin futures are favored by investors in the market, which makes them more traded than the regulated futures. Next, since bitcoin miners and some cryptocurrency hedge funds have smaller sizes and cannot enter largely regulated bitcoin exchanges as other small players who can participate in traditional futures markets, which leads these informed traders choose to use unregulated bitcoin futures for trading. Due to the participation of informed players and the lack of regulatory adjustments, unregulated bitcoin futures can absorb new information faster, and this makes them become the dominant price discoverers in the bitcoin futures market. However, if large-volume investors intend to control the movement of the bitcoin price by manipulating orders, unregulated bitcoin futures cannot prevent this behavior [14].

4.2 For hedging or speculating

As a special type of financial product, bitcoin's nature is quite different from that of commodities, which results in the requirement for hedging bitcoin being limited. For most users of futures contracts, risk hedging is a bidirectional process. For example, upstream producers of the underlying asset need to utilize the contract to hedge risk to secure returns, and downstream consumers who use the underlying asset as material need to use the contract to lock in prices for cost control purposes. While bitcoin cannot be used as material for production, which means only the group of bitcoin producers need to hedge their risk by using bitcoin futures. Bitcoin miners, as producers of bitcoin, have to consider the costs expended in the production process, such as electricity, mining machine costs, and site costs, just like producers of common commodities. Therefore, they need to determine the expected revenue by using futures. The logic for miners to use bitcoin futures is similar to the logic for traditional upstream producers for hedging risk.

For using bitcoin futures for speculation. Because currently, only bitcoin miners use futures to hedge their risk, the majority of participants in the bitcoin futures market are thought to be trading for speculative objectives. These investors use leverage to trade futures through their predictions of the market. As the market dominator, the trading behavior of speculators will influence the bitcoin futures market to appear speculative instead of hedging in character [14].

4.3 Potential Improvement in The Future

The bitcoin futures have been experienced for five years since their introduction at the end of 2017, and the attitude of researchers and scholars toward them has changed from initially considering bitcoin futures to bring more volatility to bitcoin and failing to serve the needs of hedging to now finding that they enhance the stability of bitcoin and can be used for hedging appropriately. This change is largely due to the fact that more available data can be gathered and analyzed over time, which has reduced the limitations of research on bitcoin futures. However, as a futures contract with a short period of introduction, bitcoin futures have substantial potential for improvement in the future.

In the current state of Bitcoin futures, multiple unregulated and regulated futures coexist in the market, and the preference of investors to invest in unregulated futures has resulted in a substantial difference in trading volume between the two types of futures. That causes unregulated futures to outperform regulated futures on liquidity and price discovery. Nevertheless, the futures contract's advantage of being traded on an exchange to avoid counterparty risk is not presented in unregulated futures, because there is no regulation, investors of unregulated futures are exposed to greater default risk, and while also facing the risk from large investors using their capital to control the movement of futures prices. Therefore, to make the prospective bitcoin futures market more mature, the priority issue that could be considered for bitcoin futures is to eliminate the disparity between regulated and unregulated bitcoin futures by providing a lower barrier for investors to enter the exchange.

The lack of attractiveness of regulated futures to investors is largely due to the difficulty for small investors to enter large exchanges, while unregulated futures have more freedom to trade without position constraints. However, the informed traders who can affect the price discovery ability of futures are usually small investors as bitcoin miners and small cryptocurrency hedge funds, the barrier of regulated futures makes these people become participants of unregulated futures. Thus, to eliminate the gap between regulated and unregulated futures, exchanges of regulated futures should consider adjusting contract positions to attract smaller players. In this context, the CME decided to launch the micro bitcoin futures in 2021 could serve as a useful example, since it offers a much smaller position than normal futures that allow more investors to participate in trading and provide a higher degree of flexibility. However, this new type of futures uses cash for settlement, rather than the exchange of bitcoins, which makes them unusable for hedging by bitcoin miners. Hence, exchanges can use the performance of micro bitcoin futures as a reference to adjust bitcoin futures positions to allow more small investors to participate while retaining the hedging ability.

5. Conclusion

This paper analyzes how bitcoin futures affect on the bitcoin market from recent research on bitcoin futures and identifies the influences that bitcoin market gained from its derivative, as risk hedging, stability, market entry barriers, and information efficiency. The advent of bitcoin futures has provided feasible hedging strategies and reduced the difficulty of entering the bitcoin market while improving the stability and information efficiency of the bitcoin market after eliminating the market bubble. Based on the present state of the bitcoin futures market, investors prefer to trade unregulated bitcoin futures since regulated bitcoin futures are underperforming than unregulated bitcoin futures in price discovery and information response efficiency, which means regulated bitcoin futures will need to be improved and refined by adjusting contract position in the future.

References

- [1] Corbet S, Lucey B, Peat M, et al. Bitcoin Futures—What use are they? *Economics Letters*, 2018, 172: 23-27.
- [2] Akyildirim E, Corbet S, Katsiampa P, et al. The development of bitcoin futures: Exploring the interactions between cryptocurrency derivatives. *Finance Research Letters*, 2020, 34: 101234.
- [3] Guo Z Y. Price volatilities of bitcoin futures. *Finance Research Letters*, 2021, 43: 102022.

- [4] Kapar B, Olmo J. An analysis of price discovery between Bitcoin futures and spot markets. *Economics Letters*, 2019, 174: 62-64.
- [5] Liu R, Wan S, Zhang Z, et al. Is the introduction of futures responsible for the crash of Bitcoin? *Finance Research Letters*, 2020, 34: 101259.
- [6] Kim W, Lee J, Kang K. The effects of the introduction of Bitcoin futures on the volatility of Bitcoin returns. *Finance Research Letters*, 2020, 33: 101204.
- [7] Köchling G, Müller J, Posch P N. Does the introduction of futures improve the efficiency of Bitcoin? *Finance Research Letters*, 2019, 30: 367-370.
- [8] Baur D G, Dimpfl T. Price discovery in bitcoin spot or futures? *Journal of Futures Markets*, 2019, 39(7): 803-817.
- [9] Hung J C, Liu H C, Yang J J. Trading activity and price discovery in Bitcoin futures markets. *Journal of Empirical Finance*, 2021, 62: 107-120.
- [10] Sebastião H, Godinho P. Bitcoin futures: An effective tool for hedging cryptocurrencies. *Finance Research Letters*, 2020, 33: 101230.
- [11] CORBET S, LUCEY B, YAROVAYA L. Datestamping the Bitcoin and Ethereum bubbles. *Finance Research Letters*, 2018, 26: 81-88.
- [12] DYHRBERG A, FOLEY S, SVEC J. How investible is Bitcoin? Analyzing the liquidity and transaction costs of Bitcoin markets. *Economics Letters*, 2018, 171: 140-143.
- [13] ALEXANDER C, HECK D. Price discovery in Bitcoin: The impact of unregulated markets. *Journal of Financial Stability*, 2020, 50: 100776.
- [14] NEKHILI R. Are bitcoin futures contracts for hedging or speculation? *Investment Management and Financial Innovations*, 2020, 17(3): 1-9.