

# Bitcoin and Stock Returns: An Empirical Study

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## Abstract

This paper investigates the profitability of Bitcoin and US equity. More concretely, we inspect the performances of the S&P 500 index and Bitcoin by comparing their returns and volatilities. As a result, we obtain the following significant findings. First, our regression analysis clarifies that for the period after the sudden appearance of COVID-19, there was a weak nexus between the S&P 500 index and Bitcoin returns. In addition, our return and return spread analysis evidences that for this period, on average, Bitcoin returns were much higher than the S&P 500 index returns. Moreover, our volatility and volatility spread analysis reveals that for this period, on average, the volatilities of Bitcoin returns were much higher than those of the S&P 500 index returns.

## Keywords

Bitcoin, Cryptocurrency, Return, US Equity, Volatility

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## 1. Introduction

In recent years, new digital currencies, cryptocurrencies—including Bitcoin—have attracted considerable attention around world, and studies related to cryptocurrencies are increasing (e.g., Kallinterakis & Wang, 2019; Long et al., 2020; Corbet et al., 2022; Lucey et al., 2022). However, empirical studies examining the performance of cryptocurrency investing that focus on more recent period are not enough. Hence, given and motivated by these backgrounds, our present study investigates the performance of investing in Bitcoin, one of the most major cryptocurrencies, by examining not only its return but also its risk.

More specifically, we empirically examine the performances of the S&P 500 index and Bitcoin by comparing their returns and volatilities. As a result, we obtain the following significant findings and implications. First, our regression analysis finds that for the period after the sudden appearance of COVID-19, there

was a positive linkage between the S&P 500 index and Bitcoin returns. However, our regression analysis also shows the relation was not strong. Second, our return and return spread analysis reveals that for the period after the sudden occurrence of COVID-19, on average, Bitcoin returns were much higher than the S&P 500 index returns. This clearly shows that when focusing on returns, Bitcoin recorded very superior performances than the S&P 500 for our analyzing period. Third, our volatility and volatility spread analysis clarifies that for the period after the sudden appearance of COVID-19, on average, the volatilities of Bitcoin returns were much higher than those of the S&P 500 index returns. This shows that the risk in standard finance regarding Bitcoin investing was much higher than that of the S&P 500 for the period.

As regards the rest of this paper, Section 2 reviews the recent related literature, and Section 3 explains our data and methods. Section 4 documents our empirical results, and Section 5 presents our conclusions.

## 2. Literature Review

This section provides a concise review of existing cryptocurrency studies. We focus on very recent studies in this review. First, [Caporale et al. \(2018\)](#) investigated persistence of several cryptocurrencies' data, and found that their time-series had persistence and its degree changed over time. [Ji et al. \(2019\)](#) examined the nexuses between larger cryptocurrencies, and they found that Bitcoin and Litecoin were at the center of their return connections. [Katsiampa et al. \(2019\)](#) empirically examined major cryptocurrencies' volatilities, and they found that cryptocurrencies' volatilities were positively correlated.

In addition, [Schilling & Uhlig \(2019\)](#) developed an endowment economy model with two currencies of dollar and Bitcoin. Using the model, they also discussed several implications related to monetary policy, Bitcoin production, taxation, and others. [Kallinterakis & Wang \(2019\)](#) examined herding in the cryptocurrency market, and they concluded that herding in cryptocurrencies was significant. [Long et al. \(2020\)](#) analyzed seasonality in cryptocurrencies, and found that in cross section, average past same-weekday cryptocurrency returns positively predicted their own future performances.

Afterwards, [Corbet et al. \(2022\)](#) empirically examined cryptocurrencies' liquidities after the outbreak of the COVID-19 pandemic, and suggested that in the period, cryptocurrency market liquidities increased significantly. Based on news coverage, [Lucey et al. \(2022\)](#) developed a new index as to cryptocurrencies, and they suggested using this index broadly with naming it Cryptocurrency Uncertainty Index. [Raza et al. \(2023\)](#) empirically examined the impact of financial regulation policies on cryptocurrencies, and they found that financial regulation policy uncertainty was negatively associated with cryptocurrency volatilities.

As above, our review of very recent studies on cryptocurrencies shows rapidly growing concerns about cryptocurrencies. Hence, to make further contributions to the body of research, we below attempt to empirically assess the recent per-

formance of cryptocurrency investing.

### 3. Data and Methods

This section documents our data and methods. Our data are daily time-series of an equity index and Bitcoin. Specifically, SPXR and BTCR indicate the daily percentage returns of the S&P 500 index and Bitcoin, respectively. Our sample period of these return series is from January 2, 2020 to November 29, 2022. We note that to analyze the period after the sudden appearance of COVID-19, we set our sample period to this term. **Figure 1** exhibits time-series price evolution of the S&P 500, and **Figure 2** presents that of Bitcoin during this period. As seen, at first glance, we recognize that two price evolutions have very different time-series trends.

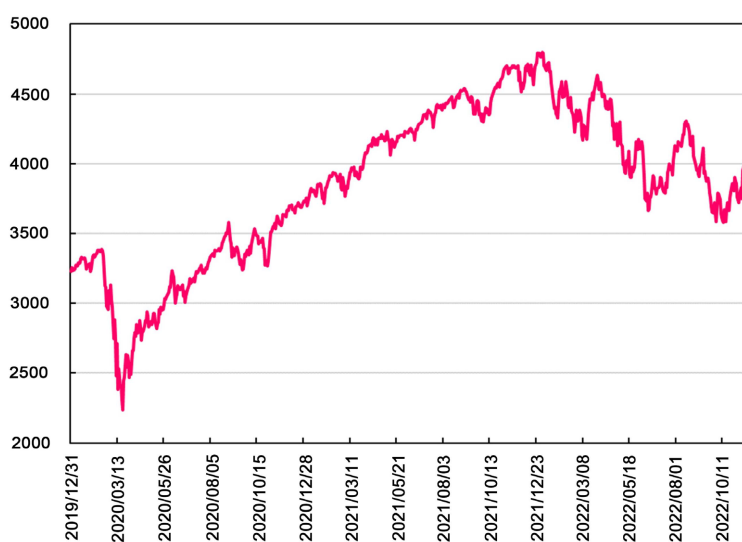
**Table 1** exhibits the descriptive statistics for SPXR and BTCR for our sample period. **Table 1** indicates that the mean value of SPXR is slightly positive and that of BTCR is clearly positive. Moreover, **Table 1** also shows that the skewness values of these two return series are both negative, and the width between maximum and minimum values as to BTCR is much larger than that of SPXR.

Also documenting our methods, we first test the relation of SPXR and BTCR by a linear regression. We next inspect SPXR and BTCR further by investigating their return levels and spreads. Moreover, we also examine the volatilities of SPXR and BTCR by inspecting their volatility levels and spreads.

## 4. Results

### 4.1. Regression Analysis

In **Table 2**, we first provide the result of a univariate regression, which regresses BTCR on SPXR. We implement the regression by using daily data from January 2, 2020 to November 29, 2022. As **Table 2** indicates, the statistically significant



**Figure 1.** Dynamic evolution of the S&P 500: January 2020 to November 2022. S&P 500 price series are daily and displayed in point.



**Figure 2.** Dynamic evolution of Bitcoin: January 2020 to November 2022. Bitcoin price series are daily and displayed in US dollars.

**Table 1.** Statistics for daily series of Bitcoin and US stock returns.

	SPXR	BTCR
Mean	0.041	0.224
Max.	9.383	21.380
Min.	-11.984	-38.178
Skewness	-0.472	-0.796

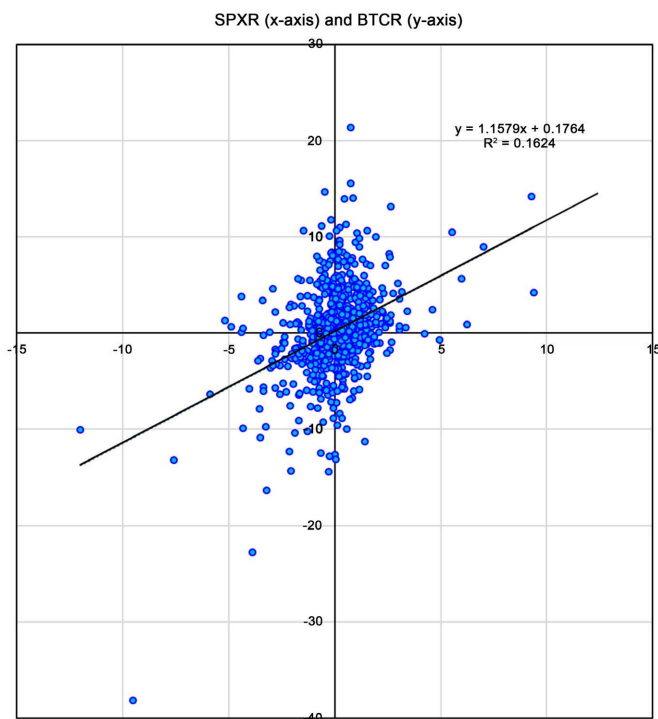
Statistics are for daily percentage returns. SPXR: return of S&P 500; BTCR: return of Bitcoin. Max. and Min. indicate the maximum and minimum values, respectively. The sample period is from January 2020 to November 2022.

**Table 2.** Regression result: Bitcoin on US equity.

	Intercept	Slope coefficient	Adjusted R-squared
Estimate	0.176	1.158***	0.161
t-statistic	1.150	7.076	
p-value	0.251	0.000	

Regression is conducted using daily percentage returns of the S&P 500 and Bitcoin. The sample period is from January 2020 to November 2022. \*\*\* means the coefficient is statistically significant at the 1% level.

positive slope coefficient (1.158 (1.1579 in **Figure 3**)) means that there was a positive linkage between S&P 500 and Bitcoin returns, although the low adjusted R-squared value (0.161 (R-squared: 0.1624 in **Figure 3**)) indicates the linkage was not strong. In addition, though it is not statistically significant, the intercept of the regression was positive value of 0.176, and this means Bitcoin would yield higher returns than the S&P 500 for the period after the sudden occurrence of COVID-19.



**Figure 3.** US equity and Bitcoin relation: January 2020 to November 2022.

**Table 3.** Annualized average returns for US equity and Bitcoin and their spread.

	SPXR	BTCR	BTCR-SPXR return spread
Annualized average return	10.257	56.331	46.074

SPXR: return of S&P 500; BTCR: return of Bitcoin; BTCR-SPXR return spread: return spread between BTCR and SPXR. All returns and spread are annualized values. The sample period is from January 2020 to November 2022.

**Figure 3** also exhibits the relation between S&P 500 and Bitcoin returns, where the realized pairs of SPXR (x-axis) and BTCR (y-axis) are plotted for our analyzing period. From this figure, we can graphically understand that for the period, there was a positive relation between S&P 500 and Bitcoin returns, but the linkage was not strong.

#### 4.2. Return and Return Spread Analysis

To more deeply grasp the relations of S&P 500 and Bitcoin returns for the period after the sudden appearance of COVID-19, in **Table 3**, we exhibit the annualized average returns as regards SPXR and BTCR, and their spread for this period. **Table 3** shows that on average, Bitcoin returns were much higher than S&P 500 index returns for the period after the outbreak of COVID-19.

#### 4.3. Volatility and Volatility Spread Analysis

Furthermore, to understand the volatilities of S&P 500 and Bitcoin returns, we calculate the annualized average volatilities of SPXR and BTCR and their spread,

**Table 4.** Annualized average volatilities for US equity and Bitcoin and their spread.

	SPXR	BTCR	BTCR-SPXR volatility spread
Annualized average volatility	25.584	73.520	47.936

SPXR: return of S&P 500; BTCR: return of Bitcoin; BTCR-SPXR volatility spread: volatility spread between BTCR and SPXR. All volatilities and spread are annualized values. The sample period is from January 2020 to November 2022.

and show these values in **Table 4**. From **Table 4**, we recognize that on average, the volatility of Bitcoin returns was much higher than that of the S&P 500 index returns for the period after the sudden appearance of COVID-19.

## 5. Conclusion

This paper investigated the profitability of Bitcoin and US equity. More concretely, we empirically examined the performances of the S&P 500 index and Bitcoin by comparing their returns and volatilities. As a result, we obtained the following significant findings and implications.

First, our regression analysis revealed that for the period after the sudden occurrence of COVID-19, there was a positive linkage between S&P 500 index and Bitcoin returns. However, our regression analysis also indicated the relation was not strong.

Second, our return and return spread analysis clarified that for the period after the sudden appearance of COVID-19, on average, Bitcoin returns were much higher than S&P 500 index returns. This clearly shows that when focusing on returns, Bitcoin recorded much superior performance than the S&P 500 for our analyzing period.

Third, our volatility and volatility spread analysis found that for the period after the outbreak of COVID-19, on average, the volatilities of Bitcoin returns were much higher than those of the S&P 500 index returns. This means that the risk in standard finance regarding Bitcoin investing was much higher than that of the S&P 500 for this period.

As above summaries, the empirical examinations conducted in this study demonstrated that as far as for the period after the sudden appearance of COVID-19, to acquire additional returns over a US benchmark equity index, the S&P 500, Bitcoin investing was effective. However, because there indeed exists much higher risk in Bitcoin investing, more detailed, and not only empirical but also notional discussion should be required, and this line of research is one of our future tasks.

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### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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