BITCOIN: IS IT AN ALTERNATIVE FOR THE STOCK EXCHANGES? A COMPARATIVE PANEL DATA ANALYSIS FOR THE FAR EAST ASIAN COUNTRIES AND TURKEY UNDER THE CROSS-SECTIONAL DEPENDENCE

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Abstract

In this study, we investigated whether bitcoin crypto money is an alternative to the stock exchange as an investment tool. For this purpose, the relationship between bitcoin and the stock market was examined in terms of the returns and liquidity. In the analysis, daily returns of the 9 Far East countries and Turkey's stock markets and daily returns of the bitcoin were used for the period of 22.02.2012-15.08.2018. According to the results of the model, an increase of the Bitcoin's returns has reduced the return on the stock market in Turkey and Far East countries. From point of this, it can be seen that the as an investment tool, bitcoin cryptocurrency has been becoming the substitute for the country stock exchanges included in the sample. The highest impact of bitcoin on the stock exchange was observed in Turkey and Indonesia while the least effect was seen on the Malaysia, Singapore and Korea respectively.

Anahtar Kelimeler: *Panel data, Cointegration, Causality, Unit root, Crypto Money, Bitcoin*
JEL Sınıflandırması: *C23, G10, G32*

BITCOIN BORSALAR İÇİN BİR ALTERNATİF Mİ? UZAKDOĞU ASYA ÜLKELERİ VE TÜRKİYE İÇİN YATAY KESİT BAĞIMLILIĞI ALTINDA KARŞILAŞTIRMALI BİR PANEL VERİ ANALİZİ

Öz

Bu çalışmada bitcoin kripto paranın bir yatırım aracı olarak borsalara alternatif olup olmadığı incelenmeye çalışılmıştır. Bu amaçla çalışmada bitcoin getirisi ve likiditesi ile borsaların getirisi ve likiditesi arasındaki ilişki incelenmiştir. Analizde 22.02.2012-15.08.2018 dönemine ait dokuz Uzakdoğu ülkesi ve Türkiye'nin borsa endekslerinin günlük getirileri ile Bitcoin günlük getiri verileri kullanılmıştır. Modelin sonuçlarına bakıldığında bitcoin getirisinin artış göstermesi Türkiye ve Uzakdoğu ülkelerinin getirilerini azaltmıştır. Buradan hareketle bitcoin kripto para biriminin örneklemdeki ülke borsalarının ikamesi olduğu görülmektedir. Bitcoin borsalara olan etkisinin en fazla olduğu ülkeler Türkiye ve Endonezya iken etkinin en az olduğu ülkeler Malezya, Singapur ve Kore olarak tespit edilmiştir.

Keywords: *Panel, Eş Bütünleşme, Nedensellik, Birim Kök, Kripto Para, Bitcoin*
JEL Classification: *C23, G10, G32*

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1. Introduction

Money has continued to evolve and change over the course of many centuries as a unit of economic measure used as a means of exchange in the transfer of goods and services. After the barter economy, precious metals such as gold and silver was used in the trade of goods and services, and since the value of money has not been defined based on the value of precious metals the banknotes have been used in economic life. As the last stage of this development, digital money has taken place in the finance world instead of physical circulation realized by paper money. One of the most popular examples of digital money is bitcoin. Thanks to recent sharp price changes and many aspects that differ from the traditional currency concept, Bitcoin or crypto-currency has become one of the most widely spoken arguments in the financial world. In the literature, there are many definitions of bitcoin, but basically, it can be defined as a payment instrument like paper money. The difference from classical money is that payments and money transfers are performed through the online platform in the form of digital money instead of paper money. But the most basic feature that distinguishes it from paper money is that it is not controlled by an authority, such as the state or the company, and it has not a center. (Atik et al. 2015:248). Although bitcoin and crypto money concepts are recognized as same in practice bitcoin can be regarded as only one of the examples of the crypto money. However, thanks to its growing popularity, bitcoin is the first term that comes to mind when crypto money is mentioned. At the same time based on the definition of Bitcoin, it is also available to claim that it has a virtual currency feature. However, as in the concept of crypto money, bitcoin is only one of the virtual money examples. Considering the relationship with the real economy, virtual currency term can be classified as closed virtual currency which can be used only in game platforms and some websites but not able to use in real economic life, as virtual currency with a unidirectional flow which are bought by real money but cannot be converted to real money and finally as virtual currency with a bidirectional flow that are suitable for use in goods and services in real life (Koçoğlu et al. 2016:78). Within framework its increasing use in the real economy, bitcoin can be classified as bidirectional virtual and crypto money. Among the main purposes of the emergence of the Bitcoin currency is the creation of a standard currency used throughout the world. For this purpose, Bitcoin was produced in 2008 by an unknown person or group of people who nicknamed as Satoshi Nakamoto and it was used for the first time in 2009. Bitcoin, which is not under the control of any state and is not controlled by a central banks, has taken its place in the world of finance as an easy-to-use currency with universal standards. Given the features of Bitcoin and other crypto-currencies, it is expected that their volume in the real economy in the next 5-10 years will reach to much larger amounts. To sum up the features that make Bitcoin so popular (Hepkorucu and Genç, 2017 : 48) :

- It is managed entirely in digital and electronic environment.
- Upper limits on the amount/supply of bitcoin in circulation have been introduced and the total amount of bitcoin has been limited to 21 million.
- It has been operating on the Peers to Peers / P2P network.
- It cannot be insured, issuance and control cannot be done by any state or any other central authority.

In this study, Bitcoin will be examined whether it is an alternative for the stock exchange as an investment tool. Relationship between stock markets and bitcoin will be examined that it will be decided that whether investors perceive bitcoin alternative investment tool during the portfolio allocation decisions.

2. Data and Sample

Daily returns of the 9 Far East Countries' and Turkey's stock exchanges and daily returns of the bitcoin for the period of 22.02.2012-15.08.2018 were used. The data was obtained from the www.tradingeconomics.com website. In order to make the data available for analysis, the country's stock market data was first matched with Bitcoin data[1], then the dates of the country data were matched and the missing dates were excluded from the analysis. Finally, in the analysis, a balanced panel of 11640 data with 1164 data for each of the 10 countries was used.

3. Model

In this study, the relationship between Bitcoin's return (RBIT) and stock exchange's return (RSTOCK) was analyzed through the Equation (1).

$$Model\ 1: RSTOCK_{it} = \beta_{i0} + \beta_{i1} RBIT_t + u_{it} \quad (1)$$

Here returns are calculated as follows:

$$RSTOCK_{it} = \left(\frac{ESTOCK_{it}}{ESTOCK_{it-1}} - 1\right) * 100 \quad (2)$$

$$RBIT_t = \left(\frac{EBIT_t}{EBIT_{t-1}} - 1\right) * 100 \quad (3)$$

Here $ESTOCK_{it}$, represents the closing value of the i. stock exchange at the day t. while $EBIT_t$; represents the closing value of the Bitcoin at the day t. Since bitcoin prices are common data worldwide, the individual (i) information in Equation (3) is not included. In the cointegration test performed for the equations (1) when the cointegration is determined, it will be decided that there is a long-term relationship between the Bitcoin and the stock market's return. As a result of the regression analysis, if $\beta_1\ lower\ than\ 0$ this indicates that Bitcoin is a substitute for the relevant stock exchange as an investment tool if $\beta_1\ higher\ than\ 0$ it will indicate that Bitcoin is a complement to the relevant stock exchange. If β_1 is statistically insignificant or there is no cointegration between $RSTOCK$ and $RBIT$, it will indicate that Bitcoin has not yet become an alternative investment instrument in terms of financial markets of sample countries.

In the analysis, the relationship between the liquidity of Bitcoin $(ILLIQBIT)$ and the liquidity of the stock exchange $(ILLIQSTOCK)$ was also tested through the Equation (4).

$$Model\ 2: ILLIQSTOCK_{it} = \alpha_{i0} + \alpha_{i1} ILLIQBIT_t + e_{it} \quad (4)$$

Here, the liquidity of each stock exchange and Bitcoin is calculated using the ILLIQ liquidity gaps measure developed by Amihud (2002). The increase in ILLIQ means that the liquidity of the related financial instrument has fallen (Gümrah and Çobanoğlu, 2018: 207). In Amihud (2002) ILLIQ method, the illiquidity can be calculated through Equation (5) (Xi and Weitian, 2013: 13; Gümrah and Çobanoğlu, 2018: 209) as follows:

$$ILLIQ_{it} = \frac{|R_{it}|}{Log(VOL_{it})} \quad (5)$$

Here $ILLIQ_{it}$; shows the amount of liquidity of the investment tool i at time t, R_{it} is the return of the investment tool i at time t, VOL_{it} is the transaction volume of the investment tool i at time t. Since daily data are used in the study, daily liquidity measures are calculated from daily price and transaction volume data by following Gümrah and Çobanoğlu (2018: 207). If Equation (5) is applied to the stock exchanges and Bitcoin respectively;

[1] Bitcoin is common data throughout the world and is available on every day, while stock exchange data are available only on weekdays except for weekends and also for national and religious holidays which are seen on different times in different countries.

$$ILLIQSTOCK_{it} = \frac{|RSTOCK_{it}|}{Log(VOLSTOCK_{it})} \quad (6)$$

$$ILLIQBIT_t = \frac{|RBIT_t|}{Log(VOLBIT_t)} \quad (7)$$

Here, $RSTOCK_{it}$ shows return of stock exchange i at the time t and $VOLSTOCK_{it}$; represents the volume of stock exchange i at the time t. $RBIT_t$ shows return and $VOLBIT_t$ shows transaction volume of the bitcoin at time t.

In the cointegration test that will be made for equation (4), if the series are cointegrated, it will be decided that there is a long-term relationship between liquidity of bitcoin and liquidity of stock exchanges. As a result of regression analysis, if α_1 is greater than 0, it will be decided that the liquidity of Bitcoin lowers the liquidity of the relevant stock exchanges, while if it is less than 0, the illiquidity of Bitcoin increases the liquidity of the relevant stock exchanges.

3.1. Method

In the study, the existence of horizontal section dependency among countries was analyzed through Breusch-Pagan (1980) LM, Pesaran (2004) scaled LM (LMS), Baltagi, Feng and Kao (2012) bias-adjusted scaled LM (LMBC) and Pesaran (2004) CD tests. The stationarity of the series was measured by the CADF panel unit root test developed by Pesaran (2006). The existence of cointegration relations between the series was analyzed by the Westerlund (2008) error correction model (ECM) test. The homogeneity of cointegration coefficients was investigated by Pesaran and Yamagata (2008) delta (Δ) method. In addition, cointegration coefficients were estimated by the Panel AML (Augmented Mean Group Estimator) method developed by Eberhardt and Bond (2009) and the existence of causality relations between the series was examined by Dumitrescu and Hurlin (2012) panel causality test.

3.2. Horizontal Cross Section Addiction Test

Bitcoin is a common data all over the world and the changes in bitcoin prices have the potential to affect the financial markets of all countries. This shows the possibility of interaction among countries and therefore there may be horizontal cross-section dependency between countries. In addition, since the financial markets of countries are open to international financial movements and integrated to each other, a change in a stock market has the potential to affect other countries' stock exchanges. This supports the prediction that there may be horizontal section dependency among countries (a shock to one country may affect other countries). For this reason, the analysis was started by testing the existence of horizontal section dependency. If there is no horizontal cross-section dependency between countries the first, if any, second-generation panel data analysis methods should be used.

Breusch and Pagan (1980) LM test was first developed to test the horizontal section dependency and this was followed by Pesaran (2004) LMS test, Pesaran (2004) CD test and Balagi, Feng and Kao (2012) deviation corrected LMBC test. Null Hypotheses of these tests : No Cross-section dependency. In the study, these tests were performed through the Eviews 9 program and the findings are presented in Table 1.

According to the results shown in Table 1, there is a horizontal cross-section dependency between the sample countries related to stock markets and Bitcoin. For this reason second-generation panel data analysis methods was used. Also while sample countries are developing policies for the stock market and Bitcoin, it can be said that at the same time they should take into account the practices of other countries involved in the analysis.

Table 1: **Cross-section Dependency Test Results**

Variables	*LM*	*LM_S*	*CD*	*LM_{BC}*
RSTOCK	8247.50***	863.56***	86.28***	863.56***
	(0.00)	(0.00)	(0.00)	(0.00)
RBIT	51465.77***	5419.17***	226.83***	5419.16***
	(0.00)	(0.00)	(0.00)	(0.00)
ILLIQSTOCK	5014.44***	522.77***	68.24***	522.76***
	(0.00)	(0.00)	(0.00)	(0.00)
ILLIQBIT	51977.76***	5473.14***	227.98***	5473.13***
	(0.00)	(0.00)	(0.00)	(0.00)

Note: Figures in the parentheses are the probability values. **** and ** indicate the existence of horizontal section dependency between countries at the significance level of 1% and 5% respectively.

3.3. Panel Unit Root Test

Since horizontal cross-section dependency was determined among the sample countries in this study, the stability of the series was tested by the CADF method developed by Pesaran (2006) which is one of the second-generation panel unit root tests. This test can take into consideration horizontal cross-section dependency and common factors among countries and can generate test statistics for each horizontal section and panel separately. Null hypothesis of test : "Has a unit root; series is not stationary". Pesaran (2006) calculated the arithmetic mean of the individual test statistics in order to obtain the panel-wide test statistic (CIPS). The formula used for this purpose is:

$$CIPS = \frac{1}{N}\sum_{i=1}^{N} CADF_i \qquad (8)$$

In this study, CADF panel unit root test was applied for countries, CIPS panel unit root test was applied for the panel, and analysis results that was performed through the Gauss 10 program are presented in Table 2.

Table 2: **Panel Unit Root Test Results**

	Level				*First Difference*			
Country	***RSTOCK***	***RBIT***	***ILLIQSTOCK***	***ILLIQBIT***	***RSTOCK***	***RBIT***	***ILLIQSTOCK***	***ILLIQBIT***
China	0.17	-0.25	1.58	-1.95	-25.10***	-25.77***	-21.20***	-23.41***
Japan	0.25	-0.07	1.08	-0.47	-23.89***	-24.75***	-22.03***	-24.80***
Indonesia	0.45	0.58	-.07	-2.85	-26.11***	-25.34***	-13.75***	-24.71***
Philippines	1.02	0.74	-1.09	-3.01	-26.45***	-37.02***	-10.09***	-24.05***
Malaysia	-0.21	0.02	-0.85	-0.58	-23.93***	-25.22***	-21.73***	-24.58***
Singapore	-0.28	-1.25	-0.79	-0.78	-25.56***	-25.22***	-23.24***	-24.58***
Thailand	-1.78	-2.01	-0.64	-1.98	-26.33***	-24.51***	-22.08***	-23.29***
Korea	-0.25	-0.17	0.98	-1.28	-25.24***	-25.22***	-23.53***	-24.58***
Taiwan	0.68	-0.87	0.69	-0.36	-24.45***	-22.78***	-21.97***	-22.24***
Turkey	0.49	-0.23	0.08	-3.10	-24.86***	-25.22***	-16.73***	-24.58***
Panel	0.054	-0.351	0.097	-1.636	-25.19***	-26.10***	-19.63***	-24.08***

Note: For CADF, the critical values at the 1%, 5% and 10% significance levels were obtained from Pesaran (2007) p. 276 are -4.28, -3.69 and -3.39, respectively. For CIPS, the critical values at the 1%, 5% and 10% significance levels were obtained

from Pesaran (2007) p. 281 are -3.03, -2.83 and -2.73, respectively. ***; indicate that the series is stationary at 1% significance level.

As can be seen from Table 2, the null hypothesis can not be rejected in the CADF and CIPS unit root tests for all series, but when the panel unit root test is conducted after taking first differences of the series, the null hypothesis was rejected at the 1% level of significance and it can be accepted that series are stationary at their first difference level. Bitcoin's excessively volatile price structure and significant developments affecting the country's stock markets are thought to have an impact on this outcome.

Since the series are not stationary, according to Granger and Newbold (1974), analyzes with original level values of the series may cause spurious regression problems. According to Engle and Granger (1987), cointegration tests should be performed in such cases. When the cointegration relation is determined between the series in the models, it is decided that the series move together in the long run and the spurious regression problem will not be encountered in the analyzes (Hubrich, Lutkepohl and Saikonen, 2001). For this reason, it was decided to investigate the existence of cointegration relation between the series in the models.

3.4. Panel Cointegration Test

Since horizontal cross-section dependency was determined among the countries, the existence of cointegration relation between the variables in the models was tested by the Westerlund (2008) Durbin-H method that is one of the second generation panel cointegration tests and takes horizontal section dependency into consideration. Null hypothesis of this test: "*No cointegration, There is no cointegration relation between the series"*. In Westerlund (2008) Durbin-H method, the existence of cointegration relation is tested for group and panel separately. In this panel cointegration test, the autoregressive parameter is assumed to be the same for all sections. Under this assumption, when the null hypothesis is rejected, it is decided that there is a cointegration relation for all horizontal sections. On the other hand, in the Westerlund (2008) Durbin-H group test, the autoregressive parameter is allowed to vary between horizontal sections. In this test, the rejection of the null hypothesis implies the existence of a cointegration relation for at least some sections (Di Iorio ve Fachin, 2008). Westerlund (2008) the Durbin-H panel cointegration test was performed through the Gauss 10 program and the obtained results are presented in Table 3.

Table 3: **Westerlund (2008) Durbin-H Panel Cointegration Test Results**

	Durbin-H Group Statistic	***Durbin-H Panel Statistic***
Model 1	1106008.316***	1684431.456***
	(0.00)	(0.00)
Model 2	626425.082***	136109.337***
	(0.00)	(0.00)

Note: *** indicates the existence of cointegration at the 1% significance level in the model. The numbers in parentheses are the probability values.

When the test results in Table 3 were examined, it was decided that null hypotheses at 1% significance level were strongly rejected in both models and that there was a cointegration relation between the variables in the models. In this case, analyzes carried out with the original level values of these series will not contain false regression problem and will be reliable.

3.5. Homogeneity Test

In order to test the homogeneity of cointegration coefficients in the study, a slope homogeneity test developed by Pesaran and Yamagata (2008) was performed. Null hypothesis of this test : "Slope Homogeneity". Pesaran and Yamagata (2008) developed two different test statistic to test these hypotheses, $\tilde{\Delta}$ for large samples and $\tilde{\Delta}_{adj}$ for small samples.

Table 4: **Slope Homogeneity Test Results**

		Test Statistics
Model 1	$\tilde{\Delta}$	7.962*** (0.00)
	$\tilde{\Delta}_{adj}$	7.973*** (0.00)
Model 2	$\tilde{\Delta}$	19.562*** (0.00)
	$\tilde{\Delta}_{adj}$	19.587*** (0.00)

Note: *** indicates that there is slope homogeneity at the 1% significance level in the model. The numbers in parentheses are the probability values.

According to the results represented in Table 4, the null hypothesis was strongly rejected in both models and it was decided that the slope coefficients are not homogeneous in the cointegration equations. In this case, while the coefficients in the models are being calculated, it would be more appropriate to choose a method that gives individual results.

4. Findings

Since cointegration coefficients were found to be heterogeneous and horizontal section dependency was determined among the countries in the panel, cointegration coefficients were determined by the Panel AMG method developed by Eberhardt and Bond (2009). In the panel AMG method, individual coefficients for each country are determined and the general result of the panel is calculated by weighting the individual coefficients. This method is a predictor that can produce results that are consistent and have an asymptotic normal distribution. It is also a robust predictor of heteroscedasticity and autocorrelation problems. For this reason, cointegration coefficients were estimated by Panel AMG method. Stata 13 program and codes written for this program were used for this process. The findings are presented in Table 5.

Referring to the estimation results of Model 1 that is shown in Table 5, it can be claimed that an increase in the return of bitcoin has reduced the return of the stock markets of the Far East countries and Turkey. This indicates that Bitcoin is becoming a substitute for the stock exchanges. When the results of the countries are examined, it is seen that the highest impact was seen in Turkey and Indonesia while the least impact was seen in Malaysia, Singapore and Korea respectively.

According to Amihud (2002), the increase in the value of the ILLIQ (illiquidity measurement) means that the liquidity of the related financial instrument has fallen. In this case, the increase in ILLIQBIT in Model 2 will indicate that the liquidity of Bitcoin has fallen. If the coefficient of this variable is negative, it will be decided that when the liquidity of Bitcoin is low, the liquidity of the relevant stock exchanges increases. When the results belong to estimates of Model 2 are analyzed, it is observed that an increase in low liquidity of bitcoin will increase the liquidity of the stock markets in the Far East countries and Turkey. However, this effect size is very small. Looking at the results of the countries, it can be seen that this effect is valid only in China, Philippines, Singapore and Thailand and that the statistically reliable results can not be obtained for the other countries.

The causality relationships between the series are examined by Dumitrescu and Hurlin (2012) test. This method can take into account the horizontal section dependency between the countries. The null hypothesis of the test is "*No Causality; There is no causality relationship between the first variable and the second variable*". (Dumitrescu ve Hurlin, 2012: 1457). In the study, Dumitrescu and Hurlin (2012) causality test was conducted through Eviews 9 program.

Table 5: **Cointegration Coefficient Estimation Results**

	Model 1		***Model 2***	
Countries	***Constant***	***Coefficient of RBIT***	***Constant***	***Coefficient of ILLIQBIT***
China	0.283*** (0.00)	-0.13*** (0.00)	0.040*** (0.00)	-0.003** (0.04)
Japan	0.386*** (0.00)	-0.14*** (0.00)	0.064*** (0.00)	-0.002 (0.25)
Indonesia	0.274*** (0.00)	-0.15*** (0.00)	0.029*** (0.00	-0.0005 (0.56)
Philippines	0.289*** (0.00)	-0.12*** (0.00)	0.065 (0.00)	-0.004** (0.04)
Malaysia	0.148*** (0.00)	-0.009*** (0.00)	0.021*** (0.00)	-0.0009 (0.22)
Singapore	0.207*** (0.00)	-0.011*** (0.00)	0.028*** (0.00)	-0.002** (0.01)
Thailand	0.24*** (0.00)	-0.013*** (0.00)	0.027*** (0.00)	-0.001* (0.05)
Korea	0.210*** (0.00)	-0.011*** (0.00)	0.043*** (0.00)	-0.001 (0.16)
Taiwan	0.249*** (0.00)	-0.012*** (0.00)	0.035*** (0.00)	-0.001 (0.16)
Turkey	0.315*** (0.00)	-0.016*** (0.00)	0.077*** (0.00)	-0.0006 (0.80)
Panel	0.261*** (0.00	-0.013*** (0.00)	0.043*** (0.00)	-0.002*** (0.00)
	Model Specification Tests			
Number of obs		11640	11640	
Wald chi2(1)		471.15	31.89	
Prob > chi2		0.00	0.00	
Root Mean Squared Error (sigma)		0.9253	0.0425	

Note: Autocorrelation and heteroscedasticity problems in estimates have been eliminated by the Newey-West method. *, ** and *** indicate that coefficients are statistically significant at the levels of 10%, 5% and 1%, respectively. The figures in the parentheses are the probability values.

Table 6: **Dumitrescu ve Hurlin (2012) Panel Causality Test Results**

	Null Hypothesis	***Lags***	***W stat.***	$\overline{Z}$ ***stat.***	***Prob.***
Model 1	$RBIT \nRightarrow RSTOCK$	19	12.44***	-3.34***	0.00
	$RSTOCK \nRightarrow RBIT$		17.99	-0.52	0.59
Model 2	$ILLIQBIT \nRightarrow ILLIQSTOCK$	38	30.44***	-2.71***	0.00
	$ILLIQSTOCK \nRightarrow ILLIQBIT$		40.12	0.72	0.46

Note: *** indicates the existence of causality relation from the first variable towards the second variable at the 1% significance level.

The results of the causality test are shown in Table 6 above. According to the findings in Table 6, there is a one-way causality in sample countries from the return and illiquidity of bitcoin towards the return and illiquidity stock markets. This suggests that Bitcoin is now becoming an alternative investment tool for countries and it is interacting with the country's stock markets.

5. Conclusion

In this study, the interaction between Bitcoin and stock markets for the 9 Far Eastern countries and Turkey were analyzed by using the daily data of 22.02.2012-15.08.2018 period. Because of being common data used all over the world, changes in the bitcoin have the potential to affect the country's financial markets. In addition, since nowadays, the financial markets of countries are now open and integrated; a change in the stock market can affect other countries' stock markets. Therefore, it is predicted that there may be horizontal section dependency among the countries included in the sample, and horizontal cross-section dependency tests have been carried out and it has been determined that there is a horizontal section dependency between the countries. In this case, second-generation panel data analysis was used. The stationarity of the series was examined by CADF panel unit root test developed by Pesaran (2006) and it was determined that the series with their original values are not stationary but become stationary when the first differences are taken. This result is stemming from Bitcoin's excessive volatility and significant developments affecting the country's stock markets. The existence of cointegration relations between the series in the models was analyzed by Westerlund (2008) Error Correction Model panel cointegration test. As a result, it has been decided that the series are cointegrated, returns and liquidity of the Bitcoin and country's stock exchanges move together in the long run.

The homogeneity of cointegration coefficients was examined by Pesaran and Yamagata (2008) delta method and it was decided that the coefficients were not homogeneous. Therefore, a prediction method that gives individual results was required to perform. Cointegration coefficients were estimated by the Panel AMG method developed by Eberhardt and Bond (2009). According to test results, increase in bitcoin returns reduce returns of stock markets in the Far East countries and Turkey, therefore, it was determined that Bitcoin has become a substitute an investment tool for the stock markets. When the results of the countries are examined, the highest effect is seen in the Turkey and Indonesia while the least effect is subject in the Malaysia, Singapore and Korea. It was also determined that an increase in the illiquidity of bitcoin increases liquidity of the stock exchanges. However, it has been determined that this effect is minor and only valid in China, Philippines, Singapore and Thailand and that for other countries statistically reliable results could not be achieved. Causality relations between the series are examined by Dumitrescu and Hurlin (2012) test, and one-way causality associations have been determined in these countries from returns and liquidity of bitcoins towards to stock markets.

Empirical evidence from this study suggests that Bitcoin is now becoming an alternative investment tool for countries and it is interacting with the country's stock market. For this reason, it is beneficial for those who direct economic policy and for financial investors to evaluate bitcoin and stocks together in terms of investment opportunities.

References

Amihud, Y. (2002). Illiquidity and Stock Returns: Cross-section and Time-Series Effects. *Journal of Financial Markets*, 5(1), 31-56.

Atik M., Köse Y., Yılmaz B. and Sağlam F., (2015). Kripto Para: Bitcoin ve Döviz Kurları Üzerine Etkileri, *Bartın Üniversitesi İ.İ.B.F Dergisi*, 6 (11), 247-261.

Baltagi, B. H, Feng, Q. and C. Kao (2012). A Lagrange Multiplier test for Cross-sectional Dependence in a Fixed Effects Panel Data Model, *Journal of the Econometrics***,** 170, 164–177.

BIST (2018). Volatilite hesaplaması. http://www.borsaistanbul.com/veriler/verileralt/ volatilite-hesaplamasi, (Accessed in 14 Agust 2018).

Breusch, T.S and Pagan, A.R. (1980). The Lagrange Multiplier Test and Its Applications to Model Specification Tests in Econometrics, *Review of Economic Studies*, 47, 239-53.

Dumitrescu, E.I. and Hurlin, C. (2012), Testing for Granger Non-Causality in Heterogeneous Panels*, Economic Modelling*, 29(4), 1450-1460.

Eberhardt, M. and Bond, S. (2009), Cross-section Dependence in Nonstationary Panel Models: A Novel Estimator, *MPRA Paper*, No. 17870.

Engle, R. F. and C. W. J. Granger (1987). Co-integration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55, 251–276.

Granger, C. W. J. and Newbold, P. (1974). Spurious Regressions in Econometrics. *Journal of Econometrics*, 2, 111-120.

Gümrah, Ü. and Çobanoğlu, C. (2018). The Relationship between Liquidıty and Return in Turkish Stock Market, *Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 11(2), 203-216.

Hepkorucu A. and Genç, S., (2017). Finansal Varlık Olarak Bitcoin'in İncelenmesi ve Birim Kök Yapısı Üzerine Bir Uygulama, *Osmaniye Korkut Ata Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi,* 1(2), 47-58.

Hubrich, K., Lutkepohl, H. and Saikonen, P. (2001). A Review of Systems Cointegration Tests. *Econometric Reviews*, 20(3), 247-318.

Koçoğlu Ş., Çevik Y.E. and Tanrıöven C., (2016). Bitcoin Piyasalarının Etkinliği Likiditesi ve Oynaklığı, *Journal of Business Reserach Turk*, 8(2), 77-97.

Pesaran, M.H. (2004). General Diagnostic Tests for Cross Section Dependence in Panels, *Cambridge Working Papers in Economics*, 435.

Pesaran, M. (2006). Estimation and Inference in Large Heterogeneous Panels with a Multifactor Error Structure. *Econometrica*, 74, 967–1012.

Pesaran, M. Hashem and Yamagata, Takashi (2008). Testing Slope Homogeneity in Large Panels. *Journal of Econometrics*, 142(1), 50-93.

Xi, H. and Weitian, L. (2013). Market Illiquidıty and Market Excess Return: Cross-Section and Time-Series Effects. Retrieved from: http://www.diva-portal.org/smash/get/diva2:704213 /FULLTEXT01.pdf.

Westerlund, Joakim, (2008). Panel Cointegration Tests of the Fisher Effect. *Journal of Applied Econometrics*, 23, 193-233.