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# THE EVOLUTION OF MONEY TO CRYPTOCURRENCY: ARE THEY ELIGIBLE TO BE ISLAMIC DIGITAL MONEY

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**Abstract**

The cryptocurrency was a very popular issue in recent years. There was a debate among scientists regarding the prohibition of cryptocurrencies as a medium of exchange. Some Islamic institutions use cryptocurrencies and blockchain platforms in the financial transaction. This study analyzes the arguments of classical and modern Muslim scientists regarding the evolution of money to become modern Islamic digital money in the form of cryptocurrency. We used ARCH GARCH to predict the volatility of cryptocurrencies. Our samples are Bitcoin, Ethereum, IDR Token, and Tether USD Token. IDRT and USDT are stablecoins. Bitcoin and Ethereum are cryptocoin. We use daily data of cryptocurrency fluctuations from August 7, 2015, to May 21, 2021. The data were taken from the official website for cryptocurrency transactions, coinmarketcap.com and blockchain. com. This study proves that Bitcoin and Ethereum are types of cryptocurrencies which have very high volatility. Meanwhile, IDRT Rupiah Token and Tether USD Token are more stable types of cryptocurrencies. In terms of using digital money for modern Islamic financial transactions, we suggest using cryptocurrencies of the token type.

**Keywords: Cryptocurreny, Gold, Islamic Scholars.**

## INTRODUCTION

Blockchain technology has become a popular issue in recent years. In a pandemic, blockchain technology and digital transactions have become human needs around the world. This is a new era of transactions, where all people in the world are connected to each other without barriers to enter the market. Implementation of digital transactions and blockchain technology serving using cryptoassets and cryptocurrencies. Some people argued that crypto currencies are not currencies and cannot be functioned as a medium of exchange. However, others use cryptocurrencies as digital money. Unlike banknotes produced by the Central Bank with a fixed face value, cryptocurrencies are created based on algorithms on blockchain data (Siswantoro et al., 2019). Cryptocurrencies are generated from cryptographics encryption techniques (Habib, 2021), whose value is determined based on market mechanisms in the blockchain technology. Figures 1 & 2 depicted cryptocurrencies price fluctuations from 2009 – 2021. The Graphics shown the cryptocurrencies fluctuations compared to previous currencies.


Source: Blockchain.com

**Figure 1.**
**Currency statistics**


Source: coinmarketcap.com

**Figure 2**
**Global Cryptocurrency chart**
**Total Cryptocurrencies Market Capitalization**

Before the advent of digital money and cryptocurrencies, money had a transformation history from several commodities such as shells, wheels, beads and even cows. Until now, money has undergone a very significant transformation into digital model. Digital money in the form of virtual currency is a milestone of modern money transformation (Habib, 2021). The value of previous currency know as fiat currency are different compared to cryptocurrencies. The value of fiat currency is obtained from its recognition as a medium of exchange by the government, while the value of cryptocurrency comes from the recognition of stakeholders in the blockchain community (Habib, 2021). Cryptocurrency indicate a relevant potential opportunities for global trade, investment and international contractual agreements in the years to come. Along with this opportunities, the cryptocurrency is a subject of debatable context among muslims scholars.

We search our literature review from video conferences and scopus journals regarding Islamic cryptocurrencies. From the video of interviews, the east London mosque, has begun accepting cryptocurrency

donations, making it whats thought to be the first mosque in Britain to do so. Moreover, It was identified in 2017 there were literally two or three Islamic organizations around the world are accepting bitcoin. If we taken it to account that muslim make up approximately a third of the worlds population and if one percent of all bitcoin currently in circulation was owned by muslims and if 2.5% was zakat will be looking at approximately 24.5 million poundssterling or approximately 32 million dollars Bitcoin eligible zakat sitting in Muslim own wallets. It means our money is going to have an impact in economic and Islamic community. We live in an era where there is an evolution of money from gold and silver to fiat money, and now it is turning into digital money. In the future, the possibility that people will use cryptoassets and cryptocurrencies in economic life is getting bigger.

Nowadays, based on our literature, there are countries that legally accepted bitcoin as a medium of exchange such as USA, Denmark, South Korea, Japan, Finland and Russia. Meanwhile, UAE and Eqypt had issued haram fatawa of Bitcoin. By arguments, that is no issue with cryptocurrency in general and Bitcoin specifically to be functioned as money. The cryptocurrency should be halal to mine, halal to invest and halal to trade. To be applied as money, cryprocurrency should be spot trades, no delayed transactions are allowed.

In the Islamic perspective, a currency must be a physical asset, and must be able to cover all activities and not be intended for speculative activities. The concept of e-business such as e-commerce and e-banking is allowed in Islam because basically everything is allowed as long as there is a sharia argument that prohibits it. Thus, trade transactions via the internet are considered as something that is permissible and in accordance with sharia rules (Alotaib & Asutay, 2015). This study, analyzes the halalness of cryptocurrencies in trading transactions. Because of the debate regarding the suitability of digital money to Islamic law. It is hoped that this research will contribute based on quantitative data on whether cryptocurrencies are meet the requirements as a currency and a medium of exchange in an Islamic perspective.

**Research problems**

Cryptocurrencies are gradually developed very rapidly in the financial technology industry, far from being unclear in their origin as a monetary experiment from a group of technology experts (Habib, 2021). Cryptocurrency has spesific problems that there has no intrinsic value, no physical form and only exists in the blockchain network. This currency also cannot be exchanged for commodities such as gold. The Cryptocurrency account holders are unidentifiable or anonymous, which is difficult to track in case of suspicious transactions. The value of Cryptocurrency is also unstable due to its high volatility (Abubakar et al. 2017). From this perspectives we build our research questions as follows:

a. What is the Islamic perspectives regarding cryptocurrency?
b. How is cryptocurrency volatility?

**Research Motivation**

The motivation of this research is to find empirical evidence of the use of digital

money in the form of cryptocurrency for Islamic economy. Our analysis is based on classical Islamic scholarly arguments regarding money and its evolution. This study presents a critical analysis of cryptocurrencies from the perspective of Islamic law. It is hoped that this research will make a significant contribution to the issue of cryptocurrency and its halalness in the Islamic economy. This research contributes to regulators and governments regarding the feasibility of cryptocurrency as a digital currency and its function in the Islamic monetary and economy.

The rest of the paper is structured as follows. Section 2 reviews the empirical literature of Cryptocurrencies and classical islamic scholars opinion. Section 3 describes data and presents the empirical framework. Section 4 presents the empirical findings. Finally, section 5 presents some conclusions and policy recommendations.

## Literature Review

### Cryptocurrency Development

The global financial crisis in 2008 was the reason for the introduction of a payment system in the form of Bitcoin by Satoshi Nakamoto, to reduce the intermediary role of financial institutions in transactions (Habib, 2021). Cryptoassets are built using cryptography, namely encryption techniques and algorithms designed to solve difficult computer problems. In 2019 there were 4946 cryptoassets that can be classified as Bitcoin and alternative coins. The types of cryptocurrencies created include Litecoin, Ethereum, Zcash, Dash, Ripple, Monero and many others. Litecoin (LTC) was launched in 2011, Ethereum (ETH) in 2015, Zcash (ZEC) in 2016, Ripple (XRP) in 2012 and Monero (XMR) in 2014 (Bajpai, 2017).

Cryptocurrencies markets are sensitive to various event (Tran&Leirvik, 2020). The trading volume in the largest cyptocurrency has grown exponentially, with increase in liquidity and the prices as well. The increased of interest and trading volume affects the efficiency of the cryptocurrency markets. The cryptocurreny market is found to be largely inefficient (Urguhart, 2016; Vidal&Ibanes, 2018) however the cryptocurrrency market can be efficient in certain period (Kristoufel,2018; Kristoufek&Vosvrda,2019). The ease of trading one cryptocurrency can be significantly different from the ease of trading another currencies, thus the liquidity in various such currencies varies (Phillip et al., 2018).

The rapid growth of cryptoassets has raised questions about the appropriate regulatory architecture to adopt changing conditions. Effective regulation of financial services promotes long term economic stability and minimizes the social costs and negative externalities from financial

instability (Cuervo et al., 2019). Research from Cuervo et al. (2019) mentioned selected elements of regulation and supervision that authorities should be consider when deciding on a regulatory framework for crypto assets. The most relevant risks related to cyptoassets are investor and protection risk, antimoney laundrey risk, and Prudential and systemic risks. Investor and protection risk include operational riks, cyber risk, commingling risk, market risk, credit risk, default risk, market integrity risk, misselling risk, fraud risks, and liquidity risk. Meanwhile prudential and systemic risks include prudential risk, business model risk and systemic risk. Consideration for the development of regulatory frameworks consist of how anticipate risks in market development.

**History of Islamic currency**

At the time of the Prophet Muhammad SAW, gold and silver were used as a medium of exchange and functioned as currency (Siswantoro et al., 2019). The Gold Dinar and Silver Dirham are mentioned in the Al-Quranulkarim as legal tender for the Muslim community. Gold and silver were also used by the Byzantine and Persian empires. In the Islamic perspective, money is formed based on the theory of value in the concept of exchange rates. Based on Islamic Monetary Theory, the intrigue value of money is the same as its nominal value (Abdullah, 2016). Classical Muslim scientists consistently disagree with modern scientists. Classical Muslim scientists chose gold and silver as Islamic currency. Ibn Khaldun in his book Mukadiman, mentions the function of gold and silver as money, the value used by everyone for trading. Al Ghazali mentions in his book Revival of religious science that Allah Almighty created gold and silver as a medium of exchange and established it by law. Al Ghazali indicated that currency cannot be used as a traded commodity, but only as a medium of exchange (Alzubaidi & Abdullah, 2017).

Ibn Taimiyyah

Ibn Taimiyah (1995) said that the Dinar and Dirham are a medium of exchange to obtain goods and services, so that they become a medium of exchange in transactions. Unlike other types of assets such as goods and services where the purpose of purchase is only to make a profit.

Al Ghazali

Imam Al Ghazali (2004) said that Allah SWT created gold and silver to be circulated among humans and become the standard of measurement for various assets or goods and services.

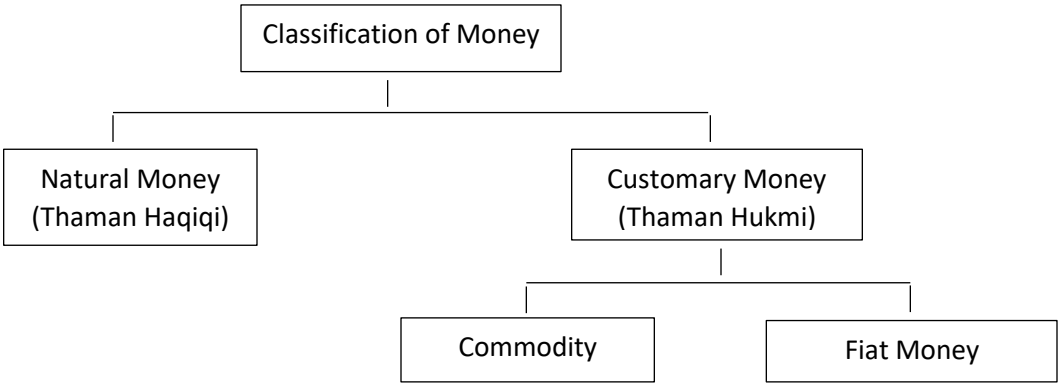
**Types of Money in Shariah**

The Islamic jurists classify money into two types: 1) natural money (thaman haqiqi) and 2) customary money (thaman hukmi) (Hadid, 2021). Based on the opinion of scientists, gold and silver are categorized as Natural Money (Thaman Haqiqi), because this precious metal is a legal medium of exchange according to Islamic law. Al Ghazali argues that gold and silver are set by Allah SWT as a medium of exchange in the

circulation of human trafficking. Gold and silver are precious metals and have the same intrinsic and face value. Customary money is money that is used as a medium of exchange because of the trust to function as money. Although, initially it was not intended as money, but because many people used it as a medium of exchange in trade transactions.

Commodities other than gold and silver that are believed to be money are examples of customary forms of money. Customary money does not have the same intrinsic value as its face value (Thamaniyyah). Customary money is divided into 2 types, namely 1) commodity money, 2) fiat money. Ibn Al Qayyim (1991) argues that the Dinar and Dirham are the value of the price of commodity goods. Price value is a known measure to measure assets, so it must be specific and accurate, not increasing and not decreasing. Because if the unit price value fluctuates like a commodity, then we do not have a unit of measure that can be confirmed as a measure of the value of the commodity, so all of them become commodity goods.

Classification of Money From Islamic Jurist




Created by researcher. Source: Habib (2021)

**Digital Currencies Applied in Islamic Countries.**

Bitcoin is called Al-Umlah Ar-raqamiyah or An-Nuqud Al-iliktroni (electronic money) which is known as digital money and is used in transactions today. Blockchain technology as a platform that produces cryptocurrencies is allowed under Islamic law (Abubakar et al., 2019). In Middle Eastern countries, there are online investments that are backed up with gold, including: e-Dinar, an online system backed by gold managed by the Central Bank of the United Arab Emirates. E-Dinar currently operates on e-Dinar Wallet and blockchain technology. in addition there is GoldMoney operating in Jersey and Canada offering a gold paymeny network account that is 100% backed up by gold combined with a mastercard, for payments you can use gold or paper currency. GoldMoney has received shariah compliance from Amanie Advisors in AAOIFI standards related to gold development with the World Gold Council.

In addition, there is a cryptocurrency operating since July 2017 in Dubai called OneGram. HelloGold, operating since 2015, is claimed to be the first gold-standardized digital currency that meets shariah compliance and operates on the Malaysian blockchain (Abdullah & Nor, 2018).

**Previous Studies**

**Arguments Allow cryptocurrencies in Islamic transactions**

The Shariah Review Bereau (2018) identifies cryptocurrencies and token money as allowed as money because they meet the requirements as a medium of exchange for transactions. Cryptocurrencies have terms as assets, benefits, rights (haq) and obligations (dayn). Meanwhile, Amalin (2018) argues that transactions using cryptocurrencies have transparency and clear regulations in trading, not containing usury.

**Arguments do not allow cryptocurrencies in Islamic transactions**

Mills & Nower (2019) argues that cryptocurrency transactions are just like gambling transactions. Cryptocurrency transactions are experiments by gamblers who find bigger problems than gambling on cryptocurrency transactions. Bouri et al.(2019) argue that there is a high degree of uncertainty in cryptocurrency transactions. Bakar et al. (2017) found three main conditions that cause cryptocurrencies to not be categorized as money, including a) no intrinsic value, b) holders of crypto money cannot be recognized as anomymous, c) unstable. This opinion is in line with Meera (2018) who argues that Islamic currency must be backed up with assets.

**RESEARCH METHODOLOGY**

**Data**

In this study, we used a mixed method, including literature description, data study and empirical research. In the study literature, we study information about the ideal model of currency from an Islamic perspective and apply it in the context of cryptocurrency digital currencies. The data used in this study is daily data from 4 cryptocurrencies namely Bitcoin, Ethereum, Tether USDT, and IDRT Rupiah Token from August 7, 2015 to May 21, 2021. Tether USDT and IDRT are stable types of coins because they are backed up by currency. Our data is obtained from historical cryptocurrency data published on coinmarketcap.com. To analyze more deeply, we use comparison of gold prices with cryptocurrencies volatility.

**Method**

In this study, the ARCH GARCH method was used. Before performing the ARCH GARCH analysis, the data stationarity test was carried out using Augmented Dickey Fuller. Augmented Dickey Fuller Test is a unit root test to test the stationary of data. With the following hypothesis:

Ho : data contains unit root or non-stationary data

H1: data does not contain unit roots or data is stationary

$$t = \frac{\acute{\varphi} - 1}{\sigma(\acute{\varphi})}$$

Data transformation

The log return value at time t: : Where is the data at time t, while is the data at time t-1.$r_t = \ln\left(\frac{Z_t}{Z_{t-1}}\right) Z_t Z_{t-1}$

Optimal Lag Determination

By using the Swatch Criterion, the optimal lag determination is carried out using the following formula:

$$SC = -2\frac{\lambda}{T} + \frac{\ln(T)}{T}K$$

Where T is the number of data, k is the number of variables, and is the log likelihood function.

Granger Causality Test

Furthermore, the Granger causality test is carried out to see the causal relationship between the stable coin and the currency that backs it up, as well as with the volatility of other cryptocurrencies.

Ho : lag variable X does not affect lag variable Y

H1 : lag variable X affects variable Y

$$F = \frac{\left(\sum \acute{u}_r^2 - \sum \acute{u}_{ur}^2\right)/P}{\sum \acute{u}_{ur}^2/(T-v)}$$

Partial Autocorrelation Function(PACF)

Partial autocorrelation between rt and rt-1 is as follows$\varphi_{11} = Corr\left((r_t, r_{t-1}\,|r_{t-1}, r_{t-2}, \ldots . r_{t-1+1})\right)$

$$= \frac{p_1 \sum_{j=1}^{i-1} \varphi_{i-1,j} p_{i-1}}{1 - \sum_{j=1}^{i-1} \varphi_{i-1,j} p_{i-1}}$$

The AR model is written as follows:$r_t = \varphi_1 r_{t-1} + \varphi_2 r_{t-2} + \cdots + \varphi_p r_{t-p} + \varepsilon_t$

$r_t$is the value of the transformation at time t, is the parameter of the AR model. is the AR model residue at time t.$\varphi_1, i\ \varepsilon_t$

The generalized autoregressive conditional heteroscedasticity (GARCH) model was first introduced by Bollerslev in 1986. This model is a model in which the variance changes over time. The GARCH(m,s) model is written as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \cdots + \alpha_m \varepsilon_{t-m}^2 + \beta_1 \sigma_{t-1}^2 + \cdots + \beta_s \sigma_{t-s}^2$$

In this model, there is one period where the volatility is very high and there is another period where the volatility is very low. Such a volatility pattern indicates the existence of heteroscedasticity because there is an error variance whose magnitude depends on the volatility of past errors.

The vector autoregressive (VAR) model was first introduced by Christopher A. Sims in 1980.

$$r_t = c + \sum_{i=1}^{p} \Phi_i\, r_{t-1} + \ a_t$$

MS GARCH

The MS GARCH model can be formulated as follows:

$$\sigma_{t,st}^2 = \alpha_{0,st} + \alpha_{1,st} \varepsilon_{t-1}^2 + \cdots + \alpha_{m,st} \varepsilon_{t-m}^2 + \beta_{1,st} \sigma_{t-1}^2 + \cdots + \beta_{s,st} \sigma_{t-s}^2$$

Where st is the state at time t, > 0, 0, $0.\alpha_{0,st}\alpha_{i,st}\beta_{1,st}$

The DCC-GARCH model is generally formulated as follows:

$$Q_t = (1 - \theta_1 - \theta_2)\bar{Q} + \theta_1 Q_{t-1} + \theta_2(\varepsilon_{t-1}\varepsilon_{t-1}')$$

with $\bar{Q} = \frac{1}{T}\sum_{i=1}^{T} \varepsilon_{t-1}\varepsilon_{t-1}'$ , is an unconditional covariance matrix, and must satisfy > 0, , and < 1. $\bar{Q}\theta_1\theta_2\theta_1\theta_2 > 0\theta_1 + \theta_2$

The MS-DCC-GARCH model can be formulated as follows:

$$Q_{t,st} = \left(1 - \theta_{1,st} - \theta_2\right)\bar{Q}_{st} + \theta_{1,st}Q_{t-1,st} + \theta_{2,st}(\varepsilon_{t-1}\varepsilon'_{t-1})$$

Where is a conditional correlation matrix with time varying at time t in state st.$Q_{t,st}$

Normality Test

The normality test using the Kolmogorov Smirnov test can be written as follows:

Ho : model residue is normally distributed

H1 : model residues are not normally distributed;

Test statistics:

$D = max|F_T(X) - F_o(X)|$ where is the normal cumulative probability, T is the number of data and is the empirical cumulative probability, the null hypothesis is rejected if or the probability value is less than $.F_T(X)F_o(X)D|D > D_{(\alpha T)}\alpha.$

Autocorrelation Test

Hypothesis

Ho :$_{1=}$ 2=...= m=0 (no autocorrelation between residues)

H1 : there is at least one$_1$ 0 for i = 1,2,3 ..., m

(there is autocorrelation between residues)

Test statistics:$Q = T(T+2)\sum_{l=1}^{m}\frac{\bar{\rho}_l^2}{T-l}$

Where T = number of data, l = number of lags, is the autocorrelation of sample lag 1, while m is the maximum lag tested. The null hypothesis is rejected if Q > or the probability value is less than$\bar{\rho}_l X_m^2\ \alpha$.

Heteroscedasticity Test

Hypothesis

Ho : there is no heteroscedasticity effect on the model residue

H1 : there is a heteroscedasticity effect on the model residue

Langrange Multiplier Test Statistics:$\xi = TR^2$where T is the amount of data and is the coefficient of determination. The hypothesis is rejected if > or the probability value is less than$R^2\xi\ X_m^2\alpha$.

Smoothed Probability

The smoothed probability according to Kim and Nelson (1999) is as follows:

$$\mathrm{P} = (S_t = i|\Psi_T) = \sum_{j=1}^{K} P(S_t = i|S_{t+1} = j, \Psi_T)$$

The predicted value of the smothed probability according to Guidolin and Pedio (2018) at t+1 can be written as follows:

$$\mathrm{P} = (S_{t+1} = i|\Psi_T) = \sum_{j=1}^{K} p_{ij}\mathrm{P}(S_t = j|\ \Psi_T)$$

**Develop Model**

Cryptocurrency transactions have high volatility (Bouri et al., 2019). Engle (1982) developed a time series data volatility model known as Autoregressive Conditional Heteroscedasticity (ARCH). Arch model is used to solve heteroscedasticity problems in models or conditions where the data variance is not constant. Meanwhile, Bollerslev (1986) developed a more flexible volatility model known as Generalized Autoregressive Conditional Heteroscedasticity (GARCH). Arch's model from Engle (1982) with modeling conditional variance related to the previous period's squared error term is as follows:

$$\sigma_t^2 = \omega + \alpha_1 u_{t-1}^2 + Vt.$$

In this study we estimate long-term volatility using the GARCH method described by

Danielsson (2011). In Garch's model the conditional variance is related to the previous period's squared error term and the previous period's conditional variance. Garch models as follows:

$$\sigma_t^2 = \omega + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + Vt,$$

Equations for each cryptocurrency and Gold variable:

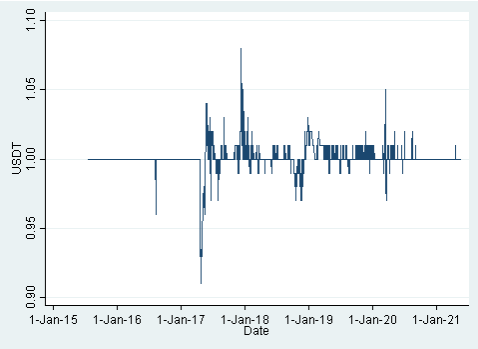
$$\sigma_t^2 = \omega + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \gamma_1 \text{Bitcoin}$$
$$\sigma_t^2 = \omega + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \gamma_1 \text{Ethereum}$$
$$\sigma_t^2 = \omega + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \gamma_1 \text{IDRT}$$
$$\sigma_t^2 = \omega + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \gamma_1 \text{Tether USDT}$$
$$\sigma_t^2 = \omega + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \gamma_1 \text{Gold}$$

under the condition .$\omega = \gamma V_{LR}$ and $\gamma + \alpha + \beta = 1$ and $\alpha + \beta < 1$ Where $\partial_t$ and denoted as the estimated volatility of time t and t-1, while is the realized return at time t-1, and is the long-term variance. In the Garch model, past volatility contributes to future volatility. is the estimation parameter. is the Long run variance. The root of the long run variance is long run volatility.$\partial_{t-1} y_{t-1} V_{LR}$ $\omega\alpha$, $\beta V_{LR}$ $\sigma_{LR}$

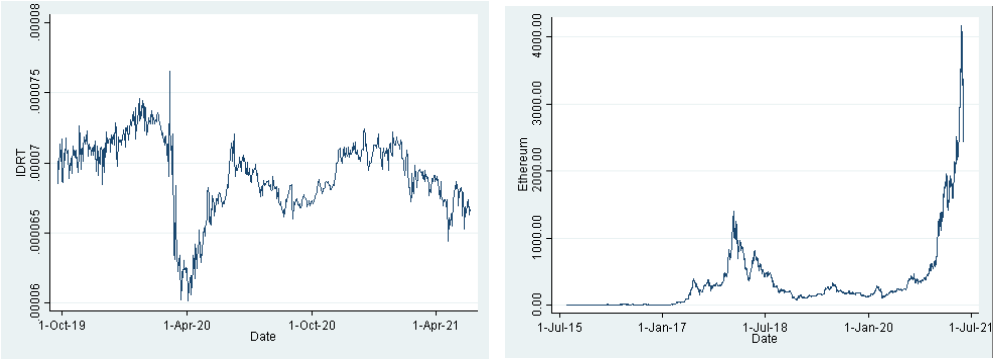
## ANALYSIS AND DISCUSSION

The analysis in this study is based on a literature review regarding the feasibility of cryptocurrencies as a medium of exchange and its functions as a currency that is widely accepted as a medium of payment with a stable and controllable value. We choose Indonesia case since the Central Bank of Indonesia start to explore feasibility study of cryptocurrency or digital money to be used in economic transactions. The application of cryptocurrency is an interesting issue of money, but it still needs to be analyzed. In this study, we compare the price volatility of cryptocurrency and stable coin to Gold long run volatility. Below is the volatility of Bitcoin, Tether USD Token, IDRT Rupiah Token and Ethereum which are sampled in this study.


Bitcoin




USDT Tether




IDRT Ethereum

Source: Coinmarkercap.com/cryptocurrency historical price

**Graphics 1**

**Price Volatility Cryptocurrency, Stable Coin and Gold**

Table 1. Descriptive of The Variables

| Label | Definition | Type | Source |
|---|---|---|---|
| BTC | Bitcoin | Crypto Coin | Coinmarketcap.com |
| ETH | Ethereum | Crypto Coin | Coinmarketcap.com |
| IDRT | Rupiah Token | Stable Coin | Coinmarketcap.com |
| USDT | Tether USD Token | Stable Coin | Coinmarketcap.com |
| Gold | Gold | Gold | World gold council.org |


Source: world Gold council.org

**Graphic 2**

**Daily gold prices in USD 1 jan 2015 – 2 July 2021**

Table 2. Descriptive Statistics of Daily Return

| | BTC | ETH | IDRT | USDT | Gold |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Observation | 2,154 | 2,091 | 605 | 2.115 | 1.357 |
| mean | 0.0031197 | 0.0054035 | 0.0000473 | 0.0000222 | 00002991 |
| Std. Dev | 0.0393290 | 0.0651479 | 0.0139695 | 0.0058932 | 0.0089955 |
| Minimum | -0.3716951 | -0.7292418 | -0.1200055 | -0.0476190 | -0.0512839 |
| Maximum | 0.2524717 | 0.5070422 | 0.1082959 | 0.0588235 | 0.0526747 |
| Variance | 0.0015468 | 0.0042442 | 0.0001951 | 0.0000347 | 0.0000801 |
| Skewness | -0.1492614 | 0.1033282 | -0.0976774 | 0.5345947 | 0.0438270 |
| Kurtosis | 10.895610 | 17.386910 | 20.252390 | 21.435680 | 7.1652190 |

Table 3. Estimation results of Variables

| | **BTC** | **ETH** | **IDRT** | **USDT** | **Gold** |
|---|---|---|---|---|---|
| Coef | 0.0028822*** | 0.0029787** | 0.000572*** | 0.00000107 | 0.0002363 |
| AR | - | 0.9357226*** | - | - | -0.048427** |
| MA | 0.9015558*** | - | 0.2283394*** | 0.6332023*** | - |
| Coef | 0.8827261*** | 0.9159656*** | - | -0.380489*** | 0.0973585*** |
| ARCH | 0.0000716*** | 0.0002814*** | 0.1103677*** | 0.0000003*** | 0.0000187*** |
| GARCH | 0.1386724*** | 0.1793344*** | 0.0000069*** | 0.1771129*** | 0.3331525*** |
| | 0.8303773*** | 0.7604268*** | 0.2866757*** | 0.8533898*** | 0.446574*** |
| | | | 0.6972394*** | | |

***,****,* indicate significance level of 1%, 5% and 10%

Table 4. Unit Root Test Bitcoin, Ethereum, IDRT, Tether USDT and Gold

| Dickey Fuller Test | Bitcoin | Ethereum | IDRT* | USDT Tether | Gold |
|---|---|---|---|---|---|
| Level z(t) | 0.9414 | 0.9699 | 0.0002 | 0.0000 | 0.8078 |
| 1st Difference | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Based on unit root test cryptocurrencies Ethereum and stationary gold on first differencing. While IDRT and Tether USDT are stationary at the level.

Table 5. The Parameter, long run variance, long run volatility Garch (1,1) estimates of Bitcoin, Ethereum, IDRT and Tether USDT for observation
7 August 2015 – 21 May 2021

| | **Cryptocurrencies** | | **Stable Coin** | | |
|---|---|---|---|---|---|
| | Bitcoin | Ethereum | IDRT* | USDT Tether | Gold** |
| Parameter $\omega$ | 0.0000716 | 0.0002814 | 0.0000069 | 0.00000034 | 0.0000187 |
| Parameter $\alpha$ | 0.1386724 | 0.1793344 | 0.2866757 | 0.17711290 | 0.3331525 |
| Parameters | 0.8303773 | 0.7604268 | 0.6972384 | 0.85338980 | 0.4465740 |
| Parameter $\gamma$ | 0.0309503 | 0.0602388 | 0.0160859 | -0.0305027 | 0.2202735 |

| | | | | | |
|---|---|---|---|---|---|
| Long run variance ($\boldsymbol{V_{LR}}$) | 0.0023134 | 0.0046714 | 0.0004289 | -0.0000111 | 0.0000849 |
| Long run VolatiRlity()$\boldsymbol{\sigma_{LR}}$ | 0.0480977 | 0.0683477 | 0.0207110 | ∞ | 0.0092138 |
| Relative LR to Gold | 5.2201671 | 7.417955 | 2.2478234 | ∞ | 1.0000000 |

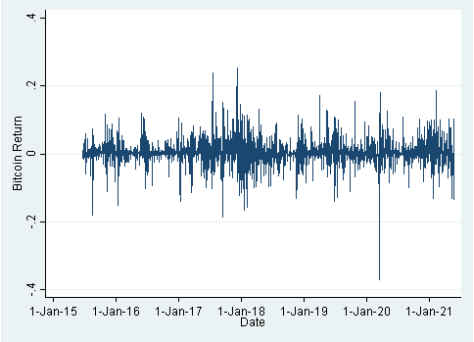
* period August 2019 – May 21, 2021, ** period 1 Jan 2015-2 July 2021

Based on statistical data processing on cryptocurrencies, the Bitcoin AR(1) MA(1) ARCH(1) GARCH(1,1) model is obtained. Ethereum AR (1) MA (1) ARCH (1) GARCH (1), IDRT AR (1) MA (8) ARCH (1) GARCH(1). Tether USDT ar (1) ma (2) arch (1) garch (1). Meanwhile, the volatility of Gold AR (1) MA (6) ARCH (4) GARCH (1). In this case, the volatility of gold long run volatility is the lowest, as well as the long run variance. Of the 5 assets studied, Ethereum is the most volatile. Bitcoin 5x volatility gold, ethereum 7 times volatility gold, IDRT 2x volatility gold and USD is infinite because you can see the type of USD price in graphics.

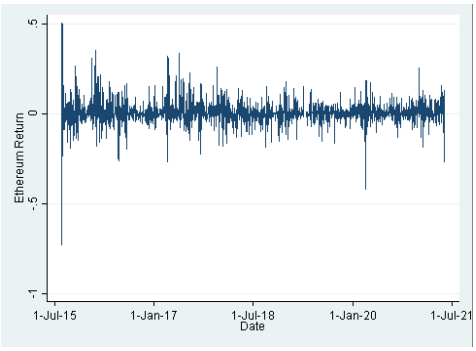
Bitcoin and Ethereum are types of cryptocurrencies that have very high volatility. While IDRT Rupiah Token and USDT are more stable types of cryptocurrencies where fluctuations follow changes in exchange rates. This finding is in line with the results of research by Antonakakis et al. (2019), Siswantoro et al. (2020) and Akcora et al. (2018). Cryptocurrency transactions, especially Bitcoin and Ethereum, have varying perceptions regarding pricing and pricing methods, this condition causes Bitcon transactions to be classified as Gharar transactions with high uncertainty. In terms of cryptocurrencies, only 2% of the total Bitcoin in circulation is used in blockchain transactions. This is what causes the high prices of Bitcoin and Ethereum. The analysis states that if the medium of exchange is not used in the transaction, then the price will rise because the supply decreases (Siswantoro et.al, 2020). Mills & Nower (2019) classifies cryptocurrency transactions as gambling, for which accuracy cannot be ascertained.

Technically, money is anything that can be used as a medium of exchange whether made of gold, silver, leather, paper and others that are generally accepted by society. According to Taqi Usmani (2015), a contemporary scientist of the Hanafi school, money is anything that has three properties, namely as a medium of exchange, a unit of account and a determinant of value. In the Islamic perspective, there is a fundamental difference between money and commodities. Shariah emphasizes money only in its basic purpose which is as a medium of exchange and standard of value. Ibn Taimiyah (1995) explains that gold and silver in this case the Dinar and Dirham were created only as a medium of exchange. The same explanation is given by Ibn Qayyim (1997) that money was created to facilitate trade in goods and services.

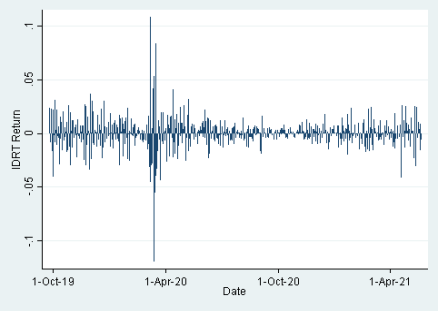
**s**



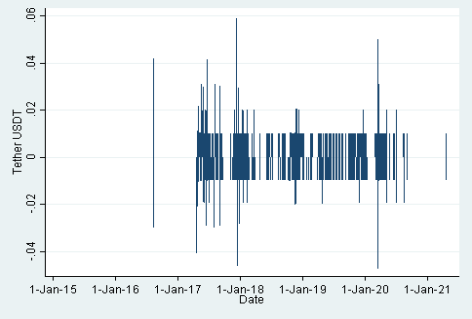

Bitcoin



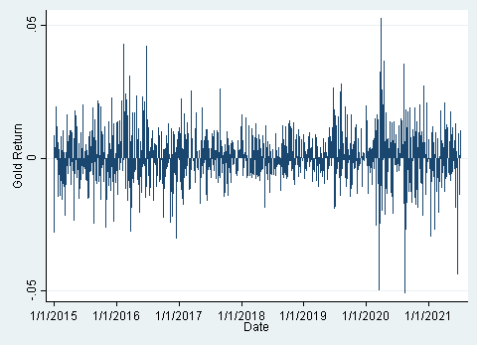

Ethereum




IDRT




Tether USDT

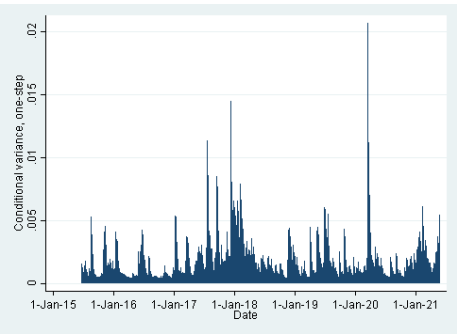



Gold

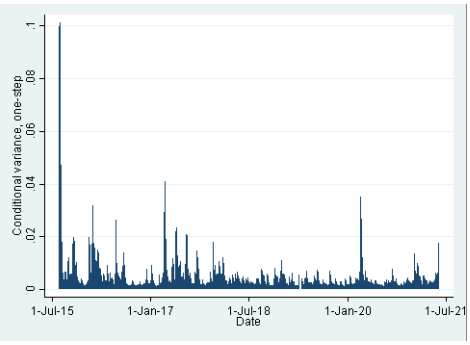
Source: Coinmarkercap.com/cryptocurrency historical price

**Graphics 3**

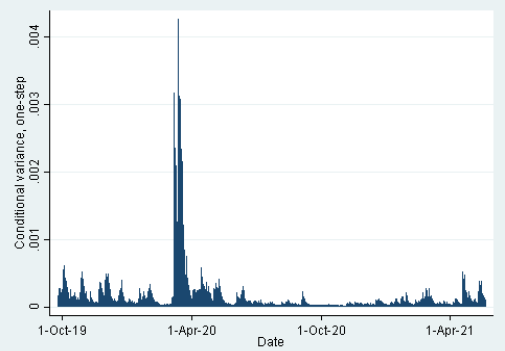
**Return Volatility Cryptocurrency, Cryptocurrency Token and Gold**



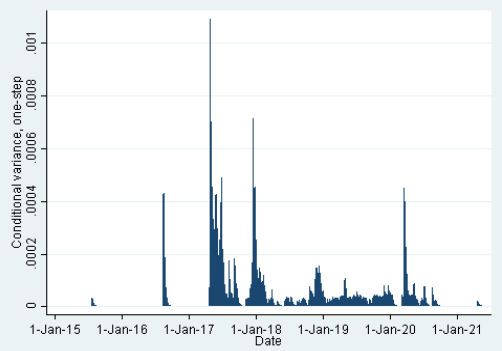

Bitcoin



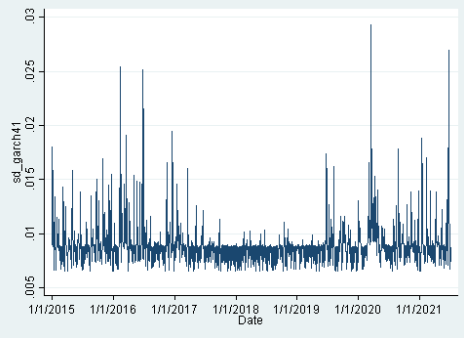

Ethereum




IDRT




USDT

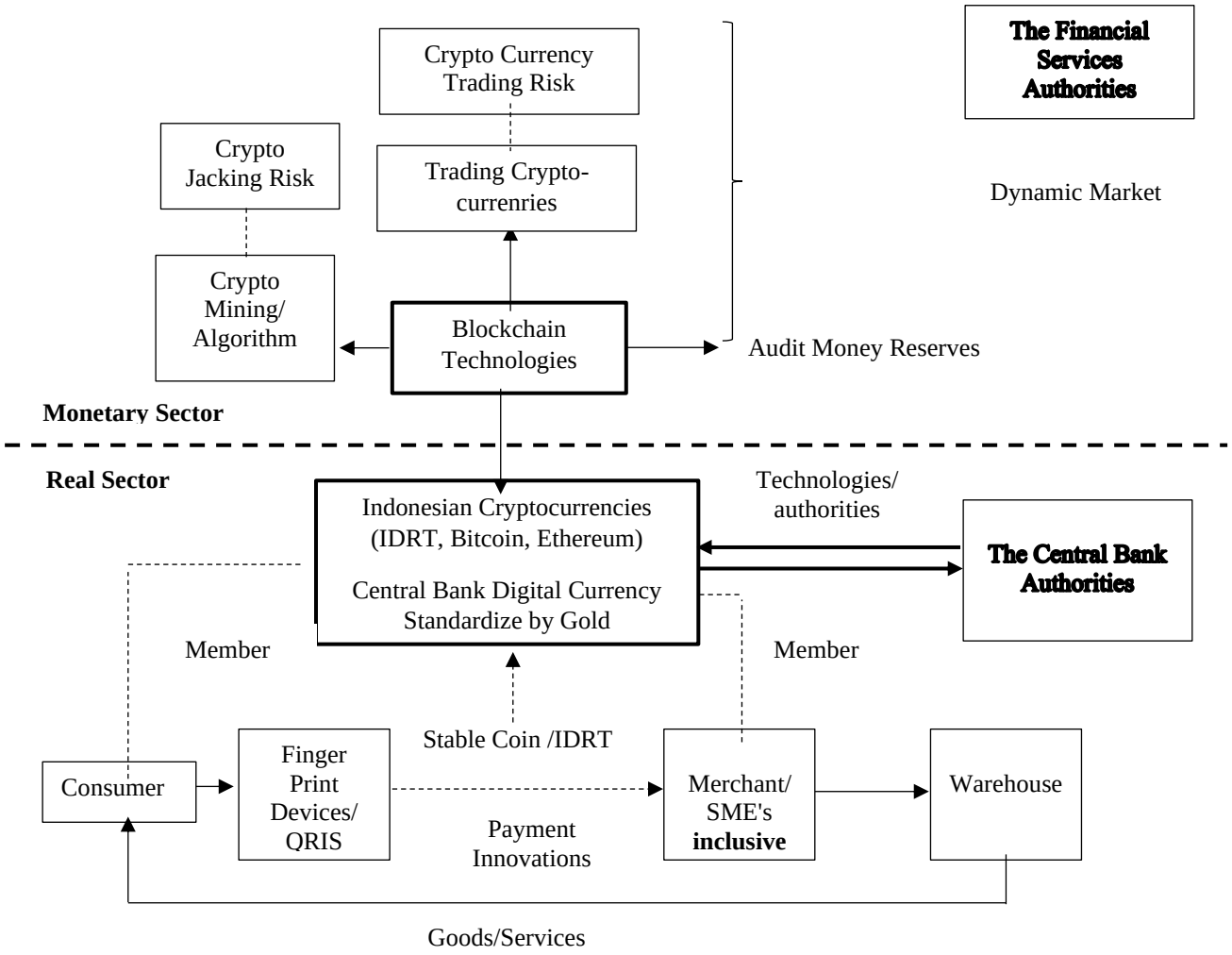



Gold

Source: Coinmarkercap.com/cryptocurrency historical price

**Graphic 4. Conditional of variance**

In terms of the use of digital currencies in the form of stable coins in Indonesia, the researchers built a cryptocurrency transaction scheme in the real and monetary sectors as follows:




**The Indonesia Crypto Currencies Transaction Scheme in Real and Monetary Sector Created by Researcher**

If Indonesia allows using cryptocurrencies in the form of digital currencies issued by the Central Bank, the researcher recommends using stable coins that are backed up by gold. Rashid et. al (2002) observed that gold has stable ratio from 1: 10 then fluctuated to 1: 15 in the long period. Cryptocurrency trading transactions are managed in a more dynamic market by the Financial Services Authority in the commodity market (futures trading). In this case, an audit of managed blockchain technology is needed to monitor the volatility of cryptocurrencies traded on commodity exchanges.

## CONCLUSION

The digital technology is a situation that can not be rejected by the moslem community. In the future, the opportunity to use cryptocurrency in islamic community transaction can not be negligance. So thus research regarding digital money in the form of cryptocurrency give us a long perspectives. Islamic law accepted money in a form of gold and silver. We conclude that the cryptocurrency can be halal if it is backed up by gold or silver. Cryptocurrencies are categorized as customary money, namely commodities that are recognized as money because they are accepted by the concessions of the user community. Cryptocurrency is a digital currency that is the result of encryption algorithms in the technology field. Because it is in the form of encryption, this currency does not have a physical form. Cryptocurrencies contribute to the development of a modern financial system where every transaction is borderless. The fundamental weakness of cryptocurrencies is that there is no authority to control their fluctuations. This study proves that Bitcoin and Ethereum are types of cryptocurrencies that have very high volatility. Meanwhile, IDRT Rupiah Token and USDT are more stable types of cryptocurrencies where their fluctuations follow changes in exchange rates.

## Recommendations

In terms of using digital money for modern financial transactions, we give recommendation for regulators to use Cryptocurrencies of the Token type. To further stabilize volatility, we also recommend using cryptocurrencies that are backed up with gold, not just backed up by fiat money such as IDR Rupiah Token and USDToken. With the gold backed up, it will return to the nature of Islamic law where the currency used has been standardized by gold. We give recommendation for practioners to be extremely careful by the fluctuations of cryptoassets and cryptocurrencies transactions even if it is backed up by fiat money such as Dollar or other currencies, because the fiat money are also fluctuated. We give recomendation for future researchers to add more samples of cryptocurrency to get a widely perspectives of cryptocurrency analysis.

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