

Impact of Margin Trading on Chinese Bitcoin Market and Its Recent Reform

By

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Abstract

This paper analyzes the impact of margin trading on the Chinese bitcoin market. For the market as a whole, conclusion is drawn that the introduction of margin trading services in China stabilizes the bitcoin market by increasing the liquidity. By comparing margin trading of bitcoin to Chinese stock and studying on historical cases, I conclude that margin trading raises forced liquidation risk of individual investors, as well as bankruptcy risk of bitcoin exchanges due to bank run failure.

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I. Introduction

The market of digital currency has grown rigorously over the last decade. Bitcoin, launched in January 2009, has been one of the most prominent among them. The design of proof-of-work mechanism, which controls the supply of bitcoin, espouses the decentralized nature of bitcoin (Nakamoto, 2008). Following the quantitative easing policies in Europe during 2013, bitcoin was considered as an alternative of gold to escape from the potential hyperinflation.¹ Starting with less than five cents at the time of its inception, price of bitcoin had soared to around one thousand US Dollars in December 2013.

In addition to the impressive rally of the price, high volatility of bitcoin also drew attention from global investors, among which Chinese investors made up the highest proportion of the daily trading volume since 2014. Various exchanges had established in China since late 2013, resulting in a fierce competition. On September 20th, 2013, Huobi became the first exchange that offered no-fee trading to investors². Soon after, three leading bitcoin exchanges in China, BTCC, Huobi and OKCoin successively introduced the margin trading and short selling services, which further boosted the investor base in China³. By late 2016, Chinese bitcoin market had occupied more than 95 percent of the trading volume around the globe.

¹ Cox, Jeff. "Bitcoin Bonanza: Cyprus Crisis Boosts Digital Dollars". *CNBC*. 27 Mar. 2013.

² Baike. "Huobi started no-fee trading". *Baidu Baike*. 2014.

³ Baike. "BTCC, Okcoin started no-fee trading". *Baidu Baike*. 2014.

With the rapid development of bitcoin in China, policy makers are confronted with great challenges about classifying bitcoin to existed categories as well as making regulations on bitcoin trading. On January 19th, 2017, margin trading services on domestic bitcoin exchanges had been officially halted after the People's Bank of China visited the three leading exchanges⁴. With continuous inspection from PBoC, domestic exchanges further announced to temporarily freeze bitcoin withdrawal on 9th February⁵.

In this paper, I will explore the impact of margin trading and short selling on the Chinese bitcoin market, an issue that has raised increasing concern from the Chinese government as well as domestic investors. I argue that the introduction of margin trading services in China stabilizes the bitcoin market in terms of liquidity. However, it raises the risk of forced liquidation for individual investors, as well as the bankruptcy risk of bitcoin exchanges due to potential bank run failure.

The remainder of this paper is structured as follows. Section II provides background introduction on bitcoin and its exchanges. Section III analyzes the impacts margin trading has on Chinese bitcoin market. Section IV discusses the trend of current bitcoin market after the no-fee policy has been halted in China and the potential solutions for the reform.

II. History and background of Chinese bitcoin market

⁴ Pete Rizzo. "China's Bitcoin Exchanges End No-Fee Trading in Market Shake-Up". *Coindesk*. Jan 23. 2017

⁵ Pete Rizzo. "More Chinese Exchanges Impose Bitcoin Withdrawal Delays". *Coindesk*. Feb 10. 2017

1. Origin of Bitcoin

The idea of bitcoin originates from a proposal written by Satoshi Nakamoto in 2008, “Bitcoin: A Peer-to-Peer Electronic Cash system”. As a peer-to-peer network, bitcoin is held by users in their own wallet and can be sent from one user to another without involvement of any financial institution. Different from a fiat currency, supply of bitcoin is not backed by any group, company, government or institution, but is generated from an algorithm process referred as “mining”. “Miners” use their computing power to verify payment transactions and pack them into a public distributed ledger called the blockchain. If “minors” successfully verify the transaction, they will be awarded with newly created bitcoins. Also, the total monetary aggregate of 21 million bitcoins ever is set up by Nakamoto from its inception.

In the academic field, classification of bitcoin has been debated heatedly. For instance, Yermack (2013) argues that due to the high volatility compared to currency, bitcoin behaves more like “a speculative investment similar to the Internet stocks in the late 1990s”. Due to the high volatility, bitcoin trading had expanded rapidly since 2010. Mt.Gox, launched in July 2010 in Tokyo, Japan, was one of the first bitcoin exchanges in the world. By 2013, it was undertaking more than 70% of the total bitcoin transaction⁶. Similar to stock trading, Mt.Gox will list all the buy and sell orders on the platform and match them into deals. For orders worth less than 100 BTC, Mt.Gox asks for 0.6% trading fee and give certain discount for big amount orders⁷. On the

⁶ Vigna, Paul. "5 things about Mt. Gox's crisis". *The Wall Street Journal*. 25 Feb. 2014

⁷ Vitalik Buterin. “MtBox publishes Bitcoin Ad in G8 Conference Magazine”. *Bitcoinmagazine*. Jun 17. 2013

midnight of February 25th 2014, Mt. Gox suspended all the trading services on the platform. Two days later, Mt.Gox filed for bankruptcy. As research from institution Teikoku Databank, Ltd shows that on February 24th 2014, Mt.Gox found around 850,000 bitcoins were stolen by hackers, equivalent to \$460 million US Dollars at the time⁸.

2. Emergence of Chinese Bitcoin Exchanges

While the era of Mt.Gox was gone, bitcoin exchanges in China just started to blossom. Bitcoin China (BTCC) was launched in 2011 as the first bitcoin exchange in China. By 2013, BTCC charged 0.3% as trading fee for both buyers and sellers, contributing to more than 90% of the domestic trading volume⁹. At the end of 2013, BTCC became one of the exchanges that eliminated trading fee and transaction fee, followed by other emerging domestic exchanges. By the end of 2014, BTCC, Huobi and OKCoin became three biggest exchanges in China, which accounted for more than 80% of the global trading volume.

As the competition became more intense in Chinese market, Huobi, OKCoin and BTCC introduced the margin trading services successively in March 2014. Exchanges offered both RMB loan and bitcoin loan to investors. OKCoin applies the Peer-to-Peer lending platform for margin trading, meaning that interest rate is purely adjusted by the market¹⁰. Huobi serves as a

⁸ CNA. "Bitcoin exchange MtGox announced bankruptcy". *CNA*. Feb 28. 2014

⁹ Coindesk. "Chinese bitcoin exchanges eliminate trading fee". *Coindesk*. Dec 16. 2013

¹⁰ Millet, Jonathan. "China's OKCoin Exchange Launches New P2P Lending Services". *Coindesk*. 20 June. 2014.

broker between creditor and debtor in the lending process, while lending rate is decided by the VIP level of each user¹¹. Meanwhile, BTCC changed back and forth on whether to open the margin trading services, causing them to lose part of the game. Table 1 shows more detailed information about platforms operated by the three leading exchanges.

However, the competition did not end up with change on the trading fee. In September 2014, OkCoin and Huobi launched futures trading of bitcoin with 20x leverage ratio, while BTCC officially had the service in late 2015¹². Table 2 shows basic rules of futures trading on OKCoin and Huobi. By 2016, Chinese exchanges had been undertaking more than 98% of the global trading volume.

3. Policies on bitcoin in China

Policy makers' attitude towards bitcoin has been complex since its rapid development in China. In 2014, when asked whether bitcoin would be forbidden, minister of PBoC, Xiaochuan Zhou classified bitcoin as a type of asset that could be traded, so there was no need to forbid bitcoin circulation in China¹³. In June 2016, director of PBoC, Songcheng Sheng, published an announcement underlining that virtual currency was not a currency. Later in August, vice president of PBoC Yifei Fan released a general proposal about framework and theoretical

¹¹ Southurst, Jon. "Huobi Brings Margin Trading, Interest Accounts to Bitcoin and Litecoin". 30 June. 2014

¹² Southurst, Jon. "China Exchange OKCoin to Launch Bitcoin Futures Trading". August 5. 2014

¹³ Qi'an Zhang. Announcement by Xiaochuan Zhou from Sohu News. *Sohu*. Apr 11. 2014

foundation of Chinese official virtual currency. After PBoC visited domestic exchanges in January, former minister of Bank of China Lihui Li illustrated in an interview that bitcoin was built on an international platform without borders, and it was impossible to purely ban it in China¹⁴.

As to bitcoin trading, few regulations had been set up before the recent reform. In 2013, China Securities Regulatory Commission published an announcement that no financial institution in China was allowed to participate in bitcoin trading¹⁵. Furthermore, when margin trading was expanding rapidly in May 2014, trading fee of most exchanges once went back to 0.3% for one month under the pressure from PBoC¹⁶.

In all, Chinese government shows a tolerant attitude in regard to bitcoin. Firstly, the government denies bitcoin as a currency but acknowledges its investment potential. Secondly, government realizes that the nature of bitcoin is decentralized, meaning that they can only control and regulate it but cannot eliminate it. Thirdly, government sees the importance of virtual currency in the future. Bitcoin, which has most liquidity among all the digital currencies, is a significant platform to observe the feasibility of blockchain as well as the virtual currency.

III. Impact of margin trading on the Chinese bitcoin market

14 8bt News. Proposal by Yifei Fan. *Sohu*. Feb 19. 2017

15 “China PBoC ban financial companies from Bitcoin transactions”. *Bloomberg*. Dec 5. 2013

16 “Five bitcoin platforms quit margin trading”. *Sina Tech*. May 7. 2014

Before analyzing the impact of margin trading, a question needs to be figured out is whether bitcoin exchanges are the true credit providers. Bitcoin exchanges offer lending on both RMB and bitcoin. While the amount of RMB and bitcoin that Chinese exchanges lend to investors for margin trading is not disclosed, it is still believed to be an over-zealous market by looking at indirect data.

Huobi lends RMB and bitcoin through its platform with a semi-market rate of 0.1% to 0.2%, while OKCoin builds a peer-to-peer lending platform for users with a complete market rate around 0.1%¹⁷. Since 2013, the daily lending rate for most exchanges stabilized at 0.1%, which equals an annual rate of 36.5%. Figure 1 shows the monthly trading volume distribution between two major currencies, CNY and USD, calculated in million bitcoins. It is presented that since the introduction of margin trading in China, proportion of trading volume in China increased steadily, which implies margin trading contributes a crucial amount to the total volume in China.

For capital lending, compared to the benchmark rate (around 5%) from PBoC and lending rate of stock margin trading (around 8.5%), bitcoin exchanges charge a much higher rate for margin trading. Therefore, it is reasonable that investors borrow from other channels when doing margin trading. However, it is rather difficult for investors to borrow bitcoins from other sources. The decentralized nature of bitcoin results in limited amount of bitcoin circulating round the

17 Yu, Wu. *2015 Global Digital Currency Industry Development Report*.

market. There are two types of investors who keep bitcoin in their hand - Long-term investors and those who keep for appreciation. Both types of investors are less willing to lend out bitcoin. For coin holders, as less and less bitcoins will be mined, they have an expectation on appreciation of bitcoin and they are less willing to lend them out. For long-term investors, keeping bitcoin in their hand enables them to trade at the first time, so they are also reluctant to lend bitcoin. Figure 2 and 3 shows the trend of annual lending rate from bitcoin exchanges, stock exchanges and People's Bank of China. Following the downward trend of the benchmark rate, securities companies lower the interest rate for stock margin trading, while bitcoin exchanges keep the same rate from the beginning. Such high and stable funding rate indicates the bullishness of the margin lending and the bitcoin speculation market as a whole.

1. Impact on the Market - Liquidity

The introduction of margin trading at that time remedies the drawback of bitcoin as an investment asset, which increases the market liquidity and stabilizes the general volatility. According to the design of Nakamoto, bitcoin production will be halved every four years and finally stays at 21 million. The advantage is that it can prevent inflation, but limited total amount also gives people expectation on an increasing currency value, which encourages users to keep bitcoin instead of investing or consuming it. As a result, decrease in circulated bitcoin causes the lack of liquidity in the market. Firstly, insufficient bid and ask orders will enlarge the bid-ask

spread, which reduces the trading volume. Secondly, when an order with a large amount of bitcoin is on the order list, it usually stays for a long time and hard to be completed. The introduction of margin trading effectively increases the amount of circulated coin in the market and expands the market depth. Before the margin trading is widely adopted in the Chinese market in March 2014, average daily trading volume for bitcoin in half year is only 169K BTC worldwide. Figure 4 shows the daily trading volume in CNY since margin trading starts in March 2014. Due to the temporary involvement of PBoC from April to June, volume had some fluctuation, and the volume had been increasing rapidly since July. The introduction of margin trading also helps stabilization of the market in the short term. Figure 5 shows the monthly volatility in 2014, indicating a down-ward momentum in volatility after introduction of margin trading in March. Meanwhile, Monthly volatility also performed steadily since 2016 except the UK Referendum in June, while it went up again after the suspension of margin trading in January 2017 (Figure 6).

2. Impact on Investors – Higher forced liquidation risk

The bitcoin margin trading market is still highly unregulated so far, embedded with high potential of forced liquidation for investors. Table 3 compares margin trading in Chinese stock market and bitcoin market in terms of market volatility, leverage ratio, investment qualification, forced liquidation rate. While the stock margin trading only offers 2x leverage ratio, meaning that you can double the initial capital, bitcoin exchanges offers up to 10x in margin trading and

even 50x in futures trading. High volatility, much larger amount of leverage, and low forced liquidation rate all imply a high forced liquidation risk.

In practical terms, suppose you invest 100,000 dollars and magnify it by 10 times as 1,000,000 dollars with short position on bitcoin. If the volatility on that day is more than 9%, exchanges will force investors to liquidate their positions. Take January 2016 as an example, among the 30 days there are four days on which daily maximum price movement exceeds 9%. If investors do futures trading with 50x leverage, in January 2016 there is an up to 100% probability of forced liquidation if investors initiate the short position at the lowest price. Even a slight opposite movement will exhaust the initial margin.

On August 19th, 2015, Bitfinex, one of the world largest bitcoin exchanges, which started to offer margin trading on June 2013, experienced a flash crash in the bitcoin market right before the midnight. Bitfinex price fell by 29% within 30 minutes with a nearly 10% fall in the total bitcoin price, causing a moment of panic among all the investors¹⁸. As one of the transparent margin trading platforms, Bitfinex discloses the open swap positions, which helps trace the story behind this event. It is a fact that several months before the crash, large amount of long positions had already been accumulating, as the total USD swaps reached 32 million US Dollars on Bitfinex around August 4th, as is nicely shown in Figure 7. The price during the moment was around 280 US Dollars. As most positions were initiated around August 4th, simple calculation

18 Caffyn, Grace. "Bitcoin Price Falls 14% Following Bitfinex 'Flash Crash'". *Coindesk*. 19 Aug. 2015.

can be made to get the approximate price for forced liquidation, which is around \$252. Before the crash, bitcoin price index was holding around \$255, which was close to the estimated price. As Figure 8 shows the swap position right before the event, a huge fluctuation happened during a very short time, indicating a large short position to be closed out and causing the price to jump from the cliff. Once a large position gets liquidated, a cascading effect is likely to happen. Since more orders reach the point, continuous liquidation will go through the order book and further drive the price down.

3. Impact on Exchanges

Without stipulation of specific reserve requirement, exchanges might undertake high risk of bank run when offering margin trading services. When commercial banks provide loans for customers, a required reserve ratio is set beforehand by the government, which is the minimum amount of depositors' balance that banks must hold as cash¹⁹. In most countries, required reserve is used as a monetary instrument to control the borrowing and interest rate. The sufficient deposit reserve also prevents banks from failure of solving the bank run, when substantial number of customers are panicked by upcoming financial crises and take deposit from banks. In China, the recent required reserve ratio is 17%²⁰. However, in the bitcoin market, no specific reserve requirement is stipulated by any institution, nor do exchanges show transparency on how many

19 Required reserve ratio. *Investopedia*. Link: <http://www.investopedia.com/terms/r/reserveratio.asp>

20 Tutt, Phillip. "China central bank cuts reserve requirement ratio by 0.5 percentage points". *CNBC*. Feb 29. 2016

bitcoins they have in the pool. While bitcoin trading among investors on the exchanges does not change the total bitcoin amount circulating within the pool, withdrawal of bitcoin to the wallet does decrease the total bitcoin amount in that specific exchange. Suppose user A stores a bitcoin in the exchange, and the exchange lends the coin to user B. User B then sells the coin to user C, who withdraws the coin to his own wallet. When A also intends to withdraw the bitcoin to wallet, the exchange will not be able to realize the transaction since there is no actual bitcoin in the pool but a nominal bitcoin. When massive withdrawal events mentioned above happen, exchanges will have a huge burden providing sufficient bitcoins for withdrawal.

The vulnerability of online exchanges raises up the possibility of massive withdrawal of bitcoin. There are two types of wallets used to store bitcoins, namely the “hot wallet” and “cold wallet”. Using cold wallet means keep bitcoin storage offline, while hot wallet is connected to the Internet. Most exchanges use hot wallet to keep users’ bitcoin in order to pay out withdrawal promptly, which remains a loophole for hackers to steal bitcoins from exchanges. On January 5th, 2015, Bitstamp claimed that \$5 million was stolen from its hot wallet from hackers²¹. As panicked by the technical accident, investors intend to withdraw bitcoin to their own wallet. To avoid the potential failure of providing enough bitcoin, Bitstamp had to halt the withdrawal function temporarily.

21 Whittaker, Zack. “Bitstamp exchange hacked, \$5M worth of bitcoin stolen”. *ZDNet*. Jan 5. 2015

IV. Chinese bitcoin market after the reform

1. Bitcoin trading transfers to the OTC market

As PBoC gets involved in the investigation, trading volume distribution round the world has changed significantly. As is shown in Figure 9, center of bitcoin trading has changed to the US market, while trading volume in CNY is less than 5%, losing the influential power on the global market. Domestic bitcoin trading has gradually transferred to the over-the-counter market, where the price has a more than \$100 premium over the price in exchanges according to price in Localbitcoins.com²². As most bitcoins are locked in the exchanges being investigated, excess demand in the OTC market gradually drives the price up.

2. Potential solution to the reform

To solve the cascading effect of forced liquidation and huge fluctuation caused by a very first closing out position, feasibility of applying circuit-breaker mechanism to bitcoin trading is worth discussing. Circuit breaker is used to temporarily suspend trading on a stock exchange or individual securities in order to restrain panic-selling or exceeding volatility of the stock market.²³ After the “Black Monday” on August 24th 2015, Chinese stock market had entered a downturn period over the rest of the year. On January 4th, 2016, Circuit Breaker was triggered in order to curb the volatility after 7% shares plunge, effectively avoided further loss of Chinese

22 Current bitcoin price in OTC market. Link: <https://localbitcoins.com>

23 Reference on definition from Investopedia: <http://www.investopedia.com/terms/c/circuitbreaker.asp>

investors²⁴. However, normal circuit breaker in the stock market do not seem to work in the bitcoin market. In fact, number of bitcoin exchanges is much more than that of stock exchanges. Regulated by different countries, bitcoin exchanges are embedded with different trading fees, services, and exposures. It is impossible to require each exchange to apply circuit breakers when huge volatility appears. This means that rally on price might not be stopped by small-scale circuit breaker, and investors will still be forced to liquidate their positions.

While it seems infeasible to implement the same circuit-breaker mechanism in stock market and stop the trading once the price reaches the point, similar work can be done to detect potential fluctuation of price in advance. Similar to the threshold value of stock circuit breaker, a maximum price movement can be set for large orders that might move the market beyond certain percentage. When a position with a large amount of bitcoin is going to be processed, the algorithm can detect whether it will go beyond the threshold level, and determine the best time to approve the deal. The implementation of such mechanism can effectively avoid flash crash caused by large-amount singular order.

V. Conclusion

The findings from this study help demonstrate the huge risk embedded in the service of bitcoin margin trading. By looking into data on price, trading volume, and change on swap position, it is

24 "China Halts Trading for Day after 7% Shares Plunge Triggers 'circuit Breaker'" *TheGuardian*. N.p., 4 Jan. 2016.

showed that investors are faced with high forced liquidation risk, while exchanges are also exposed to potential bank run failure. Learning from how the financial crisis in 2008 sets its origins in the over-leveraged investment in real estate, lack of regulations in bitcoin trading has become the problem that brooks no delay.

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Data Source:

Bitcoin Price Index: <http://www.coindesk.com/price/>

Bitcoin daily trading volume, volume in currency comparison, volume in exchanges comparison, percentage trading volume calculated from:

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

Bitfinex Margin trading swap position: <https://bfxdata.com/combined/btc>

SSE Index: <http://finance.yahoo.com/quote/%5ESSEC?ltr=1>

Basic lending rate from People's Bank of China: <http://www.pbc.gov.cn>

Stock margin trading lending rate is taken the average of 10 leading domestic securities companies: Zhongxin(中信), Hua Tai(华泰), Yinhe(银河), Guangfa(广发), Shenwan Hongyuan(申万宏源), Guotai(国泰君安), Zhaoshang(招商), Haitong(海通), Guoxin(国信), Zhongxinjiantou(中银建投). Lending rates are collected from the official websites of these securities companies.

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Did Margin Trading Crash the Price of Bitcoin?
<http://www.coindesk.com/margin-trading-crash-price-bitcoin/>

Bitfinex Outage Causes Bitcoin Price Flash Crash – The Merkle.
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BitFinex FlashCrash – Post-Mortem Analysis.
<https://www.deepdotweb.com/2015/08/24/bitfinex-flashcrash-post-mortem-analysis/>

Appendix

Table 1

Table 1 shows detailed information on margin trading services of Okcoin, Huobi and BTCC, BTCtrade and Coinnice. Data is collected from *2015 Global Digital Currency Industry Development Report* done by the biggest bitcoin forum in China called *8btc*. Link: <http://www.8btc.com/2015-smart-contract>

Exchanges	Lending rate	Return method	Discount on interest rate	Leverage ratio	Forced selling ratio (of total capital)
Okcoin	0.1%-0.2%	Manual	N/A	3X	110%
Huobi	0.1%-0.2%	Manual	N/A	3X – 5X	110%
BTCC	0.1%	Manual	N/A	3X	110%
BTCtrade	0.1%-0.2%	Manual	N/A	3X	110%
coinnice	0.03-0.1%	Automatic	Three interest-free coupon every month	3X – 10X according to VIP level	110%

Table 2

Table 2 shows detailed information on futures trading of Okcoin, Huobi, 796, Coinnice and BTCC. Data is collected from 2015 Global Digital Currency Industry Development Report. Link: <http://www.8btc.com/2015-smart-contract>

Exchanges	okcoin	Huobi	796	coinnice	BTCC
Settlement time	Friday 16:00	Friday 12:00	Saturday 10:00	Rolling	Monday – Friday 10:00 – 16:00
Initial margin	5%	5%	5%	5%	5%
Trading fee	0.03%	0.03%	0	0.03%	0.5 RMB/BTC
Forced selling rate	20%	15%	20%	5%-15%	40%
Leverage ratio	10x, 20x	5x, 10x, 20x	5x, 10x, 20x, 50x	5x, 10x, 20x, 50x	20x

Table 3

Table 3 compares stock and bitcoin margin trading in terms of market volatility, maximum leverage ratio, investment qualification and margin call rate (force liquidation). Data of volatility is collected from January 1st, 2015 to December 31st, 2015. SSE Index is used to calculate the stock volatility. Maximum leverage of stock is regulated by China Securities Regulatory Commission (Presented by Sohu News: <http://mt.sohu.com/20160519/n450422794.shtml>) The most often used stock margin call among leading securities companies in China is selected (companies including Zhongxin(中信), Guotai(国泰君安), Yinhe(银河), Guangfa(广发), Zhongxinjiantou(中信建投)).

	Volatility	Maximum Leverage ratio	Investment Qualification	Margin call (forced liquidation rate)
Stock	0.3884	1:1	Personal stock account opens more than 18 months; Bank account has more than 500,000 RMB asset	130%
Bitcoin	0.6740	1:10	N/A	110%

Figure 1

Figure 1 shows the monthly trading volume via CNY and USD in percentage in 2014. Data is calculated in million BTC and trading volume is collected from Bitcoinity.org.

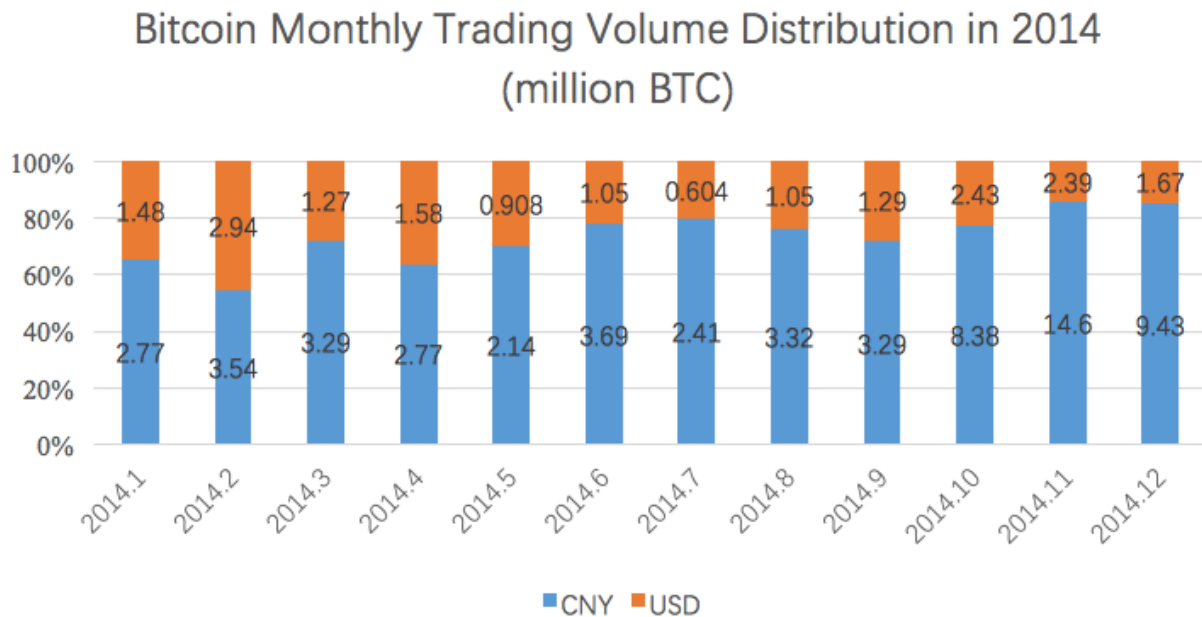


Figure 2

Figure 2 tracks interest rate change of benchmark and stock margin trading from 2013 to 2016. Basic lending interest rate is collected from People's Bank of China. Stock lending rate is calculated from average of 10 leading securities companies, Zhongxin(中信), Hua Tai(华泰), Yinhe(银河), Guangfa(广发), Shenwan Hongyuan(申万宏源), Guotai(国泰君安), Zhaoshang(招商), Haitong(海通), Guoxin(国信), Zhongxinjiantou(中银建投).

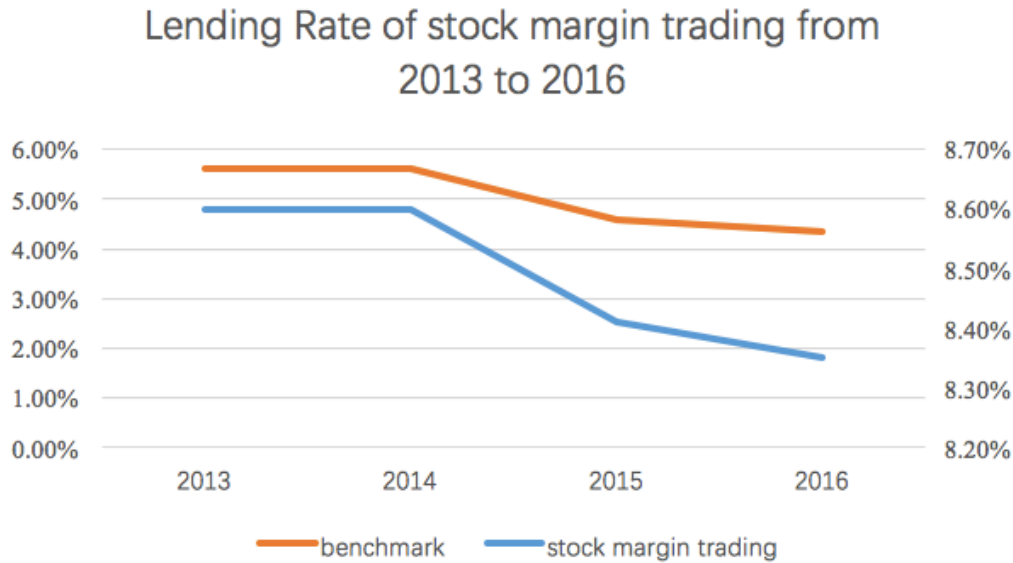


Figure 3

Figure 2 tracks interest rate change of benchmark and stock margin trading from 2013 to 2016. Basic lending interest rate is collected from Bank of China. Lending rate of bitcoin is calculated from average of three exchanges, BTCC, Huobi and Okcoin.

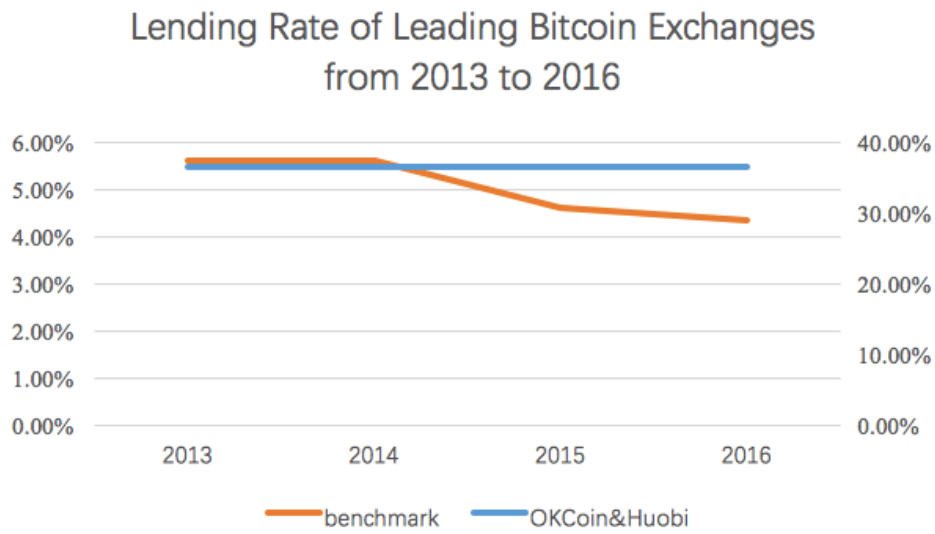


Figure 4

Figure 4 tracks the trading volume in Chinese bitcoin market in 2014, during which margin trading had been introduced. Data is collected from bitcoinity.org.

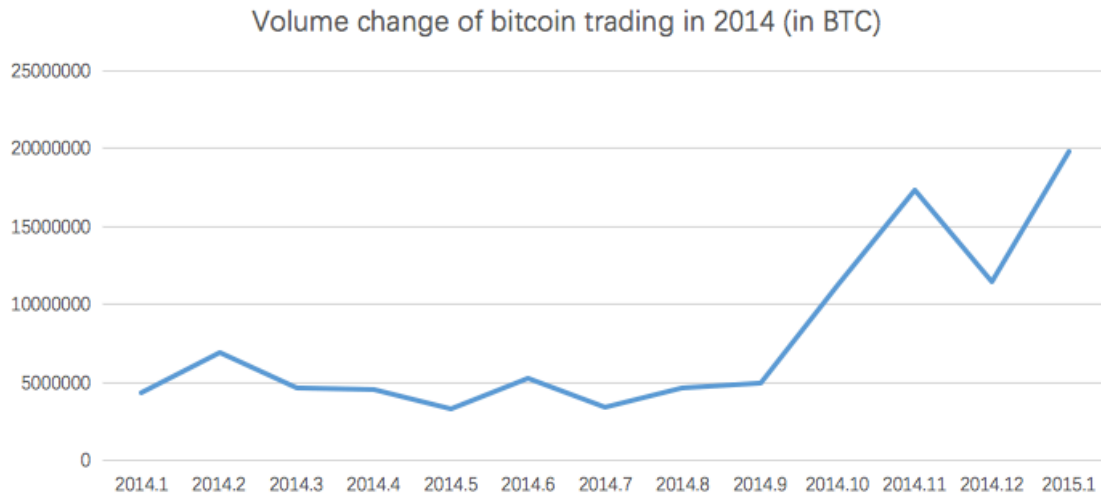


Figure 5

Figure 5 shows the volatility change of bitcoin in 2014. Price Index of bitcoin is collected from Coindesk.com.

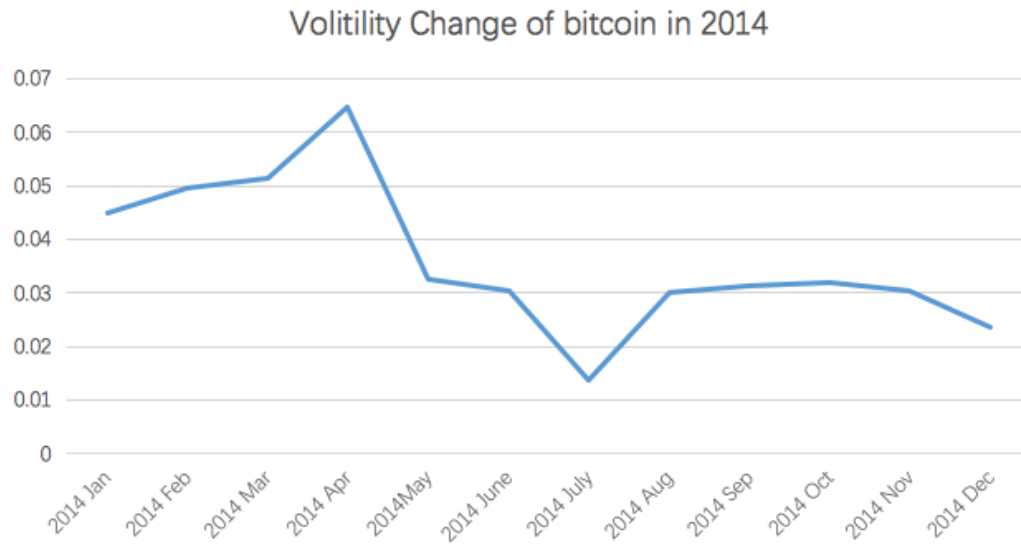


Figure 6

Figure 6 shows the volatility change of bitcoin from March 2016 until now. Price Index of bitcoin is collected from Coindesk.com.

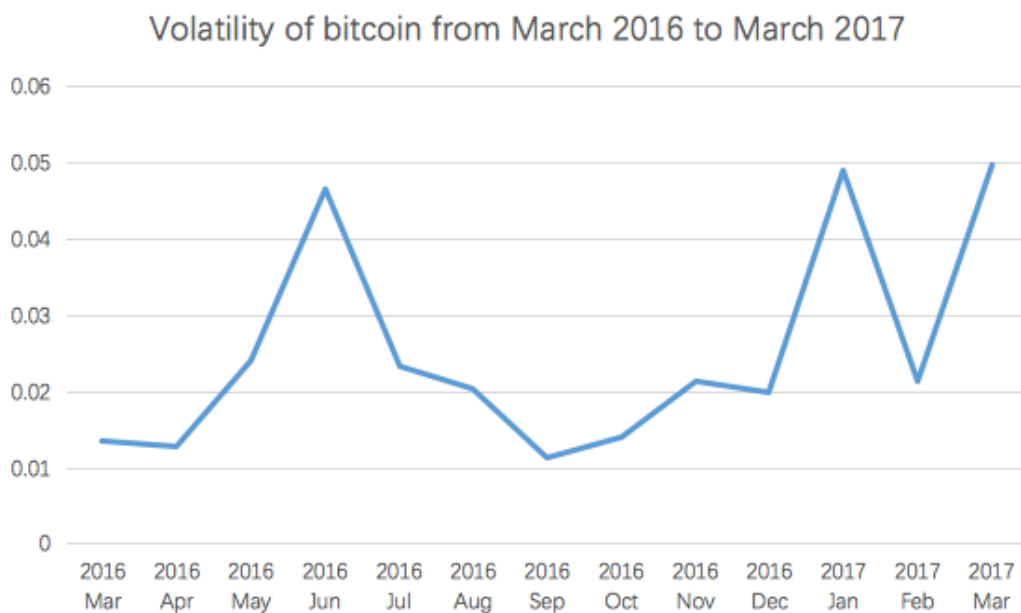


Figure 7

Figure 7 shows sum of USD swap (Green) and BTC swap (Red) with BTCUSD price (Blue) on Bitfinex from June 1st, 2015 to August 24th, 2015. Data is collected from Bitfinex.

BTCUSD Price combined with total sum of active BTC and USD swaps



Figure 8

Figure 8 shows sum of USD swap (Green) and BTC swap (Red) with BTCUSD price (Blue) on Bitfinex from August 16th, 2015 to August 20th, 2015. Data is collected from Bitfinex.

BTCUSD Price combined with total sum of active BTC and USD swaps

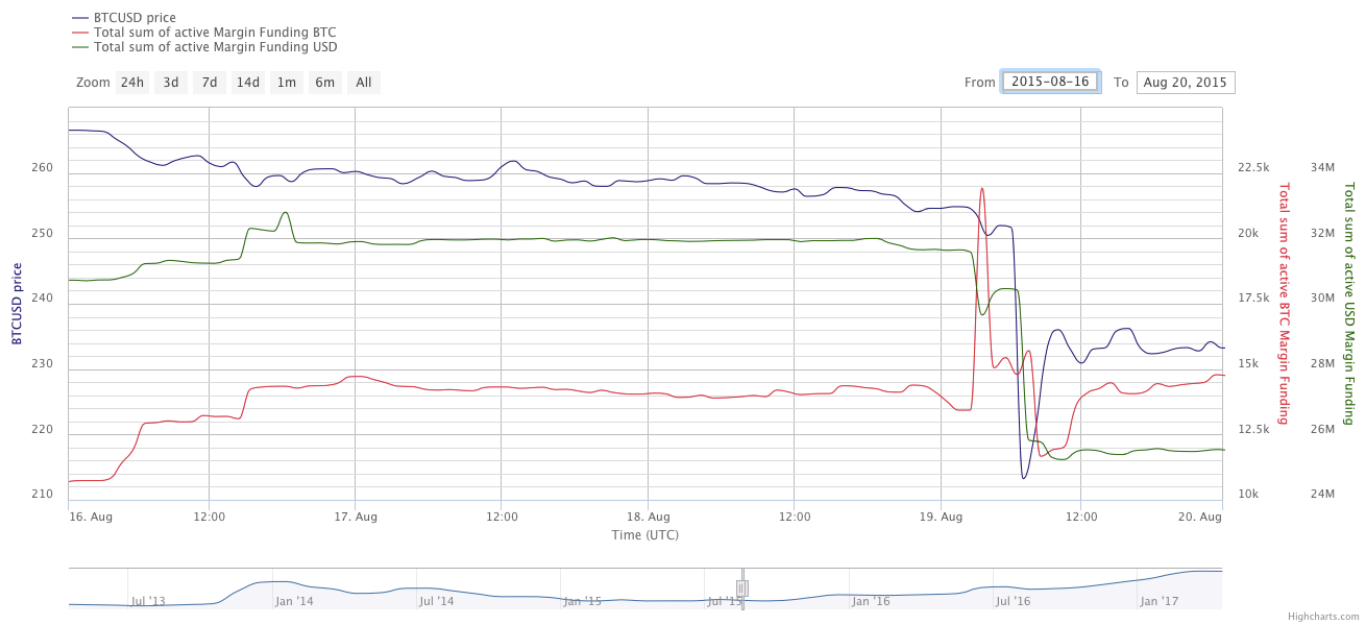


Figure 9

Figure 9 shows the daily trading volume before and after PBoC's involvement in the investigation on Chinese bitcoin exchanges starting around January 22nd, 2017. Data is presented in BTC and collected from bitcoinity.org.

