

# What is a Hedge or Safe Haven Asset for Bitcoin Investors?

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This paper investigates a hedge and safe haven asset for Bitcoin investors. Bitcoin has been receiving high attention from finance investors because of its high upside return and volatility. The recent finance literature focused upon Bitcoin characteristics as an alternative asset. We take Bitcoin investors' perspectives and consider how to manage the high volatility of Bitcoin. We employ the definitions of hedge and safe haven based on the finance literature and conduct the respective statistical analyses. Our definition distinguishes a weak and strong hedge (safe haven). Our empirical results show that traditional assets such as global equities and global bonds are weak hedges for Bitcoin. Furthermore, we observe that gold acts as a strong hedge against Bitcoin during an extreme bearish Bitcoin market, although the impact is marginal. There is no strong safe haven asset identified in our data period. Our results imply that the fundamental value of Bitcoin is still unclear, and it is difficult for Bitcoin investors to manage their portfolio risk.

## 1. Introduction

Investors seek for a new asset class that is not correlated with traditional asset classes such as stocks and bonds. Today, one of the candidates for an alternative asset class is a cryptocurrency. In particular, Bitcoin receives high attention. Bitcoin is a virtual currency and payment system which is introduced by Nakamoto. [Nakamoto 08].

Two of the most attractive features of Bitcoin is its high historical return and volatility. The market value of one Bitcoin was less than five cents in 2010 and that exceeded 19,000 U.S. dollars in December 2017. However, the price fell dramatically after the peak, and it was below 4,000 U.S. dollars in November 2018. Figure 1. illustrates the historical price of Bitcoin and we can observe major fluctuations over the observed period. Therefore, another important feature of Bitcoin is its high volatility.

Finance researchers have investigated a hedge and safe haven for portfolios. Baur defines a hedge asset as "an asset that is uncorrelated or negatively correlated with another asset or portfolio on average" and a safe haven asset as "an asset that is uncorrelated or negatively correlated with another asset or portfolio in times of market stress or turmoil" [Baur 10a]. This paper follows these definitions.

Hedge and safe haven properties are explored for commodities such as gold and silver. For instance, Baur finds that gold acts as a hedge for the U.S. stock market index [Baur 10b], Agyei-Ampomah observes that copper is a better hedge and safe haven asset for Euro bond investors [Agyei-Ampomah 14], and silver works as a safe haven asset for currency portfolio investors [Sakemoto 18].

Some studies focus upon the hedge property of Bitcoin, since it is regarded as an alternative asset class. Bouri uses the test specification proposed by Ratner, and observes that Bitcoin does not act as a hedge for U.S. and European stock indices [Bouri 17], [Ratner 13]. Furthermore, it does not work as a safe haven for most asset classes [Bouri 17]. Klein concludes that Bitcoin has a

different property against gold [Klein 18]. These studies assume that investors hold traditional assets, and add Bitcoin into their portfolios. This framework does not fit for investors who hold Bitcoin and seek to hedge assets.

The first contribution of this study is that we focus upon Bitcoin investors. We investigate whether traditional assets act as hedge and safe havens for Bitcoin. In particular, extreme negative return days for Bitcoin are different from those of other assets, and hence our examination differs from the previous literature.

The second contribution is that we focus upon a mean equation. The conditional correlation test framework [Ratner 13] is important for sophisticated investors and researchers, while it is not linked to a return directly. We employ the test specification that focus upon the mean equation [Baur 10b] and it is easier for interpretation.

Fig 1. Bitcoin Price



Notes: This data covers December 2<sup>nd</sup>, 2013 to November 29<sup>th</sup>, 2018.

The third contribution is that we extend the data sample period which includes a bear market in 2018. The price of Bitcoin is volatile and sample periods affect empirical results [Baur 18]. Furthermore, investors are interested in the properties of a safe haven during a bearish market situation, and hence our sample

period is appropriate to investigate hedge and safe haven properties.

## 2. Methodology

We employ a test model proposed by Baur. [Baur 10b]. A test asset return,  $r_t$ , is dependent upon a return on Bitcoin  $rbt_t$  and extreme market conditions for Bitcoin are taken into account by dummy variables:

$$r_t = a + b_t rbt_t + e_t \quad (1)$$

$$b_t = \delta_0 + \delta_1 D10 + \delta_2 D5 + \delta_3 D1 \quad (2)$$

$$h_t = \omega + \alpha e_{t-1}^2 + \gamma I(e_{t-1} > 0) e_{t-1}^2 + \beta h_{t-1} \quad (3)$$

$$e_t \sim N(0, h_t) \quad (4)$$

where  $a$  and  $b_t$  are estimated parameters, and  $e_t$  is an error term. The parameter  $b_t$  depends upon the dummy variables,  $D10$ ,  $D5$  and  $D1$ , which capture extreme Bitcoin market movements. The dummy variable  $Di$  is equal to one if the return on Bitcoin falls in the lower  $i$ th percentile. The estimated parameter  $\delta_0$  is the hedge coefficient. We distinguish a weak and a strong hedge as in Baur [Baur 10b]. If  $\delta_0$  is not statistically different from zero then the asset is a weak hedge for Bitcoin. Moreover, if  $\delta_0$  takes a statistically significant negative value, then this indicates that the asset is a strong hedge for Bitcoin. The parameters of dummy variables,  $\delta_1$ ,  $\delta_2$ , and  $\delta_3$  capture non-linear impacts on the asset return and if these parameters are not statistically different from zero, it indicates a weak safe haven. When these parameters are significantly negative, it implies a strong safe haven. Note that the dependent variable of the mean equation is the asset return. This is the important difference of the work conducted by Bouri which employs a conditional correlation as the dependent variable [Bouri 17]. Our specification investigates a relationship of two return series directly.

The error term  $e_t$  follows the asymmetric GJG-Runkle GARCH (GJR-GARCH) model that captures an asymmetric impact of the past squares of the error term [Glosten 93]. This provides allowance for asymmetric effects of positive and negative shocks by cause of volatility. The conditional variance of the GJR-GARCH process is expressed by  $h_t$  in equation (3). Along with the lagged squared of error term,  $e_{t-1}^2$ , and the lagged conditional variance,  $h_{t-1}$ , the equation captures the disturbance on the conditional variance. This best reflects the asymmetric nature of investors' response to asset returns which leads to both positive and negative shocks.

## 3. Data

We employ a Bitcoin price index that is an exchange rate of Bitcoin to U.S. dollars. Daily prices are adopted, and weekend prices are excluded since other asset classes are not traded during weekends [Klein 18]. We pick up 'end of the day prices' with GMT timestamp, since Bitcoin is traded continuously. The price index is transformed as the natural logarithmic price difference to obtain the return,  $r_t = \log(P_t/P_{t-1}) \times 100$ .

For hedge assets, we consider gold, global stock, and global bond. Gold has been used as the hedge asset for stock and bond markets [Baur 10a]. We use a spot price of gold and it is also quoted in U.S. dollars. MSCI World index and FTSE World Government Bond Index are employed to capture global stock and global bond performances which are U.S. dollar base indices. All three price indices are calculated return series. Our data covers from December 2<sup>nd</sup>, 2013 to November 29<sup>th</sup>, 2018.

Table 1: Summary of descriptive statistics

	Bitcoin	gold	stock	bond
Mean	0.11	0.00	0.02	0.00
Std. Dev.	5.14	0.82	0.68	0.35
Min	-58.39	-3.36	-5.03	-1.94
Max	51.7	4.58	2.56	1.81
Skewness	-0.55	0.21	-0.83	-0.11
Kurtosis	24.37	2.48	4.83	2.41

Note: Std. Dev. indicates standard deviation, Max and Min are the maximum and minimum of the daily time series.

Table 1 provides a summary of the descriptive statistics for the four assets such as Bitcoin, gold, world stock, and world bond. Among the four assets, Bitcoin has the highest daily mean return of 0.11% and standard deviation of 5.14%, which also corresponds with the qualitative results found in the literature [Klein 18]. In contrast, among the conventional hedge assets, gold has the highest daily standard deviation of 0.82%. Interestingly, gold is known as a safe haven asset, while the volatility is relatively high. Bitcoin also has a high kurtosis, which is attributed to its extreme price fluctuation within the observed period.

## 4. Empirical Results

We begin with the empirical results of hedge and safe haven assets for Bitcoin. Table 2 presents parameter estimates and each column indicates the asset we include. We observe that the hedge parameter,  $\delta_0$  is insignificant in all three assets. This indicates gold, stock, and bond work as a weak hedge for Bitcoin investors. Our findings correspond with those of Klein and Baur who highlight the difference between Bitcoin and gold [Klein 18] and [Baur 18].

Given insignificant hedge parameter results, we focus upon the safe haven parameters. For gold and stock, all safe haven parameters are insignificant in Table 2, which means that gold and stock are weak safe haven assets for Bitcoin investors. The safe haven parameter,  $\delta_1$ , in the bond result is statistically significant at the 10% level, while the sign of the parameter is positive, which indicates bond moves in the same directions during extreme Bitcoin fluctuations.

Another point worth mentioning is that the asymmetric term of GJR-GARCH model,  $\gamma$ , is statistically significant at the 1% level in the stock result, while this term is insignificant in the other two assets.

Table 2 Hedge and safe haven properties: Full sample

	(1) gold	(2) Stock	(3) bond
a	-0.01 (0.02)	0.03 (0.02)	-0.01 (0.01)
$\delta_0$	0.00 (0.01)	0.00 (0.00)	0.00 (0.00)
$\delta_1$	0.00 (0.01)	0.00 (0.01)	0.01 * (0.00)
$\delta_2$	0.00 (0.02)	0.00 (0.01)	0.00 (0.01)
$\delta_3$	-0.01 (0.02)	0.01 (0.01)	0.00 (0.01)
$\omega$	0.00 (0.00)	0.02 *** (0.01)	0.00 (0.00)
$\alpha$	0.02 ** (0.01)	0.03 (0.06)	0.04 *** (0.01)
$\gamma$	0.00 (0.02)	0.23 *** (0.06)	0.00 (0.02)
$\beta$	0.98 *** (0.00)	0.81 *** (0.05)	0.96 *** (0.00)

Notes: This table shows the estimation results in equations (1)–(4). \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Having found weak hedge and safe haven relationships between Bitcoin and other assets, we focus on a down side market. Baur demonstrates that Bitcoin estimation results are sensitive to sample periods [Baur 18]. We use the down market period of Bitcoin (January 1<sup>st</sup>, 2018 to November 29<sup>th</sup>, 2018). The price of Bitcoin fell by about 70% in this period. We repeat the same estimation whereas we only use the 10% dummy variable since the number of observations are not sufficient to construct 1% and 5% dummy variables.

Table 3 presents hedge and safe haven properties of the other assets when the price of Bitcoin fell. The hedge parameter of gold is statistically significant at the 10% level and the sign is negative, which indicates gold works as a strong hedge asset during the condition of a bearish Bitcoin market. This is positive news for Bitcoin investors since Bitcoin has idiosyncratic characteristics, and therefore it is not easy to protect the value of Bitcoin portfolios. However, the impact is marginal since a 1% decrease in the Bitcoin price leads to a 2bp increase in the gold price. In contrast to gold results, stock and bond neither serve as a strong hedge nor strong safe haven, which implies that gold has a more preferable characteristic for Bitcoin investors.

Table 3 Hedge and safe haven properties: Bear market phase of Bitcoin

	(1) gold	(2) stock	(3) bond
a	-0.02 (0.04)	0.00 (0.08)	-0.02 (0.02)
$\delta_0$	-0.02 * (0.01)	0.02 (0.01)	0.00 (0.01)
$\delta_1$	0.01 (0.01)	-0.01 (0.01)	0.00 (0.01)
$\omega$	0.02 ** (0.01)	0.04 ** (0.02)	0.00 (0.00)
$\alpha$	0.00 (0.01)	0.00 (0.17)	0.02 (0.01)
$\gamma$	-0.05 (0.04)	0.30 *** (0.11)	- -
$\beta$	0.96 *** (0.01)	0.77 *** (0.15)	0.96 *** (0.02)

Notes: This table shows the estimation results in equations (1)–(4). \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The sample period covers January 1<sup>st</sup>, 2018 to November 29<sup>th</sup>, 2018

## 5. Conclusion

This paper attempts to identify asset classes which are hedge or safe haven assets for Bitcoin investors. Our research results are concluded based on the distinguished definition of both strong and weak hedge, and safe haven assets. The empirical results show that the identified asset classes – gold, stocks and bonds are weak hedge and safe haven investments in the overall market. By narrowing to the down side market, the results identified that gold works as a strong hedge although the impact is relatively marginal. However, all of the asset classes still do not serve as strong safe haven assets during an extreme bearish market. The extreme volatility of Bitcoin and relatively short timeframe may only reflect a snapshot of the fundamental value of Bitcoin, thus strong hedge and safe haven assets may be clearly identified with the growth in maturity of the Bitcoin trading market. While many critics have questioned the fundamental value of Bitcoin, its differing properties from other traditional asset classes makes it attractive to some investors, and seeking for a hedge or safe haven assets will be useful to reduce the high risk associated with it.

## Disclaimer

The views expressed in this paper are those of our own and do not necessarily represent those of YJFX, Inc.

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