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# ECON 422: Econometrics 2 - Machine Learning and Economics

## 1. Research proposal

Using Machine Learning to analyze cryptocurrency trends:
Can we predict Tether's market cap evolution using other cryptocurrencies's demand ?

## 2. Context

Cryptocurrencies are digital assets used as currencies for online transactions, using technology to secure money creation, money movement, limit money emission, or add features such as smart contracts. Their price is determined only by offer, demand and trust that people have in it, thus their value is very volatile, which makes them both a digital currency that can be used for shopping (if accepted) and a very speculative asset that can be traded against any other cryptocurrency on online platforms.

Every unit of cryptocurrency is assigned to a wallet, an address composed of many letters and numbers. Many online exchanges offer people to trade one crypto against another, but few accept normal currencies such as USD or Euros to buy cryptos, so in order to buy any cryptocurrency, you first have to buy it on one platform that accept regulated currencies, then send it to a wallet on an exchange platform where you can trade it, which causes transaction costs.

Anyone wanting to trade cryptos must go through this process:

1) Create an account on a platform that sells cryptocurrencies against real currencies[1]
2) Create an account on a platform where you can trade cryptocurrencies
3) Send what you bought from the first platform to the second one, which causes transaction costs[2]

And the process is the same in the other direction for anyone who would like to exchange his cryptocurrency to get real money: send the crypto from the trading platform to the conversion platform (which causes transaction costs) and convert it back (which causes conversion costs).

The process isn't immediate and even if the amount of bitcoin sent from one platform to another doesn't change, the value in dollar of the asset may have changed by the time it is finally converted to dollars.

These intermediate steps make it long and costly to convert a cryptocurrency asset to a safe and stable value such as a normal currency, so a platform thought about a way that would

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[1] Few platforms accept to sell cryptocurrencies against real money (called fiat). Most platform accepting fiat make money on conversion rate euro/bitcoin, usd/btc while exchange platforms, where people trade cryptocurrencies make money on transaction fees

[2] Every time money is moved from a wallet to another, a transaction fee must be paid to secure the transaction. A computer will record the movement through a secured process and add the amount, the origin, the destination, the date and the time to a public register that will make sure this transaction can't be undone.

allow people to move much faster from a "speculative" asset to a stable value asset and opposite:

The Tether

The Tether[3] (USDT) is a cryptocurrency created by Bitfinex, one of the biggest cryptocurrency trading platform, that (supposedly) has every unit of tether backed by it's original currency (for the USDT, the original currency is the US Dollar), and guarantees a fixed rate of:

1 USDT = 1USD

It is now possible to trade at any time a cryptocurrency against its USDT value almost instantly, which secures the value since every USDT can be exchanged at any time at the rate 1 USDT = 1 USD

This not only makes it much faster to secure an investment, but also avoid both conversion and transaction costs. The Tether is called a "stable-coin" (its value is stable), and thus the ultimate safe-haven when people feel like other cryptocurrencies's values are about to go down. [4]

The Tether launched in 2015 quickly became one of the biggest cryptocurrency by volume (6th biggest today) with a market cap of 4.6 billion USD and the biggest by traded volume everyday: 40 billion USD.

## 3. Data

We plan on using the historical data of the Tether and the other most important cryptocurrencies (by market cap).
We built a scrapper that can gather historical daily data from websites and make a .csv out of it containing for each cryptocurrency:

- its value at the beginning and end of the day[5]
- its highest value and lowest value of the day
- how much volume was traded (USD)
- the market cap at the end of the day

For the last 5 years

## 4. Method

As we know, the Tether is a safe haven for anyone who would like to secure or "freeze" the value of its assets in a currency fearing it might go down. Given the volume traded and the market cap we know if the demand of Tether goes up or down.

We can assume that if the demand in Tether goes up, people expect cryptocurrencies to go down (they want to secure their investment, they think the market is going down), if the

[3] We will be talking about the USDT, for "United States Dollar Tether"
[4] The Tether is not the only stable-coin but its market cap and volume traded everyday are respectively 10 times and 100 times more important than the second biggest stable coin so I didn't judge necessary to make it part of the research proposal
[5] UTC Time

demand of Tether goes down, people are selling Tether to buy riskier assets, so expect them to go up.

We would like to analyze the data to determine if we can predict the evolution of Tether's market cap: if we can predict Tether's market cap given other cryptocurrencies's trend we will know whether the markets will be bearish or bullish, and from this we will know whether we should buy or sell.

## 5. Why

more than just a way to predict markets on this domain but a general behavior about risk
We think this this topic is interesting because even though cryptocurrencies are unregulated and for many of them heavily influenced by big actors, they follow human behaviors that most of them replicated in regulated market finance and other domains:
We will learn through this project if we can predict Tether's value but we will learn about people's behavior toward a "safe-value" which is more than just a way to predict markets on this domain but a general behavior about risk aversion.

This topic is also interesting because the US Justice Department is investigating Bitfinex for illegally manipulating the price of Bitcoin using the Tether, and because Bitfinex failed to provide an audit showing reserves correctly backing every Tether "printed" or emitted, meaning that this cryptocurrency could be the trigger of a crash if Bitfinex failed at some point to guarantee the fixed rate

## 6. Sources

https://coinmarketcap.com/currencies/tether/

https://www.bloomberg.com/news/articles/2018-11-20/bitcoin-rigging-criminal-probe-is-said-to-focus-on-tie-to-tether

https://arstechnica.com/tech-policy/2018/02/tether-says-its-cryptocurrency-is-worth-2-billion-but-its-audit-failed/