The correlation and volatility between bitcoin and the blockchain index

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Abstract

Purpose – The encrypted money market has attracted the attention of investors all over the world. Among the encrypted currency, bitcoin is undoubtedly the most popular. Because blockchain technology is the crucial support of bitcoin, exploring the relationship between bitcoin and the blockchain index is necessary.

Design/methodology/approach – This paper uses the Granger causality test to explore the correlation between bitcoin and the blockchain index. Furthermore, their volatility is analyzed by a GARCH-class model.

Findings – The results show that no significant correlation exists between bitcoin and the blockchain index; external shocks aggravate the volatility of bitcoin and the blockchain index, and the volatility has a certain degree of sustainability; and blockchain index has obvious leverage, namely, its decline has a stronger impact.

Originality/value – The volatility of bitcoin and the blockchain index is crucial for investors.

Keywords Bitcoin, Blockchain index, Granger causality test, GARCH-class model, Volatility

Paper type Research paper

1. Introduction

The electronic and virtualization of currency has accelerated the development of digital currency and bitcoin has attracted the attention of various industries. On June 18, 2019, the launch of the Libra White Paper, which is Facebook's encrypted currency, triggered another boom in bitcoin investments. In addition, what worth noting is that blockchain technology is the underlying technology that ensures that bitcoins operate normally (Yuan and Wang, 2016). Blockchain technology combines peer-to-peer with block technology, enabling people to trust the cooperation between two sides without the supervision of a central authority (He *et al.*, 2017). Blockchain technology has become the goal of enterprise informatization construction, resulting in investors gradually paying close attention to the blockchain concept stocks.

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The stocks for businesses with a connection to blockchain are classified as blockchain concept stocks in the stock market. The blockchain index is composed of 50 of the most representative blockchain concept stocks, which not only reflects the overall appearance and operation of blockchain concept stocks but also is used as the scale and standard for investors. Because of the close relationship between the blockchain and bitcoin, we expect that the price fluctuations in bitcoin affect the stock price of the blockchain Index to some extent and vice versa.

This paper explores the correlation between bitcoin and the blockchain index. The demand in the bitcoin market is not affected by macroeconomic development and investment behavior cannot be explained by standard economic and financial theory. Because digital currency is not affected by the basic level of the macroeconomy, the supply function is either fixed or evolved according to an algorithm. Therefore, the price of digital currency is entirely driven by investors' confidence in its sustainable growth. We expect that the blockchain index may become a crucial variable. Therefore, this paper puts forward the following research questions.

RQ1. Is there a correlation between the logarithmic yields of bitcoin and the blockchain index?

In fact, bitcoin is mainly used as an asset rather than currency (Baek and Elbeck, 2015; Glaser *et al.*, 2014). Compared with other currencies, the bitcoin market is highly speculative, less stable and more vulnerable when facing speculative bubbles (Cheah and Fry, 2015; Grinberg, 2011). Therefore, unlike other assets in the financial market, bitcoin creates new possibilities for stakeholders in risk management, portfolio analysis and consumer sentiment analysis (Dyhrberg, 2015, 2016). Therefore, studying its volatility is of great significance. In addition, the blockchain index is influenced by the new blockchain technology, making its volatility also worthy of attention.

Prior studies used various GARCH models. However, most such studies on the price fluctuation of bitcoin used a single conditional heteroskedasticity model, which model can better explain the relationship between bitcoin and the blockchain index is not clear. Therefore, this paper compares and analyses various GARCH models to obtain the best one to describe the volatility of bitcoin and the blockchain index. This paper puts forward the following research questions.

RQ2. How is the volatility of the logarithmic yields of bitcoin and the blockchain index?

This paper studies the relationship between the logarithmic yields of bitcoin and the blockchain index and finds no significant correlation between them. In addition, through an analysis using the GARCH model, we found that external shocks aggravate the volatility of logarithmic yields of bitcoin and the blockchain index, and the volatility has a certain persistence. Additionally, the logarithmic yields of the blockchain index have leverage; namely, the decline of the logarithmic yields of the blockchain index has a stronger impact on the market.

The structure of this paper is as follows. Section 2 summarizes the relevant research literature on the factors affecting the price of bitcoin and the price volatility of bitcoin and blockchain concept stocks. Section 3 puts forward the main research hypothesis on.

2. Literature review

2.1 Literature reviews on influencing factors of bitcoin price

The analysis of bitcoin has received significant recent attention, which can be attributed to its innovation, simplicity, transparency and growing popularity (Urquhart, 2016). A large

number of studies explored the relevant factors affecting the price of bitcoin, as shown in Table I. Kristoufek (2013) assumed that the volatility of encrypted currency is not related to basic macroeconomic factors, such as GDP, interest rates and inflation, but to investor sentiment. This result is contrary to the finding in van Wijk (2013), which holds that a significant relationship exists between the price of bitcoin and macroeconomic indicators. A statistically significant two-way relationship exists between bitcoin prices and Google trends, whereas the relationship between Wikipedia and bitcoin is not significant (Kristoufek, 2013). The page views of forum posts and Wikipedia have a significant impact on bitcoin prices (Ciaian *et al.*, 2014). The amount and sentiment of news affect the bitcoin yield (Polasik *et al.*, 2015). Dyhrberg (2015) used the GARCH model and found that the price of bitcoin is similar to that of the dollar and gold, and a significant correlation exists between bitcoin and the federal funds rate. Hayes (2016) applied a least squares regression model and found that the three main driving factors of the encrypted currency price are the competition level of miners, unit output, and the difficulty of encrypted currency mining algorithms. In addition, Bouoiyour and Selmi (2015) use the ADRL boundaries test to determine a series of factors affecting bitcoin trading prices, including the stock market. Moreover, factors such as speculation significantly affect prices during bitcoin trading under certain conditions (Kristoufek, 2014).

2.2 Literature review on bitcoin price volatility

Early literature focused on speculative bubbles related to bitcoin, as indicated in Table II. Cheah and Fry (2015) believed that a speculative bubble exists in the bitcoin market and that the basic price of bitcoin is zero. Kristoufek (2013) believed that the convenience of buying bitcoins and the lack of a need to conduct large-scale transactions create the possibility of speculative bubbles. Glaser *et al.* (2014) used the ARCH and GARCH methods to find that bitcoin was mainly used for speculation and not to buy goods or services. Phillip *et al.* (2018) found that encrypted currency has the characteristics of long memory, a leverage effect, random fluctuations and thick tails. These results are consistent with the conclusions of

Author (Year)	Influencing factors	Main conclusions
Kristoufek (2013)	Investor sentiment	A statistically significant two-way relationship exists between bitcoin prices and Google trends, whereas the relationship between Wikipedia and bitcoin is not significant
van Wijk (2013)	Macroeconomic development indicators	A significant correlation exists between the price of bitcoin and macroeconomic indicators
Ciaian *et al.* (2014)	Page view of forum posts and Wikipedia	The page views of forum posts and Wikipedia have a significant impact on bitcoin prices
Polasik *et al.* (2015)	Amount and sentiment of news	The amount and sentiment of news affect the bitcoin yield
Dyhrberg (2015)	Gold, dollar, federal funds rate	The price of bitcoin is similar to that of the dollar and gold, and a significant correlation exists between the price of bitcoin and the federal funds rate
Hayes (2016)	Technical factors	The competition level of miners, unit output and the difficulty of encrypted currency mining algorithms affect the price of encrypted currency
Bouoiyour and Selmi (2015)	Stock market, etc.	Factors such as the stock market influence the price of bitcoin
Kristoufek (2014)	Speculation, etc.	Factors such as speculation have a significant impact on the bitcoin trading price under certain conditions

Table I.
Literature review on influencing factors of bitcoin price

Catania *et al.* (2018), who used the GARCH and GHSKT models and found that encrypted currencies exhibit a long memory and a leverage effect during the process of fluctuations.

2.3 Literature review on blockchain concept stocks

At present, little literature exists on blockchain concept stocks. Duan and Dong (2019) studied the impact of the network heat of blockchain on the volatility of blockchain concept stocks. The results show that the Baidu index of blockchain has a positive correlation with the volatility of blockchain concept stocks. Li and Sun (2018) used the BCC-DEA method to measure the input-output efficiency of blockchain concept stocks and found that most enterprises have relatively low input-output efficiency given inefficient technology or scale. Table III summarizes the relevant literature of the blockchain concept unit.

Therefore, this paper aims to overcome the shortcomings of previous studies. First, considering the natural relationship between bitcoin and blockchain, the bitcoin market may have some influence on blockchain concept stocks. However, no scholars have studied the relationship between the price and volatility of the bitcoin market and blockchain concept stocks. Second, to the best of our knowledge, this study is the first on the volatility of the blockchain index. Because the volatility law of the blockchain index can provide useful guidance for investors, studying it is necessary. Finally, most studies on the volatility of bitcoin and the blockchain index are based on a single model. Therefore, this paper aims to compare the best models to analyze the relationship between bitcoin and the blockchain index. The purpose of this paper is to study the correlation between bitcoin and the blockchain index, as well as the volatility of their respective yields.

3. Research hypothesis

When the price of bitcoin increases or decreases, along with the propaganda effect of the network media, investors in the market for the short term may be highly concerned about some blockchain concept stocks and may affect their yield. For the blockchain sector, the blockchain application industry has been expanding, injecting new ideas into the traditional

Table II.
Literature review on bitcoin price volatility

Author (Year)	Main conclusions
Cheah and Fry (2015)	A speculative bubble exists in the bitcoin market, and the basic price of bitcoin is zero
Kristoufek (2013)	The convenience of buying bitcoins and the lack of a need for large-scale transactions have created the possibility of speculative bubbles
Glaser *et al.* (2014)	Bitcoin is mainly used for speculation and not to buy goods or services
Phillip *et al.* (2018)	Encrypted currency has the characteristics of a long memory, a leverage effect, random fluctuations, and a thick tail
Catania *et al.* (2018)	Encrypted currency has a long memory and a leverage effect during the process of fluctuations

Table III.
Literature review on bitcoin price volatility

Author (Year)	Main conclusions
Duan and Dong (2019)	The Baidu index of blockchain is positively correlated with the volatility of blockchain concept stocks
Li and Sun (2018)	For the majority of enterprises, uneconomic scale and inefficient technology or scale are the main reasons for the relatively low input-output efficiency

industry. Therefore, driven by the news of the bitcoin price increase, many investors have gradually begun to pay attention to the blockchain concept and generate speculative demand. However, given the uncertainty of blockchain technology, the news of bitcoin price declines has a negative impact on investors. In contrast, because the blockchain is the underlying technical support for bitcoin, we expect that the rise and fall of the blockchain index will also affect bitcoin price fluctuations. Therefore, the following assumptions are proposed.

H1. A significant correlation exists between bitcoin and blockchain concept stocks.

In addition, external shocks, including the promulgation of policies, will have a strong impact on bitcoin and the blockchain index. For example, "the Notice on Preventing Bitcoin Risk" stipulates that bitcoin cannot and should not be used as a currency in the market, which limits its trading in China and affects the yield of the bitcoin market to a certain extent. Moreover, because of the long-term effectiveness of the policy, we believe that the shock has a sustained impact on the volatility of the bitcoin market. In addition, external shocks, such as blockchain support or control policies, will have the same effect. Therefore, we expect that external shocks will increase the volatility of the logarithmic yields of bitcoin and the blockchain index, and the volatility has a certain sustainability. Therefore, the following assumptions are proposed.

H2a. External shocks can exacerbate the volatility of bitcoin and the blockchain index.

H2b. External shocks have a sustainable impact on the volatility of bitcoin and the blockchain index.

4. Data source and preprocess

4.1 Data source

This paper takes December 31, 2013 to June 25, 2019, as the time interval and crawls all of the closing price data of the blockchain index. The data on bitcoin trading are similar to data on stock market trading. We also choose the closing price for the sample analysis. To explore the relationship with the blockchain index and compare it to its law of fluctuations, the interval for bitcoin-related data is the same as that for the blockchain index. The data on the blockchain index and bitcoin are from the Wind database at http://coinmarketcap.com/website

4.2 Data preprocess

First, we drop data on holidays and weekends using the blockchain index as the standard to ensure the consistency and correspondence of the two series. Second, according to the GARCH model, directly using the closing price of bitcoin and the blockchain index is not appropriate. Therefore, this paper adopts the logarithmic difference method to address the closing price data of bitcoin and the blockchain index, that is

$$R_t = lnP_t - lnP_{t-1} \tag{1}$$

5. Data analysis and results

5.1 Basic description

The Q-Q plot of the logarithmic yields of bitcoin and the blockchain index show that both bitcoin and the blockchain index are not completely distributed on the straight line of the

Q-Q plot (Figures 1 and 2). Therefore, a preliminary consideration is that the series does not conform to the normal distribution. Further, combined with the descriptive statistics of the sample data in Table IV and the histogram of the sample data in Figures 3 and 4, the distribution of the sample data can be preliminarily judged.

Table IV shows that, for a total of 1,335 samples, the skewness of the logarithmic yield series of bitcoin and the blockchain index are −0.385 and −0.448, respectively, indicating that the series has a long-left tail, and the left tail of the blockchain index series is more obvious. The kurtosis of the logarithmic yield series of bitcoin and the blockchain index is 8.549 and 5.420, respectively, indicating that the return series have peaks, and the peak of the bitcoin series is more obvious. Therefore, both series have the characteristics of a peak and a thick tail. In addition, the Jarque-Bera values were 1745.708 and 370.580, respectively and p-values of 0.000. Therefore, the hypothesis that the logarithmic yield series of bitcoin and the blockchain index obeys a normal distribution is again rejected.

To more intuitively observe the fluctuation of bitcoin and the blockchain index over time, the fluctuation diagram is used for further analysis. Figure 5 indicates that the fluctuations of the logarithmic yield series display a "clustering" phenomenon, namely, alternating high and low fluctuations occur and last for a while.

5.2 Volatility relationships test

First, we observe the trend diagram of the closing price of bitcoin and the blockchain index (Figure 6). Combined with the original data, we observe that the closing price of bitcoin has

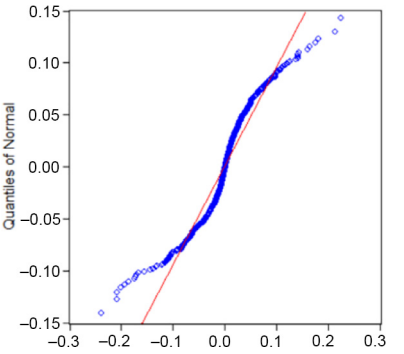

Figure 1.
Q-Q plot of bitcoin series

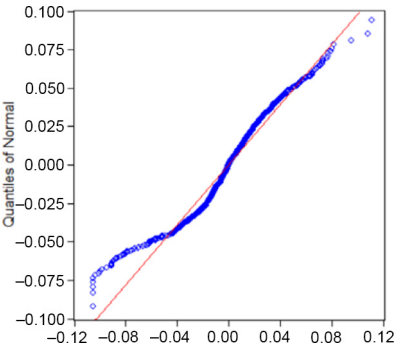

Figure 2.
Q-Q plot of blockchain index series

been increasing continuously since January 2014, reaching its highest point on December 18, 2017, and then declined rapidly until 2019. The closing price of the blockchain index has been rising since January 2014, reached its peak on June 12, 2015, and then declined. Then, by observing the scatter plot of the logarithmic yields of bitcoin and the blockchain index (as shown in Figure 7), we find that no obvious relationship exists between these two variables.

Therefore, a preliminary determination is that a weak correlation exists between the two series; however, the relationship between the volatility of bitcoin and the blockchain index cannot be clearly observed in the figure. To test the causality between bitcoin and the blockchain index and to avoid a false regression, we use the Augmented Dickey–Fuller

Basic indicators	Logarithmic yields of bitcoin	Logarithmic yields of blockchain index
Sample size	1,335	1,335
Mean	0.001	0.001
Mean	0.002	0.001
Max	0.225	0.111
Min	−0.238	−0.105
Standard deviation	0.042	0.028
Skewness	−0.385	−0.448
Kurtosis	8.549	5.420
Jarque-Bera Statistic	1,745.708***	370.580***

Note: *** Indicates significant at the 1% level

Table IV. Descriptive statistical results of bitcoin and the blockchain index

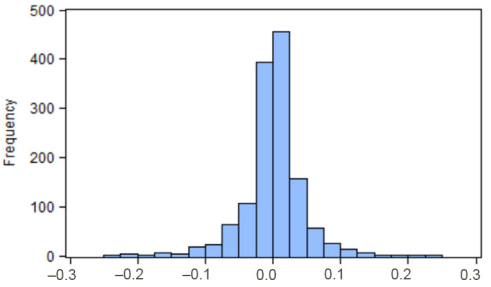

Figure 3. Histogram of bitcoin series

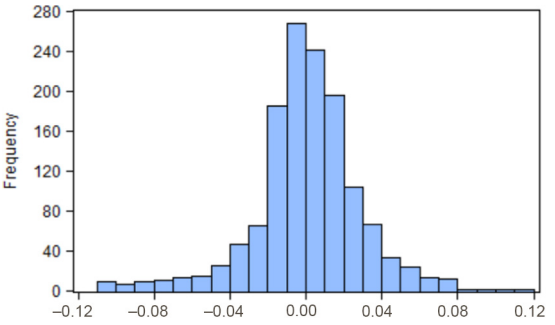

Figure 4. Histogram of blockchain index series

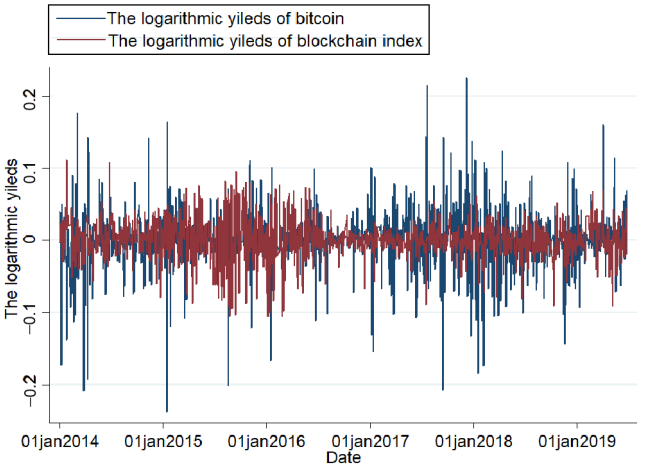

Figure 5.
Fluctuation diagram logarithmic yield series of bitcoin and the blockchain index

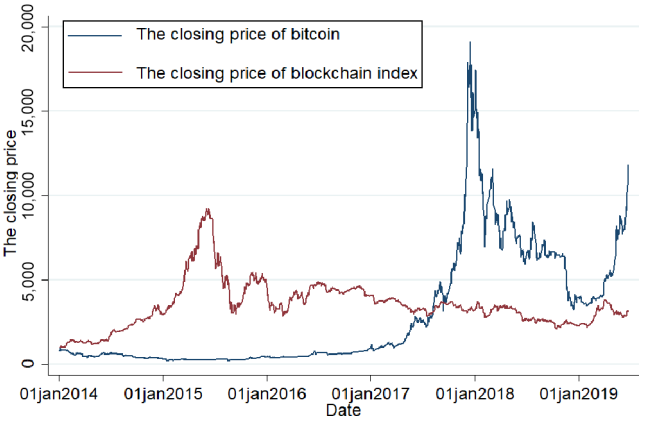

Figure 6.
Trend diagram of bitcoin and the blockchain index closing price

(ADF) method to test the stationarity of the logarithmic yield series of bitcoin and the blockchain index.

5.2.1 Stationarity test. To avoid the pseudo-regression problem, this paper uses the ADF method to test the stationarity of the logarithmic yield series of bitcoin and the blockchain index. The results are indicated in Table V. The t-statistics of the logarithmic yield series of bitcoin and the blockchain index are found to be −35.434 and −32.939, respectively. The *p*-values are both 0; therefore, the series all satisfy the characteristics of stationarity. Therefore, bitcoin and the blockchain index series passed the stationarity test and can be further modeled and analyzed.

5.2.2 Granger causality test of series. In this paper, the Granger causality test is used to explore the correlation, and the results are shown in Table VI. Table VI shows that no two-way Granger causality exists between bitcoin and the blockchain index. In other words, the bitcoin trend does not have a guiding effect on the blockchain index, and vice versa. Therefore, hypothesis *H1* is rejected.

5.3 Construction of GARCH-class model

5.3.1 ARCH test. First, in this paper, the ARCH effect is tested. Table VII shows that the autocorrelation coefficient AC and partial correlation coefficient PAC of the logarithmic yield of bitcoin and the blockchain index are not zero, indicating that the series have the ARCH effect. Therefore, the GARCH-class model can be established.

5.3.2 Construction of GARCH-class model. Because ARCH effects exist, the GARCH model is used for further analysis. The commonly used GARCH-class models include the GARCH, E-GARCH and T-GARCH models. In this paper, three GARCH-class models are selected to build the model, and the specific formulas are provided in Table VIII.

By using Eviews, the GARCH (1,1), E-GARCH (1,1) and T-GARCH (1,1) models of bitcoin and the blockchain index are established, respectively. The parameters of each GARCH model are provided in Table IX.

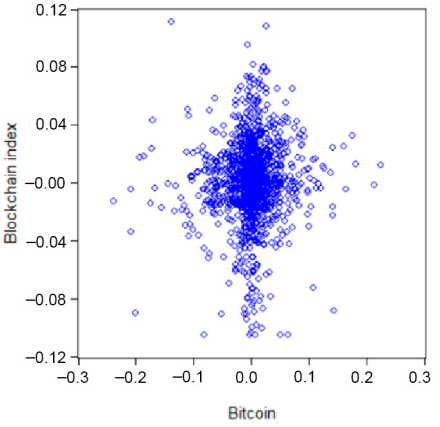

Figure 7.
Scatter plot of bitcoin and the blockchain index closing price

Table V.
ADF Test results of bitcoin and the blockchain index series

	1%-level	5%-level	10%-level	*t*-statistic	ADF
bitcoin	−3.435	−2.863	−2.568	−35.434	0.000
blockchain index	−3.435	−2.863	−2.568	−32.939	0.000

Table VI.
Granger causality test results of logarithmic yield of bitcoin and the blockchain index

	Bitcoin is not the Granger reason of blockchain index		Blockchain index is not the Granger reason for Bitcoin	
Lagged Rank	*F*-stat	*p*-value	*F*-stat	*p*-value
First-order	0.29064	0.5899	1.09042	0.2966
Second-order	0.31709	0.7283	0.53833	0.5838
Third-order	0.76134	0.5158	1.59780	0.1881
Fourth-order	0.54558	0.7023	1.53877	0.1885
Fifth-order	0.72259	0.6065	1.26486	0.2766
Sixth-order	0.68656	0.6606	1.09871	0.3609
Seventh-order	0.68477	0.6851	1.05751	0.3889
Eighth-order	0.83566	0.5711	0.93679	0.4848

We choose the optimal model of the bitcoin and the blockchain index series. Table IX shows the estimated results of the GARCH-class model based on two selection criteria, namely, AIC and Hannan–Quinn (HQ). Table IX shows that the AIC and HQ values of the E-GARCH model are the smallest for the bitcoin logarithmic yield series, and each parameter is significant at the 1 per cent level. Therefore, the E-GARCH model is chosen as the best one to describe the volatility of the bitcoin logarithmic yield. For the logarithmic yield series of the blockchain index, the AIC and HQ values of the E-GARCH model are smaller, and the parameters of the E-GARCH model are significant at the 1 per cent level. We also choose the E-GARCH model to describe the volatility of the logarithmic yield of the blockchain index.

In addition, the results in Table IX indicate that for bitcoin and the blockchain index, the parameters of the E-GARCH model are significant, which indicates that both bitcoin and the blockchain index series have leverage. In addition, the ARCH and GARCH parameters in the GARCH model are significant. The coefficients of ARCH are 0.150 and 0.063, and the

Table VII.
ARCH test results of logarithmic yield of bitcoin and the blockchain index

Bitcoin	AC	PAC	Q-Stat	Prob	Blockchain index	AC	PAC	Q-Stat	Prob
1	0.029	0.029	1.112	0.292	1	0.102	0.102	13.917	0
2	−0.032	−0.033	2.4991	0.287	2	0.052	0.043	17.604	0
3	0.018	0.02	2.9548	0.399	3	0.08	0.072	26.233	0
4	0.062	0.059	8.0386	0.09	4	0.008	−0.009	26.314	0
5	−0.036	−0.039	9.8004	0.081	5	0.008	0.001	26.396	0
6	−0.013	−0.007	10.015	0.124	6	0.024	0.018	27.184	0
7	−0.022	−0.026	10.677	0.153	7	0.03	0.026	28.372	0
8	−0.013	−0.015	10.907	0.207	8	0.054	0.047	32.272	0
9	0.003	0.007	10.918	0.281	9	−0.034	−0.05	33.857	0
10	0.009	0.009	11.028	0.355	10	−0.059	−0.06	38.471	0
11	−0.032	−0.029	12.372	0.336	11	0.078	0.088	46.736	0
12	0.003	0.005	12.381	0.416	12	−0.01	−0.015	46.864	0

Table VIII.
Formulas of GARCH-class model

GARCH-class model	Formulas
GARCH	$h_t^2 = \omega + \alpha u_{t-1}^2 + \beta h_{t-1}^2$
E-GARCH	$\log(h_t^2) = \omega + \alpha\left[\lvert\frac{u_{t-1}}{h_{t-1}}\rvert - \sqrt{2/\pi}\right] + \beta\log(h_{t-1}^2) + \delta\frac{u_{t-1}}{h_{t-1}}$
T-GARCH	$h_t^2 = \omega + \alpha u_{t-1}^2 + \beta h_{t-1}^2 + \gamma u_{t-1}^2 I_{t-1}$

Table IX.
Estimation results of logarithmic yield of bitcoin and the blockchain index by GARCH-class model

	Bitcoin GARCH-class model			Blockchain index GARCH-class model		
Parameters	GARCH	E-GARCH	T-GARCH	GARCH	E-GARCH	T-GARCH
Const(ω)	0.000*** (0.000)	−0.860*** (0.067)	0.000*** (0.000)	0.000*** (0.000)	−0.221***(0.034)	0.000*** (0.000)
ARCH(α)	0.150*** (0.014)	0.303*** (0.020)	0.145*** (0.018)	0.063*** (0.009)	0.139*** (0.018)	0.054*** (0.010)
GARCH(β)	0.788*** (0.015)	0.899*** (0.009)	0.785*** (0.016)	0.921*** (0.010)	0.984*** (0.004)	0.917*** (0.010)
E-GARCH(δ)	–	−0.030*** (0.012)	–	–	−0.033***(0.010)	–
T-GARCH(γ)	–	–	0.010 (0.020)	–	–	0.029**(0.013)
LL	2,456.616	2,467.650	2,456.662	3,055.453	3,067.586	3,057.114
AIC	−3.676	−3.691	−3.674	−4.573	−4.590	−4.574
HQ	−3.671	−3.685	−3.669	−4.569	−4.584	−4.568

coefficients of GARCH are 0.788 and 0.921, respectively. Both are positive, which satisfies the conditions of greater than zero, and the sum of α and β are less than 1. The ARCH coefficient α is greater than zero, indicating that external shocks aggravate the fluctuations in the logarithmic yield of bitcoin and the blockchain index, and these fluctuations have a strong impact. Therefore, hypothesis *H2a* is accepted. The GARCH coefficient β is less than 1, indicating that the fluctuations in the logarithmic yield of bitcoin and the blockchain index persist. Therefore, hypothesis *H2b* is accepted.

5.3.3 ARCH-LM test. The ARCH-LM test is carried out on the residual series of the fitted bitcoin and the blockchain index to test the fitting effect of the E-GARCH model. Take the lag of order 12 as an example. The results, shown in Table X, indicate that the *F*-statistics of bitcoin and the blockchain index are not significant. Therefore, the E-GARCH model has no ARCH effect.

6. Conclusions and discussions

6.1 Conclusions

First, this paper uses the Granger causality test to explore the correlation between bitcoin and the logarithmic yield of the blockchain index. Interestingly, the results of this study show that no significant correlation exists between bitcoin and the blockchain index, which does not support *H1*. This result indicates that although bitcoin is closely related to the blockchain index, the price trends of blockchain concept stocks in the bitcoin and stock markets are almost independent of each other – neither dominates the price trends of the other side. This lack of domination may be the result of the different influencing factors of investment decision making between the bitcoin market and the stock market. First, for blockchain concept stocks, the potential return on investment depends partly on the degree of application and implementation of blockchain technology and the development potential of enterprises. Second, because investments in blockchain concept stocks are at the enterprise level, investors need to have more comprehensive information to evaluate the returns and losses.

Second, this paper engages in a descriptive statistical analysis on the closing price series and logarithmic yield series of bitcoin and the blockchain index. The results make the following points.

- The closing prices of bitcoin and the blockchain index fluctuate sharply, indicating that certain risks exist in the investment of bitcoin and blockchain concept stocks and, thus, investors should increase the awareness of risk prevention.
- Heteroskedasticity and the characteristics of peak, a thick tail and agglomeration exist in the logarithmic yield series of bitcoin and the blockchain index, indicating that risk does not significantly affect this logarithmic yield.

Finally, the GARCH-class model is constructed to analyze the volatility of the logarithmic yield series of bitcoin and the blockchain index. The results make the following points. For

	Bitcoin	Blockchain index
F-statistic	0.384	0.403
Prob. F (1, 1332)	0.970	0.963
Obs * R^2	4.638	4.861
Prob. Chi-square(1)	0.969	0.963

Table X. Formulas of GARCH-class model

both bitcoin and the blockchain index, the E-GARCH model is the best one. In addition, by constructing the GARCH model, we find that external shocks aggravate the volatility of the logarithmic return of bitcoin and the blockchain index, and the volatility has a certain persistence. We accept the assumptions of *H2a* and *H2b*. By analyzing the E-GARCH model, we find that the logarithmic yield series of the blockchain index has obvious leverage characteristics.

6.2 Discussion

At present, bitcoin fluctuates sharply, and its main demand is speculation. In addition, the decentralization of bitcoin makes effectively monitoring it difficult, and the investment risk increases accordingly. Therefore, investors need to be cautious about investing in the bitcoin market.

In addition, the application of blockchain technology in blockchain concept stocks is not yet mature. However, we predict that the investment value of blockchain concept stocks will be enhanced as blockchain technology matures. The enterprises represented by blockchain concept stocks deserve continuous attention. Therefore, although the blockchain concept stocks are rising well, they are not suitable for catching up with high positions. The investment opportunities should be judged by the maturity of medium and long-term technology, the driving force and the degree of benefit of the relevant enterprises.

Importantly, a threshold also exists for "blockchain concept stocks." From bitcoin to blockchain, many public investors begin to invest in blockchain concept stocks before they have a clear understanding of them. Because blockchain is not the same as bitcoin, investors need to clarify the two concepts and rationally address the price trends in the two markets.

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