# Rahva Teknik ve Sosyal Araştırmalar Dergisi

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**Rahva Teknik ve Sosyal Araştırmalar Dergisi (RAHVA)** Mühendislik, Fen, Sosyal ve Sağlık Bilimleri alanlarında Türkçe ve İngilizce dillerinde özgün araştırma makaleleri, vaka çalışmaları ve teknik raporları, derlemeleri açık erişim ilkesini destekleyerek yayınlamayı amaçlayan akademik hakemli bir araştırma dergisidir. Araştırma makalelerinin kuramsal ve ampirik sonuçlara dayandırılması beklenmektedir. Derleme makalelerinde ise belirli bir konu üzerinde geniş bir kaynakça kullanılarak konunun derinleştirilmiş bir şekilde değerlendirilerek aktarılması beklenmektedir.

Dergiye gönderilen çalışmaların daha önce herhangi bir dergide yayınlanmamış ve yayımlanmak üzere herhangi bir dergiye değerlendirilmek üzere sunulmamış olması gerekmektedir. Dergi yayın ücreti talep etmeyip, periyodu yılda iki sayıdır. Yayınlanmak üzere gönderilecek çalışmalar için kabul edilebilir benzerlik oranı üst sınırı Mühendislik, Sağlık ve Fen Bilimleri alanı için %20, Sosyal Bilimler alanı için %25'tir.

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İstatistikler

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Etik İlkeler ve Yayın Politikası

Ücret Politikası

Dizinler

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*Araştırma Makalesi*

# THE RISE OF BITCOIN IN TURKEY AS A NEW INVESTMENT TOOL

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**Abstract:** Cryptocurrencies are becoming increasingly popular among investors. The surveys show that investors in emerging markets are more inclined to invest in cryptocurrencies (Statista, 2022). Bitcoin has a market cap of around 50% of the total cryptocurrencies which led us to base our study on it. Turkish investors new to the financial markets are specifically interested in a new initial public offering (IPO) and Bitcoin. The underlying drive for this new investor type is to have quick and high returns from their investments. In 2020 IPO's provided high and fast returns but they were limited in terms of investment size. Bitcoin on the other hand is accessible for the average investor. This study analysed the position of Bitcoin as an investment tool in Turkey between 2014-2021 and tried to find out the interaction between Bitcoin and the possible substitutive investment tools like BIST100 Index, USDTRY, Interest rate, and Gold. According to our findings, there is a trade-off between interest rate and Bitcoin in the long-run, but in the short-term there is causality between BIST100 and Bitcoin.

**Keywords:** *Crypto currency, Initial public offering, Bitcoin.*

## Bir Yatırım Aracı olarak Bitcoin'in Türkiye'de Yükselişi

**Özet:** Kripto para birimleri yatırımcılar arasında giderek daha popüler hale gelmektedir. Yapılan anketlere göre, gelişmekte olan piyasalardaki yatırımcıların kripto para birimlerine yatırım yapmaya daha meyilli olduğunu göstermektedir (Statista, 2022). Bitcoin, toplam kripto para birimlerinin yaklaşık %50'si kadar bir piyasa değerine sahip olduğundan, çalışmamızı bu konuya odaklandırdık. Finans piyasalarında yeni olan Türk yatırımcılar özellikle yeni halka arzlar ve Bitcoin ile ilgilenmektedirler. Bu yeni yatırımcı tipinin altında yatan itici güç, yatırımlarından hızlı ve yüksek getiri elde etmektir. 2020'de halka arzlar yüksek ve hızlı getiri sağladı ancak yatırım büyüklüğü açısından sınırlı kaldı. Bu çalışmada Bitcoin'in 2014-2021 yılları arasında Türkiye'de bir yatırım aracı olarak konumu incelenmiş ve etkileşim ortaya konulmaya çalışılmıştır. Bitcoin ile BIST100 Endeksi, USDTRY, Faiz oranı ve Altın gibi olası ikame yatırım araçları arasındaki ilişkiler analiz edilmiştir. Uzun vadede faiz oranı ile Bitcoin arasında bir negatif bir ilişki bulunmuşken, kısa vadede BIST100 ve Bitcoin arasında negatif bir korelasyona rastlanmıştır.

**Anahtar Sözcükler:** *Kripto para, Halka arz, Bitcoin.*

### 1. Introduction

The aim of this study is to investigate Bitcoin trading in Turkey, and its rise as an investment tool. The possible substitute instruments like interest rate, gold, US Dollar and the stock exchange market are analysed whether there is a trade between Bitcoin trading and these investment tools. There are several cryptocurrencies being traded in the markets. (Bankrate, 2022). The top 12 crypto currencies have a market value of $731 billion. Bitcoin has a market cap of $368 billion which corresponds to 50.3% of the $731 billion. Having such a heavy weight led us to use Bitcoin as a representative crypto currency for Turkish markets. Bitcoin is expected to become a regular currency without a central bank backup. Pro cryptocurrency investors claim that more and more financial transactions will be based on Bitcoin.

The major drawback of Bitcoin is the extreme volatility compared to stable currencies. Even weak currencies have a certain convertibility and acceptability factor in transactions. If you index your revenues or expenses to Bitcoin as a company, cash flow statements will be next to impossible to manage. On the other hand, a speculative investor managing a portfolio of financial instruments may benefit from the volatility of Bitcoin. That will be our research focus.

This study aims to give a point of view on bitcoin as an investment tool in Turkey. The creation and implementation of Bitcoin are given in the second part. In the third part, the studies and the findings of the studies related to our subject are summarised. Data, methodology, and the findings are explained in the fourth part. Finally, in the conclusion part, the findings are summarised and suggestions are made.

## 2. Creation and Implementation of Bitcoin

Bitcoin is the first cryptocurrency introduced to the financial markets. The origin of Bitcoin was initiated by the White paper written by Satoshi Nakamoto soon after the 2008 Mortgage Crisis (Nakamoto, 2008). He claimed that an electronic payment system should be based on cryptographic proof instead of trust. Banks' competitive advantage for payment systems relied on the trustworthiness of the financial institutions. A deposit made at a bank was assumed to be safe due to the factors related to the name of the bank, size of the bank and its reputation. In addition, in certain countries the deposits up to a certain limit assumed no default risk due to certain governmental deposit insurance schemes. Bitcoin unlike other currencies has a limited supply of 21 million. At present the bitcoins in circulation are 19,063,693 which leaves 1,936,306 to be mined in the future. In other words, 90.78% of the bitcoins are mined and are in circulation (Buybitcoinworldwide, 2022).

Bitcoin is defined to be a future currency that may replace or complement other well-established currencies. There is an ongoing discussion about the classification of Bitcoin whether it is an investment or a speculative vehicle. In a study the results showed that the Bitcoin market is positively skewed. The stock market on the other hand is negatively skewed. Also, the Bitcoin market has a positive excess kurtosis that causes more chances for extreme values to occur (Baek and Elbeck, 2015).

There may be interest of Bitcoin in developed and developing countries. Developing countries might have more difficulties facing them during the adaptation of Bitcoin. Technical problems, volatility of the currency, system stability and susceptibility to hacker attacks might be more challenging (Giungato, Rana, Tarabella & Tricase, 2017).

Analyzing Bitcoin/USD, EUR/USD and USD/TRY volatility using standard deviation of monthly percentage changes, the results were both dramatic and as expected. We expected EUR/USD to have the lowest volatility, USD/TRY to have a higher volatility due to the fact that Turkey is an emerging market. Finally, BTC/USD was expected to have the highest volatility mainly due to being both a currency with a short history and a highly speculative financial instrument. The results were in expected order as the volatility figures were very high for Bitcoin. While USDTRY is three times more volatile than EURUSD, BTCUSD is almost 25 times more volatile than EURUSD (Table 1).

**Table 1** Standard deviations based on monthly percentage price changes (January 2012-April 2022)

| Currency | Standard Deviation |
|---|---|
| EURUSD | 0.02 |
| USDTRY | 0.06 |
| BTCUSD | 0.516 |

Source: Investing.com and authors calculations.

In order to be classified as a payment instrument, cryptocurrencies need to be used for regular financial transactions. There has been a dramatic increase in the value of transactions in 2021. In 2022 and 2023, the increase in expected transactions will be 70.5% and 55.4%. Worldwide cryptocurrency transactions value is given in the table below.

**Table 2** Cryptocurrency transactions worldwide 2018-2023

| Year | Value (USD Billion) |
|---|---|
| 2018 | 1.43 |
| 2019 | 1.85 |
| 2020 | 2.2 |
| 2021 | 6.1 |
| 2022 | 10.4 |
| 2023 | 16.16 |

Source: Insider Intelligence, April 1, 2022. 2022 and 2023 years are forecasted.

## 3. Literature Review

Consumers from countries in Africa, Asia, and South America were most likely to be an owner of cryptocurrencies, such as Bitcoin, in 2021. This is a result of 55 different consumer surveys given and combined by Statista Global Consumer Survey over the course of that year (Statista, 2022). Nearly one out of three respondents to Statista's survey in Nigeria, for instance, mentioned they either owned or use a digital coin, as opposed to six out of 100 respondents in the United States. This is a significant change from a list that looks at the Bitcoin (BTC) trading volume in 44 countries: There, the United States and Russia were said to have traded the highest amounts of this particular virtual coin. One of the theories to explain investing is the regret theory (Loomes and Sugden, 1982). Perceptions about the investment motivate investment behavior. According to research (Glaser, Zimmermann, Haferkorn, Weber & Siering, 2014) profit expectancy influences bitcoin investment. The second regret theory assumption is that risk attitude motivates investment decisions. Third, individuals do make rational investment decisions. These three facts may explain the appetite for bitcoin and other cryptocurrencies in underdeveloped or emerging markets. First time investors without any previous investment experience are more risk takers especially in cryptocurrencies since there has been a dramatic increase in the previous years. Even there have been huge price falls in the past since the prices recover and make new highs it eliminates the concept of risk for these investors.

Atik, Köse, Yılmaz & Sağlam (2015) analysed the interaction between Bitcoin daily exchange rates and the most widely used cross currency prices in the world between 2009 and 2015 and tested the interaction with Granger causality analysis. According to the author, it has been determined that Bitcoin and Japanese Yen affect each other with a lag and that there is a one-way causality relationship between Japanese Yen and Bitcoin.

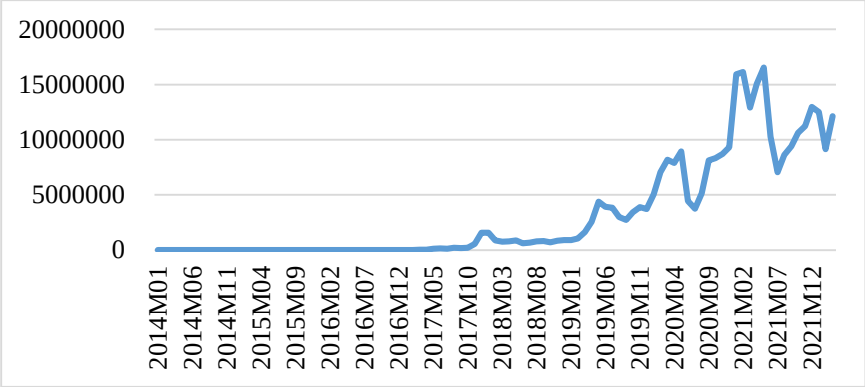
Çetiner (2018) made a comparison of bitcoin with other payment instruments, explained its advantages and disadvantages, and gave examples from relevant studies. The results reveal that, the establishment of blockchain-based networks is a prerequisite for many electronic transactions in areas such as financial movements, supply chains, healthcare services to make the transactions simple and safe. For this reason, studies should be carried out to support all kinds of activities for the use of bitcoin and other crypto currencies in the world, to pave the way and to prepare the legal procedures. Alpago (2018) evaluated the structures, functions, position and importance of bitcoin and similar cryptocurrencies in the current monetary system with a comparative and analytical analysis. The author thinks that the existing rules and working methods of cryptocurrencies will change and transform over time. Also, digital transactions, where protection is more difficult, require maximum attention and security measures will gain importance.

Çolak and Sandalcılar (2019) examined the relationship between some selected financial variables in Turkey (USD, EURO, POUND, SDR, BIST 100, Republic Gold, M1 and M2 money supplies) and the Bitcoin (BTC) by using Granger Causality test for the period 2013-2019. Bitcoin is the dependent variable. The results showed that there is a 5% significance level from SDR and USD to BTC and a 10% significance level from Euro and BIST 100 to BTC. İnci and Lagasse (2019) analysed the dynamic nature of cryptocurrencies as individual investment opportunities, and as components of

optimal portfolios. The authors reveal that as a single investment, the best cryptocurrency is Ripple, followed by Bitcoin and Litecoin. Kesa and Mahoro (2019) suggest that the volatility of Bitcoin makes them unstable, which leads to being an unreliable measure of price. In one study undertaken between 2010-2016 the results have shown that the returns of Bitcoin are not random which is anti-persistence (Pathiranage, Xiao and Li, 2021).

## 4. Data and Methodology

The possible factors affecting the Bitcoin trading volume are examined in this study. The trading of Bitcoin started in 2013 in Turkey. In the first years of introduction of Bitcoin, the trading volume was around 1-3 million dollars, but later started to rise in 2017 and reached its maximum levels in 2021 since its introduction (Graph 1).




**Graph 1** BTC trading volume (mn), *Source: investing.com*

The change in the trading volume of bitcoin is the dependent variable. BIST100 Index (Stock market index of Turkey), USDTRY (the parity between US Dollar and Turkish Lira), Interest rate (2-year-bond-yield) and Gold (gold futures) are the explanatory variables. These variables are chosen as substitute investment tools for bitcoin. The values of the selected instruments are taken from the Website "investing.com", comprising the monthly data from January 2014 to March 2022.

### Model Estimation

*Unit Root Test*

Unit root tests, namely ADF (Augmented Dickey-Fuller) developed by Dickey and Fuller (1981) and Phillips Perron (PP) developed by Phillips Perron (1989) are used whether a series is stationarity. In the following model, the stationarity is checked at none:

$$\Delta Y_t = \delta Y_{t-1} + u_t \quad (1)$$

The hypothesis of the unit root test is as follows:

$H_0$: $\delta \geq 0$: The series is not stationary, there is a unit root

$H_1$: $\delta < 0$: The series is stationary

Next, the lag length is found with the Vector Auto regressive-VAR model by using the Akaike (AIC) and Schwarz (SIC) statistical criteria to determine the appropriate delays.

*ARDL Test*

After the determination of the order of integration of the selected variables, the existence of a relationship between a dependent variable and independent variables is tested. ARDL test, developed by Pesaran and Shin (1995) is preferred when the variables are stationary at the level or at the first difference. ARDL model investigates whether there is a cointegration relationship between variables when some variables are [I(1)] or some are [I(0)] (Uzgören and Akalın, 2016: 49). ARDL regression model and the hypotheses are formulated as below: (Pesaran and Shin, 1995, p. 2):

$$y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{p} \varphi_i \, y_{t-i} + \beta^{\iota} x_t + \sum_{i=0}^{q-1} \beta_i^* \, \Delta x_{t-i} + u_t \quad (2)$$

$H_0$: α1= α2=0 (Null hypothesis: the long-run relationship does not exist)

$H_1$: α1≠ α2≠0 (Alternative hypothesis: the long run relationship exists)

When the value of F-statistic exceeds the critical bands, H_1 is accepted; there is a long-run relationship between the series. Next, error correction model (ECM) is estimated. The sign of the coefficient of "CointEq" is expected to be negative and significant. Short run relationship of the series exists when the F-statistic value is more than the critical value bands. ECM is crucial to find the time period in which a dependent variable returns to equilibrium after a change in other variables.

Based on the theoretical knowledge above, the hypothesis whether there is a cointegration relationship between the Bitcoin, the interest rate, BIST100, USDTRY and gold is formulated and tested.

**Results**

*Unit Root Test*

The stationarity of the variables at level and first difference of the variables are summarised in Table 3. Critical values in a sample of 96 observations at 95% confidence level are -1.944211 in AFD test and in PP test at level, respectively. At first difference, the critical values at 95% confidence level are -1.944445 in AFD test and -1.944248 in PP test, respectively. BTC is stationary at level, the other variables are stationary when their first differences are taken. In this situation, ARDL test can be applied.

**Table 3** Unit root test results

| | | **Augmented Dickey Fuller** | | **Phillips-Perron** | | |
|---|---|---|---|---|---|---|
| **Variables** | | **Level** | **First difference** | **Level** | **First difference** | **Order of integration** |
| BTC | t-Stat | -10.1953 | -7.7175 | -10.3671 | -52.4214 | I(0) |
| | prob. | 0 | 0 | 0 | 0 | |
| LNBIST | t-Stat | 2.1799 | -9.2658 | 2.3554 | -9.2709 | I(1) |
| | prob. | 0.9929 | 0 | 0.9955 | 0 | |
| LNGOLD | t-Stat | 1.1262 | -10.0259 | 1.4815 | -10.1313 | I(1) |
| | prob. | 0.9319 | 0 | 0.9652 | 0 | |
| LNINT | t-Stat | 0.705 | -8.867 | 0.6446 | -8.8763 | I(1) |
| | prob. | 0.866 | 0 | 0.8538 | 0 | |
| USDTRY | t-Stat | 3.4538 | -8.3273 | 4.0716 | -8.3231 | I(1) |
| | prob. | 0.9998 | 0 | 1 | 0 | |

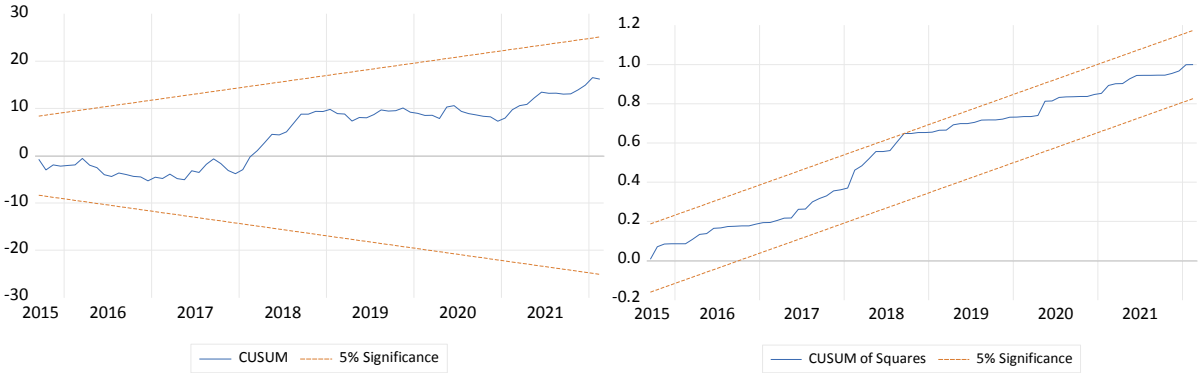
*ARDL Cointegration Test*

The estimated model is checked by diagnostic tests: Serial Correlation, Heteroscedasticity, Ramsey-Reset and Cusum and Cusum Square tests (Table 4). Heteroscedasticity test shows that all residuals have constant variance. Ramsey-reset test indicates that there is no specification error. There is no serial autocorrelation (Breusch-Godfrey Serial Correlation test). According to Jarque-Bera Normality test the residuals are normally distributed. The Cusum and Cusum of Squares show that the lines are inside the confidence bounds; there is no structural change in the model regression (Graph 2). R-squared of 75% reveals that 75% of the data fit the regression model.

**Table 4** Diagnostic tests

| **Tests** | **Prob(F-stat)** |
|---|---|
| Heteroscedasticity Breusch-Pagan test | 0.1929 |
| Ramsey-Reset test | 0.0869 |
| Serial Correlation LM test | 0.3956 |
| Jarque-Bera Normality test | 0.4526 |

| | |
|---|---|
| R-Squared | 0.7559 |




**Graph 2** Cusum and cusum of squares

In this study the 3rd case is selected (Case 3: (unrestricted constant and no trend) $a0 \neq 0$ and $a1 = 0$) to test the cointegrating bound test (Table 5). Maximum lag is 8 (automatic selection) for dependent and regressors by using AIC (Akaike information criterion). F-statistic (11.65012) is greater than the upper bound critical values (3.644, 4.216, 5.512). The null hypothesis is not accepted; long-run relationship exists between the interest rate and bitcoin. Based on the AIC, the selected lag length is (3,5,2,0,0).

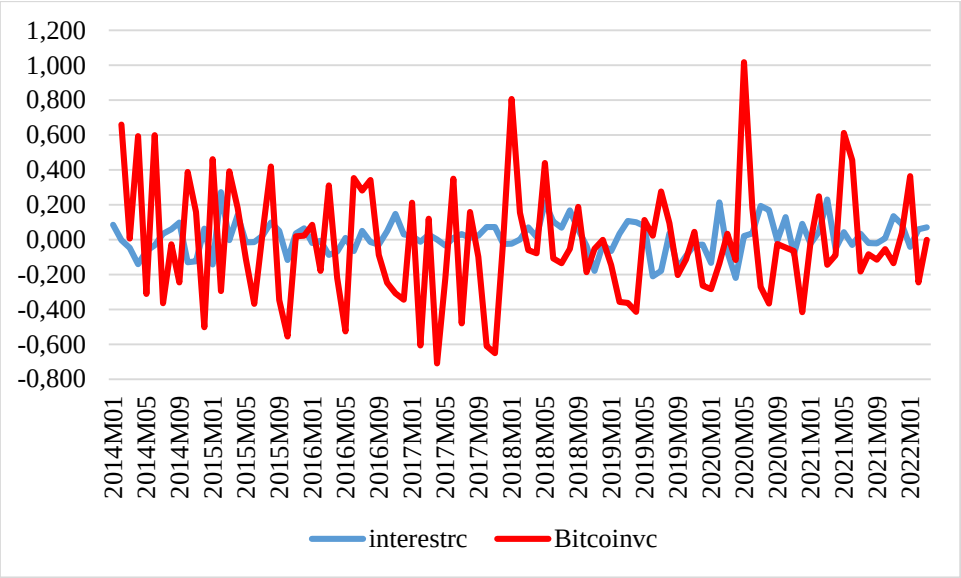
**Table 5** Long-run form (case 3: constant, no trend)

| **F-Bounds Test** | | **Null Hypothesis: No levels relationship** | | |
|---|---|---|---|---|
| **Test Stat.** | **Value** | **Signif.** | **I(0)** | **I(1)** |
| F-statistic | 11.65012 | | Finite sample n=80 | |
| K | 4 | 10% | 2.548 | 3.644 |
| Actual sample size | 93 | 5% | 3.01 | 4.216 |
| | | 1% | 4.096 | 5.512 |

Interest rate (LNINT) is found as significant at the 95% confidence level (Table 6). Interest rate has a negative sign indicating that there is a trade-off between these two investment tools, interest rate and bitcoin in the long-run. The coefficient of LNINT (interest rate) has a negative sign, so the interest rate is negatively correlated with the Bitcoin.

**Table 6** ARDL test results

| **variable** | **coeff.** | **t-Stat** | **Prob.** |
|---|---|---|---|
| LNBIST | 0.486 | 1.769 | 0.0808 |
| LNGOLD | -0.048 | -0.143 | 0.8862 |
| LNINT | -0.268 | -2.162 | 0.0337 |
| USDTRY | 0.001 | 0.058 | 0.9534 |




**Graph 3** Bitcoin and interest rate

The regression model is estimated as follows:

$$BTC_{it} = \beta_0 + \beta_1 + \beta_3 LNINT_{it} + u_{it} \quad (3)$$

After obtaining the long-run relation, the next step is to estimate the short-run Error-correction Model (ECM). Error Correction Model (ECM) can be derived from ARDL model which integrates short run adjustments with long run equilibrium.

**Table 7** Short-run estimation results

| Variable | Coeff. | t-Stat. | Prob. |
|---|---|---|---|
| C | -0.712 | -7.256 | 0 |
| D(BTC(-1)) | 0.353 | 2.394 | 0.019 |
| D(BTC(-2)) | 0.175 | 1.707 | 0.0917 |
| D(LNBIST) | -0.619 | -1.125 | 0.264 |
| D(LNBIST(-1)) | -1.208 | -2.238 | 0.028 |
| D(LNBIST(-2)) | -0.505 | -2.881 | 0.0051 |
| D(LNBIST(-3)) | -1.147 | -2.196 | 0.031 |
| D(LNBIST(-4)) | -1.289 | -2.322 | 0.0228 |
| D(LNGOLD) | 0.395 | 0.456 | 0.6495 |
| D(LNGOLD(-1)) | 1.335 | 1.546 | 0.1259 |
| CointEq(-1)* | -1.509 | -7.825 | 0 |

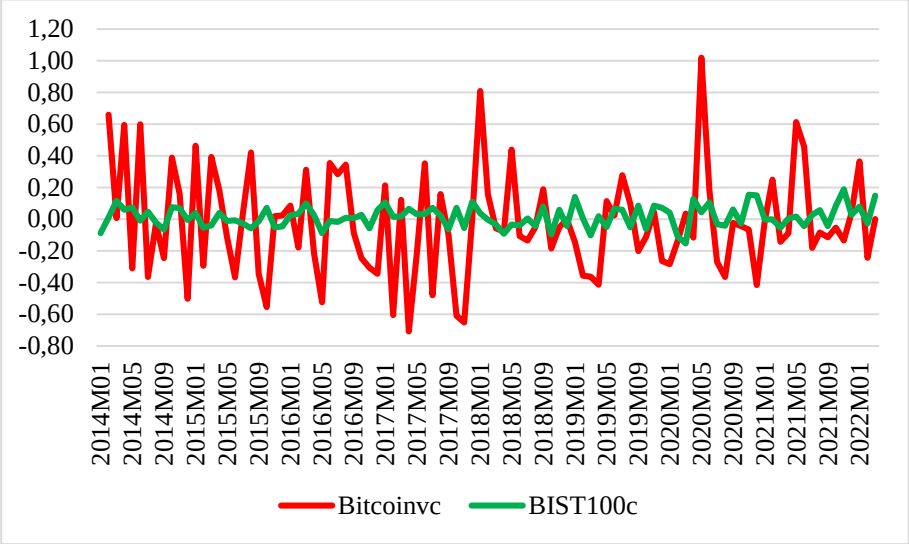
*Error correction: ECM (-1)

| F-Bounds Test | | Null Hypothesis: No levels relationship | | |
|---|---|---|---|---|
| Test Stat. | Value | Signif. | I(0) | I(1) |
| F-statistic | 11.65012 | | | |
| K | 4 | 10% | 2.45 | 3.52 |
| | | 5% | 2.86 | 4.01 |
| | | 1% | 3.74 | 5.06 |

The short-run estimation results are summarised in Table 7. F-statistic (11.65012) is greater than the upper bound critical values (3.52, 4.01, 5.06), so there exists short-run relationship. BIST100 (LNBIST) is insignificant at the 95% confidence level. This shows that there is short-term causality

from BIST100 to Bitcoin. The negative sign of LNBIST shows a trade-off between bitcoin and stock exchange in the short-run.

According to the results, the error correction coefficient (CointEq) is negative and significant. The error correction coefficient determines the time required to reach equilibrium from the short term to the long term and is calculated as 1/CointEq coefficient. It is found as $1/1.50 \approx 0.66$ according to the table. In this case, the short-term deviations will be reflected in the long-term balance after half a year. Graph 4 shows the volatility of Bitcoin and BIST100. There seem sharp rises and falls in Bitcoin values. However, trade volume in BIST100 is more stable that Bitcoin trading (Graph 4).




**Graph 4** Bitcoin and BIST100

## 5. Conclusion

Bitcoin was firstly introduced in 2008 by Nakamoto. In his article Nakamoto explains his aim about the Bitcoin as the importance of an electronic payment system based on cryptographic proof where two parties could transact directly with each other. The system was introduced just right after 2008 Mortgage Crisis when there were uncertainty and mistrust towards the financial markets. With this system the transactions would protect sellers from fraud as Nakamoto suggested. The system is very new. It was introduced in 2013 in Turkey. Soon after its introduction, the investors have become aware of the cryptocurrencies as investment tools. Bitcoin has also become an alternative portfolio instrument.

The constraint of this study is that the analysis comprises of selected investment tools in a certain period. The results may not be consistent with the other studies in the literature until now; and the results may be totally different in the following studies as the variables and the periods change. Also, Bitcoin is evaluated only as an investment tool in this study. Further studies may consider the bitcoin as a transaction tool.

This study analysed the position of Bitcoin as an investment tool in Turkey and tried to find out the interaction between the Bitcoin and the possible substitutive investment tools like BIST100 Index, USDTRY, Interest rate, and Gold. There is a trade-off between interest rate and bitcoin in the long-run, but in the short-term there is causality from BIST100 to Bitcoin.

The relationship between the interest rate, the stock market and bitcoin lies at the investors' options about the period (such that investors generally prefer quick profits). In Turkey new type of investors are observed during the Covid period. The number of stock market investors were almost fixed around 1 million. During 2020 the number of investors almost doubled to a total of 1.976,976 investors. In 2020 the total number of IPO's were 8. In 2021 there was a record of 52 IPO's. The investors were mainly attracted to IPO's to make quick profits in the opening day or in a months's time. The same

investors new to the game also were attracted to the Bitcoin since it looked like a sure way of making quick and huge gains. This shows the trade-off between bitcoin and stock markets in the short-run, when the investors expect to get quick returns. The investors expecting returns in the long-run generally prefer interest rate or bitcoin, so in the long-run there is a negative relationship between these two tools.

**Çıkar Çatışması**

"Yazarlar çıkar çatışması olmadığını beyan etmişlerdir."

**Yazarların Katkı Oranı**

"Yazarlar makaleye eşit oranda katkı sağlamış olduklarını beyan etmişlerdir."

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