



## INVESTIGATION OF DOGECOIN PRICE MOVEMENTS: A GSADF ANALYSIS

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### ABSTRACT

Today, people provide information through different channels. The information channels used can affect the decision-making mechanism due to asymmetric information or different tendencies. Especially in recent years, people use social media to reach information quickly. Therefore, notifications made on social media reveal economic results. Cryptocurrencies are digital currencies intended to be used as currency. Unlike their traditional financial rivals, cryptocurrencies are not backed by a central bank or authority.

The success of cryptocurrencies depends on its infrastructure, the block chain. Especially in recent years, the popularity of cryptocurrencies has increased. After the popularization of cryptocurrencies, digital currencies are discussed more especially in the media. In addition to the positive features, negative features are also included in the media. There are concerns about the misuse of cryptocurrencies. It is mentioned that cryptocurrencies provide financing for criminal organizations and are used in money laundering. In addition to these, it is reported that cryptocurrencies are used for tax evasion.

The lack of intrinsic value of cryptocurrencies puts investors in trouble in terms of investment and price determination. Cryptocurrencies, which are digital currencies, have many digital price determinants such as social media. Two different objectives were determined in this study. The first is the detection of the presence of bubbles in Dogecoin prices. The second is the examination of the relationship between bubbles and tweeter notifications. In the study, Dogecoin prices between May 2020 and May 2021 are examined with the GSADF test. From May 2020 until May 2021, 10 different price bubbles are observed. Some bubbles can be associated with tweets by Elon Musk. However, the biggest bubble observed, the April 2021 price bubble, is due to a different reason.

**Keywords:** Dogecoin, Tweets, GSADF

## 1. INTRODUCTION

Introduced to the financial market by Nakamoto in 2008, Bitcoin provides decentralized movement of funds. Interest in cryptocurrencies has increased over time. Today, more than 6,000 cryptocurrencies are securely traded on over 350 online exchanges. As of September 2021, the total market cap of cryptocurrencies exceeded \$300 billion [1]. Even though the value of cryptocurrencies is not supported by any tangible assets, it has gained the trust of users because it is formed in peer-to-peer blockchain networks and publicly discloses its transaction history [2].

Every transaction on the blockchain contains of a virtual identity, that is, the transfer of a virtual value from a blockchain address or a set of addresses to another. With the emergence of unregulated markets of cryptocurrencies, the appearance of high volatility has become normal. Since there are hundreds of cryptocurrencies and the crypto market has no legal infrastructure, prices are easy to manipulate.

Cryptocurrency assets, which have reached very large numbers today, can no longer be considered as a niche market. It is directed towards crypto money assets through mainstream financial resources channels. While some countries are taking steps to legalize Bitcoin as a payment system, today's cryptocurrency markets are still open to manipulation. It is known that the volatile price movements,

especially in the crypto money markets, are realized through social media. In this research, the price movements of Dodge Coin, which was announced by Elon Musk, will be examined.

## 2. DODGECOIN

Dogecoin is a decentralized peer-to-peer digital currency [3] that allows you to easily send money online. In order to understand the content of Dogecoin, it is necessary to know the Doge Meme, which requires an explanation in itself. The term meme was first coined by Richard Dawkins in 1976. According to Dawkins, meme is defined as a natural human propagation, copying and changing of ideas and culture [4]. The story of Doge Meme began in February 2010; when Japanese kindergarten teacher Atsuko Sato posted photos of her Shiba Inu pet dog Kabosu on her blog [5]. Dogecoin was created by combining Doge Meme with coin, which is very popular on the Internet.

Introduced as a “joke currency”, Dogecoin has grown from a capital of 60 million dollars in 2014 to a crypto currency with a size of 10 billion US dollars as of 2021. Compared to other cryptocurrencies, Dogecoin has a strong ICO program with its infrastructure. The main difference between Bitcoin and Dogecoin is the hash algorithm. To make the comparison between Bitcoin and Dogecoin correct, Litecoin, which serves as the basis on which Dogecoin is built, must also be included in the comparison [6].

**Table 1.** Comparison of Cryptocurrency

	Bitcoin	Litecoin	Dogecoin
Founder	S. Nakamoto	C. Lee	B. Markus
Release Date	2009	2011	2013
Hashing Algorithm	SHA-256	Scrypt	Scrypt
Blok Count	500,000	1.5 Milyon	2.5 Milyon
Blok Size	1 MB	25 KB	10 KB
Blok Time (min)	10	2.5	1

As can be seen in the table, the Dogecoin system is essentially simpler in terms of computation time, entropy and valuation. Therefore, Dogecoin is one of the successful crypto money initiatives that reached crowdfunding very quickly.

## 3. ELON MUSK TWEETS

Elon Musk has become a wealthy businessman thanks to PayPal, the popular money transfer service for Web consumers [7]. Musk is the founder of SpaceX, a California-based company. In 2005, SpaceX is building the Falcon rocket, which it hopes can one day make both space tourism and a colony on the planet Mars realistic targets for humanity. Seen as a phenomenon in social media, every tweet of Elon Musk creates volatility in the relevant financial instrument, either positively or negatively. Since this study aims to examine the price movements of Dogecoin, the following table lists Musk's tweets about Dogecoin.

**Table 2.** Musk Tweets

Date	Content
16.05.2021	Positive review by Musk of Dogecoin forking, which he was tagged in [12]
28.01.2021	The cover of the magazine Dodge, which evokes Dogecoin, was published [11]
25.12.2020	Published a Christmas image featuring the Dogecoin symbol [10]
20.12.2020	A tweet was posted saying Dodge [9]
18.07.2020	Dogecoin picture was shared [8]

#### 4. LITERATURE

In many studies in the literature, the effect of social media on cryptocurrencies has been examined. The effect of 5600 tweets sent by Trump on the S&P500 index during 2016-2018 was examined [13]. In the study in which the abnormal return was measured, negative but statistically insignificant results were obtained.

GSADF test was used for bubble research on the cryptocurrencies BTC and ETH, and according to the results, many price bubble formations were found [14]. In another study [15], in which the GSADF method was used, nine different bubbles existed between 05.02.2012-05.05.2019 in BTC, four different balloons existed between 09.08.2015-05.05.2019 in ETH, and three different bubbles existed in XRP between 04.08.2013-05.05.2019. In the study on Bitcoin [16], the authors identified a number of short-lived bubbles and three large bubbles (2011-2013) lasting between 66 and 106 days in the time series using the GSADF method.

In study [17], tweets about bitcoin between 2013 and 2018 are reserved for each five-minute slice. In total, the dataset reached 18 million tweets. According to the empirical evidence obtained as a result of the Vector Autoregressive Model analysis, it is seen that active investor interest can significantly increase Bitcoin liquidity in real time, which in turn can increase price efficiency in the Bitcoin market. In another study [18], researchers investigated the relationship between tweets about bitcoin, bitcoin searches in Google Trend and bitcoin prices between 2016-2018. According to the results of the research, a causal relationship was found between the variables and the bitcoin price. In another study on tweets [19], it has been found that tweets sent using the data of 2014-2018 affect the Bitcoin volume of the next day and there is a causal relationship between them.

Apart from the effect of social media, the bubbles in the prices of cryptocurrencies have been examined by researchers. In the study [20], the existence of bubbles in Bitcoin, Ethereum, Ripple and Litecoin prices between 2016-2019 was investigated. According to the results of the GSADF test, bubbles were observed for all 4 cryptocurrencies.

#### 5. DATA AND METHOD

In the study, Dogecoin prices between May 2020 and May 2021 were examined. The examination was made by GSADF test. For the detection of individual bubbles, it is [21] stated that the SADF test should be performed. However, the SADF test gives biased results if there are more than one bubble in



From May 2020 until May 2021, 10 different price bubbles are observed according to the figure.

## **7. CONCLUSION**

As a result of the analysis made in the study, 10 different price bubbles were observed from May 2020 to May 2021. Some bubbles can be associated with tweets by Elon Musk. However, the biggest bubble observed, the April 2021 price bubble, is due to a different reason.

In addition to the asymmetric information in the crypto money market, cryptocurrencies become a speculative financial investment tool with the herd behavior. As seen in the studies in the literature, the price movements of cryptocurrencies are interconnected [22]. In particular, price changes in Bitcoin quickly lead to price changes in other cryptocurrencies. The Dogecoin price bubble formed in April 2021 can be explained by the price action of Bitcoin.

As with other investments, cryptocurrencies are prone to speculative bubbles. Bitcoin's core value (intrinsic value) is considered zero. The results obtained from this study show that crypto money markets have common features with other markets in terms of bubble formation. Parabolic movements seen in cryptocurrencies create speculative bubbles. However, the most dangerous situation with bubbles is that the cause of parabolic movements in prices is not known exactly.

In this study, it is aimed to provide information to finance professionals who invest in these markets or who are considering making investments by investigating the existence and duration of bubbles in Dogecoin prices, which have been popular in the cryptocurrency market recently. The observation of many bubbles in the time series indicates that Dogecoin cannot be a reserve currency. Cryptocurrency market is generally volatile. In this context, Dogecoin shows the unique price movements seen in the cryptocurrency market.

## **CONFLICT OF INTEREST**

The author stated that there are no conflicts of interest regarding the publication of this article.

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