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THE DAY OF THE WEEK EFFECT IN EURO AND BITCOIN: EVIDENCE FROM VOLATILITY MODELS

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Abstract

In order to understand relationships between different currencies, Econometrics presents us a lot of tools. One of these tools ARCH Models are often used by many papers. On the other side, anomalies, and volatilities are the main psychological results of financial markets. This paper, it is aimed to determine some anomalies of currencies with an ARCH model as EGARCH (p, q) model with data 03.02.2014-31.12.2020 period on Bitcoin and Euro Currency. It is made in this paper clear that financial investors behave towards financial assets within anomalies and volatilities. Therefore, it is proved that the main focal point of financial epistemology should be anomalies, so volatilities also in financial innovations.

Keywords: Bitcoin, Euro, Day of the week anomaly

Jel Classification: C32,C58,C87

EURO VE BİTCOİN'DE HAFTANIN GÜNLERİ ETKİSİ: VOLATİLİTE MODELLERİNDEN KANITLAR

Özet

Ekonometri, farklı para birimleri arasındaki ilişkileri anlamak için bize birçok araç sunmaktadır. Bu araçlardan biri olan ARCH Ailesi Modelleri, birçok makalede sıklıkla kullanılmaktadır. Öte yandan, anomaliler, dolayısıyla oynaklıklar finansal piyasaların temel psikolojik sonuçlarıdır. Bu çalışmada, Bitcoin ve Euro Para Birimi için 03.02.2014-31.12.2020 dönemi verileri kullanılarak EGARCH (p, q) modeli ile haftanın günleri anomalilerinin belirlenmesi amaçlanmaktadır. Bitcoin için elde edilen sonuçlar neticesinde; Cuma günleri hariç hafta içi her gün Bitcoin getiri serisinde haftanın günü anomalisinin varlığı tespit edilmiştir. Euro getiri serisi için elde edilen sonuçlara göre Perşembe günleri hariç Euro getiri serisinde haftanın günü anomalisi tespit edilememiştir. Bu makalede finansal yatırımcıların, anomaliler ve oynaklıklar içinde finansal varlıklara yönelik davrandıkları açıkça belirtilmiştir. Bu nedenle finansın ana odak noktasının anomaliler olması gerektiği, dolayısıyla finansal yeniliklerde de oynaklıkların olması gerektiği kanıtlanmıştır.

Anahtar Kelimeler: Bitcoin, Euro, Haftanın günü anomalisi

Jel Sınıflandırması: C32,C58,C87

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1. Introduction

The concept of an anomaly is used to describe an investor's psychology within a given and specific financial market generally. It is an exceptional form of financial behaviour. It defines sometimes-unknown, generally-unexpected, unnormal, often-repeated, at highest degree information-dependent behaviours. Nonetheless, they have got some decisive and distinctive impacts on financial markets such as stock markets and forex markets.

On the other side, Bitcoin can be considered as a cryptocurrency. Even though the main purpose of Bitcoin has changed since the beginning, it could be saved its cryptocurrency situation, and it turned into a financial innovation totally (For the development of concept of the financial innovation such as Engelen et al. (2010); Merton (1995); Shin et al. (2012); Awrey (2013); Boz and Mendoza (2014); Bos et al. (2003)) According to Beck et al. (2016), financial innovations have got dark and bright sides. And also, it can be stated that cryptocurrencies had been a subject of the exchange process in different market structures. In these markets, the behaviors of investors have shown similarities with other currency markets. For example, Bouri et al. (2019), Yi et al. (2018) emphasized these similarities. Yi, Xu and Wang (2018) stated that cryptocurrency markets were formed according to main cryptocurrencies like Bitcoin and Ethereum.

And it is so important here to determine whether or not Bitcoin is a currency or a financial asset. If it is a currency in classical terms, it should have got some economic, political features and it shall also realize some necessities in terms of international and national law. But, on the other side, it is a product of high, definitive, and enthusiastic technological development (Lechman and Marszk, 2015). In financial markets, it can be sold and bought directly, for this reason, it could be accepted as a financial asset. However, it can be concluded that anomalies, if they are as accepted as one of the main determinants in the financial market context, were seemed in financial markets and began to subjects of financial research papers.

The main purposes of this paper is to i) Investigate anomalies, so volatilities in cryptocurrency markets, ii) make detection of anomalies in cryptocurrency markets, iii) make a comparison between cryptocurrency and a current currency in terms of financial behaviours.

In order to realize these purposes, a comprehensive literature review was realized in sections 1, 2, and 3. Econometric methodology is elaborated in section 4. And discussion and conclusion are made in section 5.

2. Literature Review

2.1. Anomalies and Volatilities

According to the efficient market hypothesis, financial information and knowledge have got important roles in forming financial markets. For this reason, retaining of financial information, evaluating of financial information, using financial information are dominant concepts in a rational environment. Basdekidou (2017) classified investors as long-term institution&non-commercial traders(investors), the swing momentary institution traders(institutions), the short-term non-commercial traders(speculators)and the intrady non-commercial traders(speculators). Besides, investors, whose abilities, behaviors, and revenues

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are taken shape in these environments, behave in patterns generally. Caporale and Plastun (2020) and Plastun et al. (2019) described this anomalies as abnormal price changes in financial markets are of interest to both academics and practitioners. According to Fama's and Samuelson's Efficient Market Hypothesis (EMH) prices should follow a random walk and there should be no detectable pattern; they should fully reflect all available information and be unpredictable. The main implication of the EMH is that traders should not be able to "beat" the market and make abnormal profits. And these patterns are determined due to information levels in financial markets according to the efficient market hypothesis. It can be understood that efficient market hypothesis had got great importance, especially in today's financial markets. On the other side, it was an uncompleted theory because of a lot of reasons due to their dependence on the information. According to an inference of Jaisinghani, Kaur and Inamdar (2019) an efficient market is one in which prices reflect all the available information, this implies that there are no possibilities for investors to earn abnormal profits on a sustainable basis, it is also proposed that there are three broad forms of market efficiency including the "weak" form, the "semi-strong" form and the "strong" form.

Schwert (2002), Karan (2011), Woo et al. (2020) define and classify anomalies in a beneficial manner. According to their classification, anomalies are unavoidable depending on the nature of the information. Their forms sometimes may be sourced from time-related activities such as daily, weekly, and monthly, sometimes sourced from market-focused activities such as price-earnings ratio. The accepted main focus point of this paper are time-related anomalies and Jaisinghani (2015) stated that the most prominent calendar anomalies reported in empirical studies include the day of the week effect (including the weekend effect), the month of the year effect, the winter effect (also commonly known as the Halloween effect), and the trading-month effect (also referred to as semi-month effect). Therefore, it could be understood that anomalies are definitive features of financial markets in a wide spectrum. Caporale and Plastun (2019) strengthened this idea, according to their research, anomalies can change from country to country in terms of developed and emerging, from markets to markets in terms of Forex and stock and other market forms, from assets to assets (exchange rates, stocks, oil, gold, and many others) and in different frequencies. Also, Weeraddana et al. (2018) stated that anomalies are the product of unexpected events, shocking news, and rumors were important factors that drive the financial markets. Traders or investors may or may not be aware of the anomalous time periods that occur due to these factors. And also, according to Chkir et al. (2014) anomalies, especially weekday anomalies, are a subject of deep analysis including adverse information, thin trading, settlement procedures, inventory control costs, and measurement errors. Hsu et al. (2021) found more evidence on the issue of calendar anomalies in the Taiwanese stock market. Popovic and Durovic (2014) found more evidence on intraday and intraweek anomalies in special forex markets. On the other side, Hou, Xue and Zhang (2014) related different anomalies in microcaps. They found that most of the anomalies were exaggerated.

Volatilities are very specific and very special financial market depictions and also they are a decisive part of traders' or investors' analysis. In order to depict a financial's asset price, first of all, it is need to understand asset price's change over time and to understand the direction, size, and intensiveness of this change. According to Gaunersdorfer and Hommes (2000), the volatility of financial assets is a key feature

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for measuring risk underlying many investment decisions in financial practice and they are beneficial in order to observe asymmetric information (Kim and Song, 2020), and also indispensable in time series analysis and stochastic volatility modeling (Niyitegeka and Tewari, 2013). It is therefore important to gain theoretical insight into economic forces that may contribute to or amplify volatility and cause, at least in part, it's clustering. Ali et al. (2003) stated that idiosyncratic volatilities, high transaction costs, lower investor sophistication could be a source of the anomaly, therefore it is important to determine likely firm-related risk, as less than systematic risks. Jiang and Tian (2010) sustained that anomalous patterns (anomalies) are the result of model misspecification as opposed to market misreaction. Avramov et al. (2013) defined a market, which was full of anomalies and depended on anomaly strategies of investors and traders, main features of this market was based on price momentum, earnings momentum, credit risk, dispersion, idiosyncratic volatility, and capital investments.

Baker et al. (2011) elaborated on different volatilities and found that anomalies and volatility were in a strict, sound, and comprehensive relationships in terms of behavioral finance referring to Shleifer (2000), Barberis and Thaler (2003), Baker and Wurgler (2007), Kahneman and Tversky (1979), especially in the example of low volatility anomalies. Dutt and Jenner (2013), Jordan and Riley (2015), Li et al. (2015), Li et al. (2016), Blitz and Vidojevic (2017) related low volatility anomalies with high return relationships.

Another important feature of financial asset returns is volatility clustering. Mandelbrot (1963) maintained that the large-scale price changes in financial assets that occur in large-scale price changes; Small-scale price changes follow small-scale price changes, forming a cluster. This situation is expressed as "volatility clustering". Gaunersdorfer and Hommes (2000), Lux and Marchesi (2000), and Leal (2014) stated that there were two important behavioral strategies in financial markets. Fundamentalists forecast future prices cum dividends through an adaptive learning rule. In contrast, chartists forecast future prices based on the observation of past price movements. Beside these, Leal (2014) stated that the interplay of fundamentalists and chartists robustly generated excess volatility of asset prices, volatility clustering, trends in prices (i.e. positive serial correlations of returns) over short horizons, and oscillations in prices (i.e. negative serial correlations of returns) over long horizons, often observed in financial data.

2.2. Anomalies, Volatilities and Some Projections

Stock price anomalies, currency anomalies, and other anomalies seem very often in finance-economics literature. Almost every financial asset began to describe and define with a specific anomaly or some anomalies. Therefore, it can be concluded that anomalies are specific features of markets with all of their abilities.

Frankfurter and Mcgoun (2001) stated that although anomalies were defined as wide-using words in economics and finance theories such as Capital Asset Pricing Model and Efficient Market Hypothesis and there was no comprehensive conceptualization behind this. They also maintained that anomalies are distinctive and descriptive concepts in scientific philosophy and natural science. Filbeck et al. (2017) argued that anomalies are behavioral features of financial markets definitely. Nguyen and Pham (2021) put forward

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financial anomalies were root causes of retaining high revenues in existing financial markets due to behavioral and psychological impacts. According to Singh, Babshetti, Shivaprasad (2021), anomalies could not be told with current theories and scientific theories correctly and fully. Park and Sohn (2013) observed the Korean market and they verified relationships between financial market structure and anomalies.

Shiller (2003) defined anomalies as excess volatilities and continued they are, together, indispensable parts of finance-related research. Therefore, in order to understand volatilities, it is essential to understand anomalies. Stracca (2004) stated that anomalies, so volatilities, were grouped in five categories, namely (i) decision heuristics, (ii) emotional and visceral factors, (iii) choice bracketing, (iv) unknown preferences, and (v) reference dependence. Frugier (2016) and Shu and Chang (2015) argued volatilities are products of the sentimental response of investors. Bekiros et al. (2017) stated that behaviors of investors have shown different signs toward volatilities in terms of national and cultural identities.

Volatility models are generally very important, especially in the detection of anomalies. In table 1. it has seemed some papers in which there are anomalies of Bitcoin, volatility models.

Table 1. Some Papers On Bitcoin, Anomalies, Econometric Models

BITCOIN AND ANOMALIES			
Authors	**Anomalies**	**Econometric Model**	**Conclusion**
Donglian Ma, Hisashi Tanizaki (2020)	Day of Week Anomalies in Bitcoin Markets.	Stochastic Volatility impacts	There is volatility impacts on Mondays and Thursdays. On Mondays, the mean returns are higher than on other days.
David Yechiam Aharon, Mahmoud Qadanv (2019).	Bitcoin and day of week anomalies.	GARCH model	There are volatility impacts on Mondays.
Guglielmo Maria Caporale, Alex Plastun(2019)	Cryptocurrencies (Bitcoin, Litecoin, Ripple, Dash) and day of week anomalies.	Student's t-test, ANOVA, Kruskal Wallis test. Regression analysis with dummies.	There is no weekday anomalies in Litecoin, Ripple and Dash. But Bitcoin returns are especially high on Mondays.
Dirk G. Baur, Daniel Cahill, Keith Godfrey, Zhangxin (Frank) Liu. (2019)	Bitcoin, hour of day, day of week and month of year.	High frequency data analysis.	There are no important anomalies.
Harald Kinateder, Vassilios G. Papavassiliou (2021)	Day of week anomalies, Month of year anomalies, Halloween anomalies.	GARCH Dummy Model	In Septembers the volatility is especially low. From Friday to Sunday, the volatility decreases. After Sunday the volatility increases.

It is another dimension to create an anomaly understanding about current currencies. Especially, US dollar and Euro are selected as financial tools by investors of developing and under-developed countries.

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Table 2. Some Papers On Euro, Anomalies, Econometric Models

EURO ANOMALIES			
Authors	**Anomalies**	**Econometric Model**	**Conclusion**
Satish Kumar and Rajesh Pathak (2016)	Calendar anomalies	Regression analysis	Monday and Wednesday currency anomalies are positive and larger than Thursday and Friday. Day of the week and January anomalies are larger in before 2008 crisis periods than after 2008 crisis periods in India Example.
Satish Kumar (2018)	Calender anomalies	GARCH Models	Findings of lower returns on Monday and Wednesday and high returns on Thursday and Friday were obtained for all currencies. Similarly, returns for all currencies are higher in January and lower in the rest of the year.

When the studies in the literature are examined, it is seen that the days of the week effect is included in the mean and conditional variance models.

3. Econometric Methodology

In this study, the EGARCH model, which is an asymmetric conditional variance model, was used. The variance equation containing the effect of days of the week belonging to the EGARCH model is as follows (Yavuz, 2015):

$$\ln h_t = \alpha_0 + \beta_1 \ln h_{t-1} + \theta \frac{e_{t-1}}{\sqrt{h_{t-1}}} + \gamma \left| \frac{e_{t-1}}{h_{t-1}} \right| + V_1D_1 + V_2D_2 + V_3D_3 + V_4D_4 + V_5D_5$$

Here, the coefficients V_1, V_2, V_3, V_4, V_5 are the coefficients expressing the changes in volatility on Monday, Tuesday, Wednesday, Thursday, Friday, respectively, while D_1, D_2, D_3, D_4, D_5 are dummy variables for the relevant days. In order to avoid the dummy variable trap, it was decided not to include the dummy variable for Monday (D_1) in the model.

Although volatility in financial assets is defined by price movements, financial asset returns are used more in the measurement and modeling of volatility due to some advantages over prices. One of these advantages is that financial markets are considered to be close to perfect competition for investors so that the size of the investments does not affect price changes. Another advantage is that financial asset returns have more effective statistical features such as stagnation compared to prices. One of these advantages is that financial markets are considered to be close to perfect competition for investors so that the size of the investments

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does not affect price changes. Another advantage is that financial asset returns have more effective statistical features such as stagnation compared to prices.

The ARCH model and its extensions (GARCH, EGARCH, etc.) are among the most popular models used to predict market returns and volatility.

Among these models, the EGARCH (p, q) model is the method used to model the varying variance. The positivity condition in ARCH and GARCH models is not sought in this model. In addition, with the EGARCH model, the variance is guaranteed to be positive. The EGARCH (p, q) model is shown as follows (Nelson, 1991);

$$y_t = \phi y_{t-1} + \varepsilon_t$$
$$\varepsilon_t = \eta_t \sqrt{h_t}$$
$$\ln h_t = \alpha_0 + \beta_1 \ln h_{t-1} + \theta \frac{e_{t-1}}{\sqrt{h_{t-1}}} + \gamma \left| \frac{e_{t-1}}{\sqrt{h_{t-1}}} \right|$$

In the EGARCH (p, q) model, the first equation shows the average model used. It is possible to switch to ARCH Family models by creating an average model with a period delay of the dependent variable.

In the above equation, there is an asymmetric effect if the θ parameter is statistically significant. In addition, if it is negative, it can be mentioned that there is a leverage effect. The β parameter gives information about the persistence of volatility and has a positivity feature.

4. Data and Empirical Findings

The aim of investigating the relationship between the Euro and Bitcoin in the study is that there are very few studies in the literature that discuss the relationship between the euro and bitcoin. Most of the studies have investigated the relationship between the dollar and bitcoin. In this study, it is aimed to reveal the volatility structures between Bitcoin and Euro returns and to prove the existence of the day of the week anomaly. EGARCH (p, q) model was used to determine volatility structures. In order to detect the days of the week anomaly, the dummy variable is defined for Tuesday, Wednesday, Thursday and Friday. The dummy variable for Monday was removed from the model in order to avoid the dummy variable trap.

In the dummy variable to be created for Tuesday, the dummy variable is defined by giving the value 1 for every Tuesday and 0 for the other days. The same procedures were done for the other days included in the analysis.

Daily prices between 03.02.2014-31.12.2020 were used to examine the day of the week effect in the Bitcoin and Euro markets. Bitcoin and Euro prices are compiled from investing.com site. In the study, firstly, the returns of the daily price series were calculated and the formula rt = (Pt - Pt-1) / Pt-1 was used. Analyzes were made with Eviews 9 package program.

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Graphical and descriptive statistics of the return series are presented below in Figure 1 and Table 1, respectively**.**

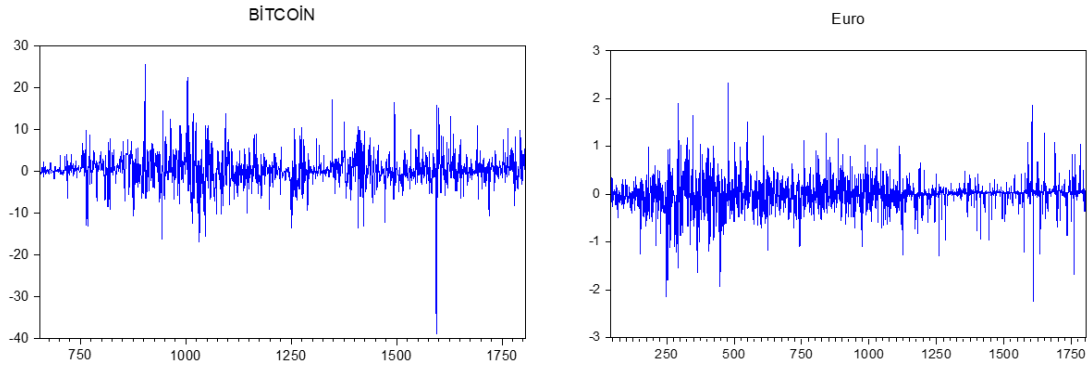
Table 3. Descriptive Statistics of Euro and Bitcoin Returns

	BITCOIN	**EURO**
Mean	0.351288	-0.002248
Median	0.158019	0.020713
Maximum	336.7452	2.333450
Minimum	-57.20841	-2.236674
Standard Deviation	9.143900	0.350282
Skewness	27.36870	-0.250134
Kurtosis	1017.701	9.967748
Jarque-Bera	77661180	3670.150
Probability	0.000000	0.000000
Number of Observations	1805	1805

When the table is examined, it is seen that the mean values of the series are much smaller than the standard deviation values. For a normal distribution, the skewness value should be 0 and the kurtosis value should be 3. According to the table, it is seen that the average return of Euro is negative, skewed and flat to the left, and the average return of Bitcoin is positive, curved to the right and extremely flattened.

In addition, when the skewness and kurtosis values, which are Jarque Berra test statistics, and the probability value are examined, it is understood that the series are not normally distributed, and that the Euro and Bitcoin return series have typical financial time series characteristics.Figure 1 shows the graphs of the Euro and Bitcoin return series. When these graphs are examined, volatility clustering stands out. In order to use ARCH Family models, the existence of the ARCH effect must be proven in series.

Figure 1. Charts of Returns



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Before proceeding to the ARCH effect determination, the stability of the return series should first be investigated in order to establish correct models that test the day of the week anomaly. There is a consensus in the literature that return series will always be stable. In order to prove the accuracy of this, Augmented Dickey Fuller (ADF) and Phillips-Peron (PP) unit root tests were applied and models with constant terms, constant terms and trends were created.

Table 4. Unit Root Test Results for Euro and Bitcoin Return Series

	ADF		PP	
	Intercept	**Intercept+Trend**	**Intercept**	**Intercept+Trend**
Bitcoin	-.412.256 (0.0001)	-4.411.052 (0.0000)	-4.797.425 (0.0000)	-4.796.518 (0.0000)
Euro	-4.185.505 (0.0001)	-4.202.376 (0.0000)	-4.185.938 (0.0000)	-4.202.666 (0.0000)

*** AIC information criterion was used to determine the most appropriate delay number in the ADF test. Barlett kernel function for PP test and Newey-West method for bandwidth were used. ** Values in parentheses show probability values.**

The hypotheses used for unit root testing are as follows;

H_0: Series Unit Root

H_1: Series Stable

According to Table 2, which includes the unit root test results, the null hypothesis that the return series has a unit root is rejected at the 1% significance level. In this context, it was concluded that the series were stationary in level values and a result parallel to the literature was obtained.

The ARCH-LM Test was used to determine the effect of ARCH in the series included in the study, and the Breusch-Godfrey LM test was used to detect the presence of autocorrelation, and the results are presented in Table 3.

Table 5. Autocorrelation and Heteroscedasticity Test Results for Bitcoin and Euro Returns Series

		nR^2	Probability
Bitcoin	**Breusch Godfrey LM Test**	0.524.126	0.3825
	ARCH-LM (1)	1063.981	0.0003
Euro	**Breusch Godfrey LM Test**	0.717229	0.6986
	ARCH-LM (1)	1.753650	0.0000

*** ARCH-LM (1) refers to the values in 1st delay.**

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The hypotheses used for the ARCH test can be shown as follows;

H_0: There is no ARCH effect.

H_1: There is an ARCH effect.

According to the results, the ARCH effect was determined according to the probability value of the two return series. Volatile models can be used in this case.

The hypotheses established for the Breusch Godfrey LM Test are as follows;

H_0: There is no autocorrelation.

H_1: There is autocorrelation.

According to these results, it is striking that no autocorrelation problem was observed in Euro and Bitcoin returns during the sampling period, but there is a variance problem.

In the light of the information in the literature, the presence of asymmetric effect in the Bitcoin series has been determined (Bouoiyour & Selmi, 2015). In this context, Bitcoin and Euro returns were modeled through the EGARCH model to see both the asymmetry effect and solve the variance problem.

Table 6. Model Estimation Results for Bitcoin

Mean Equation			
Days(Dummy Variables)	**Coefficients**	**Standart Error**	**Probability**
Tuesday	0.609178	0.122313	0.0000
Wednesday	-0.440902	0.139320	0.0016
Thursday	-0.267914	0.120635	0.0264
Friday	0.126636	0.152270	0.4056
Variance Equation			
	EGARCH(1,1)	**Standart Error**	**Probability**
α_0	-0.031856	0.010101	0.0016
β_1	0.933106	0.003969	0.0000
θ	-0.127083	0.007970	0.0000
γ	0.362591	0.010347	0.0000
AIC	5.690398		
SIC	5.705650		
Log-Likelihood	-5122.049		
ARCH-LM (1)	0.000147 (0.9903)		

As a result of the findings; In the Bitcoin return series, dummy variables of Tuesday, Wednesday, and Thursday were found to be statistically significant at a 1% significance level. Thus, the presence of a day-

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of-week effect in the Bitcoin return series on every weekday, except Fridays, has been detected. The negative values of the coefficients of Wednesday and Thursday indicate that the Bitcoin returns are changing these days, and the losses on Wednesdays are more than on Thursdays.

The model with the smallest AIC, SIC, and Log-Likelihood values among five different EGARCH Models obtained for five days of the week was chosen as the most appropriate model and the variance model coefficients were interpreted.

According to the results of EGARCH (1,1,1) Variance Model; Since the θ parameter is statistically significant, the presence of an asymmetric effect on the Bitcoin return series is acceptable. Thus, negative news has a greater impact on Bitcoin volatility than positive news. The negative coefficient sign indicates the presence of leverage in the Bitcoin market. The negative news increases the volatility of the Bitcoin return streak even more, according to the positive news.

Coefficient β gives information about the volatility cluster. The fact that the value of this coefficient is very close to 1 (0.93) indicates that the volatility shock has permanent and permanent effects.

Finally, when the ARCH test is performed on the most suitable model, it is seen that the ARCH effect disappears according to the results of the ARCH-LM test statistics.

Similarly, when the days of the week effect and the most suitable EGARCH model are desired to be determined for the Euro return series, the results in Table 5 are obtained.

Table 7. Model Estimation Results for the Euro Return Series

Mean Equation			
Days (Dummy Variables)	**Coefficients**	**Standard Errors**	**Probability**
Tuesday	0.014250	0.016962	0.4008
Wednesday	0.004188	0.013353	0.7538
Thursday	-0.035364	0.008569	0.0000
Friday	0.005193	0.018840	0.7828
Variance Equation			
	EGARCH(1,1)	**Standard Error**	**Probability**
$\boldsymbol{\alpha}_0$	-0.074165	0.005728	0.0000
$\boldsymbol{\beta}_1$	0.986558	0.001371	0.0000
$\boldsymbol{\theta}$	0.009104	0.003073	0.0031
$\boldsymbol{\gamma}$	0.070081	0.004865	0.0000
AIC	0.547000		
SIC	0.562238		
Log-Likelihood	-488.3943		
ARCH-LM (1)	1.083067 (0.2980)		

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According to the results, the dummy variables of Tuesday, Wednesday and Friday in the Euro return series were found to be statistically insignificant. Thus, the existence of a day-of-week effect in the Euro return series except Thursdays could not be detected. The negative value of the coefficient on Thursday indicates that the euro return has changed and there are losses these days.

According to the results of EGARCH (1,1,1) Variance model ; As the θ parameter is statistically significant, the existence of an asymmetric effect in the Euro return series is accepted. Thus, negative news affects Euro volatility more than positive news. A positive coefficient sign indicates that there is no leverage effect in the Euro market. Coefficient β gives information about the volatility cluster. The fact that this coefficient value is very close to 1 (0.98) indicates that the volatility shock has permanent effects.

In addition, when the ARCH test is performed on the final model, it is seen that the ARCH effect disappears according to the ARCH-LM test statistics.

Daily data were used for the sampling period of 03.02.2014-31.12.2020 in order to determine the presence of the day of the week anomaly and volatility structures in the Euro and Bitcoin return series. It has been determined that two return series have financial time series characteristics. It is a known fact that financial time series generally exhibit a stable structure. However, in this study, ADF and PP unit root tests have proven that they do not contain a unit root. With the Breusch Godfrey test, it has been revealed that there is no autocorrelation problem, but with the ARCH-LM test, there is a variance problem in the two return series. In order to model the changing variance, the EGARCH (1,1,1) model was used and the dummy variables were added to the model, and the day of the week anomaly was examined. As a result of the results obtained for Bitcoin; The presence of the day of the week anomaly has been detected in the Bitcoin return series every weekday except Fridays. Bitcoin returns on Wednesday and Thursday change to a negative value, and it turns out that losses are greater on Wednesdays than on Thursdays. In addition, the presence of asymmetry and leverage effect in the Bitcoin market has been accepted.

According to the results obtained for the Euro return series, no day of the week anomaly was detected in the Euro return series except Thursdays. The negative value of the coefficient on Thursday indicates that the euro return has changed and there are losses these days. While the existence of asymmetric effect is accepted in the euro return series, the existence of leverage effect is not accepted. Thus, negative news affects Euro volatility more than positive news.

5. Discussions and Conclusions

Financial Markets are a vivid part of our age. The institutional and individual investors breathe in and breath out in these financial markets. There are no structural rules according to developing behavioural economics and behavioural finance but decisions and behaviors of investors. According to financial innovation literature, the behaviour of investors is so complex toward new financial instruments, tools, and objects, also new ideas. However, it can be seemed or assumed that these complexities cannot be defined so easily. The effects of the weekday always is an important and proved reality of financial markets, and this situation

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also concluded by a lot of different works such as Hiraki et al. (1998), Solnik et Bousquet (1990), Liu and Lee (2020).

If it is considered the main features of financial markets, anomalies, and their more natural, excessive, and understandable versions, volatilities serve as a frame for both market practitioners and theorists. Whatever their origin is, the anomalies and volatilities are always realities subjected to a wide financial spectrum. Besides these, especially anomalies are undetectable with classical economic, psychological, and sociological ways and other scientific reasoning methods easily, but a very small piece of volatilies can be noticeable and foreseeable with some econometric tools and it is known that their dependence on investor's behaviors.

In this research, it is investigated volatilities, so anomalies of two financial assets with two reachable data and a simple model. Even the easiest way, the existence of volatilities is not only a strict and sound reality but also is an ordering governor of related financial assets due to investors' mods, affections, behaviors and emotions, and maybe other undiscovered behavioural and psychological matters. Therefore, there is no difference between a currency and bitcoin in terms of producing anomalies, so volatilities. It can be concluded here; investors behave towards financial assets in similar ways. It can be also a good direction for future research on what should be the main answers of financial regulators to these extraordinary technological and fast changes.

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