ABD ve Japonya Para Politikası Belirsizliğinin Bitcoin Fiyatları Üzerindeki Etkisi

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Araştırma Makalesi

Öz

Bitcoin’e olan ilgi hem kripto para borsalarında hem de akademik çalışmalarda giderek artmaktadır. Yapılan çalışmalarda genellikle Bitcoin fiyatı üzerinde etkili olabileceği düşünülen finansal varlık değişkenleri dikkate alınmaktadır. Bu çalışmada ise para politikası belirsizliği (MPU) ile ilgili gazete haberlerinde yer alan terimlere dayalı olarak oluşturulan para politikası belirsizlik endeksleri kullanılmıştır.

Çalışmada, Ağustos 2010-Ağustos 2020 dönemlerinde Bitcoin fiyatı ile ABD ve Japonya para politikası belirsizlik endeksleri aylık verileri Hatemi-J (2012) asimetrik nedensellik testiyle analiz edilmiştir. Çalışma bulguları ABD ve Japonya para politikası belirsizliği ile Bitcoin fiyatları arasında nedensellik ilişkisinin olmadığını göstermektedir. Çalışma döneminde, ABD ve Japonya para politikası belirsizliği ile ilgili haberlerle Bitcoin fiyatları arasında bir ilişki olmadığı sonucuna varılmıştır.

Anahtar Kelimeler

Para Politikası Belirsizliği (MPU)
Kripto paralar
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Makale Hakkında

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The Effect of The Monetary Policy Uncertainty of US and Japan on Bitcoin Price

Abstract

The Interest in Bitcoin is increasing both in cryptocurrency exchanges and academic studies. Studies generally take into account financial asset variables that are thought to have an impact on the price of Bitcoin. In this study, it was used the monetary policy uncertainty indices based on the terms of the newspaper news about monetary policy uncertainty (MPU).

In the study, it was analyzed the monthly data of the Bitcoin price and the US and Japanese monetary policy uncertainty indices by using the Hatemi-J (2012) asymmetric causality test in period of the August 2010 and August 2020. The study findings show that there is no causality between US and Japanese monetary policy uncertainty and Bitcoin prices. During the study period, it was concluded that there is no relationship between the news about US and Japanese monetary policy uncertainty and Bitcoin prices.

Keywords

Monetary Policy Uncertainty (MPU)
Cryptocurrencies
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Introduction

There is a long-standing relationship between trusting to the money and the economy. As an example of this situation, we can understand that the money of the royals, who ruled for a long time in the past, reflects the economic processing of that period. Today, in the same way, there is a trust and demand against the money of powerful states. On the other hand, increasing polarization, political and economic developments all over the world increase the perception of risk and uncertainty. However, it affects both the demand for money and which currency will be accepted as international money.

In the case of the uncertainty and risk, individuals change their consumption preferences, investors change investment preferences, and governments change policy methods. There are many studies that prove this situation, especially in the academic literature e.g./such as Husted et al. (2017), Balcılar et al. (2020), Gupta et al. (2020). Also, according to Uncertainty Avoidance Index (UAI) created by Hofstede (1983), Japanese are one of the highest uncertainty avoidance people.

Cryptocurrencies are one of the best examples of an escape from traditional money. The first example of these cryptocurrencies "Bitcoin", created by someone or someone under the code name "Satashi Nakamoto'' in 2008. Later, if the number of crypto money was expressed in thousands, but it has desired the most popular cryptocurrency became bitcoin. Bitcoin is followed by ethereum, ripple tether, etc. Although there are cryptocurrencies, they could not dethrone bitcoin from the first row. This proves the demand for alternative currency and the most important transaction volume, especially to escape traditional currencies. However, there are evidences in the literature that bitcoin prices are sensitive to financial markets Demir et all. (2018), Kristoufek (2013). Also, studies investigating the acceptance of bitcoin as an alternative currency, financial asset Grinberg (2012), Briere et al. (2015).

Throughout the studies, it was observed that bitcoin was seen as an alternative payment tool, an alternative investment and investment tool. However, the high volatility in Bitcoin prices requires that the factors causing this volatility be taken more seriously. In this study, whether the existence of a relationship between the change in bitcoin prices and monetary policy uncertainty has been investigated. In this context, Husted et al. (2017) Monetary Policy Uncertainty (US MPU) Index for the US and Arbatlı et al. (2017) used the Monetary Policy Uncertainty (JP MPU) Index for Japan. These two indices are developed based on the studies of Baker et al. (2016). The common feature of the indices is that they are an indicator that shows confidence in monetary policy based on the frequency of the news on monetary policy uncertainty for the US and Japan. Based on this, it was aimed to investigate the bitcoin prices of the change in these indices.

In this context, literature studies on the subject are reviewed/summarized in the second section of the study. In the third section, the data set, and method of the study is explained. In addition, the analysis results obtained from the study are interpreted. In the conclusion section, empirical findings are interpreted in comparison with the literature. Finally, the contribution of the findings obtained from this study to the literature is explained and suggestion are made.

2. Literature Review

The studies conducted in this subject, the majority of studies examining the effect of the Economic Policy Uncertainty (EPU) index on cryptocurrencies. On the other hand, there are very few studies involving both EPU and MPU variable, Shaikh, I. (2020). In this study, it is hoped that it will contribute to the literature by evaluating only these variables.

Author	Variables	Method- Date	Results
Bartos (2015)	Facebook, Google, S&P500, Dow Jones, and BTC, gold prices	Error Correction Model (ECM) 2013M3-2014M8	Bitcoin price effected by latest public news. Error Correction Model (ECM) also based forecasts indicate that Bitcoin prices effected by financial developments and speculative movements.
Atik et al. (2015)	BTC - cross rates; Euro (EUR), Japanese Yen (JPY), British Pound (GBP), Canadian Dollar	Granger Causality Test June 2009-February 2015	Bitcoin and Japanese Yen affect each other with a delay and a one-way causality relationship from Japanese Yen to Bitcoin has been detected.

	(CAD), Australian Dollar (AUD) and Swiss Franc (CHF) '		
Nguyen et al. (2019)	U.S. and China monetary policy components, Bitcoin, Ethereum, Litecoin and Ripple	Regression	level of policy interest rates are not significant for both the U.S. and China, tight monetary policy of China effect the cryptocurrency returns. But U.S. monetary policies do not significantly affect cryptocurrency returns.
Tomás and Ibañez (2018)	Monetary policy news and BTC	GARCH-type models 2011-2017	Monetary policy news do not affect Bitcoin and it highlighting the absence of any kind of control on Bitcoin.
Wang et al. (2019)	US EPU, EMU, VIX	Granger causality risk, MVQM-CAViaR 19 July 2010 to 31 May 2018	According to the MVQM-CAViaR approach, the study found that the impact of US EPU, EMU and VIX shocks on Bitcoin's risk was low, and according to Granger causality analysis, the risk spread effect from Bitcoin was insignificant for the US EPU, EMU and VIX index.
Güney (2020)	EPU – USD / TL and EURO / TL exchange rate	ARDL 1999M1 2018M6	MPU index affects Dollar/TL exchange rate, not EURO/TL exchange rate
Al-Yahyaee et al. (2020)	EPU in Canada, Australia, China, Japan, the EU, Mexico, the UK, and the US major real exchange markets (FER)	Quantile on-Quantile (QQ) approach as well as nonparametric causality tests in quantities	It shows extreme dependence between EPU and FERs. In addition, it was found that the dependency structure between the variables considered was asymmetrical between the quantities.
Shaikh, (2020)	MPU (EPU) in China, the UK, Japan, the US and Hong Kong,	Quantile regression and Markov regime-switching model	Bitcoin refunds are more sensitive to the EPU in the US and Japan EPU China and Japan. While uncertainty in the US and Japan has a negative effect on the Bitcoin market, it has a positive effect in China. Also MPU effect the bitcoin.
Ongan and Göçer (2021)	MPU index - Componant of the Money(yen) demand in japan.	Linear and nonlinear autoregressive distributed lag (ARDL) models November 2000 September 2018	Demand for the Yen increases when uncertainties in the Japanese monetary policy (MPU) decrease, while demand decreases when the MPU rises. Hence, the increase in MPU drives the Japanese away from demanding the local currency Yen.

3. Methodology

3.1. Aim of the Research and Data Set

This study investigates the effect of Monetary Policy Uncertainty (MPU) which calculated for US and Japan on Bitcoin prices. For these purpose, It was tested mutual simetric-asimetric relations among the variables. Monetary Policy Uncertainty (MPU) index was determined as a representative of the the monetary policy uncertainty variable for these two countries. On the other hand, monthly bitcoin data was used for the purpose of balancing the data of all variables. However, Hatemi-J (2012) test was run among the MPU index of the US, MPU index of the Japan and Bitcoin price by using montly (121 observation) data in period of 2010M8-2020M8. And also it was applied the Lee-Strazicich (LS) unit root test to determine the unit roots and structural breaks of the series, and Gauss" 10 econometric analysis package program was used to analysis data. While creating the data set, it was tried to obtain the largest data available for Bitcoin price and other variables. Lastly, sum of the information of the data set given in Table 1.

Table 1. Data Set

Variable	Variable Description	Time Period	Sources
MUS	Monetary Policy Uncertainty (MPU) index of the US	August 2010- August 2020 Monthly data	policyuncertainty.com
MJAP	Monetary Policy Uncertainty (MPU) index of the Japan		policyuncertainty.com
BTC	Bitcoin Price		tr.investing.com

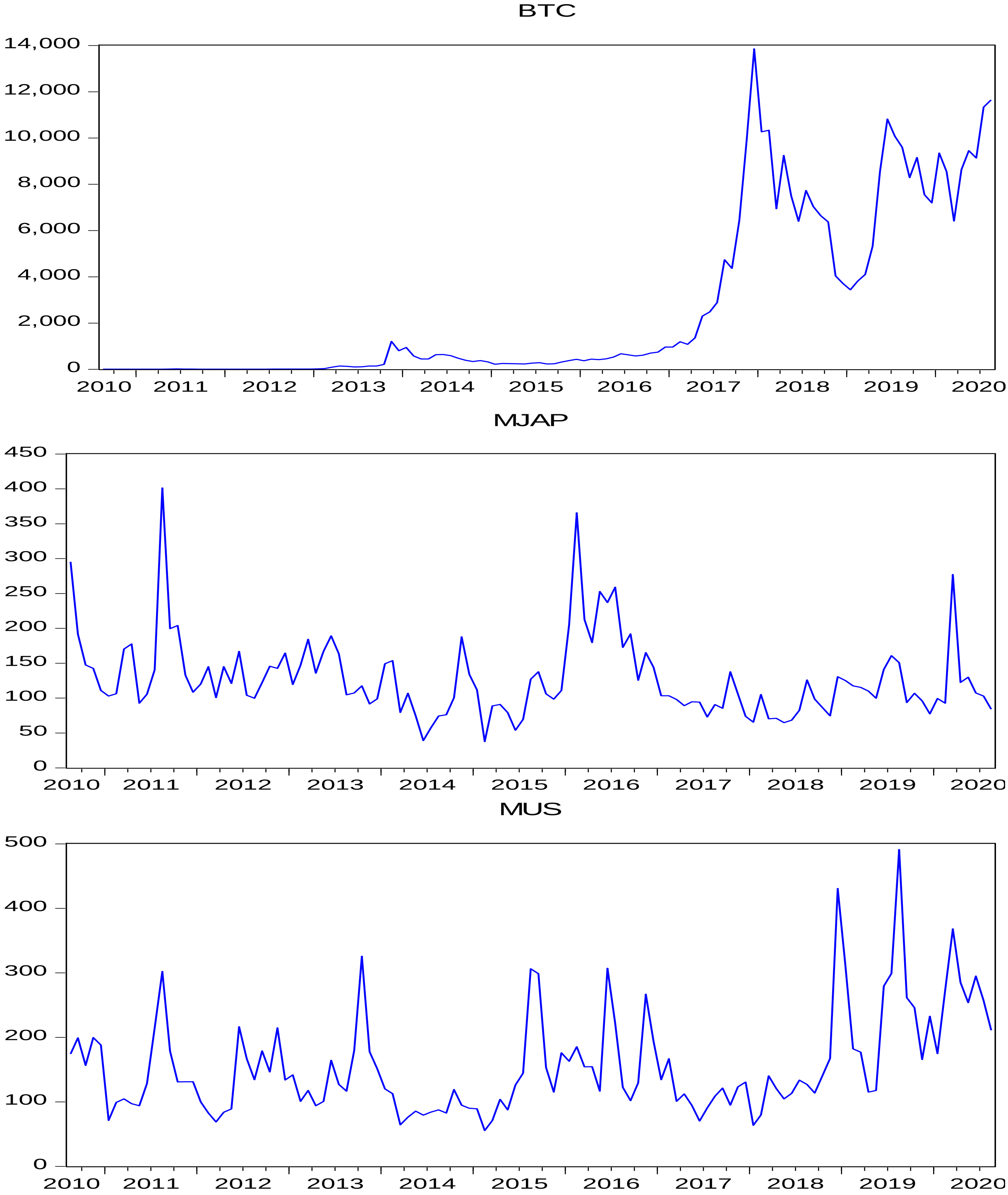

Figure 1. Charts of Series

3.2. Research Hypotheses

The hypotheses related to the research are organized as follows.

H_0: There is no causal relationship between BTC and MUS, MJAP.

H_1: There is causal relationship between BTC and MUS, MJAP.

3.3. Lee-Strazicich Unit Root Test

In terms of reliability of results in time series; In order to prevent spurious regression, stationarity condition is sought. In order to investigate the relationship between variables, the stationarity of variables (whether unit-rooted or not) should be tested first Augmented Dickey-Fuller ADF (1981), Phillips-Perron (1988), Ng-Perron (2001) etc. unit root tests are also some of the stationarity tests. Unlike conventional ADF based structural break unit root tests, the LM unit root test also allows breaks under the null hypothesis. Therefore by Lee-Strazicich (2003, 2004), a new unit root test has been added to the literature. According to this new test, structural breakage can be allowed in each of the basic and alternative hypotheses.

The method used in the LM unit root test is as follows;

$$y_1 = \delta Z_t + e_t \qquad e_t = \beta e_{t-1} + \varepsilon_t \tag{1}$$

In equation (1), the Z_t exogenous variables vector denotes error terms with the property $\varepsilon_t \sim iid\, N(0, \sigma^2)$) .The model that includes two changes in the level is expressed as A $Z_t = [1, t, D_{1t}, D_{2t}]$ Here; for $D_{jt} = 1$, $t \geq T_{bj} + 1$, $j = 1{,}2$ and 0 for other cases. . T_{bj} shows the break time. Model C contains 2 changes in trend and level, model $Z_t = [1,\ t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}]$. Here; $DT_{jt} = t - T_{bj}$ for $t \geq T_{bj} + 1$, $j = 1{,}2$ and 0 for other cases. While the process of data creation (DGP) includes breaks under the basic hypothesis (β = 1), it is in the form of an alternative hypothesis (β <1). Lee and Strazicich used the following equation to obtain the LM unit root test statistics.

Lee and Strazicich used the following equation to obtain LM unit root test statistics.

$$\Delta y_t = \delta' \Delta Z_t + \emptyset \tilde{S}_{t-1} + u \tag{2}$$

Here; $\tilde{S}_t = y_t - \tilde{\psi}_x - Z\delta$, *t=2,…,T;* and $\tilde{\delta}$ value is the coefficient obtained from ΔZ_t in the regression of Δ_{yt}. $\tilde{\psi}_x$, is found with $y_1 - Z_1\delta$ where y_1 and Z_1 are the first elements of y_t and Z_t in the order specified (Lee and Strazicich 2003: 1083).

While determining the break times, the points where the $\tilde{\tau}$ test statistic value is the smallest are selected;

$$LM_\tau = \inf_{\lambda} \tilde{\tau}(\lambda) \tag{3}$$

The formula $\lambda_i = T/TB_i, i$ i=1,2 is used to show the break point. T, here refers to observations. While single break (LM) unit root test critical values are obtained from Lee and Strazicich (2004), the critical values of the unit root test with two break (LM) can be obtained from Lee and Strazicich (2003). If the test statistical values found as a result of the analysis exceed the critical value, the unit root base hypothesis with structural break is rejected (Yılancı, 2009: 330–331).

3.4. Hatemi-J Asymmetric Causality Analysis

The asymmetric causality test, which was first introduced to the literature by Granger and Yoon (2002), was developed by Hatemi-J (2012), and causality is investigated by dividing variables into positive and negative components. In this asymmetric causality analysis, it is aimed to find the relationships that will help to understand the dynamics of the series.

According to causality relationship between two integrated variables y_{1t} and y_{2t} (Hatemi-J, 2012: 449-450);

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{10} + \sum_{i=1}^{t} \varepsilon_{1i} \qquad ve \qquad y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{20} + \sum_{i=1}^{t} \varepsilon_{2i} \tag{1}$$

Here, $t = 1, 2, \dots T$, denotes the constant terms, y_{1t} and y_{2t} denotes initial values, ε_{1i} and ε_{2i} error terms. Positive and negative shocks are expressed as in equation (2);

$$\varepsilon_{1i}^{+} = \max\ (\varepsilon_{1i}, 0), \varepsilon_{2i}^{+} = \max\ (\varepsilon_{2i}, 0), \varepsilon_{1i}^{-} = \min\ (\varepsilon_{1i}, 0) \ \ ve \ \ \varepsilon_{2i}^{-} = \min\ (\varepsilon_{2i}, 0), \tag{2}$$

However, Its expressed as $\varepsilon_{1i} = \varepsilon_{1i}^{+} + \varepsilon_{1i}^{-}$ ve $\varepsilon_{2i} = \varepsilon_{2i}^{+} + \varepsilon_{2i}^{-}$

Based on these, it is possible to rewrite equations (1) and (2) as follows

$$y_{1t} = y_{1t-1} + \varepsilon_{1t} = y_{1,0} + \sum_{i=1}^{t} \varepsilon_{1i}^{+} + \sum_{i=1}^{t} \varepsilon_{1i}^{-}, \tag{3}$$

$$y_{2t} = y_{2t-1} + \varepsilon_{2t} = y_{2,0} + \sum_{i=1}^{t} \varepsilon_{2i}^{+} + \sum_{i=1}^{t} \varepsilon_{2i}^{-}. \tag{4}$$

Both of the positive and negative shocks in each variable are expressed in cumulative form as

$$y_{1t}^{+} = \sum_{i=1}^{t} \varepsilon_{1i}^{+}, \qquad y_{1t}^{-} = \sum_{i=1}^{t} \varepsilon_{1i}^{-}, \qquad y_{2t}^{+} = \sum_{i=1}^{t} \varepsilon_{2i}^{+}, \qquad y_{2t}^{-} = \sum_{i=1}^{t} \varepsilon_{2i}^{-}, \tag{5}$$

In that case, assuming that is $y_t^{+} = y_{1t}^{+}, y_{2t}^{+}$, the causality relationship between the positive components is tested through the p delayed vector autoregressive model (VAR). VAR (p) model is expressed as in equation (6);

$$y_t^{+} = v + A_1 y_{t-1}^{+} + \cdots + A_p y_{t-1}^{+} + u_t^{+} \tag{6}$$

Here, y_t^{+} indicates a variable vector of size 2x1, v is constant variable vector of size 2x1, u_t^{+} is error term size of 2x1, and A_r is expressed as a parameter matrix of "r" order, which is determined using 2x2 size delay length information criteria. The following equation is used to determine the optimal lag lengt:

$$HJC = \ln(|\widehat{\Omega}_j|) + j\left(\frac{n^2 lnT + 2n^2 \ln(\ln T)}{2T}\right), \qquad j = 0, \dots, p \tag{7}$$

$(|\widehat{\Omega}_j|)$ shows *j* length of the lag of, the estimated VAR model's error term is variance-covariance matrix, n is the number of equations in the VAR model, and T is the number of observations.

After the lag length is determined, the Wald statistic is used to test the H_0 fundamental hypothesis, which indicates the absence of Granger-causality between series. The VAR model equation created in order to obtain the Wald statistics is as follows.

$Y = DZ + \delta$ the equation is more clearly expressed;

$Y\!: = (y_1^{+}, y_2^{+}, \dots, y_T^{+})$

$D\!: = (v, A_1, A_2, \dots, A_p)$

$$Z_t := \begin{bmatrix} 1 \\ y_t^{+} \\ y_{t-1}^{+} \\ \vdots \\ y_{t-p+1}^{+} \end{bmatrix} \tag{8}$$

$Z\!: = (Z_0, Z_1, \dots, Z_{T-1})$

$\delta\!: = (u_1^{+}, u_2^{+}, \dots, u_T^{+})$

According to equation (8): it refers to matrixes of different sizes $Y: (n\ x\ T)$, $D: \left(n\ x\ (1+np)\right)$, $Z_t: ((1+np)\ x\ 1)$, $Z: ((1+np)\ x\ T)$ and $\delta: (n\ x\ T)$.

The basic hypothesis ($H_0: C\beta = 0$) which states that there is no Granger causality, is tested with the Wald statistic. The Wald statistics can be calculated with the help of the following equation;

$$Wald = (C\beta)'[C((Z'Z)^{-1} \otimes S_U)C']^{-1}(C\beta) \quad (9)$$

Equation in equation (9) is in the form of $\beta = vec(D)$ and indicates the column clustering operator. $\otimes$ Kronecker, C represents the indicator function including constraints. The variance-covariance matrix calculated for the unconstrained VAR model is expressed as $S_U = \frac{\hat{\delta}_U' \hat{\delta}_U}{T-q}$. And here, the q h represents the number of lags in the VAR model.

4. Research Findings

4.1 Lee-Strazicich Unit Root Test

In this study, the C model was taken into account to determine the breakage of the series in the Lee-Strazicich (LS) test. According to the Lee-Strazicich Unit Root Test for the all variables are stationary at the I (0). The resuls of the LS test are shown in Table 2.

Table 2. The Results of Lee- Strazicich Unit Root Test

Lee-Strazicich Unit Root Test (Model C)						
Variable	**Level Test Statistics**	**Level Breaking Date**	**Critic Value**	**1. Difference Test Statistics**	**1. Difference Breaking Date**	**Critic Value**
MUS	-6.884468*	October 2018	-4.033098	-	-	-
MJAP	-4.473055*	September2015	-4.153348	-	-	-
BTC	-4.312737*	June 2015	-4.145689	-	-	-

Note: *It is significant at 5% level.

4.2 The Results of the Hatemi-J Asymmetric Causality Analysis

In the study, The Simetric and Asymmetric Causality relations among the variables of the MUS, MJAP, BTC were analyzed by Hatemi-J (2012), and the findings obtained from the analysis are shown in Table 3.

Table 3. The Results of the Hatemi-J Asymmetric Causality Analysis

Direction of causality	**Test Statistics (Wald) χ2**	**Bootstrap Critical Values**		
		%1	**%5**	**%10**
MUS> BTC (+)	0.261	41.215	15.272	9.006
MUS> BTC (-)	0.275	38.353	14.630	8.766
MJAP> BTC (+)	0.023	23.717	4.376	2.319
MJAP> BTC (-)	0.025	21.707	4.672	2.308
BTC> MUS (+)	0.252	38.995	14.374	8.625
BTC> MUS (-)	0.268	41.167	15.242	9.014
BTC> MJAP (+)	0.023	23.848	4.498	2.239
BTC> MJAP (-)	0.026	24.944	4.548	2.326

Note: *It is significant at 5% level.

According to the results of the equation in which a positive causality relationship from the MUS index towards the BTC, variable was tested, the (T) test statistic value (0.261), it`not significant due to less than the bootstrap critical value (15.272). Therefore, from BTC variable towards the MUS index the (T) test statistic value (0.252), it`not significant due to less than the bootstrap critical value (14.374). Besides of that, in another equation (T) where negative causality was tested from the MUS index towards the BTC, variable, the test statistic value is (0.275), lower than the bootstrap critical value (14.630). However, in another equation (T) where negative causality was tested from BTC variable towards the MUS index the (T) test statistic value (0.268), bootstrap critical value (15.242). In all cases, the (T) test values were smaller than the boosrap critic values. There was no statistically significant relationship between the variables at the 5% significance level. Thus, the H_0 hypothesis was accepted, and the H_1 hypothesis was not able to be accepted.

According to the results of the equation in which a positive causality relationship from the MJAP index towards the BTC, variable was tested, the (T) test statistic value (0.023), it`not significant due to less than the bootstrap critical value (4.376). However, from BTC variable towards the MJAP index the (T) test statistic value (0.023), it`not significant due to less than the bootstrap critical value (4.498). Besides of that, in another equation (T) where negative causality was tested from the MJAP index towards the BTC, variable, the test statistic value is (0.025), lower than the bootstrap critical value (4.672). Therefore, in another equation (T) where negative causality was tested from from BTC variable towards the MJAP index the (T) test statistic value (0.026), bootstrap critical value (4.548). In all cases, the (T) test values were smaller than the boosrap critic values. There was no statistically significant relationship between the variables at the 5% significance level. Thus, the H_0 hypothesis was accepted, and the H_1 hypothesis was rejected.

Conclusion

Today, the use of bitcoin in global markets is gaining momentum. The number of those who see bitcoin not only as a value exchange tool but as a unit of account is increasing. Even the number of those who accept it as a value storage tool is not at all. This situation makes it necessary to investigate which macro factors are effective on bitcoin prices. Many variables that are thought to have an impact on bitcoin prices have been taken into consideration. Many factors such as economic growth, stock markets, risk and fear indices, bonds, interest rates, CDS spreads, geopolitical risks have been examined. However, it has been observed that methods such as case study method and google trend search are used This study uses a variable called the monetary policy uncertainty index (MPU). This index has been prepared considering the use of concepts such as uncertainty and risk through the press and media, and it is thought that it will have an indirect effect on the bitcoin demands of individuals.

Accordingly, the symmetrical-asymmetrical causality was questioned between bitcoin prices and Monetary Policy Uncertainty (MPU) index data prepared for the USA and Japan. The hatemi-J asymmetric causality test was run and it was tried to select the widest available data range. Lee-Strazicich unit root test analysis was performed in unit root tests that allow structural breaks in data belonging to variables. It was seen that all series are stationary in I (0). In addition, different symmetrical-asymmetric models have been established to examine both one-way and two-way relationships between variables.

When we look at the findings obtained from the analysis, no causality relationship was found between Bitcoin prices and MPU indices. The increase and decrease in the MPU index or a change in bitcoin price is not revealing on the MPU index. These results are in the same direction as the Nguyen et al. (2019) study for the USA, and it has been seen that the contrary findings were reached with Shaikh (2020). When considered for both the USA and Japan, it appears to be similar to the findings from the Tomás and Ibañez (2018) study. In fact, it can be said that its results are divided into two in the literature. On the one hand, there are findings that the variables related to monetary policy uncertainties are effective on bitcoin prices, on the other hand, there are results in terms of the absence of this interaction, as in this study. This situation is thought to stem from the representative variable used in relation to monetary policy uncertainty and the method of implementation used.

Lastly, considering the variables and data set used in this study, it is seen that the change in the MPU index prepared for monetary policy uncertainty does not explain bitcoin prices. However, when we look at the literature, there are some results in this direction. However, the results in which the economic policy uncertainty index, which is prepared with the same methods in the literature, explains the price of bitcoin is dominant. From here, it can be interpreted that bitcoin prices are affected by more general economic uncertainties.

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