Social Media's Influence on Cryptocurrencies

By: Kyle Humphreys, Supreet Ghatorra, Phil Zheng, Giancarlo Granata, and Jonathan Gonzalez

Project Title: Co-Investigators

Group members names and take assignment:

Data Collection (Jonathan): My responsibilities are to gather information about how Elon Musk's tweets have affected dogecoin. I will be looking for the timeline of the price of the coin, the dates of tweets, and how much of an effect it had on the coin. This information will help us forecast the future and understand how much social media can affect crypto.

Excel/Python (Supreet): In this role, my responsibility is to analyze data that reflects Elon's tweets and their effect on the price of Dogecoin. I will be uploading this data into a Jupyter Notebook and comparing the mean price of dogecoin before and after a tweet from Elon. This data will be shown in a table format, and also through a graph highlighting certain spikes caused by tweets.

Writing-up (Kyle): My responsibility will be to take all the data I am given from my group members and extract the important information to write a concise summary. I will talk about what we find and the conclusions we can draw from the data. I will be responsible to make sure our project is well-written with all the criteria being met.

Proposal/research/methodology (Phil): I will be asking critical questions such as what the relationship between cryptocurrency and market price is. I will also look at potential drivers behind this relationship such as internet trends, celebrity influence, or political force. I will assist Kyle and Supreet to determine what methods/code can determine the relation between Elon Musk's tweets and Dogecoin's price.

Editing/Presentation Slides Formulation (Giancarlo): Along with helping capture data and conducting data analysis, I will be in charge of editing the paper and deciphering the data. In

addition to editing the project, I take responsibility for creating the project presentation that will encapsulate all its key points for summary and presentation.

Abstract:

Our project's topic is to determine social media's effect on cryptocurrencies. To find this relationship, we examined Elon Musk's tweets and the effect on Dogecoin's prices. We analyzed datasets using a combination of various charts and simulations within the Jupyter Notebook. First, we used the Monte Carlo simulation to prove that there is a correlation between Elon Musk's tweets and Dogecoin.

When we discovered how influential Elon was, we ran a Monte Carlo simulation to see if he could be using social media to deliberately manipulate the market. We could not prove this, but we do know that Elon Musk has more influence on the prices of cryptocurrencies than any other individual. It was surprising to see the impact one individual can have on a highly traded cryptocurrency such as Dogecoin, proving how volatile cryptocurrencies are.

Motivation:

Our group's main purpose for this project is to understand how social media affects crypto prices. We narrowed it down to see how much impact one person on social media can have. This is a heated topic in the world of not just crypto and Fintech. This is due to cryptocurrency being affected drastically (supposedly) by a single user or a couple of users ultimately falling under price manipulation.

One example some of us think of when the topic of social media and crypto prices is mentioned is Elon Musk and his tweets. According to Science Direct, Elon Musk's single tweets can raise a price by 16.9% or drop the price by 11.8%. If this is really the case, this could sway future crypto investors away. Crypto itself has already been considered a highly volatile currency

even before the Elon tweet controversy, adding another layer of volatility from social media. As a result, this makes crypto unattractive to many long-term investors. However, if we analyze the pattern for each tweet Elon posts, and predict the flexibility of the crypto market, there will be a high-return investment for investors that are willing to take risks. We can either work against the market or play the crypto game with Elon and make good fortunes.

The topic is interesting to us because as business majors in a world of social media, it's important to understand the influence of societal figures on crypto and beyond. This is helpful because we can make sure to not follow a trend just because an influential person starts it. Also, if any of us ever gather this type of influence, we can use it responsibly. Even if we do not, we can still use our research to make sure others are aware of the power that Elon Musk and many others hold with their social media presence.

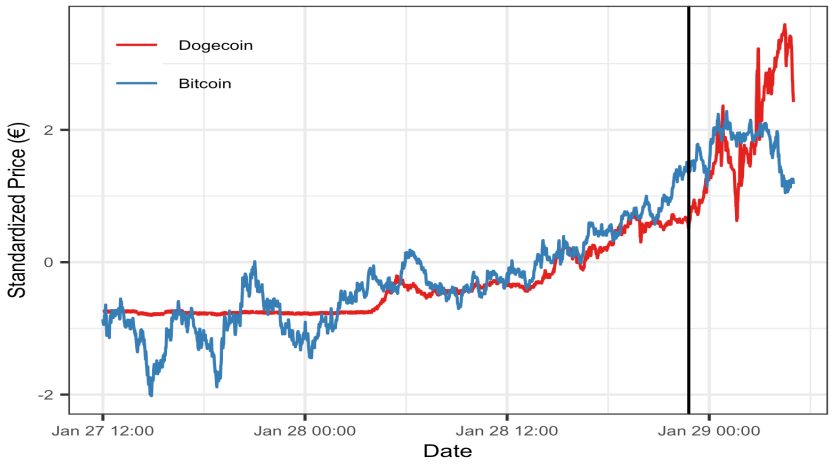
Review of Current Understanding of the Topic:

There have been reports of huge spikes and drops from influential figures such as Elon Musk and large cryptocurrencies like Dogecoin and Bitcoin. For a brief background, Dogecoin was a joke in 2013, but behind Elon's backing became one of the top 10 digital assets in 2021. This showed how the internet can alter the price of financial products including stock prices and cryptocurrency.

An example of this is when Elon made a tweet about Reddit users short-squeezing the GameStop stock price. The case we are focusing on is the effects on Elon's tweets on the price of Dogecoin. In particular, we want to know how a public figure can drive up the price for a cryptocurrency by nearly 1,000% by using Twitter (Kay) (Reimann).

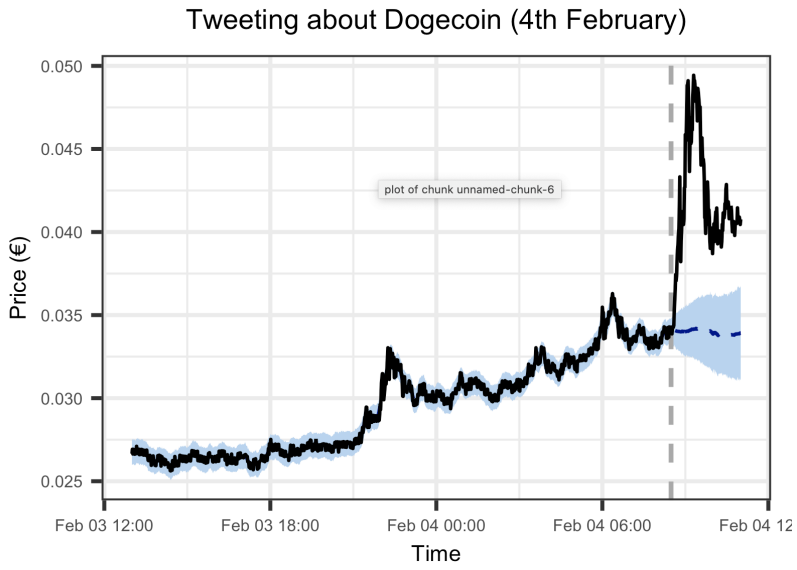
Findings/Results/Analysis:

The general consensus is that there is a drastic effect of social media on cryptocurrencies. When a figure of high influence makes a positive tweet about crypto, its value skyrockets, and vice versa. However, we wanted to do research into this phenomenon to prove that causation, not correlation causes this trend. In other words, we wanted to make sure a public figure's tweets directly influence crypto's value, and that they do not instead post about how crypto is doing. To examine this, we can look into Elon Musk's relationship with Dogecoin as he is known to love it. Fabian Dablover conducted an analysis of this relationship in his article, *Causal effect of Elon Musk tweets on Dogecoin price.* The first step for this was computing a graph of the price history of Bitcoin and Dogecoin as seen below:



The black line represents the time when Elon Musk tweeted a positive tweet about Dogecoin. Bitcoin is a good baseline for crypto as it is the biggest cryptocurrency and will show an overall trend in the crypto market. While Bitcoin did increase as Elon tweeted, it was nowhere near the sharp increase Dogecoin saw. Now, to determine causation, Dablover used the price history of Dogecoin and Bitcoin to accurately predict future trends. He used this history with a

formula to predict the 95% credible interval to the price after Elon's tweet. This time he looked at the positive tweet Elon made on February 4th. This graph is depicted below:

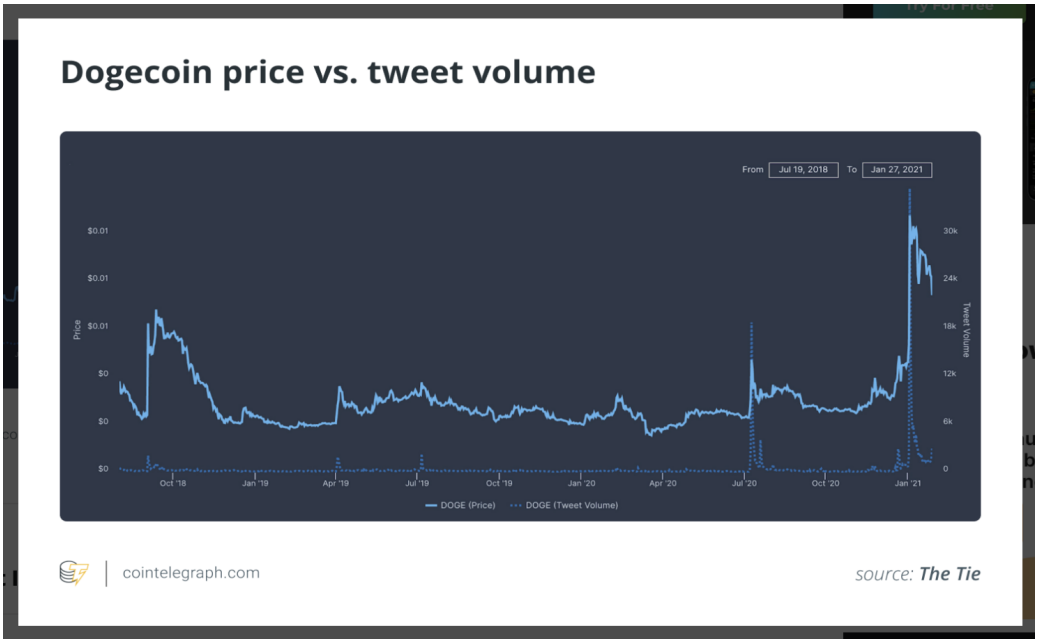


As you can see, the blue shaded area represents the range that the model predicted dogecoin's price would be at naturally, if not for Elon's tweet. The actual price of Dogecoin after ELon's announcement was much higher than the top of this confidence interval, showing that Elon's tweets do cause changes in Dogecoin's price. This applies to any influential figure with any cryptocurrency.

Now that we have determined that there is a correlation between Elon Musk's posts and Dogecoins price, we have to wonder if Elon Musk is manipulating the market through social media. We always see headlines from news articles about how drastic the changes in price are and we have to wonder if there is some intentional manipulation. In our project, we aim to find out if social media truly plays a major role in how a cryptocurrency is priced. But how would we go about this type of research? The first method that we used in our findings was through code.

First, we downloaded the datasets in the form of CSV for two sets. Then, we downloaded the dataset for Dogecoin and Elon Musk's Twitter. We decided to focus on Elon's tweets since he

is one of the most influential figures in history. Finally, we created a program code that would look for Elon's mentions of Dogecoin (of any form) and see if there was a cause-and-effect relationship between the price and the time of the tweets. The graph below shows the strong relationship between Social media and the price of crypto, especially Elon Musk's tweet and the dogecoin pricing.

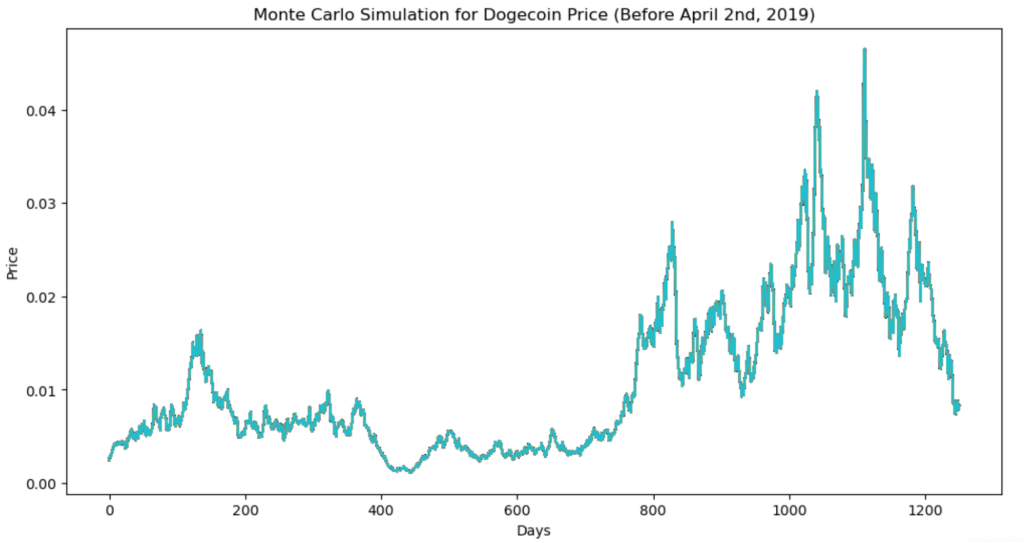


The simplest way to understand how Elon affected Dogecoin was to calculate the daily return for the crypto. We see a nearly 350% increase when Elon makes his tweet in January 2021. As a billionaire willing millions of followers, Elon's action can change the attitude of the internet community, hence driving the price for this "meme" crypto.

Despite the findings above, there is still not enough evidence for our group to confirm whether Elon Musk's social media influence was deemed to have affected Dogecoin's prices. In search of more evidence, we decided to run what is called a Monte Carlo simulation. A Monte Carlo simulation is a simulation that uses past data to predict the future. This is commonly used within the financial world commonly used in predicting the prices of financial assets such as

stocks, derivatives, etc. We made sure to run the Monte Carlo simulation before April 2nd, 2019. That date is important as it is the date that Elon first tweeted about anything related to Dogecoin. We wanted the simulation to show what it would think the price path would be of Dogecoin before Elon Musk started to tweet about it. The Monte Carlo simulation is given directly below:

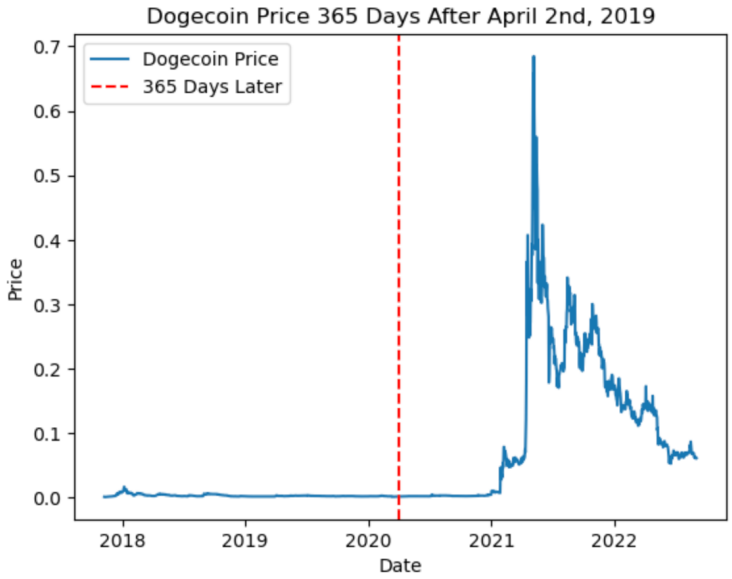
Figure 1.0:



In the table above, we ran the simulation for 350 to have t-days after April 2nd, 2019 to get a rough idea of what the returns would be like post-Elon's tweet. After, we calculated the mean and standard deviation of datasets from the monte carlo simulation; finding a mean of 2.14 and a standard deviation of 2.17. Then once we got the monte carlo simulation we wanted to cross-examine this with the actual price a year after Elon Musk's tweets.

While this kind of analysis would not be exact in its estimates, it would give us a rough idea of what a world without Elon's tweets would be like and how that would compare to the real world. Compare this with the graph below of what actually happened 365 (might change to a couple of years instead) days after Elon Musk's tweet about the Dogecoin price.

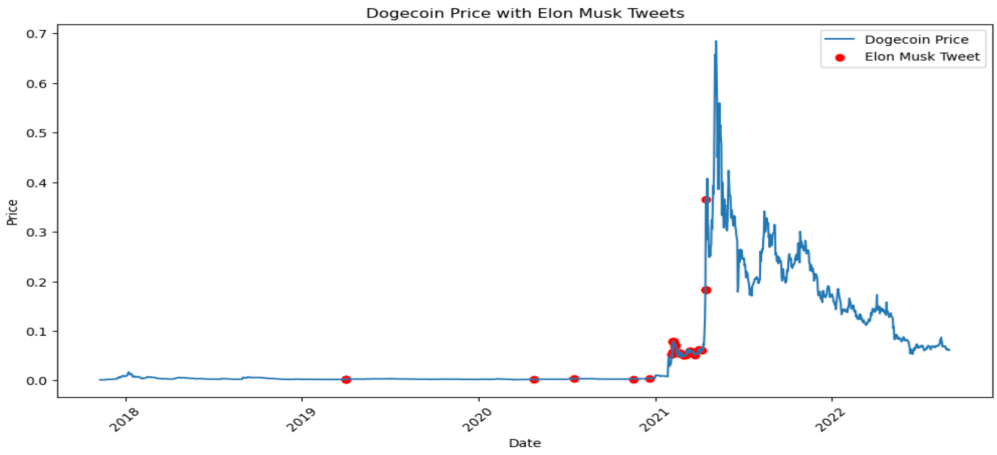
Figure 1.1:



Looking at the graph above we can see that the price of the Dogecoin had a huge spike in 2021 and trailed off in 2022. The Monte Carlo simulation predicted this in a couple of instances. First, most of the lines were congested around a price of 0.2. This tells us how unlikely it would have been for Dogecoin's price to follow this path if it was not partially for Elon Musk's tweets.

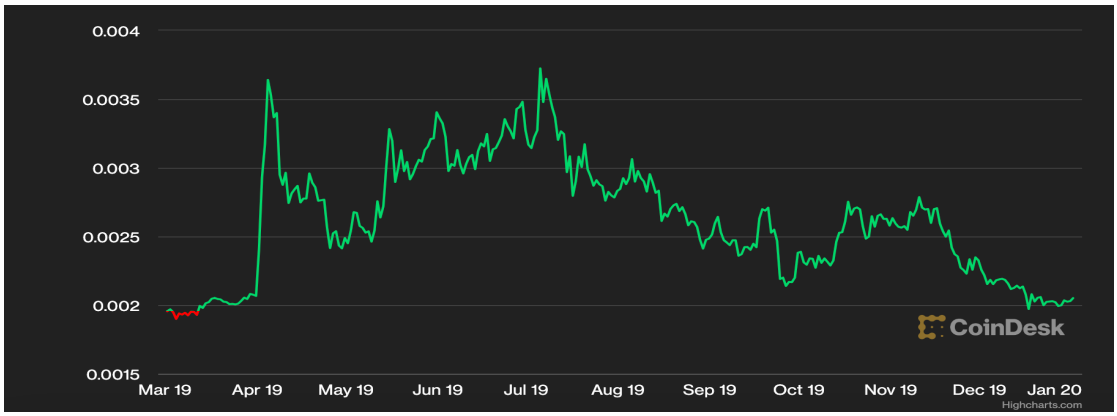
While contributions to a price change in any asset is a science in itself, we and typically are multi-variable, there seems to be a glimpse of an indication from this particular examination that Elon Musk's tweets have an effect on the price of Dogecoin. Now we could not just stop there. So we merged the two data sets within Jupyter and filtered for tweets that mentioned Dogecoin in some sort of way.

Figure 1.3:



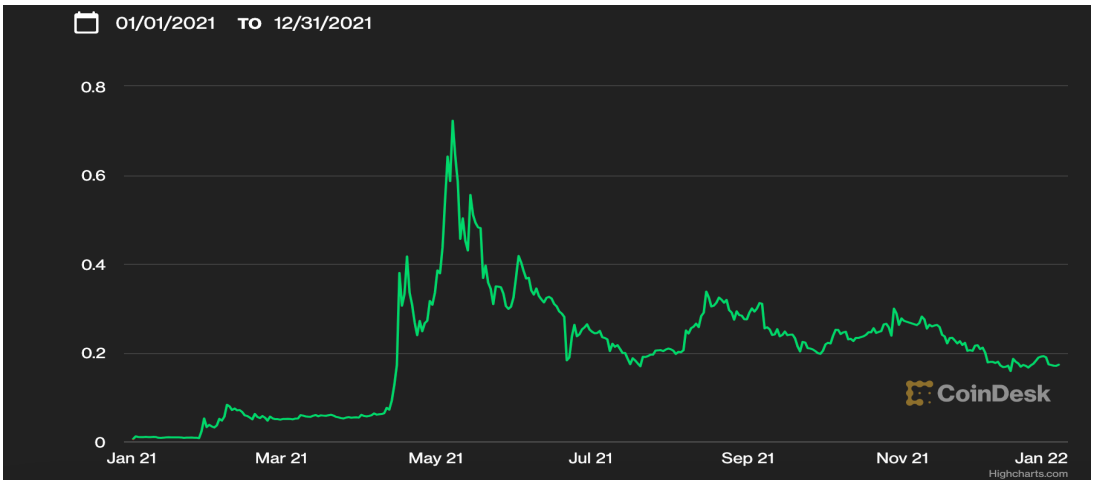
From this graph, the red dots highlight where there was some mention of Dogecoin. The only caveat there with our methods within Jupyter is that we could not filter images. For example, if Elon made a mention of Dogecoin through a picture/meme, we could not detect it. So it would be difficult to get all mentions of Dogecoin but we still managed to find a lot of mentions regardless. After I got this chart I then decided to take a closer look into 2019. We can see from the graph that there is one dot that corresponds to what we said earlier where Elon first mentioned Dogecoin on April 2nd, 2019.

Figure 1.4:



Taking a closer look, we spotted that sharp increase on April 2nd, 2019. One of Elon's first mentions is about cryptocurrency. Then we got another graph for the year 2021.

Figure 1.5:



With this graph, we should pay attention to not only the trend of the graph. Looking back at Figure 1.3, we can see that within 2021 there were many mentions of Dogecoin (or anything related). This correlates with our finding that Elon made many mentions of Dogecoin within SNL and that also took place in 2021. Another key point we see in this graph is the price. Referring to Figure 1.0, the Monte Carlo simulation never predicted that the price of Dogecoin would even reach .05. But as we can see in Figure 1.6 the price ended up going towards 0.7.

A huge gap between the simulation and the real data. From these chart comparisons, we see that Elon Musk has created some fluctuations in Dogecoin's price and might have even sparked the general upward trend since 2019 toward the price increase (and many fluctuations). But regardless of the graphs and the simulations, causation does not equal correlation. While the graphs do align generally with what we are trying to prove in that Elon Musk's tweets have a huge impact on the price of Dogecoin, there still are many variables that could contribute to the price.

Conclusion:

We can conclude that social media does have a large impact on crypto. Not only that, but even one person can have a huge impact on a cryptocurrency. In this case, Elon has clearly had a huge effect on Dogecoin's trajectory. From the Monte Carlo simulation that we ran, we analyzed and cross-examined the data and found a strong correlation. Therefore, we can confidently say that Elon has an impact on Dogecoin's price, not just a small impact but a sizable one.

This matters because even during our lectures, the topic of crypto and uncertain volatility has always been brought up. From this, we can see that for the casual investor who would want to passively grow their wealth over time, Dogecoin and these other trendy currencies are not the answer. Admittedly, currencies like Ethereum and Bitcoin are starting to gain more adopters, so the price is less affected but one individual. Even still, the one constant among all cryptocurrencies is that they come with high potential returns, but also high risk. ("Most Stable Cryptocurrency In 2023).