

# Digital Tools Project-Effect of Interest Rate Changes on Cryptocurrencies.

Cameron Storey, Marc David Parker, Matthias Olieslagers, Qian Chen

UZH Digital Tools for Finance

2022

# Introduction

The goal of this research report is to discover how changes in FED interest rates have an impact on the prices of cryptocurrencies (e.g. Bitcoin)

We will look at multiple methods and see if there are any significant results with an aim to create a strategy we could use to successfully trade cryptocurrency markets.

# Our Code

The code we have developed within Python, we have used a range of python packages as follows:

- ▶ Pandas
- ▶ Numpy
- ▶ matplotlib

The following were used for our data handling, data analysis and our data visualisation.

# Analysis Method

We have based our analysis on correlation and trend analysis.  
We obtained results based on a hypothesis testing method and tried to see if there were any significant results.

Our results are shown in the following slides.

## Findings, n day change

We ran multiple methods the first was an analysis of the price change n days after a FED rate change. We were looking to see if there is a significant move on a specific day.

	FED_change	0day	1day	2day	3day	4day	5day	6day	7day
FED_change	1.000000	-0.121775	-0.071150	-0.137565	-0.220316	-0.156568	-0.197437	-0.272994	-0.241836
0day	-0.121775	1.000000	0.839905	0.800050	0.801722	0.741039	0.724519	0.763272	0.729151
1day	-0.071150	0.839905	1.000000	0.960274	0.940703	0.925157	0.875687	0.783426	0.757515
2day	-0.137565	0.800050	0.960274	1.000000	0.935841	0.865569	0.812844	0.719470	0.676462
3day	-0.220316	0.801722	0.940703	0.935841	1.000000	0.960578	0.908720	0.826185	0.801751
4day	-0.156568	0.741039	0.925157	0.865569	0.960578	1.000000	0.965985	0.874655	0.851037
5day	-0.197437	0.724519	0.875687	0.812844	0.908720	0.965985	1.000000	0.956686	0.939305
6day	-0.272994	0.763272	0.783426	0.719470	0.826185	0.874655	0.956686	1.000000	0.975990
7day	-0.241836	0.729151	0.757515	0.676462	0.801751	0.851037	0.939305	0.975990	1.000000

## Findings, n day change

We see no significant evidence of a price change in a certain direction on a specific day. So we will now perform a moving average analysis.

# Findings, Moving Average

As we observed no significant result we have moved onto Moving average in which we obtained the following data/results.



	10MA_after	in CI10	50MA_after	in CI50	100MA_after	in CI100
Dates						
2016-12-15	832.159	1	907.1	1	1007.87	1
2017-03-16	1039.83	1	1182.86	1	1737.59	1
2017-06-15	2621.48	1	2562.62	1	3301.4	1
2017-12-14	16789.5	1	13934.8	1	11728.9	1
2018-03-22	7876.63	1	8304.66	1	7788.05	1
2018-06-14	6510.16	1	6917.66	1	6766.36	1
2018-09-27	6598.83	1	6428.51	1	5190.92	1
2018-12-20	3914.6	1	3714.32	1	3808.29	1
2019-05-02	6108.16	1	7841.82	1	9381.62	1
2019-08-01	11331.1	1	10518.1	1	9583.72	1
2019-09-19	9099.63	1	8689.59	1	8161.01	1
2019-10-31	9188.94	1	7956.84	1	8143.51	1
2020-01-30	9562.93	1	8648.74	1	8031.78	1
2020-03-04	7586.75	1	6816.72	1	7991.54	1

# Findings, Moving Average

Once again we see nothing significance so we will move onto volatility analysis.



# Findings, Volatility

We now chose to analyse if there is any effect on the volatility and daily change of the BTC price data when there is a FED rate change.

Dates	VAR5_after	in CI5	VAR10_after	in CI10	VAR20_after	in CI20
2016-12-15	58.7501	1	2879.67	1	10397.7	1
2017-03-16	5495.71	1	5703.06	1	4116.18	1
2017-06-15	8799.64	1	8087.16	1	7507.3	1
2017-12-14	1.28859e+06	1	4.24513e+06	1	3.77894e+06	1
2018-03-22	149627	1	621939	1	565757	1
2018-06-14	16939.5	1	68529.4	1	68476.3	1
2018-09-27	1810.74	1	2119.79	1	18416.3	1
2018-12-20	13713.1	1	18449.9	1	15011.3	1
2019-05-02	15027.7	1	290445	1	970608	1
2019-08-01	300588	1	326216	1	408592	1
2019-09-19	375869	1	872259	1	627497	1
2019-10-31	6155.87	1	44146.8	1	170059	1
2020-01-30	11754.9	1	82583.4	1	124992	1
2020-03-04	261404	1	2.49269e+06	1	2.19922e+06	1
2020-03-16	325954	1	396339	1	299765	1
2021-06-17	5.60069e+06	0	4.21199e+06	1	2.3778e+06	1
2022-03-17	356444	1	3.30016e+06	1	4.99017e+06	1
2022-05-05	7.11792e+06	0	8.71889e+06	1	5.96133e+06	1
2022-06-16	400450	1	458997	1	466011	1
2022-07-28	113644	1	154663	1	279407	1
2022-09-22	52446.5	1	55977.4	1	147491	1
2022-11-03	1.02615e+06	1	4.2326e+06	1	4.2326e+06	1

# Findings, Volatility

	0	1	2	3	4	5
Dates						
2016-12-15	False	False	False	False	False	False
2017-03-16	False	False	False	False	False	False
2017-06-15	False	False	False	False	False	False
2017-12-14	False	False	False	False	False	False
2018-03-22	False	False	False	False	False	False
2018-06-14	False	False	False	False	False	False
2018-09-27	False	False	False	False	False	False
2018-12-20	False	False	False	False	False	False
2019-05-02	False	False	False	False	False	False
2019-08-01	False	False	False	False	False	False
2019-09-19	False	False	False	False	False	False
2019-10-31	False	False	False	False	False	False
2020-01-30	False	False	False	False	False	False
2020-03-04	False	False	False	False	False	False
2020-03-16	False	False	False	False	False	False
2021-06-17	False	False	False	False	True	True
2022-03-17	False	False	False	False	False	False
2022-05-05	False	False	False	False	False	False
2022-06-16	False	False	False	False	False	False
2022-07-28	False	False	False	False	False	False
2022-09-22	False	False	False	False	False	False
2022-11-03	False	False	False	False	False	False

# Findings, Volatility

Once again we see the FED rate change has no significant effect of the BTC price change or price Action, we see some significant results but we do not believe this is due to the FED changing the rate and more likely because of something else happening in the world and the market.

# LIBOR Correlation

We also ran an analysis on the correlation of the price of BTC and LIBOR (The London Inter-Bank Offered Rate)

We observed in the short term (approximately the last year) a strong negative correlation, although in the long term we couldn't see any significant predictors and thus LIBOR is not indicative of price move magnitude or direction.

# Conclusion

In conclusion, while it is possible that changes in the FED rate could influence the demand for Bitcoin, there are also a number of other factors that can impact the cryptocurrency's price. These include things like global economic conditions, investor sentiment, regulatory developments, and technological advances. As a result, it is difficult to draw a direct causal relationship between the FED rate and Bitcoin price.