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VOLATILITY BEHAVIOR OF VIRTUAL CURRENCIES

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ABSTRACT

In order to do a volatility analysis, since the exchange rate is higher than the average risk, the higher the average rate of return, the higher the average growth rate of the year. applied the method of data analysis. An attempt to volatility analysis can be made in one year, in the middle of the end of 2016.

Keywords: Virtual Currencies; Volatility; Garch Model

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1. INTRODUCTION

International financial institutions have reduced the money needs of the bankless poor to their supposed need for money from banks, while mobile network operators, international payment providers, and academic researchers have speculatively placed them in relation to digital money or mobile money (CHIPERE, 2018).

Currently there is a huge variety of virtual currencies in the financial market, while the most well-known and cited is *Bitcoin*, for being the pioneer. The general objective of this article is to make a volatility analysis of the virtual currencies *Bitcoin* and *Ethereum*, because they are considered of greater impact in the economy. It is known that institutional volatility would therefore be a better systemic risk metric than discrete news or policy changes (HARTWELL, 2018).

In order to study the volatility, the Garch method was used as a tool for risk analysis. We can see a rapid and drastic change produced by the new technologies in man's relations with money, as well as the new configurations that are established with the virtualization.

A correlation analysis was performed between the Bitcoins and Ethereum currencies because an investor needs to be aware in order to price this part of the financial risk (BARUNIK; VACHA, 2018).

The article is divided into chapters, the first being the introduction regarding the presentation of the problem, the general objective, as well as its justifications. Second chapter deals with the bibliographic survey on crypto-coins, GARCH method, correlation and volatility. The third chapter demonstrates the methodology used in the research. The fourth chapter deals with data collection. Fifth chapter is demonstrated the data analysis, finally the conclusions observed and the bibliographical references.

2. BIBLIOGRAPHIC BASE

2.1. Local Currencies

They are based on the logic of encouraging circulation in a very small group of people as a way to promote economic development, using, for this, physical instruments identified and used as currency (FOBE, 2016).

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By investing in local currency denominated securities, foreign investors increase the diversification of their financial portfolios and gain exposure to rapidly growing economies (BORRI, 2017).

The emergence of local currencies articulate concrete instruments that allow the purchase and payment of debts, as well as acting as a "system of debt settlement that translates to the existence of a system of payments", and for assuming, in a systematic logic, also an institutional character (FOBE, 2016).

2.2. Digital Coins

The 21st century can be characterized with a vast development of technologies and with the increase of the use of the internet that has significantly succeeded the development of the monetary system introducing a new phenomenon - the virtual currencies (DIBROVA, 2016).

From the government's point of view, a digital private currency can be considered a foreign currency because the central bank cannot control its supply as opposed to conventional fiduciary money (issued by the government) (RAHMAN, 2018).

Digital coins offer the possibility of substantially reducing transaction fees for online purchases. These payment platforms are so dominant that they can charge high fees despite the low operating costs. Supporters of the new digital currencies believe they can offer lower transaction fees through technological innovation than regulation. Of course, it remains to be seen whether they can overtake Visa and MasterCard's entrenched payment networks (MOORE, 2013).

Digital currencies, in turn, have the following advantages: (i) instant transactions, (ii) low or no cost, and (iii) without territorial borders. Digital currencies, therefore, are those used by a community of users that seeks, in addition to the advantages mentioned above, the support offered by the internet as the basis for their transactions. No internet, no need to talk about digital currency (FOBE, 2016).

2.3. Bitcoin and Ethereum

Bitcoin has become one of the most popular and volatile assets on the market in just nine years since it came into operation in 2009. Despite its notable speculative component (BAEK; ELBECK, 2015) and with a fundamental value equal to zero

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(CHEAH; FRY, 2015), this criptomoeda has attracted the attention of many companies and academics of different areas. In particular, the research on Bitcoin was based primarily on computational aspects, given its innovative technology (SWAN, 2015; VIDAL-TOMÁSA, 2018).

Bitcoin is a revolution in remittances, remittances could not be simpler. exorbitant fees for sending money, but seriously threatens financial intermediation as we know it, since it is no longer possible simply to create money, but also makes the future financial crisis impossible (KUBÁT, 2015).

Ethereum is an Open Source platform focused on the creation and distribution of decentralized applications. Applications that do not need intermediaries, can interact with social systems, financial systems, game interface and anything else < https://portaldobitcoin.com/tudo-sobre-ethereum/>.

2.4. Currency volatility

Volatility plays an important role in risk modeling and assessment, as well as in the pricing of complex financial products. Therefore, studying the inherent characteristics of the conditional variance of financial time series has received a growing interest in economics recently (LAHMIRI; BEKIROS; SALVI, 2018).

Since the first transactions of 2009, Bitcoin had a relatively stable up until 2011, when prices fluctuated strongly between the cycles of appreciation and depreciation, Bitcoin's value grew rapidly from US $ 0.30 to US $ 32, after which it fell to $ 2. By the end of 2012, Bitcoin was trading nearly $ 13 before being widely accepted and speculators to raise prices (GEORGETA, 2016).

As Bitcoin is used primarily as an asset rather than a currency (BITTENBERG et al., 2004), the Bitcoin market is currently highly speculative and more volatile and susceptible to speculative bubbles. than other currencies (GRINBERG, 2011; CHEAH; FRY, 2015). Bitcoin therefore has a place in financial markets and portfolio management (DYHRBERG, 2016a), and to examine its volatility is crucial (KATSIAMPA, 2017).

Thus, during the Cypriot financial crisis, the price of Bitcoin rose, peaking at $ 266 on April 10, 2013, then falling to $ 50 / Bitcoin (GEORGETA, 2016).

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2.5. Garch Method

The ideal model of conditional heteroscedasticity is explored with respect to the adequacy of Bitcoin's price data. It is verified that the best model is the AR-CGARCH model, highlighting the importance of including a short- and long-term component of the conditional variance (KATSIAMPA, 2017).

Few would argue that Engle's autoregressive conditional heteroscedasticity (ARCH) model and Bollerslev's generalized ARCH (GARCH) model, along with its various extensions, are excellent tools for modeling and predicting the dynamic characteristics of condition volatility. . Conventional GARCH models, which use the daily closing price to infer conditional volatility, may omit certain useful intraday information (JIANG et al., 2018).

For statistical inference in GARCH models, numerous studies have been carried out. A GARCH model (1, 1) is defined as:

$$yt = ηt \sqrt{ht},\ t= 1, 2... \quad (1)$$

$$ht = w + αy2t-1 + βht-1 \quad (2)$$

com valores iniciais y_0 e $h_0 \geq 0$, onde: $w > 0$, α e $\beta \geq 0$, e $\{ ηt : t \geq 0 \}$.

The GARCH model (1, 1) is now tremendously successful in empirical work on econometrics and finance and is regarded as the benchmark model for capturing conditional volatilities by many economists (DONG; MUYI; WUQING, 2014).

Let η be a generic random variable with the same distribution as ηt. The largest Lyapunov exponent associated with the model (1.1) is given by:

$$γ= E\log (β + αη^2) \quad (3)$$

The γ signal plays a key role in the study model (1.1). It is well known that the necessary and sufficient condition for the existence of a strict stationary solution for the model (1.1) is $γ < 0$ (DONG; MUYI; WUQING, 2014).

3. METHODOLOGY

The method used to obtain the volatility results of the Bitcoin and Ethereum coins was Garch (defined in section 2.5).

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The data were obtained from the virtual magazine yahho.com.br where it is updated daily according to the behavior of the financial market. The data period was from June / 2016 to June / 2018, and the collection was done in June / 2018.

The tool for data analysis was Microsoft Office Excel, whose parameters used for analysis were date and adjusted closure.

The Garch parameters were then calculated as shown in Tables 1 and 2.

The parameters of tables 1 and 2 made it possible to calculate the volatility of the aforementioned currencies.

The return series was calculated with the following calculation basis:

the conditional expectation of the quadratic variation (VQt) is equal to the conditional variance of the returns,

$$Et\text{-}1\ (VQt\ ) = Vart\text{-}1\ (rt\ )\ \sigma t^{2} \qquad (4)$$

If VR is a non-skewed estimator of quadratic variation, it follows that the conditional variance of returns can be bound to VR as σt 2 = Et-1 (VRt), where the information combination is defined as tt-1 {rt- 1, VRt-1, rt-2, VRt-2, ..., r1, VR1}. Assuming that the RV has log-normal distribution, the restriction assumes the following form: (VAL; PINTO; KLOTZLE, 2014).

$$\sigma 2\ t = Et\text{-}1\ (VRt\ ) = \exp\ (Et\text{-}1\ \log(VRt\ ) + Vart\text{-}1(\log(VRt\ )) \qquad (5)$$

4. SURVEY OF DATA

Figures 1 and 2 show the historical data of the Bitcoin and Ethereum currencies respectively, relating the rate against the period.

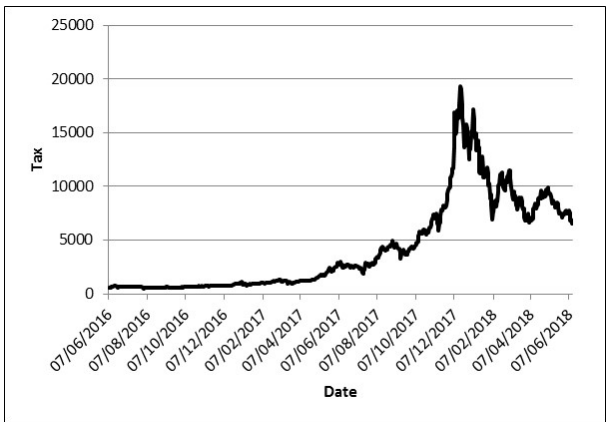

Figure 1: Bitcoin currency tax
Source: Prepared by the authors (2018).

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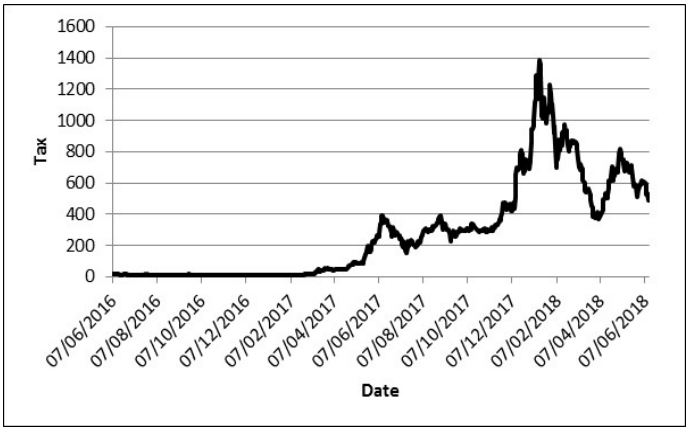

Figure 2: Ethereum currency tax
Source: Prepared by the authors (2018).

Figures 3 and 4 represent the return graphs of the Bitcoins and Ethereum coins respectively.

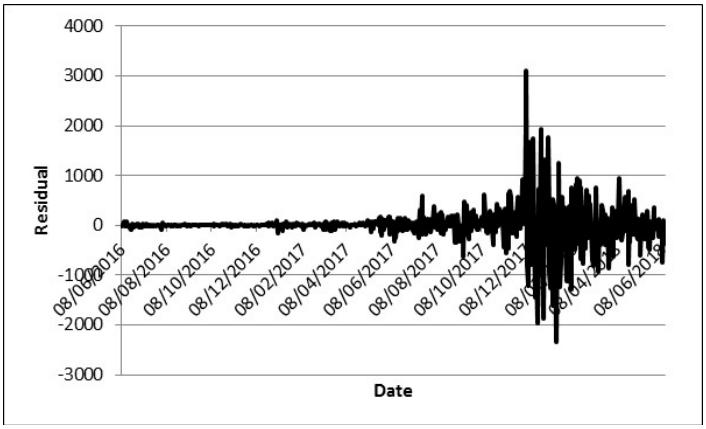

Figure 3: Bitcoin Return Chart
Source: Prepared by the authors (2018).

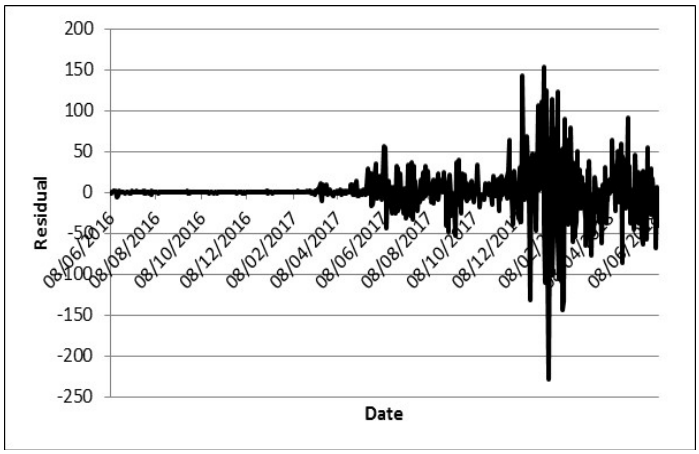

Figure 4: Ethereum Return Chart
Source: Prepared by the authors (2018).

The reason for using series of returns has two factors, the information of returns serve the interests of investors and the series of returns has statistical properties more interesting than series of prices (JIANG et al., 2018).

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5. DATA ANALYSIS

Knowing that:

Uncond. Var is the conditional variance in period t;

α is the reaction coefficient of volatility;

β is the persistence coefficient of volatility;

Table 1: Parameters Garch Bitcoin

GARCH Parameters Bitcoin	
Uncond. Var	136020,6636
ω =	11,86435603
α =	0,192052002
β =	0,807947998
persistence=	1

Source: Prepared by the authors (2018).

The Garch test that allowed us to analyze the volatility of the Bitcoin currency showed that the series is not conditional and had a persistence result of 1.

Table 2: Parameters Garch Ethereum

GARCH Parameters Ethereum	
Uncond. Var	777,6144911
ω =	0,014229372
α =	0,241488738
β =	0,758511262
persistence=	1

Source: Prepared by the authors (2018).

The Garch test allowed to analyze currency volatility Ethereum showed that the series is not conditional and had a persistence result of 1.

A volatility analysis of the Bitcoin and Ethereum currencies was carried out as shown in figures 5 and 6 because it is known that its correct estimation assumes great relevance in risk and asset sizing and pricing, as well as in the elaboration of investment strategies (PINHO;, 2016).

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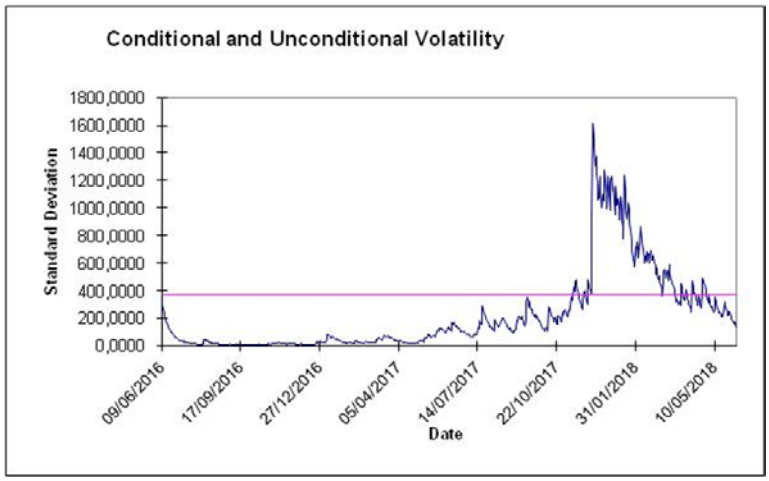

Figure 5: Graph of Volatility of the Bitcoin currency
Source: Prepared by the authors (2018).

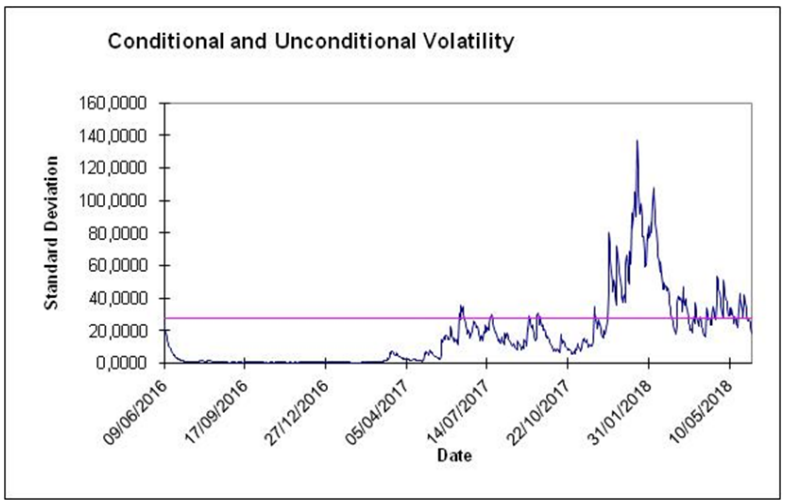

Figure 6: Graph of Volatility of the Ethereum currency
Source: Prepared by the authors (2018).

Figure 5 shows that Bitcoin began to show greater variability in the financial market in an earlier period in the middle of the end of 2016 when compared to figure 6 that represents the data of the Ethereum currency.

The calculated return log for each currency (calculation basis shown in section 3) was:

Bitcoin: Log = -4416.0380

Ethereum: Log = -2327.7607

6. CONCLUSION

It is possible to conclude from the historical data that the Bitcoin currency began to have a significant behavior for the market from August 2017 in counterpart Etherium began in June 2017. The return series made it possible a clear

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visualization that both had a behavior unstable against the market in the same period between December 2017 and February 2018. The Garch test made it possible to conclude that the two currencies are not conditional because they had a persistence result of 1. By the analysis of volatility it can be concluded that in the period of January 2018 the two currencies had greater volatility, but when observing more accurately the graph shows that the currency Bitcoin had greater volatility from the end of the year 2016.

It is suggested that analyzes with a longer period and a larger number of currencies be performed for future research.

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