HASHKEY CAPITAL

Bitcoin Macro Market Co-movement

2025

BACKGROUND

Satoshi Nakamoto mined the first block of Bitcoin in 2009, and a digital currency and payment system has been born ever since. Early community discussions and related literature studies focused on whether Bitcoin is a currency or an asset, and what risk-return attributes it has. After identifying Bitcoin's more asset-oriented positioning, scholars began to compare Bitcoin with traditional assets, such as gold, and investigated whether it could be used as an effective money market hedging tool alongside Bitcoin's safe-haven attributes.The strong outbreak of Bitcoin, especially in the aftermath of the COVID-19 crisis, has led to more research focusing on the linkage between Bitcoin, as a part of the global financial markets, and particular financial asset classes (e.g., stocks, currencies, foreign exchange).

In studying the dynamic correlation of assets, we find that different scholars have adopted various schemes to explore the dynamic correlation between Bitcoin and different financial asset classes, such as Granger's causal analysis, Johansen's co-integration analysis, various DCC models, random matrix theory and principal component analysis, ADCC-GARCH, etc. In this paper, we finally adopt the DCC model used in the paper published by Jong-Min Kim, Seong-Tae Kim, and Sangjin Kim in 2020 for studying the dynamic correlation between Bitcoin and various financial assets. The paper is On the Relationship of Cryptocurrency Price with US Stock and Gold Price Using Copula Models, in which the paper examines the relationship between cryptocurrency (Bitcoin), the US stock market (S& P 500) and gold prices in a highly volatile financial environment during the COVID-19 epidemic.

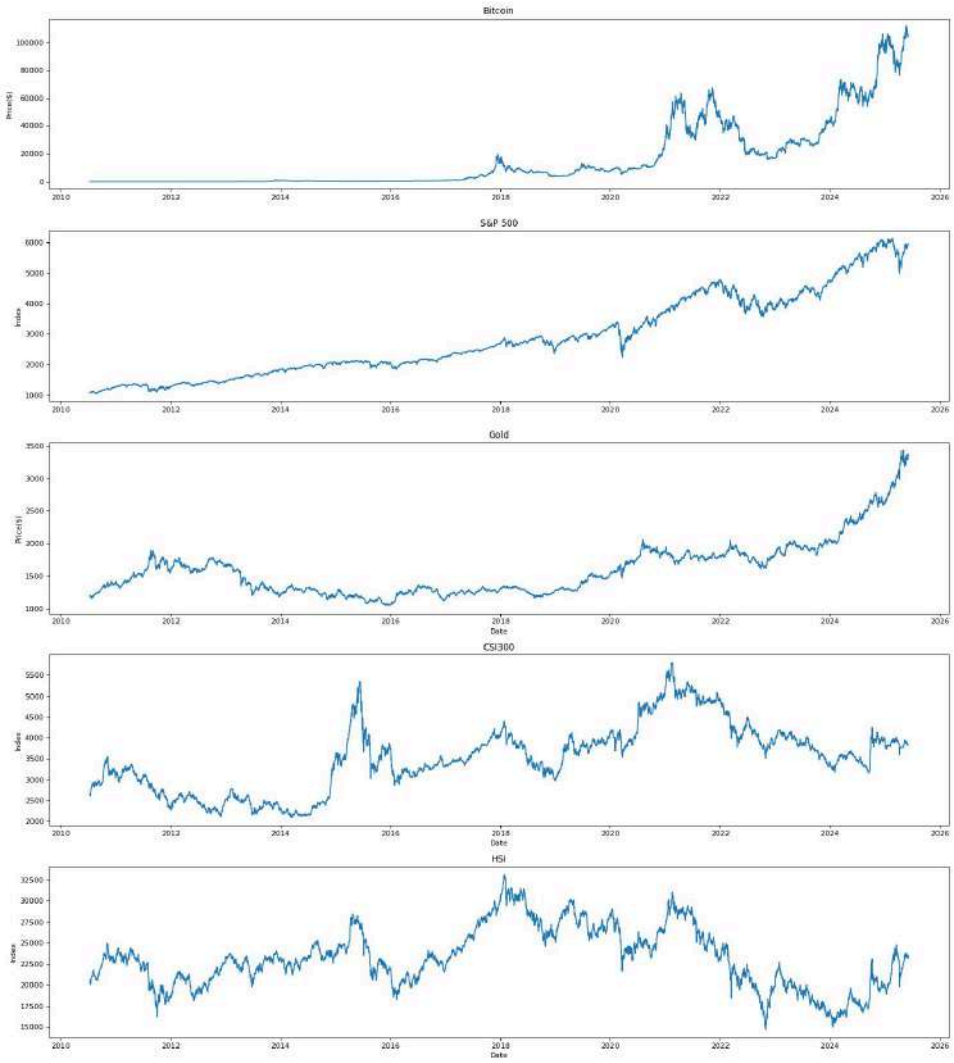
In that paper the methodology uses four dynamic conditional correlation (DCC) models, namely DCC, NA-DCC, GC-DCC, and GCNA-DCC.The sample is selected from daily closing price data from January 2, 2018 to September 21, 2020.

Model description and sample selection

The dynamic conditional correlation (DCC) model is a multivariate volatility model proposed by Engle (2002) that can be used to simulate and estimate the time-varying correlations between multiple assets (time-varying correlations) It captures the concept of correlation clustering, that is, the correlation between variables may be high at some times and low at other times. Depending on the research object, the DCC model has been widely applied and modified since its proposal, and Jong-Min Kim, Seong-Tae Kim, and Sangjin Kim's empirical study on Bitcoin in 2010 is one of them.

This article is based on the paper published by Jong-Min Kim, Seong-Tae Kim, and Sangjin Kim. The sample selection range is expanded to the past fifteen years and the research objects include Bitcoin and the S&P 500 Index, gold, the CSI 300 Index, and the HSI. The S&P 500 Index is used as a proxy variable for the US stock market, the CSI 300 Index is used as a proxy variable for the the Shanghai and Shenzhen stock market, the HSI is used as a proxy variable for the Hong Kong stock market, and gold is selected due to its safe-haven nature.

The paper affirms the feasibility of applying the GC-DCC and GCNA-DCC models to high-volatility financial data, so this paper selects GC-DCC as the model studied in this article. The sample range is the daily logarithmic returns from July 15, 2010 to June 3, 2025, with 5438 data for each asset. We obtained our Bitcoin data from coinmarketcap, the gold data from investing.com, Standard & Poor's 500 Index (S&P 500 Index), CSI 300 Index (CSI300), Hang Seng Index (HSI) data from WSJ website 。



Price curves of Bitcoin, S&P 500 Index, gold, CSI 300 Index, and HSI. Source: HashKey Capital

The above chart shows the raw price trends of Bitcoin, S&P 500 Index, Gold, CSI 300 Index, and HSI since July 2010. The first three markets show the same long-term growth trend and they have seen significant growth after the outbreak of the COVID-19 pandemic (2020), which may be related to the market volatility, safe-haven demand, Global monetary policy easing. Compared with gold and the S&P 500 Index, Bitcoin has shown more obvious characteristics of sharp rise and fall. The trends of the CSI 300 Index and Hang Seng Index have been more similar over the past 15 years, and compared with the first three, their overall trends have been relatively stable and they have developed independent trends.

Logarithmic Return Trend Analysis

In the empirical analysis, in order to ensure the stationarity of the time series under study, the rate of return used in this paper is the logarithmic rate of return. Thus the daily closing price series are converted into logarithmic return time series. In order to simplify the expression, the data names in the charts in this article will be simplified. LBTC, LSP500, LGOLD, LCSI300 and LHSI are used to represent the logarithmic returns of these four types of assets. The calculation method is:

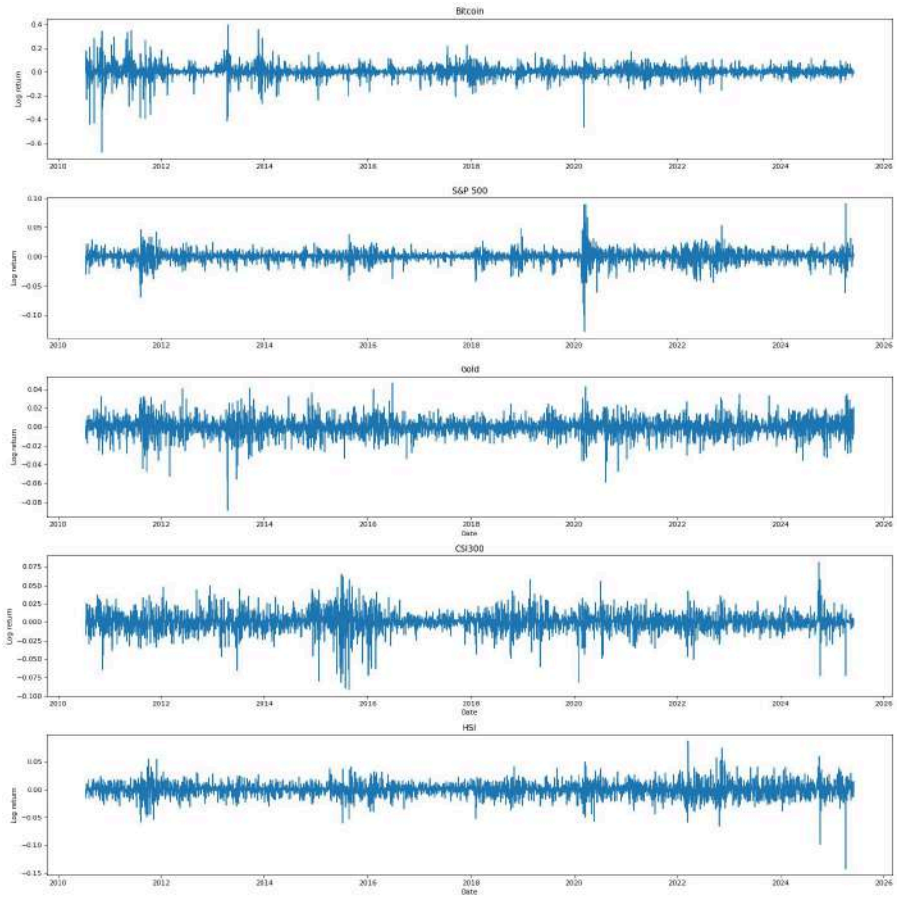
$$log\ returnt = ln(Pt) - ln(Pt-1)$$

log returnt is the logarithmic rate of return, Pt for the closing price of the t day ,Pt-1for t-1. First, we conduct basic descriptive statistical analysis on the yield series of each asset after processing, and the results are shown in the table below.

	LBTC	LSP500	LGOLD	LCSI300	LHSI
count	5438	5439	5439	5439	5439
mean	0.0027	0.0003	0.0002	0.0001	0.0000
std	0.0483	0.0091	0.0081	0.0112	0.0109
min	-0.6752	-0.1277	-0.0888	-0.0915	-0.1418
25%	-0.0127	-0.0014	-0.0023	-0.0027	-0.0028
50%	0.0019	0.0000	0.0000	0.0000	0.0000
75%	0.0187	0.0030	0.0031	0.0029	0.0034
max	0.3952	0.0909	0.0469	0.0814	0.0869
skew	-1.0211	-0.7104	-0.5493	-0.6816	-0.4528
kurt	22.0204	21.7601	7.8989	9.8887	11.3275
JB	82917.1656	80216.1022	5712.4867	11175.4366	15901.7467
P-Value	0	0	0	0	0

Descriptive statistics of the logarithmic return series of each asset, Source: HashKey Capital

From the basic descriptive statistics of the data, the mean and standard deviation of Bitcoin's yield are quite different from the mean of the S&P 500 Index, Gold, CSI 300 Index, and Hang Seng Index yield series, and Bitcoin's price fluctuations are relatively the most violent. From the perspective of skewness and kurtosis, the skewness of each yield series is negative, showing a left-skewed distribution, and the kurtosis values are all greater than 3, with an overpeak phenomenon, which is consistent with the characteristics of peaked and thick-tailed financial data. In addition, the JB statistic values of the daily logarithmic return series of the five assets are all large, which also shows that the logarithmic return series of the five markets reject the assumption of normal distribution.

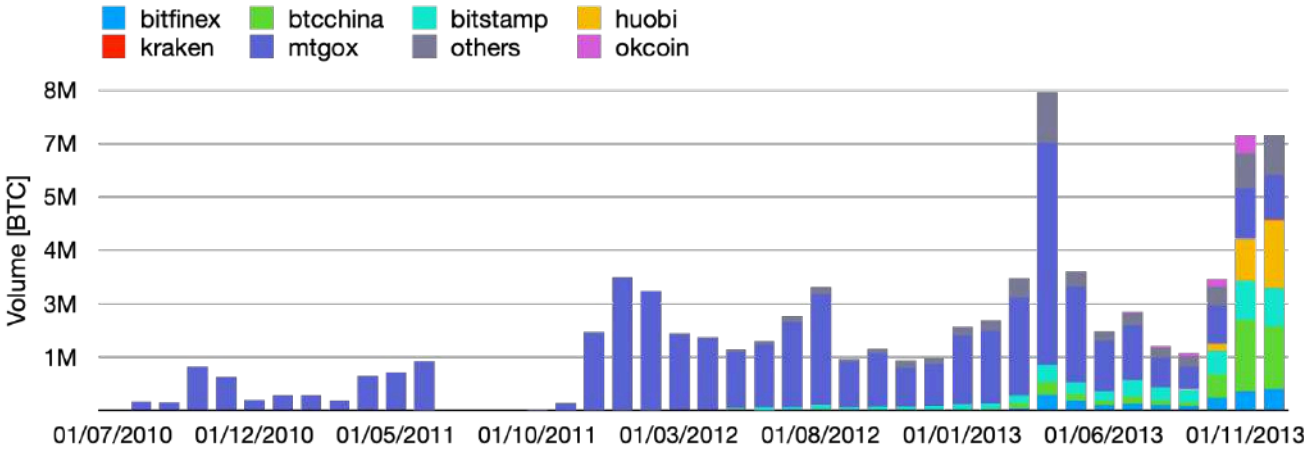


Bitcoin, S&P 500 Index, Gold, CSI300, HSI daily logarithmic return trend chart, Source: HashKey Capital

From the above figure we can see that Bitcoin logarithmic returns fluctuated frequently and dramatically from July 2010 to 2014 (e.g., -0.8 to +0.5), and then fluctuated again in late 2017 to early 2018 and on March 12, 2020 (exceeding ∓0.2). The volatility of the logarithmic returns of the S&P 500 Index, the CSI 300 Index, and the Hang Seng Index is much smaller than that of Bitcoin, and the logarithmic returns mainly fluctuate between -0.1 and +0.1. The volatility range of the logarithmic returns of gold is the smallest (-0.08 to +0.04), reflecting its safe-haven properties.

Bitcoin's history crashes three times

Bitcoin's extreme volatility before 2014 was caused by a variety of factors. First, the early market size was small, with a total market value of less than US$10 billion, and poor market depth. Large orders could easily cause drastic price fluctuations. Second, the trading platform lacked transparency, compliance, and security. Several exchanges that emerged between 2010 and 2014 generally had security risks, and their operating cycles mostly lasted only 1-2 years. They lacked compliance supervision and transparent operating mechanisms. Early Bitcoin transactions were still very primitive until the emergence of exchanges changed this situation.



2010-2014 Exchange Trading Volume Distribution Chart, Source:bitcoinity

The most representative of these is the Mt. Gox exchange, which once occupied 80% of the Bitcoin trading market after it was transformed into a Bitcoin exchange in July 2010. However, it suffered its first hacker attack in 2011, which led to a price crash. In 2014, it went bankrupt due to a system vulnerability and lost 850,000 Bitcoins. Both crises caused severe market fluctuations.

In December 2017, the ICO craze caused the price of Bitcoin to soar to a historical peak of nearly $20,000, but this craze did not last. In January 2018, the market took a sharp turn for the worse, and the price began to fall precipitously, falling below the $10,000 mark in February. There were multiple factors behind this round of plunge: the crazy expansion of the ICO bubble in 2017 accumulated huge risks, a large number of low-quality projects collapsed in 2018, and further led to regulatory panic; at the same time, the hard fork war of Bitcoin Cash (BCH) in November further exacerbated market turmoil, causing a serious setback to speculators' confidence.

In contrast, the "312 crash" on March 12, 2020 (a halving in 24 hours) was mainly due to the panic in the global financial market caused by the new crown epidemic. The liquidity crisis in the traditional market was transmitted to the encryption field, coupled with the serial liquidation of high leverage in futures trading in the market.

Although the causes of these crises are different, the former is the lack of attention to security, opacity and bubble burst in the industry, and the latter is the external impact, but they all deeply exposed the high volatility and fragility of the cryptocurrency market in its early development stage. However, these crises also promoted the upgrade of risk control of exchanges, the improvement of regulatory frameworks and the process of investor education, laying the foundation for the subsequent market to become more mature.

Empirical Analysis and Results

Summary of GC-DCC results

In order to further study the time-varying correlation between Bitcoin, S&P 500 Index, Gold, CSI 300 Index and Hang Seng Index, we conducted an empirical study on GC-DCC modeling. The following table gives the basic statistical characteristics of the dynamic correlation coefficients between the four variable groups.

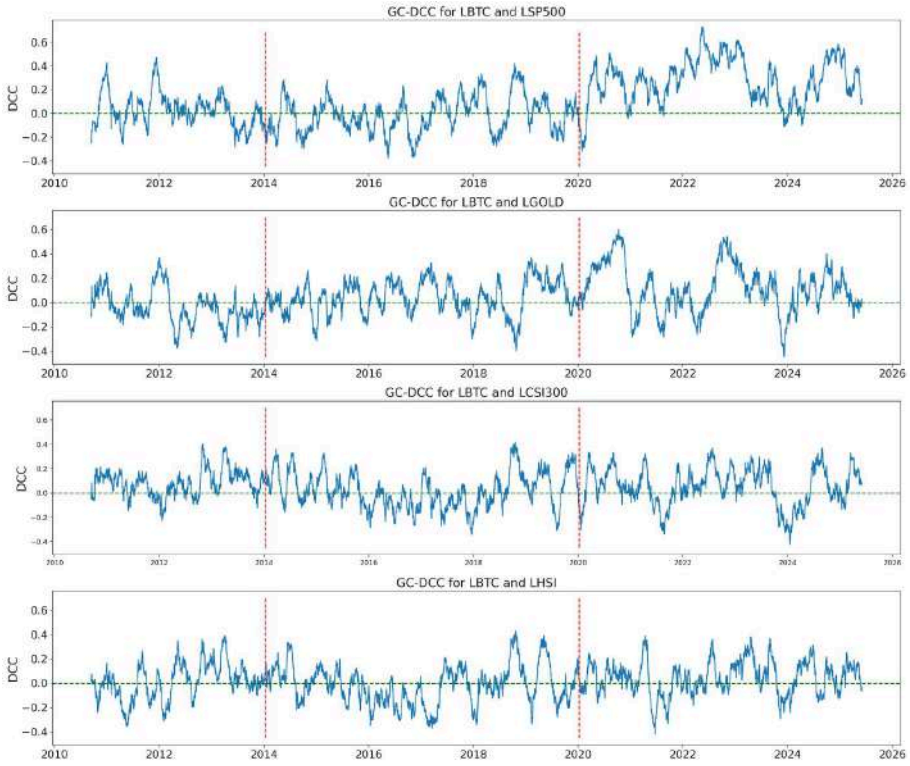
	count	mean	std	min	25%	50%	75%	max
BTC_S&P500	5378	0.107	0.212	-0.376	-0.052	0.080	0.254	0.729
BTC_GOLD	5378	0.052	0.171	-0.443	-0.068	0.039	0.163	0.601
BTC_CSI300	5378	0.046	0.145	-0.426	-0.049	0.045	0.152	0.418
BTC_HSI	5378	0.013	0.152	-0.417	-0.087	0.016	0.116	0.431

GC-DCC modeling empirical results,Source: HashKey Capital

It can be seen that the mean value of the DCC between Bitcoin and the S&P 500 Index is 0.107, ranging from -0.376 to 0.729; the mean value of the DCC between Bitcoin and gold is 0.052, ranging from -0.443 to 0.601; the mean value of the DCC between Bitcoin and the CSI 300 Index is 0.046, ranging from -0.426 to 0.418; the mean value of the DCC between Bitcoin and the HSI is 0.013, ranging from -0.417 to 0.431. From the difference in the size of the mean, it is more obvious that there is a certain long-term linkage relationship between Bitcoin and the S&P 500 Index, while the DCC between Bitcoin and the HSI is the smallest. At the same time, the standard deviation of the DCC between these assets shows that the standard deviation of the DCC results of Bitcoin and S&P 500 Index is largest, indicating that the volatility spillover between Bitcoin and S&P 500 Index is relatively large.

The following figure is a graph of DCC of each sequence, which clearly shows the similarities in the dynamic correlations between the sequences:

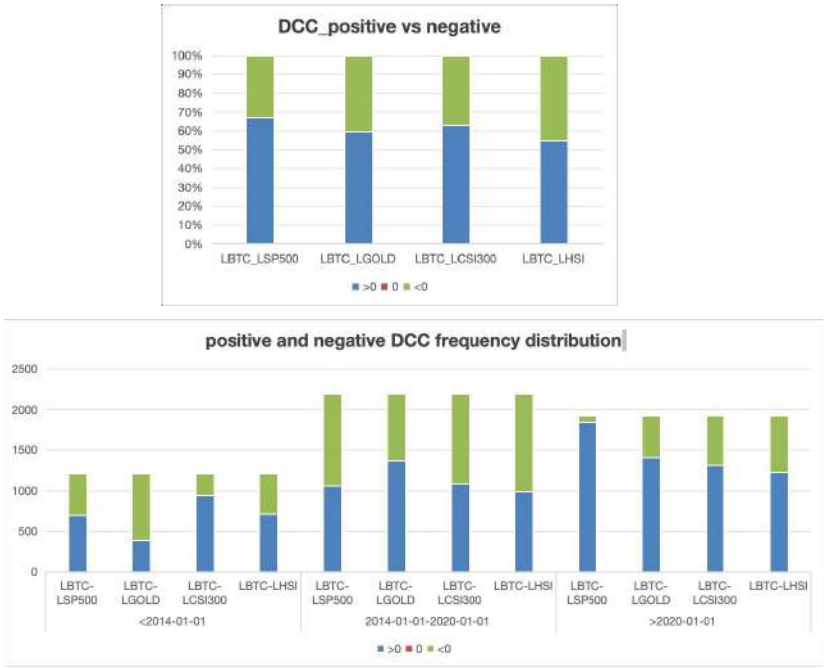
- There is great volatility. The positive correlation mainly appeared before 2012 and after 2020, while most of the negative correlations appeared between 2012 and 2020.
- After 2018, the amplitude began to expand and new peaks continued to appear.
- All showed a deep V trend at the beginning of 2024. As Bitcoin rises to reach all-time highs in late 2023-early 20204, surpassing $100,000 USD.



Dynamic conditional correlation coefficient trend chart of Bitcoin and S&P 500 Index, gold, CSI300, HSI logarithmic returns, source: HashKey Capital

Note: The dotted lines indicate segmentation dates. This article divides the samples into Phase 1 (2010/7/15~2014/1/1), Phase 2 (2014/1/1~2020/1/1), and Phase 3 (2020/1/1~2025/6/3)

After statistics, the GC-DCC results between Bitcoin and S&P 500 Index, Gold, CSI 300 Index, and HSI all show positive over 50% of the time from July 2010 to June 2025, with Bitcoin's positive correlation with S&P 500 Index reaching over 65% of the overall time. And the frequency of positive correlation of DCCs increases significantly with time.

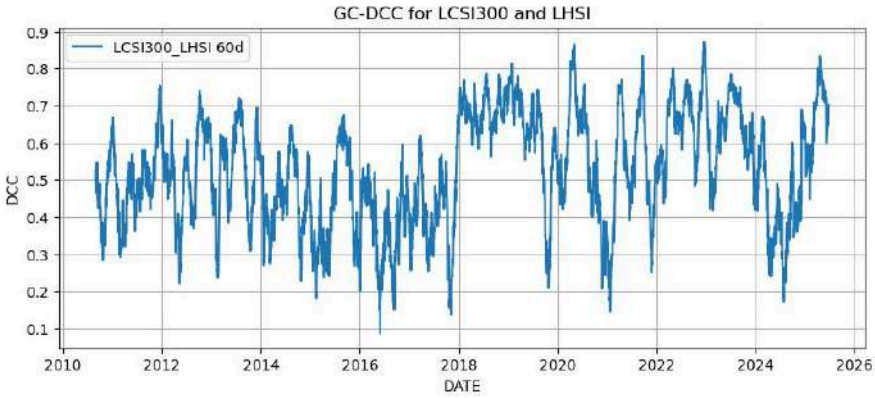


GC-DCC empirical results positive and negative quantitative statistics, Source: HashKey Capital

As shown in the DCC trend chart, this article divides the samples into three phase according to the similarity between the development process of Bitcoin and the DCC curve, namely phase 1 (2010/7/15~2014/1/1), phase 2 (2014/1/1~2020/1/1), and phase 3 (2020/1/1~2025/6/3). According to the DCC curve, the following conclusions can be drawn:

- All showed a large fluctuation correlation in phase 1, and mainly showed a positive correlation;
- In phase 2, the correlation fluctuates in a narrow range around 0;
- phase 3 is the five years after the outbreak, during which the correlation has been above 0 for a long time, and the up and down fluctuations widened , with multiple deep V shapes.

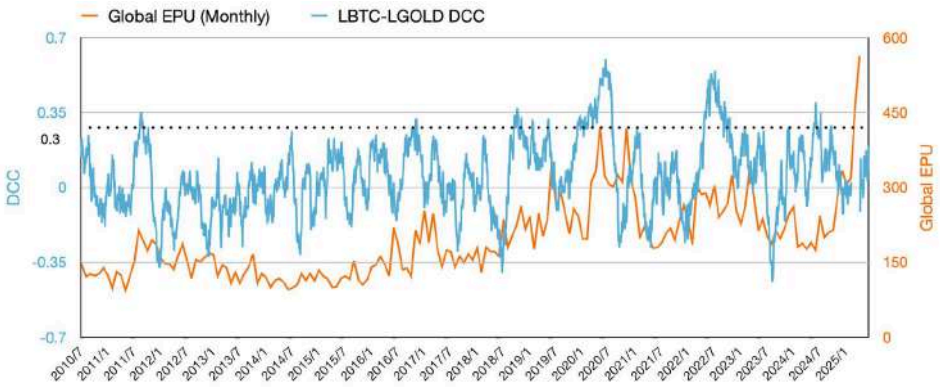
Since the price trend and logarithmic return trend of the HSI are close to those of the CSI 300 Index, and the correlation trends of the two with Bitcoin are similar, we have separately done the DCC results of the CSI 300 Index and the Hang Seng Index. The results show a long-term positive correlation. Before 2018, the correlation was long-term above 0.4, and after 2018, it jumped to 0.6 and fluctuated. This high positive correlation makes the Hang Seng Index and the CSI 300 Index highly similar.



Dynamic correlation coefficient between CSI 300 Index and Hang Seng Index, source: HashKey Capital

Bitcoin and gold also have safe-haven properties

Judging from the DCC curve of LBTC-LGOLD, the correlation between the two fluctuates rapidly in special years, such as the end of 2011, January 2017, November 2018-January 2019, the first half of 2020, the second half of 2022, and 2024. These time points are exactly when the global Economic Policy Uncertainty Index (EPU) is at a high point. The EPU index was first constructed by scholars Baker, Bloom and Davis in 2012. They developed the EPU index based on the frequency of words related to the three concepts of economy, policy and uncertainty that appeared simultaneously in the top ten major newspapers in the United States. At present, the index is the GDP-weighted average of the EPU indexes of multiple countries. The higher the EPU index, the greater the degree of uncertainty in global economic policies.



Comparison of the LBTC-LGOLD's DCC and the global economic policy instability index, source: Economic Policy Uncertainty，HashKey Capital

It can be seen from the figure that during periods of highly unstable economic policies (i.e. when the EPU index is above 200), such as the 2011 debt ceiling debate, the 2017 US election, the first US trade war 1.0 in 2018, the 2020 COVID-19 pandemic, the 2022 Russia-Ukraine war, and the 2024 US election, DCC has soared. This shows that during periods of global instability, Bitcoin and gold are highly correlated, and Bitcoin has shown safe-haven properties at these moments.

Institutional Entry Drives Bitcoin and S&P 500 Index's Linkage

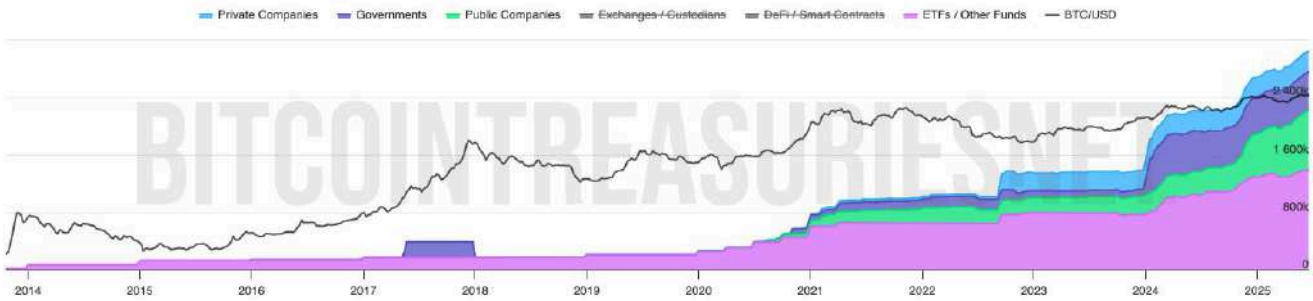
The DCC trend between Bitcoin and S&P 500 Index was similar to that of gold before 2020, but it became different after 2020. The former has been at a high po sitive level for a long time, while the correlation with gold has fluctuated around 0.
The DCC between Bitcoin and the S&P 500 Index has shown a structural upward shift after 2020. The reason behind this is that the properties of Bitcoin have undergone fundamental changes and have been affected by the Federal Reserve's interest rate hike and cut policies.

Dynamic correlation of log returns of Bitcoin and S&P 500 Index with the federal funds rate, source:Fed，HashKey Capital

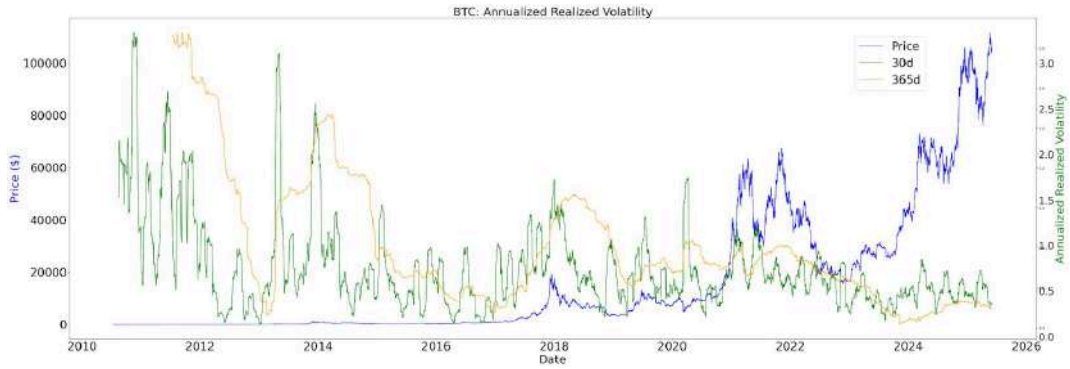
From the above figure, we can see that the interest rate hike and cut trend has been going on since 2016, but the impact of the interest rate hike and cut policies on Bitcoin prices did not become apparent until 2019. The figure shows that from 2016 to 2019, the federal interest rate gradually increased, but the correlation between Bitcoin and the S&P 500 Index fluctuated around 0. After March 16, 2020, the DCC between Bitcoin and the S&P 500 Index soared significantly, and remained positively correlated for the next five years.

From March 2022 to July 2023, the Federal Reserve began to raise interest rates 11 times in a row. During this period, the correlation between the Bitcoin and the S&P 500 Index remained above 0, but despite this, it has shown a downward trend. Even after the interest rate hikes stopped, the correlation between the two dropped to 0 from August 23 to February 24. The logarithmic returns of Bitcoin and the S&P 500 Index responded to the interest rate hike and cut policies at the same time, which shows that there is a certain linkage between Bitcoin and the S&P 500 Index.

This linkage is driven by the entry of institutions into the crypto market. In August 2020, MicroStrategy purchased Bitcoin for the first time. Spent about $250 million to buy 21,000 Bitcoins. Tesla bought $1.5 billion worth of Bitcoins in early 2021. As of July 8, 2025, 257 entities, including public and private companies, ETFs and countries, hold 3,407,573 Bitcoins, accounting for 16.227% of the total Bitcoins supply.



Distribution trend of BTC shares held by the main body, source:bitcointreasuries
The impact of institutional entry on Bitcoin market is also to make its price more stable. As shown in the figure below, the volatility gradually converges to below 0.5.



Bitcoin historical volatility chart, source: HashKey Capital

Analysis of the three major stages of Bitcoin

According to the analysis in the previous article, Bitcoin has gone through three stages: 2010 to 2014, 2014 to 2020, 2020 to 2025.

Phase 1 (July 15, 2010 ~ January 1, 2014) *"Peer-to-peer cash"*

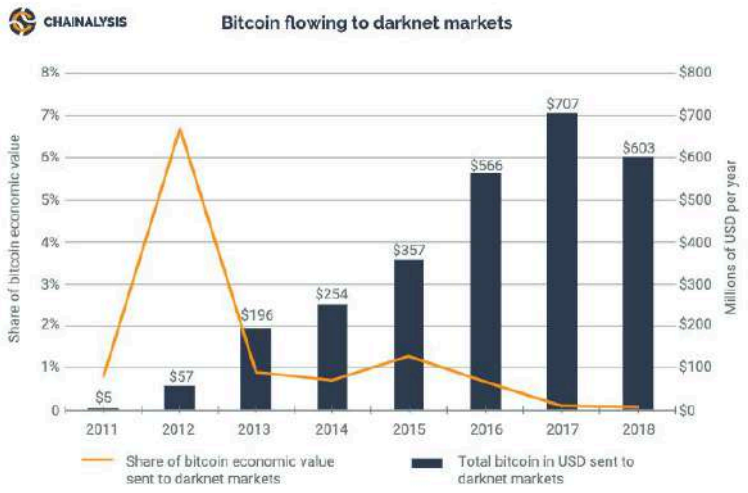
During this period, Bitcoin had just been born for two years and had developed from the geek circle to the mining circle. It was still in a wild growth period. Judging from the logarithmic return rate and volatility trend, it fluctuated violently from 2010 to 2014. During this period, the DCC of the Bitcoin with S&P 500 Index, gold, CSI 300 Index and HSI was also relatively unstable, with several obvious spikes.

The reason behind this instability is that the macro environment was in a slow recovery period after the 2008 financial crisis. Secondly, the Bitcoin market was relatively small at the time, and Bitcoin buyers were in a stage of extreme speculation or satisfying darknet transaction needs. This article believes that Bitcoin before 2014 had more payment currency attributes.

Darknet

In February 2011, 26-year-old Ross Ulbricht created the first successful darknet market, Silk Road, a "deep network" that operates using Tor 's hidden services. The website was banned by the FBI on October 2, 2013. It was revealed that within less than three years, the website had achieved 1.2 million transactions with a total transaction value of 9.5 million Bitcoins. The FBI also successfully tracked more than 700,000 Bitcoins flowing directly from the Silk Road marketplace to Ulbricht's personal account.

The Chainalysis (2019) report shows that the share of Bitcoin sent to the darknet reached a maximum of 7% in 2011-2013, while after 2013 the share rapidly declined and fell, remaining at 1% in 2013-2015, and after 2015 due to the development of privacy coins such as Monroe Coin and stablecoins led to a further rapid decline in the share of Bitcoin in the darknet and fell.



Bitcoin darknet inflow, source: Chainalysis (2019)

Phase 2 (January 1, 2014 to January 1, 2020) *"Digital Gold"*

In December 2013, the price of Bitcoin exceeded that of gold for the first time. Bitcoin began to be frequently compared with gold. An important promoter of Bitcoin's early "digital gold" narrative are Wall Street analyst Wences Casares and cryptocurrency supporter Trace Mayer. Wences Casares proposed in the Wall Street Journal and in a speech at Stanford University that Bitcoin's scarcity (up to 21 million coins) and decentralization make it "gold in the digital age." Trace Mayer proposed the concept of Bitcoin's "hard money" and compared it to gold. The community then debated the positioning of Bitcoin as a "payment" or "value storage."

Bitcoin has experienced three halvings in 2012, 2016, and 2020 during this phase, entering a period of rapid development. The price of Bitcoin in US dollars has risen from double digits to four digits. Due to its drastic price fluctuations, in the debate,Bitcoin has gradually evolved from "peer-to-peer cash" to "digital gold".
From 2014 to 2020, the crypto market entered a period of explosive growth in terms of products, infrastructure, players, and gameplay. These developments not only enriched the entire cryptocurrency industry, but also supplemented Bitcoin's other value attributes beyond its digital gold reserve value:

- Products: Ethereum smart contracts, stablecoins, private transactions, Monero, NFT
- Infrastructure: public chain, wallet, exchange, data platform, tg bot
- Economic mechanisms: ICO, IEO, yield farming, lending, derivatives
- Players: Miners, VCs, Developers, Traders

At this stage although lightning network payments and Bitcoin Layer 2 have been developing, with the issuance of Tether (USDT) and the launch of the privacy coin Monero in 2014, these more stable and private cryptocurrencies have already met the original payment needs. Bitcoin's payment currency attributes have been further weakened at this stage.

On the contrary, the value of Bitcoin's gold reserves is slowly being reflected. And gradually integrate it into the traditional financial system：

- **November 2016** - Chicago Mercantile Exchange (CME) releases Bitcoin Reference Rate(BRR)。 For the first time, the price of Bitcoin was included in the pricing system of the traditional financial market, laying the foundation for the launch of subsequent financial products (such as futures).
- **October 2017** - Chicago Mercantile Exchange (CME) launched Bitcoin futures. Allowing investors to hedge risks or speculate through compliant channels means that institutional funds can legally participate in the Bitcoin market. CME's endorsement further enhances the financial legitimacy of Bitcoin.
- **January 2018** - Switzerland begins accepting Bitcoin for tax payments.It shows that sovereign entities recognize Bitcoin, similar to the historical role of gold as a means of tax payment.
- **September 2019** — Bakkt's physically delivered Bitcoin futures are officially launched.The physical delivery mechanism directly links the futures market to spot supply, similar to the physical delivery logic in the gold futures market.

Phase 3 (2020/1/1~2025/6/3) Reserve Assets

The outbreak of the epidemic at the end of 2019 caused fluctuations in the global financial market. The DCC empirical results of this phase also showed significant differences from the other two phases, with multiple deep V and positive peaks. At this stage, many companies and countries began to use Bitcoin as reserves, and liquidity flowed into the crypto market significantly.

National Reserve

According to the Bitcoin Treasury, governments hold 527,656 bitcoins, accounting for 2.5% of the total. The top three countries holding bitcoins are the United States, China, and the United Kingdom, all of which were seized by law enforcement.The detailed statistics are shown in the following table.

Gov't	Quantity	Nature	Source	Fiscal Reserves/Strategic Reserves Progress
USA	198,012	Law enforcement seizure	Silk Road, Bitfinex hacker Ilya Lichtenstein	In March 2025, President Donald Trump signed an executive order to establish a "Digital Fort Knox." This strategic cryptocurrency reserve will be used to consolidate confiscated Bitcoin assets.
China	190,000	Law enforcement seizure	PlusToken Case	Be cautious.
U.K.	61,245	Law enforcement seizure	Qian Zhimin Case	In 2021, the City of London discussed including Bitcoin in its fiscal reserves, but did not implement it. The current attitude is cautious.
Ukraine	46,351	Donate	Russo-Ukrainian War	As real-time wartime capital is constantly being consumed. In 2022, Ukraine's Ministry of Digital Transformation promote the law "On virtual Assets". In 2024, a bill to include Bitcoin in the country's fiscal strategy enters the drafting stage.
North Korea	13,562	Hacker Attacks	-	Citizens are officially prohibited from holding and using cryptocurrencies.
Bhutan	11,924	Mining	-	Since 2019, hydroelectric power has been used for Bitcoin Mining. Bitcoin holdings account for 30% to 40% of their national economies.
Salvador	6,232	Buy	Starting from November 2022, buy 1 Bitcoin per day.	In 2022, it is part of the national financial strategy, with Bitcoin being considered a long-term reserve asset. There have been state-backed " Volcano Bonds" issued, geothermal energy mining facilities built, and a national Bitcoin office created to coordinate strategy. In early 2025, under pressure from the International Monetary Fund (IMF), Bitcoin's legal tender status was abolished in exchange for a $1.4 billion bailout. Businesses are no longer obliged to accept Bitcoin, and citizens can no longer pay taxes in Bitcoin.

Gov't	Quantity	Nature	Source	Fiscal Reserves/Strategic Reserves Progress
Venezuela	240	Petro-related or confiscated	-	In 2018, the government launched the Petro, a cryptocurrency that failed. In 2020, Bitcoin mining was legalized and BTC can be used to pay for imported goods. Banks are banned from trading cryptocurrencies in 2021. In 2023, the government shut down private mines, confiscated mining machines, and only allowed "state-owned cooperative enterprises" to mine. In May 2024, Venezuela completely closed down Bitcoin mines and arrested miners. In September 2024, the opposition proposed adopting Bitcoin as a national reserve asset.
Finland	90	Law enforcement seizure	Drug raids	During the Russo-Ukrainian War of 2022, 1,891 BTC were sold.
Iran	About 10,000	Mining	-	In 2019, the religious regime officially recognized the legality of crypto mining and introduced a miner licensing system, on the condition that all mined BTC must be sold to the Central Bank of Iran. In 2020, approximately 1,000 crypto mining farm licenses were issued. In 2021, former President Rouhani admitted that about 85% of mining was carried out without permission. In 2021, Iran's Bitcoin mining accounted for about 4%-8% of the global network. Later, officials said it dropped to 0.5%-1%, and less than 0.1% in 2024. In 2022, a bill was passed allowing the military to build private power plants and transmission lines. As of 2023, there are about 180,000 crypto mining machines in Iran, of which about 100,000 belong to the state or its affiliated companies (such as the Islamic Revolutionary Guard Corps)

Gov't	Quantity	Nature	Source	Fiscal Reserves/Strategic Reserves Progress
Germany	(46,359)	Law enforcement seizure	movie2k.to pirated website case	It was seized in 2019 and liquidated in mid-2024 to cover the budget deficit.
Bulgaria	(213,519)	Law enforcement seizure	International tax evasion case	Seized in May 2017, it was sold in a secret auction in 2018 to Asian investors and sovereign wealth funds, with the funds raised going to strengthen the Bulgarian army.
Georgia	60	unkown	unkown	-

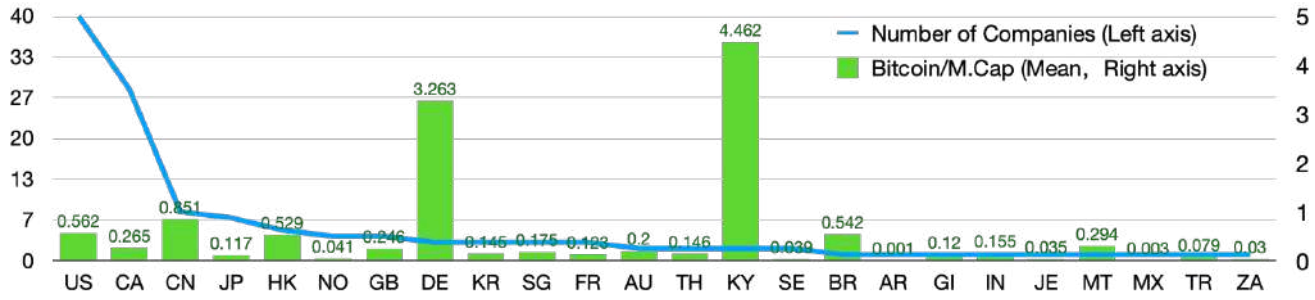
Company reserves – Bitcoin are included in the balance sheet

According to statistics, 147 public companies have held Bitcoin, covering a total of 28 countries and regions. Among them, the countries and regions with the largest number of companies holding Bitcoin are the United States (45 companies), Japan (32 companies), Canada (8 companies), China (8 companies), Hong Kong (8 companies), and Germany (7 companies).

The relevant information of the top ten Bitcoin holding companies is statistically analyzed in the following table. It can be seen that most companies have a background in the encryption industry, with mining companies being the most numerous. MicroStrategy holds nearly 600,000 bitcoins, accounting for 70% of the total holdings of public companies.

Company	Nature	Hold	Funding	Purpose/ Status
MicroStrategy	An American enterprise software company that mainly provides business intelligence (BI) and mobile software solutions	597,325	Issuance of shares, convertible bonds, own cash, debt financing	Long-term holding
ONCE	The largest Bitcoin mining company in the United States	50,000	Issuance of shares and convertible bonds	Long-term holding, 7,377 BTC loaned out to earn interest by January 2025
XXI	Twenty One Capital, an American Bitcoin company, has shareholders including Tether (51.7%), Japan's SoftBank Group (Softbank), exchange Bitfinex and Cantor Fitzgerald.	37,230	Issuance of convertible bonds	Long-term holding
Riot Platform	US Mining Company	19,225	Mining Output	Long-term holding
Metaplanet Inc.	Japanese hotel business transforms into Bitcoin, Web3 enterprise	15,555	Issue zero coupon bonds and stocks	Plans to use Bitcoin as collateral to obtain financing for the purchase of profitable businesses, such as digital banks
Galaxy Digital Holdings Ltd	Diversified financial services and investment management company focusing on digital assets and blockchain technology	12,830	Business Collection	Long-term holding, asset management
CleanSpark, Inc	US Bitcoin Mining Companies	12,608	Mining Output	Long-term holding
Tesla, Inc.	Electric vehicles, energy storage solutions and solar technology	11,509	Cash Purchase	-
Hut 8 Mining Corp	US Bitcoin Mining Companies	10,273	Mining output, cash purchase	-

Based on the market value of public companies, we can calculate the amount of Bitcoin held by each company and the company's market value (i.e. Bitcoin holdings/company market value). Then, by taking the average value, we can statistically calculate the situation of this indicator in various countries and regions, as shown in the figure below.



BTC/M.Cap Comparison by Country, source: HashKey Capital

After calculation, the average value of global Bitcoin holdings divided by the market value of public companies is about 0.507. It can be seen that this indicator in China is about 1.68 times the global average, and Germany (DE) and the Cayman Islands (KY) are 3.263 and 4.462 respectively, which are 6.44 times and 8.8 times the global average.

The anomaly of BTC/M.Cap in these three regions is that three of them hold a large amount of Bitcoin:

Company	Country	Nature of Company	BTC held	Company Market Value	BTC / Market cap
Microcloud Hologram	Cayman Islands	Holographic Technology	2353	$37.2M	745.8%
Advanced Bitcoin Technologies AG	Germany	Blockchain Innovation and Digital Asset Management	242.2	$5M	566.5%
SOS Limited	China	China's emergency rescue services turn to blockchain	802.8	$25.5M	371.5%

Conclusion

This paper explores the dynamic correlation between Bitcoin and gold, S&P 500 Index, CSI 300 Index, and HSI by selecting the historical price data in the past 15 years. According to the DCC empirical results demonstrated, the dynamic correlation between Bitcoin and S&P 500 Index has gone through three phases: from 2010-2014, it is across positive and negative, and fluctuates significantly up and down; **from 2014-2020, the dynamic correlation fluctuates around 0 up and down, and the fluctuation decreases; from 2020-2025, the dynamic correlation between Bitcoin and S&P 500 Index shows a significant positive correlation in the long term.**

According to the DCC curve results, the three phases correspond to the three phases of Bitcoin, 2010-2014 is the "peer-to-peer cash" payment system phase, Bitcoin is mainly based on monetary attributes, with frequent darknet transactions and imperfect exchange infrastructure; 2014-2020 is the digital gold phase, the correlation curve between Bitcoin and gold is compared with the EPU index curve, during several periods of global economic instability (EPU index >200) , its correlation curve and the EPU index appeared to synchronize the response of the spike; 2020-2025 for the asset reserve phase, Bitcoin is mainly a strategic reserve attribute, reflected in the governments hold 527, 656 Bitcoin (2.5% of the total), and 1,151,815 Bitcoin (5.4% of the total), held by public and private companies.

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