Trade Uncertainties and the Hedging Abilities of Bitcoin

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Abstract

In this paper, we use daily data from October 2011 to May 2019 to estimate the monthly realized correlation between stock returns of the United States (US) and Bitcoin returns. Then, we relate the realized correlation with a news-based measure of the growth of trade uncertainty for the US. Our results show that the realized correlation is negatively impacted by increases in trade uncertainty, suggesting that Bitcoin can act as a hedge relative to the US stock market in the wake of heightened trade policy-related uncertainties, and can provide diversification benefits for investors.

Keywords: US stock market; Bitcoin; realized correlation; trade uncertainty

JEL Codes: C22, G10

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1. Introduction

In an interview on the 21st of May 2019 on Fortune's Balancing the Ledger show, Digital Currency Group founder Mr. Barry Silbert noted how Bitcoin's acceleration coincided with talks breaking down between Beijing and Washington (see Figure A1(a) in the Appendix). Mr. Silbert went on to say: "If you look at over the past five years—when 'Brexit,' happened, Bitcoin went up. When 'Grexit' happened, Bitcoin went up". In other words, Mr. Silbert meant that Bitcoin acts as an asset that is insulated from the uncertainties of the traditional financial system, i.e., there seems to be a "flight to safety" property of Bitcoin. In this regard, Mr. Silbert is not alone, as many market watchers have speculated that Bitcoin, at times referred to as "digital gold", has benefited from investors' jitters in the equities and foreign exchange markets. In this case, both stocks and China's currency were sent downward, as the trade talks between the United States (US) and China failed to yield positive results. Having said this, given the volatility that exists in Bitcoin, there are plenty of cases where the price of Bitcoin went down when other major macro events took place – something conceded by Mr. Silbert in the interview.[1] In general, however, trade uncertainty in the US has been on the rise since Mr. Donald J. Trump became the US president in January 2016.[2]

Against claims in the "popular" media about trade uncertainty and Bitcoin's hedging ability (see for example, Platanakis et al., 2018; Corbet et al., 2018; Fang et al., 2019, among others), the objective of this paper is to check the validity of such claims in a proper statistical manner. For this purpose, we focus on the time-varying correlation between US stock market and Bitcoin returns, and the effect that changes in trade uncertainty have on this correlation. If indeed Bitcoin does act as a hedge in the wake of heightened trade uncertainties, the correlation between the returns of US stock market and Bitcoin should be negatively affected.

Uncertainty is a latent variable, and hence measuring the same associated with trade is not straightforward. Recently, Baker et al. (2016) solved this problem by analyzing the number of newspaper articles dealing with trade related uncertainties, and then quantifying the same into a monthly index for the US. Traditionally, researchers would use a dynamic conditional correlation-generalized autoregressive conditional heteroskedasticity (DCC-GARCH) model (Engle, 2002) to obtain the underlying time-varying correlation between asset returns. However, given our short sample period of October 2011 to May 2019, it is not possible to obtain a statistically significant correlation, given the overparameterized structure of the DCC approach. Given this, from an econometric modelling perspective, we first recover a measure of underlying monthly realized correlation between US stocks and Bitcoin returns from daily data, and then linearly regress this realized correlation on the growth in the news-based measure of trade uncertainty.[3]

To the best of our knowledge, this is the first paper to analyze the impact of trade uncertainty on the correlation between US stock and Bitcoin returns.

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[1] The interview can be found at: http://fortune.com/2019/05/20/bitcoin-trump-china-trade-war/.

[2] See, http://review.chicagobooth.edu/economics/2018/article/trump-s-trade-policy-uncertainty-deters-investment, for a detailed formal discussion in this regard by Professor Steven J. Davis, who is William H. Abbott Distinguished Service Professor of International Business and Economics at Chicago Booth and senior fellow of the Hoover Institution at Stanford University.

[3] We could have used a DCC-GARCH-mixed data sampling (DCC-GARCH-MIDAS) model (Colacito et al., 2011) to estimate the impact of monthly growth in trade uncertainty on the daily correlation of US stock and Bitcoin returns. But recent strong criticisms of the DCC approach involving algebraic non-existence, mathematical irregularity, and non-asymptotic properties (McAleer, 2019), led us to undertake the above-mentioned two-step method.

2. Methodology

We observe the price process (of US stocks and Bitcoin) in month t, consisting of $T + 1$ daily prices or T daily returns, after removing one observation. Assuming that the number of daily observations per month is constant across all months, the returns during such months' time periods cover $t_0 < t_1 < \cdots < t_{T+1}$. We construct daily returns as the logarithmic difference between two consecutive daily observed prices, within a month, as:

$$R_{t,i} = \log(P_{t,i}) - \log(P_{t,i-1}) \tag{1}$$

where $R_{t,i}$ is a daily return and $P_{i,t}$ accounts for the daily price i and $i = (1, \ldots, T)$, where $T + 1$ is the total number of daily prices within month t.

Then, by employing all daily returns we construct the monthly realized variance (RV). For each month t, we retrieve a monthly point for RV_t obtained from daily returns, as follows:

$$RV_t \equiv \sum_{i=1}^{T} R_{t,i}^2 \tag{2}$$

The monthly RV_t is estimated by summing all successive daily squared returns and stands for a benchmark realized volatility estimator. Monthly RV is highly predictable and useful (Barosso and Santa-Clara, 2015). French et al. (1987), and Schwert and Seguin (1990) introduce the construction of realized volatility estimates on the basis of daily returns.

After that, we estimate realized correlation (RC) by realized covariance ($RCov$) - as introduced by Barndorff-Nielsen and Shephard (2004) - divided by the square roots of the RV estimators of assets A and B. Specifically, a monthly point for RC_t obtained from daily returns is given by:

$$RC_t \equiv \frac{RCov_t}{RV_t^A \cdot RV_t^B} \tag{3}$$

where, $RCov_t$ is estimated as the cross-products of two daily returns series throughout each month t:

$$RCov_t \equiv \sum_{i=1}^{T} R_{t,i}^A \cdot R_{t,i}^B \tag{4}$$

Once we recover the RC_t from equation (3), we estimate the following linear regression to relate the growth in trade uncertainty (GTU) to the realized correlation between the logarithmic-returns of US equity index and Bitcoin:

$$RC_t = \alpha + \beta \cdot GTU_t + \varepsilon_t \tag{5}$$

where ε is the regression error. Based on Bitcoins acting as a hedge for conventional equities in the wake of increased trade uncertainty, our hypothesis is that β should be negative and statistically significant.

3. Data and Results

We first obtain daily US dollar values of the US MSCI stock index and Bitcoin price, and convert them into logarithmic-returns to derive our monthly realized returns correlation (RC) using equation (3). The daily data spans 3rd October 2011 to 20th May 2019, resulting in the realized correlation for the monthly period October 2011 to May 2019. The US MSCI stock index is collected from DataStream, while the Bitcoin prices are taken from Bitstamp (https://www.bitstamp.net/), the world's longest standing cryptocurrency exchange. For the monthly trade uncertainty data, Baker et al. (2016) use search results

from the Access World News database of over 2,000 US newspapers. The trade-related index requires the article constituting the index to include the three terms: economic, uncertainty, and policy, as well as a set of categorical policy terms, namely import tariffs, import duty, import barrier, government subsidies, government subsidy, WTO, World Trade Organization, trade treaty, trade agreement, trade policy, trade act, Doha round, Uruguay round, GATT or dumping. The data is taken from: http://policyuncertainty.com/categorical_epu.html,[4] and plotted in Figure A1(b) in the Appendix. Given that we are interested in the impact of the changes of trade uncertainty on the realized correlation of US stock and Bitcoin returns, we take the first-differences of the natural logarithms of the trade uncertainty variable, i.e., its growth rate, which we denote as GTU.[5]

In Figure 1, we superimpose RC and GTU. In general, visual inspection does seem to suggest a negative correlation between RC and GTU. In fact, the correlation is -0.250 with a t-statistic of -2.459, i.e. significant at the 5% level.

Figure 1. Plot of Realized Correlation (RC) between MSCI US Stock and Bitcoin Returns, and Growth in News-Based Trade Uncertainty (GTU)
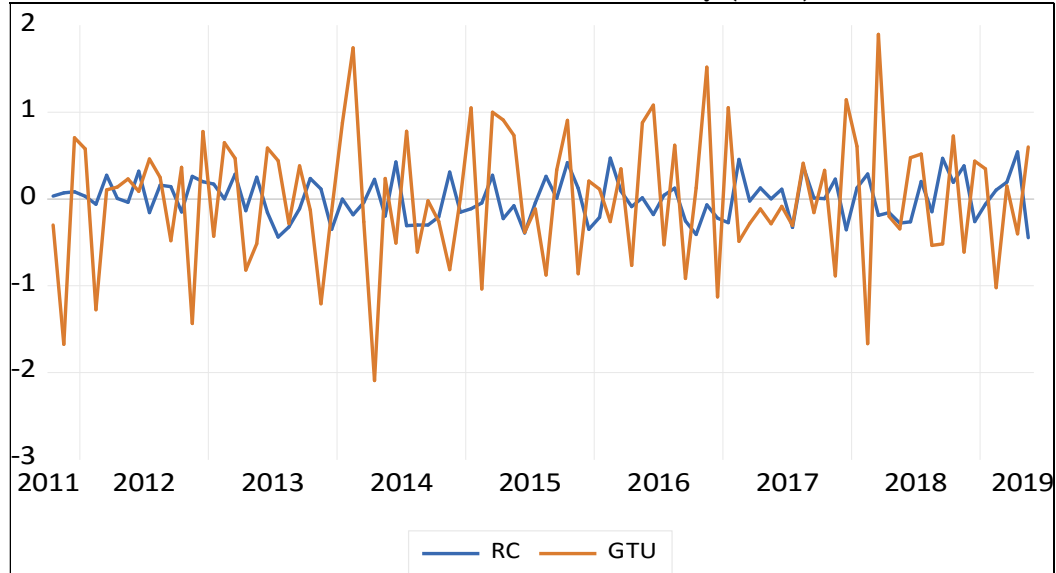
Next, as shown in Table 1, we estimate equation (5) with Newey and West (1987) heteroscedasticity and autocorrelation (HAC)-adjusted standard errors, and find that β is equal to -0.079 with a t-statistic of -3.324, i.e., significant at the 1% level.[6] This indicates strong evidence in favour of the claim that, in the wake of growth in trade uncertainty, Bitcoin does act as a hedge for US equities.[7] We also estimate equation (5) over the two

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[4] Note trade uncertainty data is available for the US from January 1985.

[5] This transformation also ensures that GTU is a stationary variable based on standard unit root tests, details of which are available upon request from the authors.

[6] This result continues to hold if we allow for a lag of RC to control for persistence. Complete details of these results are available from the authors.

[7] We conduct a similar analysis based on the realized correlation between MSCI stock returns of China and Bitcoin returns, and regress it on China's news-based growth in trade uncertainty from October 2011 to April 2015. The trade uncertainty index for China is based on the work of Davis et al. (2019), and is available at: http://policyuncertainty.com/china_monthly.html. Unlike the US, however, we are not able to obtain a significant relationship (even at the 10% level) between the realized correlation and growth in trade uncertainty of China, although the coefficient is negative. Interestingly, when we estimate a Markov-

equal sub-samples of August 2012 to December 2015, and January 2016 to May 2019, to account for the possible heightened trade uncertainty during the current presidential term of Donald J. Trump. Table 1 shows that the β coefficient is negative and statistically significant at the 5% level across both the sub-samples, but is indeed higher under the second sub-sample, suggesting that Bitcoin has acted as a stronger hedge (at least economically)[8] relative to the US stock market during the current presidential regime following a growth in trade uncertainty.[9]

Table 1. Estimation Results

Sample Period	α	β	R^2
2011:10-2019:05	0.003	-0.079[***]	0.062
	(0.022)	(0.024)	
2012:08-2015:12	-0.018	-0.075[**]	0.061
	(0.036)	(0.032)	
2016:01-2019:05	0.014	-0.104[**]	0.090
	(0.035)	(0.043)	

Note: The entries correspond to the estimate of equation (5), i.e., $RC_t = \alpha + \beta\ GTU_t + \varepsilon_t$ based on Newey and West (1987) standard errors in parentheses, with RC being the realized correlation between US MSCI stock returns and Bitcoin stock returns, and GTU being the growth in news-based trade uncertainty. ***, ** denote significance at 1% and 5% levels.

4. Conclusion

In this paper, we test the claims in the popular media that, in the wake of heightened trade uncertainty, Bitcoin has served as a "flight to safety" relative to the US stock market. Based on monthly realized correlation, derived from daily data, over the period October 2011 to May 2019, which in turn is regressed on growth in a news-based measure of trade uncertainty, we find a negative and statistically significant effect of increased trade uncertainty on the underlying correlation of the US stock and Bitcoin returns. This finding suggests that Bitcoin can serve as a hedge relative to the US stock market following increases in trade policy-related uncertainties, and hence can provide diversification benefits to investors.

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[8] switching model (without regime-specific error variances), we are able to obtain a significant negative relationship at the 10% level for the regime in which the conditional mean of the realized correlation is relatively higher. So, for China, we find weak evidence for the hedging ability of Bitcoin relative to its stock market in the wake of increased trade uncertainties. Complete details of these results are available upon request from the authors.

[8] Based on the equality of the regression coefficients test of Paternoster et al. (1998), the estimate of β across the two sub-samples is found not to be different in the statistical sense.

[9] For the sub-sample 2011:10 to 2015:12, β is equal to -0.061, with a t-statistic of -2.152, i.e. significant at the 5% level.

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APPENDIX

Figure A1(a): Monthly US Stock and Bitcoin Returns:
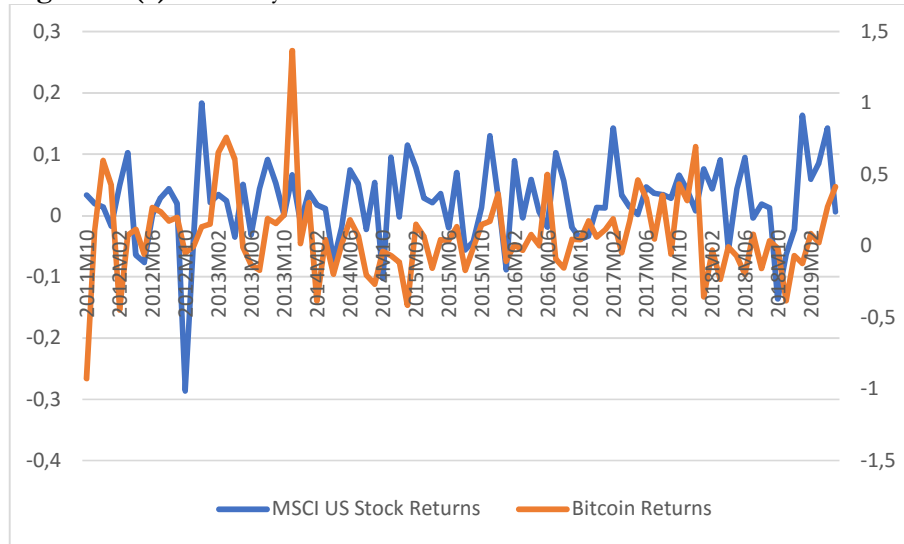
Note: Left vertical axis corresponds to MSCI stock returns, while the right is Bitcoin returns.

Figure A1(b): US Trade Uncertainty