Yayın Geliş Tarihi (Submitted): Haziran/June-2023 | Yayın Kabul Tarihi (Accepted): Temmuz/July-2024

Exploring the Causal Relationship Between Crypto Assets and Bist100: An Empirical Investigation

Kripto Varlıklar ve Bist100 Arasındaki Nedensel İlişkinin Keşfedilmesi: Ampirik Bir Araştırma

Öğr. Gör. Dr. Kezban HİTAY SARP 厄

Abstract

Since the emergence of crypto assets, developments in these markets have significantly impacted and continue to influence all traditional financial markets. The financial turbulence resulting from these effects underscores the necessity and importance of a thorough understanding of crypto asset markets. Moreover, to mitigate the impact of turbulence and implement effective strategies, it has become imperative for all financial markets. The main aim of this study is to determine the causal relationship between Bitcoin, the crypto asset with the highest market volume, and the BIST100, which represents the Turkish stock market. The study period is divided into two temporal periods considering the COVID-19 pandemic, which affected all markets and caused significant changes in their performance. The time intervals are defined as prepandemic (18/01/2017 - 9/03/2020) and pandemic period (10/03/2020 -05/05/2023). Daily data was used for analysis, and weekend prices were excluded from the analysis as the stock market operates only on weekdays. The Vector Autoregressive (VAR) model-based Granger Causality Test was used to examine the data. The results of the analysis indicated that no causality could be detected between Bitcoin and BIST100, and vice versa, during both the pre-pandemic and pandemic periods.

Keywords: Crypto Assets, Stock Markets, Covid-19, Granger Causality Analysis

Paper Type: Research

Özet

Kripto varlıkların ortaya çıkışından itibaren, bu piyasalarda meydana gelen gelişmeler tüm geleneksel finansal piyasaları önemli düzeyde etkilemiş ve etkilemeye devam etmektedir. Bu etkiler sebebiyle oluşan finansal çalkantılar, kripto varlık piyasalarını iyi anlamanın gerekliliğini ve önemini ortaya koymaktadır. Ayrıca çalkantılardan daha az zararla çıkmak ve doğru stratejileri uygulayabilmek için tüm finansal piyasa taraflarının kripto varlıklar ile geleneksel finansal piyasalar arasındaki ilişkileri yakından takip etmeleri zorunlu bir ihtiyaç haline gelmiştir. Bu çalışmanın temel amacı, piyasa hacmi en yüksek kripto para birimi olan Bitcoin ile Türkiye borsasını temsil eden BIST100 arasındaki nedensellik ilişkisini belirlemektir. Tüm piyasaları etkileyen ve performanslarında önemli değişikliklere neden olan COVID-19 salgını dikkate alınarak çalışma dönemi iki zamansal döneme ayrılmıştır. Zaman aralıkları pandemi öncesi (18/01/2017 - 9/03/2020) ve pandemi dönemi (10/03/2020 -05/05/2023) olarak tanımlanmıştır. Analiz için günlük veriler kullanılmış ve borsa sadece hafta içi çalıştığı için hafta sonu fiyatları analiz dışında tutulmuştur. Verilerin incelenmesinde Vektör Otoregresif (VAR) model tabanlı Granger Nedensellik Testi kullanılmıştır. Analiz sonuçlarına göre, hem pandemi öncesi hem de pandemi dönemlerinde Bitcoin ile BIST100 ve tersi arasında herhangi bir nedensellik ilişkisi tespit edilememiştir.

Anahtar Kelimeler: Kripto Valıklar, Hisse Senedi Piyasası, Covid-19, Granger Nedensellik Analizi

Makale Türü: Araştırma

¹ Balıkesir Üniversitesi, Bigadiç Meslek Yüksekokulu, kezban.hitay@balikesir.edu.tr

Attf için (to cite): Hitay Sarp, K. (2025). Exploring the Causal Relationship Between Crypto Assets and Bist100: An Empirical Investigation. Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi, 27(2), 599-609

Introduction

In our world where technological developments and digitalization are accelerating and gaining importance, it is inevitable that some innovations will emerge in the financial system and financial markets every day. One of the innovations that swiftly impacted humanity and gained rapid acceptance is crypto assets. With its structure that combines the existing monetary system with technology and eliminates centralization, it has almost made a breakthrough in the world of finance. Although it lacks a legal basis worldwide, the widespread acceptance among people and its emergence as a digital investment tool lead us to contemplate that such digital assets will become an integral part of our lives in the future (Pilatin, 2022; Janson & Karoubi, 2021).

Money has always had an important place throughout human history. Money went through an important process of change until it took its present form. Throughout human history, there have been many different objects used instead of money. For example; various grains, seashells, beads, stones are some of these objects (TCMB, 2023). In order for an object to be used instead of money, it must have some functions such as being a medium of exchange, a unit of account and value, an instrument of investment and savings, and an instrument of economic policy (Eken & Kale, 2018).

Before the currency structure used today, people used barter system. The barter system, which mostly fulfilled its function in periods when the number of people and monetary transactions is low, had brought many difficulties. Especially, when the amount of purchase and sale was high, the difficulty of transporting these objects constituted a important problem. It was not always possible to match mutual needs at the time of trade. Also, It was difficult for the person who owns many products to find the person who would like to buy this product. Due to these difficulties, the barter system could not survive (Elmas & Aydın, 2021).

In former times, with the abandonment of the barter system, the commodity money system began to be used in many economies. Commodity money is money made from precious metals such as gold and silver. Afterwards, the usage area of the money obtained from these mines decreased and the economies switched to paper money. Paper money has been used for many years. At the present time, the reasons such as the invention of the internet, the development of technology and banking applications have caused the transfer of paper money to the virtual environment and the fiat money produced by banks has become widespread (Öztürk & Koç, 2006).

The factors such as technological developments and the increase in the use of the internet have led to a change in the money system used, and money has become a digital object rather than a physical asset. This object, which became digital and enabled transactions using the encryption technique, was quickly included in the financial system by taking the name of crypto asset (Dibrova, 2016). Crypto assets have a decentralized structure, unlike coins that have a centralized structure and are traded in the banking system. This decentralized structure is controlled by the blockchain database, and crypto assets are produced in the public domain by methods known to everyone. While traditional currencies can be issued by national central banks when deemed necessary by governments, the amount to be produced in crypto assets is determined during the establishment of the crypto system and this rate is not exceeded. In addition, crypto assets cannot be seized by the states without the permission of their owners (Pirincci, 2018). Crypto assets came into our lives with the introduction of Bitcoin in the article "Bitcoin: A Peer-to-Peer Electronic Cash System" written by Satoshi Nakamoto in 2008 (Nakamoto, 2008). This article focuses on the element of trust. Accordingly, electronic money will be fully peer-to-peer and can be sent directly from one party to the other without going through any financial institution. This way of sending will eliminate the need for any intermediary institution and transfer transactions can be made with a decentralized money.

1. Conceptual Framework

1.1. Crypto Assets and Bitcoin

Crypto assets are math-based and decentralized coins that use the science of cryptology. Crypto asset transactions, which are based on a number of cryptographic transactions, have become an escape route after the 2008 financial crisis, when the trust in banks and the banking system was shaken. Initially employed in trade, it has evolved over time into an investment tool (Eren, Erek, & Akbaba, 2020). Crypto assets typically has a number of features. These features can be listed as follows (Kubar & Toprak, 2021);

- They do not have any material and physical structure, they are a completely digital currency.

- They are decentralized. A third party is not needed to perform a transfer between two parties.

- The system is open to all users.

- It does not contain any terms and conditions limiting its use.

- TL, USD etc. can be converted into currencies.

- All crypto money transactions are created with high security, by well-equipped and independent miners.

The first crypto asset to appear was Bitcoin. Bitcoin is the crypto asset that was first introduced by Satoshi Nakamoto and has the highest transaction volume since its release. Bitcoin has a number of features that distinguish it from other currencies. These features can be listed as follows (Yumuşaker, 2019);

- It is decentralized. It does not work under any authority.

- Uses P2P3 technology.
- It is completely digital.
- Produced with a limit of 21 million.
- It has a complex system.
- A limited usage network is available.
- No insurance can be made.

The technology behind crypto assets is blockchain technology. Although blockchain technology came to the fore with crypto assets, it is actually a technology that emerged in 1985. Blockchain is a structure based on distributed ledger technology, which allows a transaction to be approved and maintained by all the participants, and keeps the ever-growing list of transaction records in its memory by protecting it from dangers such as theft or alteration (Yıldırım, 2019).

Blockchains consist of a distributed, chronological blockchain, constantly growing as completed blocks are added together with a new set of records. These blocks contain transactions and information from previous blocks. Since each block contains the hash of the previous block, there is a unique linear path from the first block ever sent to the current block (Mukhopadhyay at al., 2016).

Blockchain technology allows the creation of decentralized currencies, smart contracts, and assets that can be controlled over the internet. In addition to the financial system, it also has a field of use in fields such as law, business world, communication and politics.

In this study, the causal relationship between crypto assets and stocks is investigated. Krypto assets represent Bitcoin, while the stock market is represented by the BIST 100 index. Based on this premise, the study investigates the causal relationship between Bitcoin and the BIST 100 index. Stocks, issued by anonymous companies, provide certain rights and obligations to their holders and attract a large investor base. These financial markets, which are sought after by investors, have the ability to be influenced at different levels by any event occurring in the economies. The degree of influence is significant for individuals investing in these markets. Correctly predicting and taking precautions against market reactions to events will increase investment gains and uplift the overall economic level. Recently, technological advancements have led to a global interaction in all financial markets. This situation has resulted in a rapid transmission of a situation occurring in one market to other markets, and on the other hand, attract investors with curiosity and the potential for high profits. Any development in these markets determines whether investors will gain or lose. Specifically, determining the interaction between two markets in which investors actively participate will yield a successful investment outcome.

1.2. Literature Review

Due to the rapid introduction of crypto assets into our lives and the interest of investors, scientific studies are carried out on many subjects such as the identification of crypto assets, the functioning of the blockchain technology behind it, price prediction, the existence and direction of the relationship between them and other financial assets. It is not surprising that a technology that has such a large and rapid impact on financial investment life is included in research. Accordingly, in this part of our study, some studies in the literature on the relationship between crypto assets are included.

Kaymak & Koç, in the study conducted in 2022, attempts were made to determine whether the changes in Bitcoin transactions have an impact on the Istanbul Stock Exchange. The research period was set between 2017 and 2021, and both Granger causality analysis and Toda Yamamoto causality analysis were performed. The analysis results did not reveal any causal relationship between the variables.

Ciaian, Rajcaniova, & Kancs, in their study conducted in 2018, examined the relationship between Bitcoin and altcoins in the short and long term. The period of 2913-2016 and the daily prices of the data were used as the study period. According to the results of the research, while a price relationship was detected between Bitcoin and altcoin, it was concluded that this price relationship was significantly stronger in the short run than in the long run.

Liang, Li, Chen, & Zeng in their study in 2019, made comparisons with foreign exchange and stocks to determine the dynamic properties of crypto money. In the study, the four-year daily closing prices of the data were used. Volatility, centrality, cluster structure, robustness and risk characteristics formed the comparison criteria. According to the results of the research, it has been concluded that the dynamics of the crypto asset is more similar to the stock, the crypto money market is more fragile than the stock market with its robustness and clustering structure, and it is a high-risk financial market at the time of analysis.

Kaya examined the cointegration and causality relationship between 4 crypto assets in his study carried out in 2021. As a result of the ARDL bounds test applied using weekly closing prices in the research, it has been determined that there is long-term cointegration between crypto assets.

Klein, Thu, & Walther, investigated whether Bitcoin and gold act similarly in their study in 2018. Bitcoin, silver, gold, crude oil prices, S&P500 and MSCI Emerging Markets 50 index were used as variables in the study using the data between 2011-2017. Conditional variance and BEKK-GARCH methods were used as methods. As a result, while gold is a tool used when the markets are stressful, bitcoin is in a linear relationship with the markets when the markets are down.

In the study carried out by Kubar & Toprak in 2021, the relationship between Bitcoin and the top 10 altcoins with the highest market value was analyzed. The relationship between crypto assets was analyzed with the Granger Causality Test. As a result of the analysis, it was concluded that Bitcoin has a strong and positive relationship with all other crypto assets, with the exception of Bitcoin and Tether (USDT) crypto currency.

Sami & Abdallah, in their study in 2020, examined whether the crypt asset market affects stock market returns in the Gulf countries. The authors worked with daily data, taking into account the period of 2914-2019 as the study period. As a result of the study, it was concluded that the stock market and crypto money market are substitutes for investors in the Gulf countries. Also, every 10 percent increase in crypto asset returns is associated with a 0.17 percent decrease in stock market returns. It has been determined that the crypto money market blocks stock market indices in the Gulf countries.

In their 2022 study, Yıldız & Mülayim aimed to establish the cointegration relationship between crypto assets (Bitcoin, Ethereum, Binance Coin, TETHER, Cardano) and BIST 100. The analysis, conducted through the ARDL bounds test model, revealed that there is no cointegration relationship between cryptocurrencies and BIST 100.

In their 2022 study, Gökalp investigated whether developments in the crypto asset market influenced Borsa Istanbul (BIST) indices. The study utilized the three most popular crypto assets, namely Bitcoin, Ethereum, and Ripple, as research variables, while BIST100, BIST30, and banking (XBANK) indices served as indexes. Additionally, oil prices (WTI) and the fear index (VIX) were incorporated as control variables. The findings revealed a positive spillover effect from crypto asset markets to the indices considered in the study.

Özdemir & Çoşkun, In their study 2023, explored the connections between the BIST 100 Index and Bitcoin transaction volume. The research employed the cointegration test methods proposed by Engle-Granger (1987) and Tsong et al. (2016). The findings of the study indicated the presence of a cointegration relationship between BIST 100 and Bitcoin transaction volume.

2. Method

In this section, information about the purpose, data set and method of the research is given. Following are the outputs and results of the analysis.

In addition, since the data used in the study are obtained from platforms that are open to everyone, it does not require any ethics committee report.

2.1. Purpose of the Study

The aim of the study is to investigate the Causal relationship between the increasingly popular crypto assets and the stock market and to determine the effect of the Covid-19 pandemic on this relationship. Since crypto assets have started to be included in the portfolio for many investors, the need to determine the relationship between other investment instruments arises. In addition, the Covid-19 pandemic, which affected the whole world and created a global crisis, indeed, had some effects on financial markets and products. In this respect, it is thought that determining both the relationship between assets and the impact of the Covid-19 pandemic will provide useful information for investors.

2.2. Data Set and Method of the Study

The data set of the study consists of the daily closing data of the BIST 100 index and the Bitcoin price obtained from the two periods determined as the pre-pandemic (18/01/2017 - 9/03/2020) and the pandemic period (10/03/2020 - 05/05/2023). The main reason for taking daily data is the assumption that more accurate results will be achieved in the analysis. Analysis was carried out with a total of 3160 observations, 1580 in the pre-pandemic period and 1580 in the pandemic period. Data on Bitcoin price and BIST100 index were obtained from

https://tr.investing.com/, 2023, which contains publicly available data. Variables were included in the analysis by taking their differences.

In the study, Granger Causality Test were used as methods to determine the relationship between Bitcoin, which has the highest transaction volume among crypto assets, and the BIST 100 index. The analysis was carried out using the E-Views 13 package program.

In order to apply Granger Causality Test, the time series to be used must be stationary. For this reason, it should first be checked whether the series are stationary (Granger, 1069). The commonly used stationarity tests in the literature are the Enhanced Dickey-Fuller (ADF) unit root test developed by Dickey and Fuller (1981) and the Philips Perron (PP) unit root test. Therefore, ADF and PP tests were carried out to determine whether the data is stationary or not. Then, the Granger causality test to determine the causality relationship between the variables were applied and the outputs obtained according to the analysis results were interpreted.

3. Findings of the Study

In order to increase the possibility of comparing analysis results, pre-pandemic and pandemic analysis results are shown in the same table. In order for the series to be considered stationary, the calculated test statistics should be less than the critical values at the 1% significance level (Gujarati, 2003).

In order to determine whether the series are stationary or not, the hypotheses are first formed as follows.

H₀: There is a unit root.

H₁: There is no unit root.

Table 1 displays the unit root test results of the dataset. Our study found that the test statistics of the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests indicate that the data become stationary when first differenced, using both the constant and constant-trend models. Thus, the data is stationary at the level of I(1). Furthermore, the null hypothesis (H_0) is rejected for all variables at a significance level of 1%.

		Augmented Dickey Fuller (ADF) Test					
		Constant					
Period	Variable	I(0)		I(1)			
		Т	Р	Т	Р		
Pre-Pandemic	BIST100	-2.645722	0.0843	-30.30503	0.0000*		
	BTC	-2.080917	0.2526	-26.43143	0.0000*		
Pandemic	BIST100	-0.174330	0.9390	-12.29542	0.0000*		
Period	BTC	-1.005184	0.7531	-28.41973	0.0000*		
		Augmented Dickey Fuller (ADF) Test					
Period		Constand-Trend					
	Variable	I(0)	I(0)		I(1)		
		Т	Р	Т	Р		
Pre-Pandemic	BIST100	-2.578084	0.2906	-30.29899	0.0000*		
	BTC	-2.034251	0.5811	-26.42634	0.0000*		
Pandemic	BIST100	-1.671686	0.7630	-12.30804	0.0000*		
Period	BTC	-1.175873	0.9137	-28.43117	0.0000*		
		Phillips-Perron Test					
Period		Constant					
	Variable	I(0)		I(1)			
		Т	Р	Т	Р		
Pre-Pandemic	BIST100	-2.567051	0.1004	-30.29229	0.0000*		
	BTC	-2.176223	0.2153	-26.41333	0.0000*		
Pandemic	BIST100	0.022922	0.9594	-31.03146	0.0000*		
Period	BTC	-1.034416	0.7425	-28.41777	0.0000*		
		Phillips-Perron Test					
Period		Constand-Trend					
	Variable	I(0)		I(1)			
		Т	Р	Т	Р		
Pre-Pandemic	BIST100	-2.492693	0.3317	-30.28707	0.0000*		
	BTC	-2.167054	0.5069	-26.40740	0.0000*		
Pandemic	BIST100	-1.673719	0.7621	-31.01906	0.0000*		
Period	BTC	-1.191108	0.9108	-28.42877	0.0000*		
" sign indicates the confidence level, where "", "**", and "***" represent confidence levels							
of 99%, 95%, and 90%, respectively.							

Tablo 1: Unit root test

The delay numbers for the VAR model to be established for the Granger Causality Test are presented in Table 2. According to the results in the table, the appropriate delay number for the pre-pandemic period is 7 according to the Likelihood Ratio (LR) test, and 1 according to the Finite Prediction Error (FPE) and Akaike (AIC) criteria, while it is 0 according to the Schwarz (SC) and Hannan-Quinn (HQ) information criteria. Considering the Akaike (AIC) information criterion, the number of lags is 1. During the pandemic period, the delay number is 5 according to the Likelihood Ratio (LR) test, Finite Prediction Error (FPE), and Akaike (AIC) criteria. However, it is 0 according to the Schwarz (SC) and Hannan-Quinn (HQ) information criteria. Taking into account the Akaike (AIC) information criterion, the delay number is determined as 5. Therefore, the VAR model for the Granger Causality Test during the pandemic period is established with a delay of 5.

Appropriate Delay Numbers by Information Criteria for the VAR Model								
(Pre-Pandemic Period)								
Lag	LogL	LR	FPE	AIC	SC	HQ		
0	-9015.860	NA	37767672	23.12272	23.13467*	23.12731*		
1	-9011.236	9.212105	37707310*	23.12112*	23.15696	23.13490		
2	-9008.018	6.394676	37783008	23.12312	23.18286	23.14610		
3	-9003.789	8.382457	37760834	23.12254	23.20616	23.15470		
4	-9000.745	6.018583	37853511	23.12499	23.23251	23.16634		
5	-8999.646	2.166381	38136228	23.13243	23.26384	23.18297		
6	-8997.411	4.396069	38309275	23.13695	23.29226	23.19668		
7	-8990.803	12.96048*	38054142	23.13027	23.30947	23.19919		
8	-8988.296	4.905614	38200221	23.13409	23.33719	23.21221		
Delay Numbers According to Information Criteria for the VAR Model								
(Pandemic Period)								
Lag	LogL	LR	FPE	AIC	SC	HQ		
0	-11239.58	NA	1.13e+10	28.82455	28.83650*	28.82915*		
1	-11235.05	9.015620	1.13e+10	28.82321	28.85905	28.83699		
2	-11228.91	12.19838	1.12e+10	28.81772	28.87746	28.84070		
3	-11228.48	0.866189	1.13e+10	28.82686	28.91049	28.85902		
4	-11213.89	28.83224	1.10e+10	28.79972	28.90724	28.84108		

 Tablo 2: Appropriate delay numbers by information criteria for the VAR model

Granger causality test was applied to test whether the BIST100 index of Bitcoin (BTC) and the BIST100 index are the cause of Bitcoin. And accordingly, the following hypotheses were formed.

28.79038*

28.80018

28.80153

28.80578

28.92180

28.95549

28.98073

29.00887

28.84092

28.85992

28.87045

28.88389

1.09e+10*

1.10e+10

1.11e+10

1.11e+10

H₀: BTC (BIST100) is not the cause of BIST100 (BTC).

H₁: BTC (BIST100) is the cause of BIST100 (BTC).

15.07040*

0.348409

6.815049

4.585627

5

6

7

8

-11206.25

-11206.07

-11202.60

-11200.25

According to the results in Table 3, no causality could be detected from Bitcoin to BIST100 and from BIST100 to Bitcoin both in the pre-pandemic and pandemic periods. Accordingly, no inference can be made about BIST100 by looking at the price of Bitcoin.

	υ	5 5		
	Casuality	Chi-Square Statistics	df	Probability
BTC \rightarrow BIST100	NO	0.894493	1	0.3443
BIST100 \rightarrow BTC	NO	0.489257	1	0.4843
BTC \rightarrow BIST100	NO	0.874476	5	0.9720
BIST100 \rightarrow BTC	NO	1.761806	5	0.8810
	BTC \rightarrow BIST100 BIST100 \rightarrow BTC BTC \rightarrow BIST100 BIST100 \rightarrow BTC	CasualityBTC \rightarrow BIST100NOBIST100 \rightarrow BTCNOBTC \rightarrow BIST100NOBIST100 \rightarrow BTCNO	$\begin{array}{c} Circle Casuality \\ Casuality \\ BTC \rightarrow BIST100 \\ BIST100 \rightarrow BTC \\ BTC \rightarrow BIST100 \\ BTC \rightarrow BIST100 \\ BTC \rightarrow BIST100 \\ BTC \rightarrow BIST100 \\ NO \\ RIST100 \rightarrow BTC \\ NO \\ BIST100 \\ Augustual casual casu$	$\begin{array}{c} & Chi-Square \\ Statistics \end{array} & df \\ \hline Statistics \end{array} \\ \hline BTC \rightarrow BIST100 & NO & 0.894493 & 1 \\ BIST100 \rightarrow BTC & NO & 0.489257 & 1 \\ \hline BTC \rightarrow BIST100 & NO & 0.874476 & 5 \\ \hline BIST100 \rightarrow BTC & NO & 1.761806 & 5 \\ \hline \end{array}$

Tablo 3: Results of Granger Causality Analysis

Conclusion and Suggestions

In today's world, where technology is accepted and established in all areas of life, economic functions cannot be expected to be excluded from this development. As in every field, it is inevitable that economic units will be affected by the development of technology. The adoption of this inevitable situation by all parties and not staying out of the circle are also important for both following the global structure and existing in commercial life. In particular, the fact that e-commerce has an important place in human life with technology and the spread of digital payments is considered as proof that technology cannot be avoided in economic units.

Bitcoin, the inaugural crypto asset born out of diminishing trust in the conventional banking system following the 2008 banking crisis, along with altcoins developed on the foundation of Bitcoin, has progressively gained recognition and acceptance as an investment tool among individual investors. As a result of this accepted view, the absence of a state guarantee behind it and the formation of speculative-purpose situations have brought investors face to face with high risk. The fact that investors, who also face high losses from time to time, do not give up on their cryptocurrency investments, signals that these digital assets will exist in our future lives. The fact that crypto assets are now inevitable in our lives raises questions about the relationship between other financial assets and these digital assets. Accordingly, this study was carried out in order to determine the relationship between the stock market, which is our main investment tool, and the crypto asset market. While determining the period range of the research, a global asset such as cryptocurrencies was investigated, and the study period was divided into two periods as the pre-pandemic period and the pandemic period, since it is inevitable that the Covid-19 pandemic, which has a global impact, will have a significant impact on the markets.

The data were analyzed by using the Granger Causality Test. According to the results obtained, no causality was detected from Bitcoin to BIST100 and from BIST100 to Bitcoin both in the pre-pandemic period and the pandemic period. This shows that a price movement in the Bitcoin variable does not have any effect on BIST100 and a change in BIST100 does not have any effect on Bitcoin.

Rapid changes in cryptocurrencies indicate that these assets are high-risk assets. Identifying the relationship between cryptocurrencies and traditional investment instruments will help both increase portfolio return and hedge risk. Accordingly, it is thought that the study will contribute to the literature. In addition, the findings obtained as a result of the research have reached similar results with the studies that have previously participated in the literature (Buğan, 2019; Tunçel, Alptürk, & Altunay, 2022).

Factors such as the absence of a legal foundation for crypto assets, limited information available to investors, the existence of numerous undiscovered aspects, and the lack of a designated contact person in case of issues contribute to investors approaching these digital tools with caution. In contrast, BIST, with its well-established history in the Turkish financial market, possesses a legal basis, an audit mechanism, and a reachable center in case of problems, providing a safer environment for investors. Consequently, this study did not identify a causal relationship between Bitcoin and BIST 100.

Taking into account the research findings and additional studies in the literature, it is evident that crypto assets are swiftly gaining acceptance as an investment tool. However, the results indicate that crypto assets cannot be regarded as a direct one-to-one alternative to BIST 100. Nonetheless, incorporating them into a diversified portfolio is deemed reasonable. Future developments will unveil the position these assets will assume within the investment landscape. Consequently, this study serves as evidence elucidating the developmental stages of crypto assets. Replicating the study with the same data in the future or expanding crypto asset analyses with new variables holds the potential to furnish crucial insights into the trajectory of financial markets. Therefore, it is anticipated that this study will make a substantial contribution to the financial literature.

References

- Buğan, M. F. (2019). *Teorik ve Ampirik Perspektifte Seçilmiş Finans Konuları*. Ankara: Nobel Bilimsel Eserler.
- Ciaian, P., Rajcaniova, M., & Kancs, A. (2018). Virtual Relationships: Short- and Long-Run Evidence From Bitcoin and Altcoin Markets. *Journal of International Financial Markets, Institutions and Money*, 173-195.
- Dibrova, A. (2016). Virtual currency: new step in monetary development . 5th International Conference On Leadership, Technology, Innovation And Business Management- Published by Elsevier Ltd., 42-49.
- Eken, M. H., & Kale, S. (2018). Finans Teorisi Kapsamında Para Arzı Bileşenleri Üzerine Bir İnceleme: TCMB Örneği. Kırklareli Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 176-189.
- Elmas, B., & Aydın, S. (2021). Geçmişten Günümüze Parnın Tarihi: Fiziki Paradan Kripto Paraya. *Muhasebe ve Finans Tarihi Araştırmaları Dergisi*, 253-264.
- Eren, B. S., Erek, M., & Akbaba, A. N. (2020). Kripto Para Kavramı ve Muhasebeleştirilmesi. İnsan ve Toplum Bilimleri Araştırmaları Dergisi, 1340-1367.
- Gökalp, B. T. (2022). Kripto Para Piyasasının Borsa İstanbul Endeksleri Üzerindeki Etkileri . *Ekonomi, Politika & Finans Araştırmaları Dergisi*, 481-499.
- Granger, C. W. (1069). Investigating Causal Relations By Econometric Models and Cross-Spectral Methods. *Econometrica*, 424-438.
- Gujarati, D. N. (2003). Basic Econometrics. New York: The McGraw-Hili Companies.
- https://tr.investing.com/. (2023). https://tr.investing.com/. Von https://tr.investing.com/: https://tr.investing.com/ abgerufen
- Janson, N., & Karoubi, B. (2021). The Bitcoin: to be or not to be a Real Currency? *The Quarterly Review of Economics and Finance, Elsevier*, 312-319.
- Kaya, M. (2021). Seçili Kripto Para Birimleri Arasındaki Eşbütünleşme ve Nedensellik İlişkisinin Analizi . *Ekonomi Bilimleri Dergisi*, 138-160.
- Kaymak, O., & Koç, S. (2022). Borsa İstanbul işlem hacimleri ile Bitcoin işlem hacimleri arasındaki ilişkinin Toda Yamamoto yaklaşımı ile incelenmesi 2017:01 – 2021:12. Gazi İktisat ve İşletme Dergisi, 488-500.
- Klein, T., Thu, H. P., & Walther, T. (2018). Bitcoin is not the New Gold A comparison of volatility, correlation, and portfolio performance. *International Review of Financial Analysis*, 105-116.
- Kubar, Y., & Toprak, Y. (2021). Bitcoin ve Altcoin'ler Arasındaki İlişkinin Granger Nedensellik Testi ile Analizi. *Journal of Emerging Economies and Policy*, 233-247.
- Liang, J., Li, L., Chen, W., & Zeng, D. (2019). Towards an Understanding of Cryptocurrency: A Comparative Analysis of Cryptocurrency, Foreign Exchange, and Stock. 2019 IEEE International Conference on Intelligence and Security Informatics (ISI), 1-3.
- Mukhopadhyay, U., Skjellum, A., Hambolu, O., Oakley, J., Yu, L., & Brooks, R. (2016). A brief survey of Cryptocurrency systems. 2016 14th Annual Conference on Privacy, Security and Trust (PST), 12-14.
- Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. https://bitcoin.org/bitcoin.pdf (Date: 02.01.2023), 1-9.

- Özdemir, D., & Çoşkun, K. F. (2023). BIST100 ve Bitcoin İşlem Hacmi Arasındaki Eşbütünleşme ve Nedensellik İlişkis. *Üçüncü Sektör Sosyal Ekonomi Dergisi*, 901-916.
- Öztürk, N., & Koç, A. (2006). Elektronik Para, Diğer Para Türleriyle Karşılaştırması ve Olası Etkileri. *Sosyal Ekonomik Araştırmalar Dergisi*, 207-243.
- Pilatin, A. (2022). Bireylerin Sosyo-Ekonomik Özellikleri Kripto Varlık Satın Almalarını Etkiler Mi? Türkiye'den Kanıtlar. *Gümüşhane Üniversitesi Sosyal Bilimler Dergisi*, 665-678.
- Pirinççi, A. E. (2018). Yeni Dünya Düzeninde Sanal Para Bitcoin'in Değerlendirilmesi. International Journal of Economics Politics Humanities and Social Sciences, 45-52.
- Sami, M., & Abdallah, W. (2020). Cryptocurrency and Stock Market: Complements or Substitutes? Evidence From Gulf Countries. *Applied Finance Letters*, 25-35.
- TCMB. (03. 04 2023). *Türkiye Cumhuriyet Merkez Bankası*. Von Türkiye Cumhuriyet Merkez Bankası: http://www.tcmb.gov.tr abgerufen
- Tunçel, M. B., Alptürk, Y., & Altunay, M. A. (2022). Kripto Paralar ile BIST100 Endeksi Arasındaki Nedensellik İlişkisi: Bitcoin Örneği. *Abant Sosyal Bilimler Dergisi*, 367-374.
- Yıldırım, M. (2019). Blok Zincir Teknolojisi, Kripto Paralar ve Ülkelerin Kripto Paralara Yaklaşımları. Bartın Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 265-277.
- Yıldız, M., & Mülayim, A. (2022). Kripto Paralar ile BIST 100 Arasında Eşbütünleşme İlişkisi: ARDL Sınır Testi Yaklaşımı. *Çankırı Karatekin Üniversitesi İİBF Dergisi*, 392-415.

Yumuşaker, M. C. (2019). Kripto Para ve Tipleri, Bitcoin Olgusu ve Muhasebesi. OPUS Uluslararası Toplum Araştırmaları Dergisi, 1007-1029.

ETİK ve BİLİMSEL İLKELER SORUMLULUK BEYANI

Bu çalışmanın tüm hazırlanma süreçlerinde etik kurallara ve bilimsel atıf gösterme ilkelerine riayet edildiğini yazar(lar) beyan eder. Aksi bir durumun tespiti halinde Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi'nin hiçbir sorumluluğu olmayıp, tüm sorumluluk makale yazarlarına aittir.