

Impact of COVID-19 on the Crypto Market and the Power of BTC & ETH

IE 6600 - Computation and Visualization for Analytics

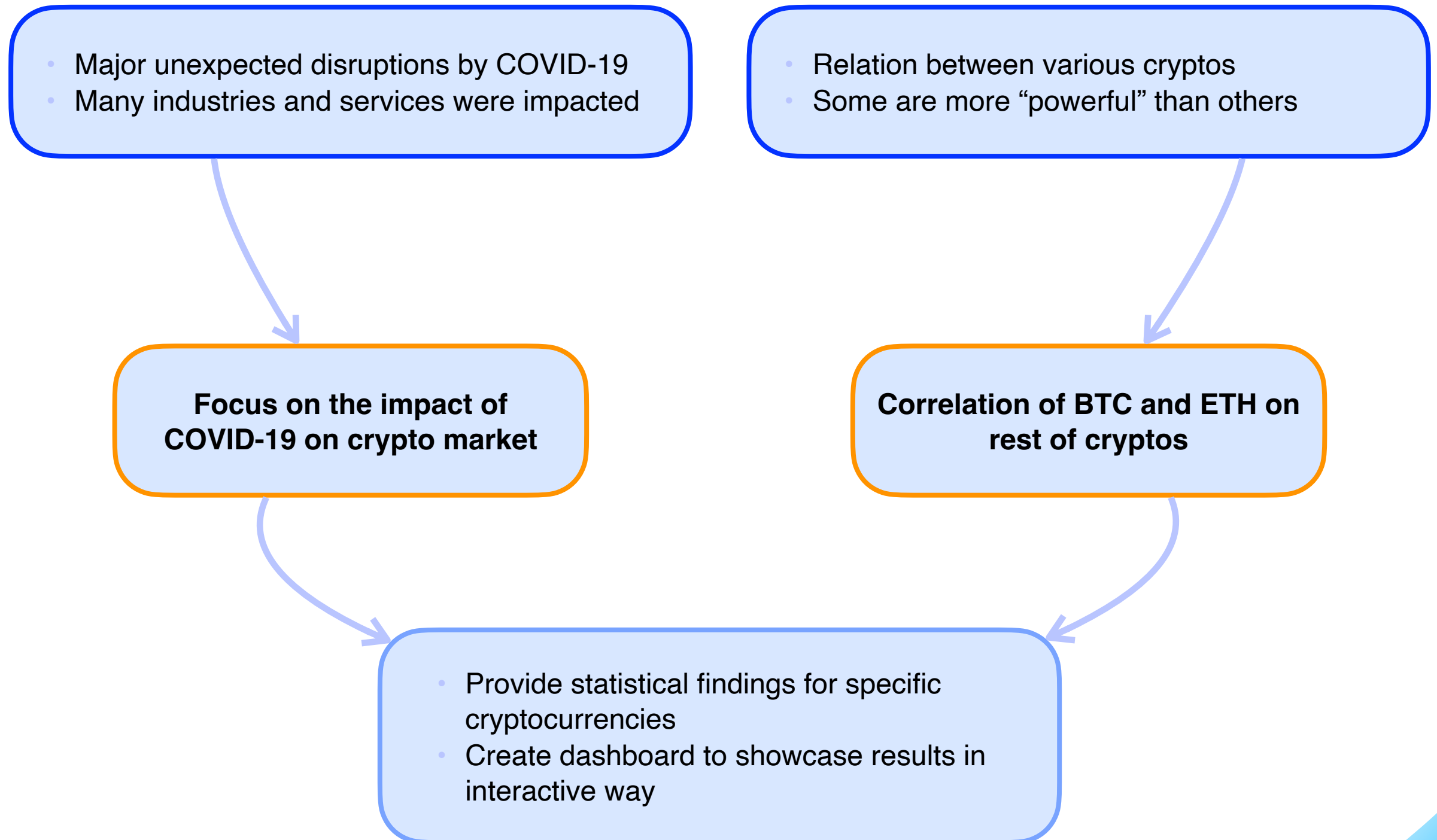
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Problem Context



Research Questions

RQ 1:

Did COVID-19 impact the crypto market?

RQ 2:

How do price movements in major cryptocurrencies influence the rest of the market?

Data Sources

Step 1: Download Datasets

Kaggle ([link](#))



Date, Open, High, Low,
Close, Adj Close, and
Volume

Step 2: Combine Datasets

Combined Dataset

Merged adding a new
column named "Symbol"
(i.e. BTC, ETH, etc)

Step 3: Clean Dataset

- Checked for 'nan' values (none present)
- Dropped unnecessary columns (Adj Close)

Data Overview

Column Name	Type	Description
Date	datetime	The day on which the price data was recorded
Open	float	The opening price of the cryptocurrency in USD
High	float	The highest price of the cryptocurrency in USD
Low	float	The lowest price of the cryptocurrency in USD
Close	float	The closing price of the cryptocurrency in USD
Volume	float	The trading volume of the cryptocurrency
Symbol	string	The ticker symbol of the cryptocurrency



index	Date	Open	High	Low	Close	Volume	Symbol
0	2018-10-08	1.004	1.008	1.002	1.002	382900.000	USDC
1	2018-10-09	1.004	1.008	1.000	1.007	108803.000	USDC
2	2018-10-10	1.005	1.019	1.004	1.010	711783.000	USDC

⋮

20394	2022-11-16	0.087	0.091	0.084	0.086	712826081.000	DOGE
20395	2022-11-17	0.086	0.087	0.083	0.085	461654197.000	DOGE
20396	2022-11-18	0.085	0.087	0.084	0.085	337485766.000	DOGE

⋮



Calculated Metrics

- *30-Day Moving Average of Price*
- *Percentage Change in Price*
- *30-Day Rolling Mean of Percentage Change in Price*
- *30-Day Rolling Standard Deviation of Percentage Change in Price*
- *Percentage Change in Volume*



index	Date	Open	High	Low	Close	Volume	Symbol	Moving_Average	Daily_Pct_Change	Daily_Vol_Change	Rolling_Mean	Rolling_Std
40	2018-11-18	1.010	1.015	1.001	1.012	5735460	USDC	1.008	0.274	0.036	0.018	0.605
41	2018-11-19	1.012	1.052	1.001	1.020	27873100	USDC	1.009	0.821	3.860	0.047	0.622
42	2018-11-20	1.016	1.057	1.007	1.020	43293600	USDC	1.009	-0.024	0.553	0.025	0.612



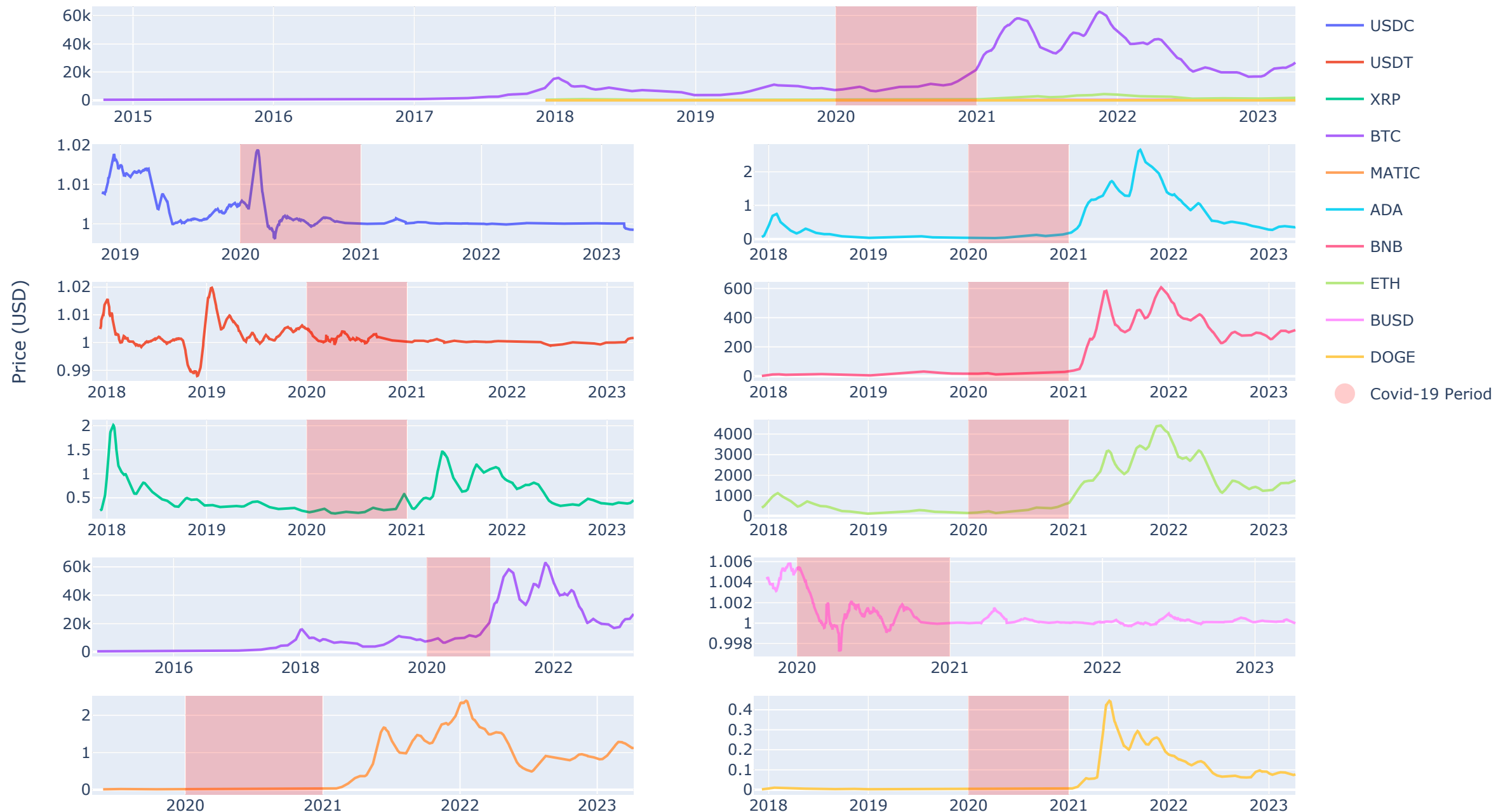
14829	2021-12-16	0.828	0.837	0.805	0.806	2178245900	XRP	0.934	-2.562	-0.295	-0.925	3.970
14830	2021-12-17	0.806	0.829	0.780	0.799	2364224847	XRP	0.924	-0.861	0.085	-0.970	3.961
14831	2021-12-18	0.799	0.835	0.793	0.827	1806931648	XRP	0.917	3.514	-0.236	-0.688	3.969



Data Exploration

RQ 1: Did COVID-19 impact the crypto market?

Moving Average of Closing Prices over 30 Days



- Cryptocurrencies experienced a slight price increase during the COVID-19 pandemic.
- ADA, XRP, BNB, ETH, MATIC, DOGE, and BTC had a significant peak after the pandemic.
- USDC, USDT, and BUSD displayed price fluctuations during the pandemic but later stabilized.

Data Exploration

RQ 1: Did COVID-19 impact the crypto market?

Rolling Mean of Daily Price Change



- The diagram shows price variations in cryptocurrencies during the pandemic.
- USDC, USDT, and BUSD had significant ups and downs, while some had little change.
- Different cryptocurrencies were impacted in different ways by the pandemic.

Data Exploration

RQ 1: Did COVID-19 impact the crypto market?

Rolling Standard Deviation of Daily Price Change

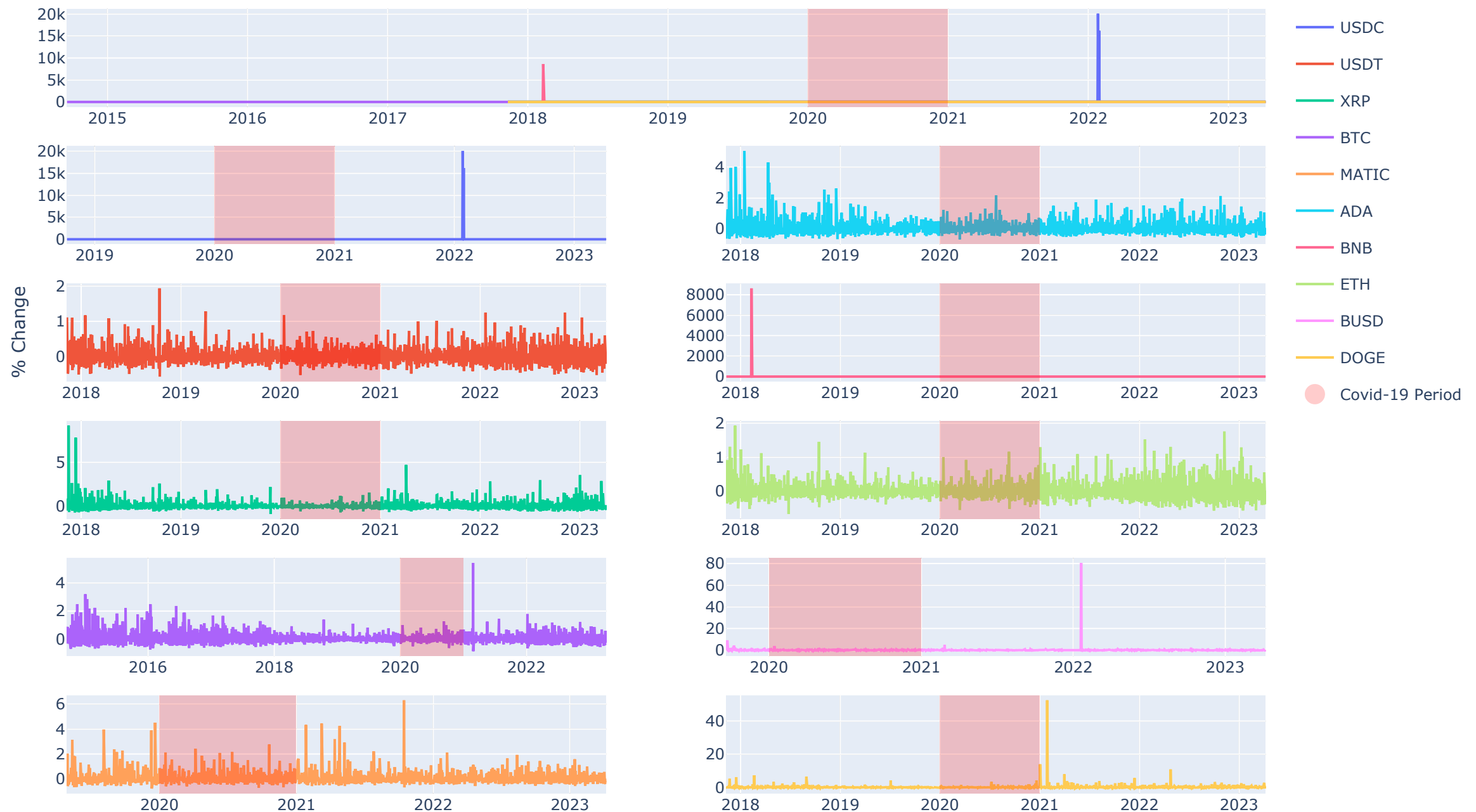


- Pandemic period affected market volatility
- Cryptocurrencies like USDC, USDT, BNB, ETH, BTC, and BUSD experienced significant volatility
- Pandemic may have contributed to market instability in major cryptocurrencies.

Data Exploration

RQ 1: Did COVID-19 impact the crypto market?

Percentage of Daily Volume Changes

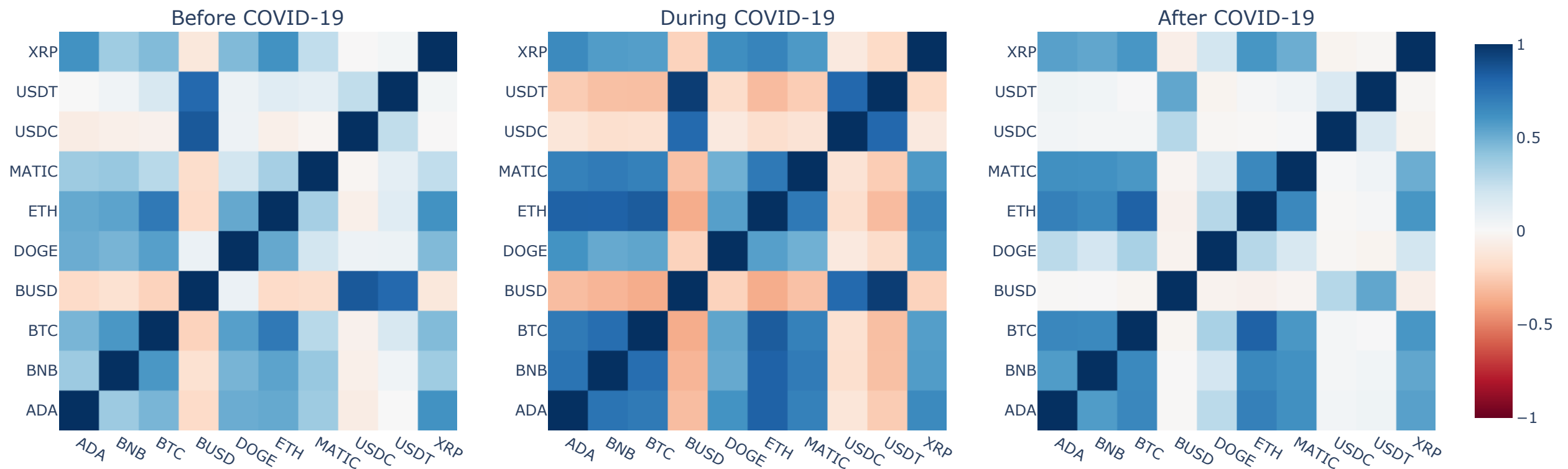


- Trading activity did not undergo a significant shift during the pandemic period.
- Volume changes followed a consistent pattern before, during, and after the pandemic.
- XRP, ETH, BTC, MATIC, and DOGE experienced a slight uptick in volume changes after the pandemic.

Data Exploration

RQ 1: Did COVID-19 impact the crypto market?

Correlation Matrices of Daily Percentage Changes Before, During, and After COVID-19 Period

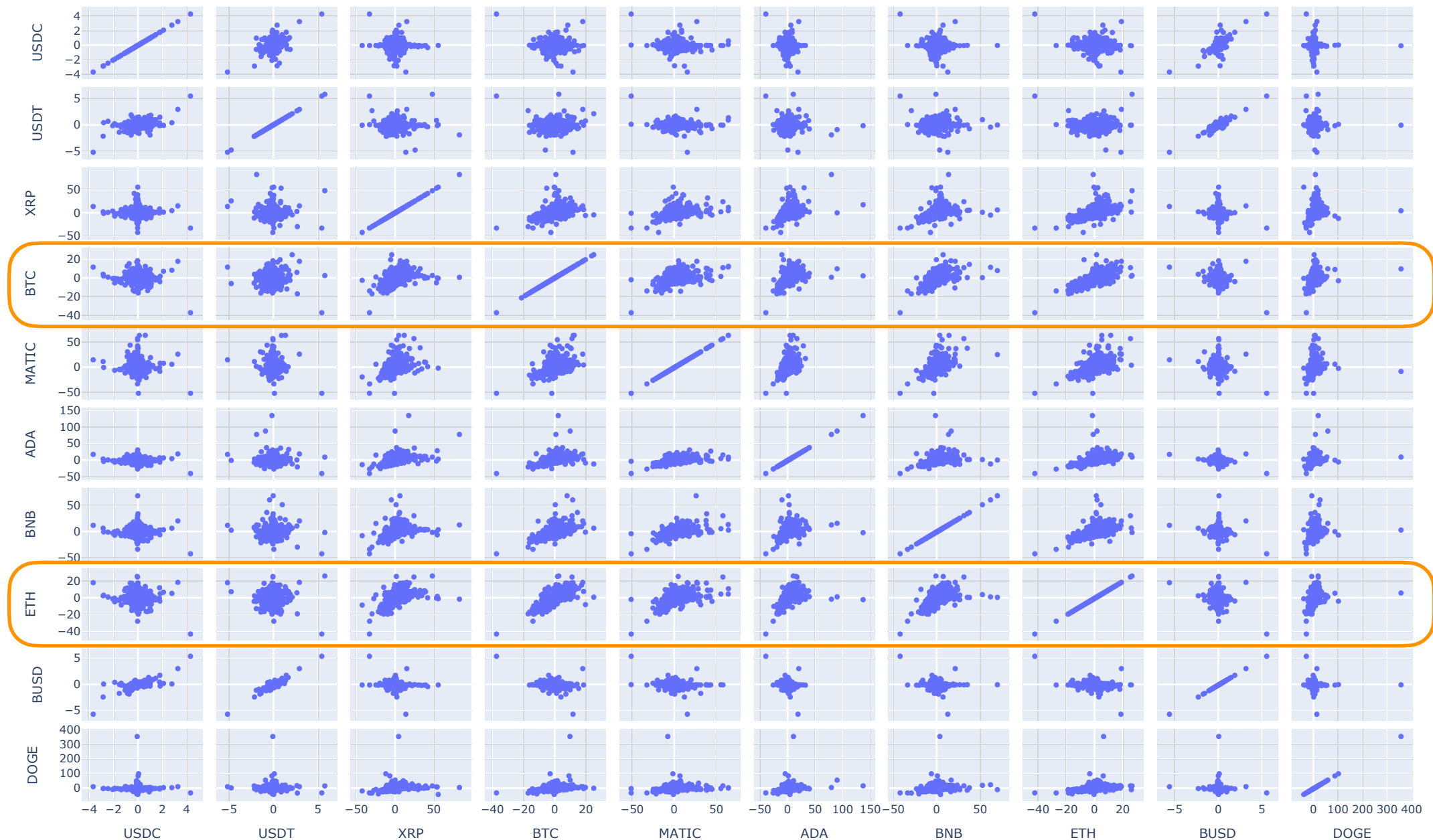


- USDT, USDC, and BUSD showed a different trend compared to other cryptocurrencies during the pandemic period.
- Most cryptocurrencies followed similar patterns in price fluctuation during the pandemic.
- The observation was made by analyzing heatmaps representing pre-pandemic, pandemic, and post-pandemic periods.

Data Exploration

RQ 2: How do price movements in major cryptocurrencies influence the rest of the market?

Scatter Plot Matrix of Daily Price Percentage Changes



- ETH and BTC show strong correlation with other cryptocurrencies
- This suggests their movements influence other cryptocurrencies
- Granger causality test performed to prove this behavior.

Data Exploration

RQ 2: How do price movements in major cryptocurrencies influence the rest of the market?

Granger Causality Test

Granger Causality Test, p-values (significance 0.05)

Lag Order	BTC vs. USDC	BTC vs. USDT	BTC vs. XRP	BTC vs. MATIC	BTC vs. ADA	BTC vs. BNB	BTC vs. BUSD	BTC vs. DOGE	ETH vs. USDC	ETH vs. USDT	ETH vs. XRP	ETH vs. MATIC	ETH vs. ADA	ETH vs. BNB	ETH vs. BUSD	ETH vs. DOGE
1	0.4404	0.539	0.0005	0.2461	0.4401	0.1264	0.0201	0.3246	0.2574	0.0365	0.0023	0.1819	0.1567	0.3347	0.0139	0.0227
2	0.0957	0.0055	0.0003	0.0972	0.0099	0.0697	0.01	0.5673	0.2941	0.067	0.0092	0.1333	0.205	0.1751	0.037	0.0489
3	0.1747	0.015	0.0009	0.0153	0.0293	0.0405	0.0113	0.5514	0.2695	0.0947	0.0094	0.0779	0.1511	0.2997	0.0179	0.1086
4	0.0352	0.0281	0.0018	0.0318	0.0752	0.0373	0.0215	0.662	0.1446	0.1092	0.0183	0.0618	0.1594	0.4119	0.0398	0.1346
5	0.0472	0.0548	0.0013	0.0005	0.0065	0	0.0313	0.6508	0.1383	0.0626	0.0354	0.0095	0.1888	0.0316	0.0918	0.0153
6	0.0616	0.0721	0.0013	0.0005	0.0154	0	0.0209	0.7196	0.2158	0.0527	0.0664	0.0017	0.0806	0.0706	0.0662	0.0228
7	0.1055	0.1465	0.004	0.0011	0.0077	0.0001	0.0482	0.726	0.3036	0.0855	0.0375	0.0037	0.0841	0.0786	0.1071	0.0389
8	0.086	0.206	0.0003	0.0014	0.013	0.0003	0.0672	0.783	0.1919	0.1386	0.0179	0.0066	0.0719	0.0318	0.1312	0.0641
9	0.0859	0.2103	0	0.0024	0	0.0004	0.089	0.8466	0.2538	0.1954	0	0.0111	0.0092	0.0395	0.1977	0.0895
10	0.0961	0.1003	0	0.0047	0	0.0014	0.0345	0.8743	0.2338	0.2456	0	0.0173	0.0099	0.04	0.101	0.1131

Legend: **Green** - Null Hypothesis Rejected

Null Hypothesis: *no Granger causality exists between the time series*

- Using a Granger causality test, one can analyze if price fluctuations in major cryptocurrencies like BTC and ETH have predictive power for the price changes in other cryptocurrencies.
- Bitcoin significantly influenced the prices of XRP, MATIC, ADA, BNB, and BUSD, but not USDC, USDT, and DOGE.
- Past price changes in Bitcoin can be used to predict future price changes in the aforementioned cryptocurrencies.
- Ethereum's price movements significantly influenced the prices of USDT, XRP, MATIC, BUSD, and DOGE, indicating major cryptocurrencies can impact the market dynamics of other cryptocurrencies.

Tableau Interactive Dashboard

Impact of COVID-19 on Cryptocurrencies and the Power of Bitcoin & Ethereum

Symbol

ADA

BNB

BTC

BUSD

DOGE

ETH

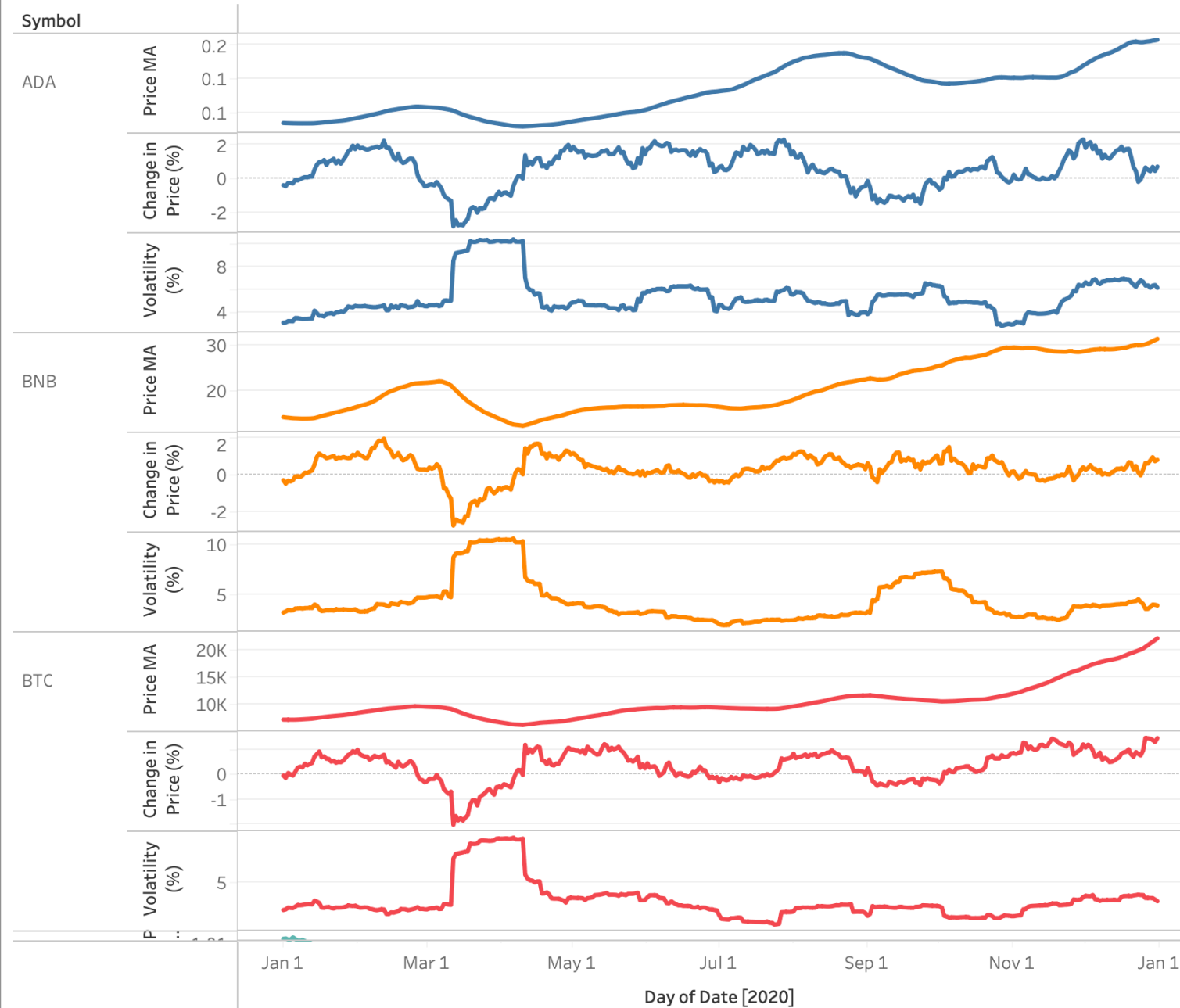
MATIC

USDC

USDT

XRP

Moving Average, % Change in Price, Volatility during COVID-19

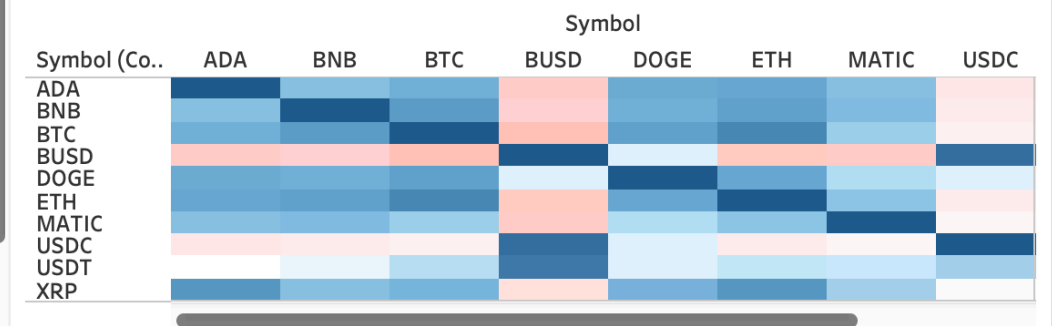


Pearson Correlation Matrix

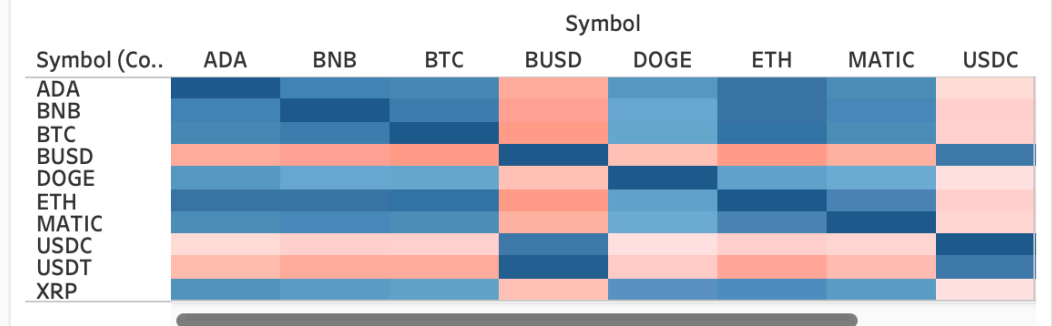
Pearson Correlation Coefficient



Before COVID-19



During COVID-19



After COVID-19

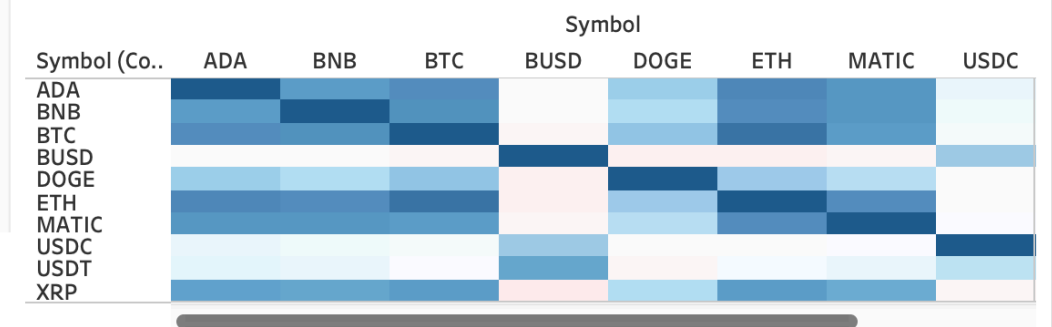
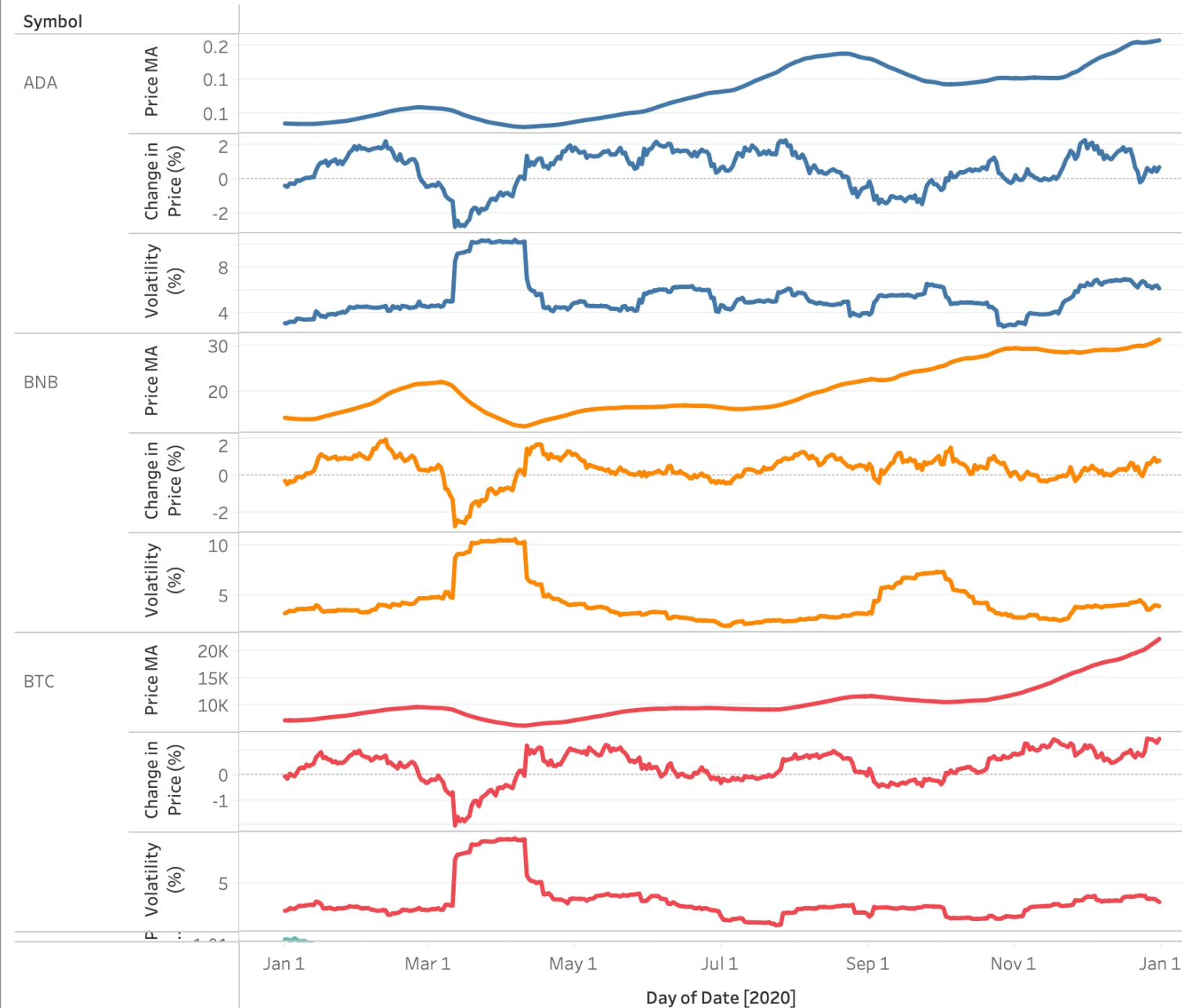


Tableau Interactive Dashboard

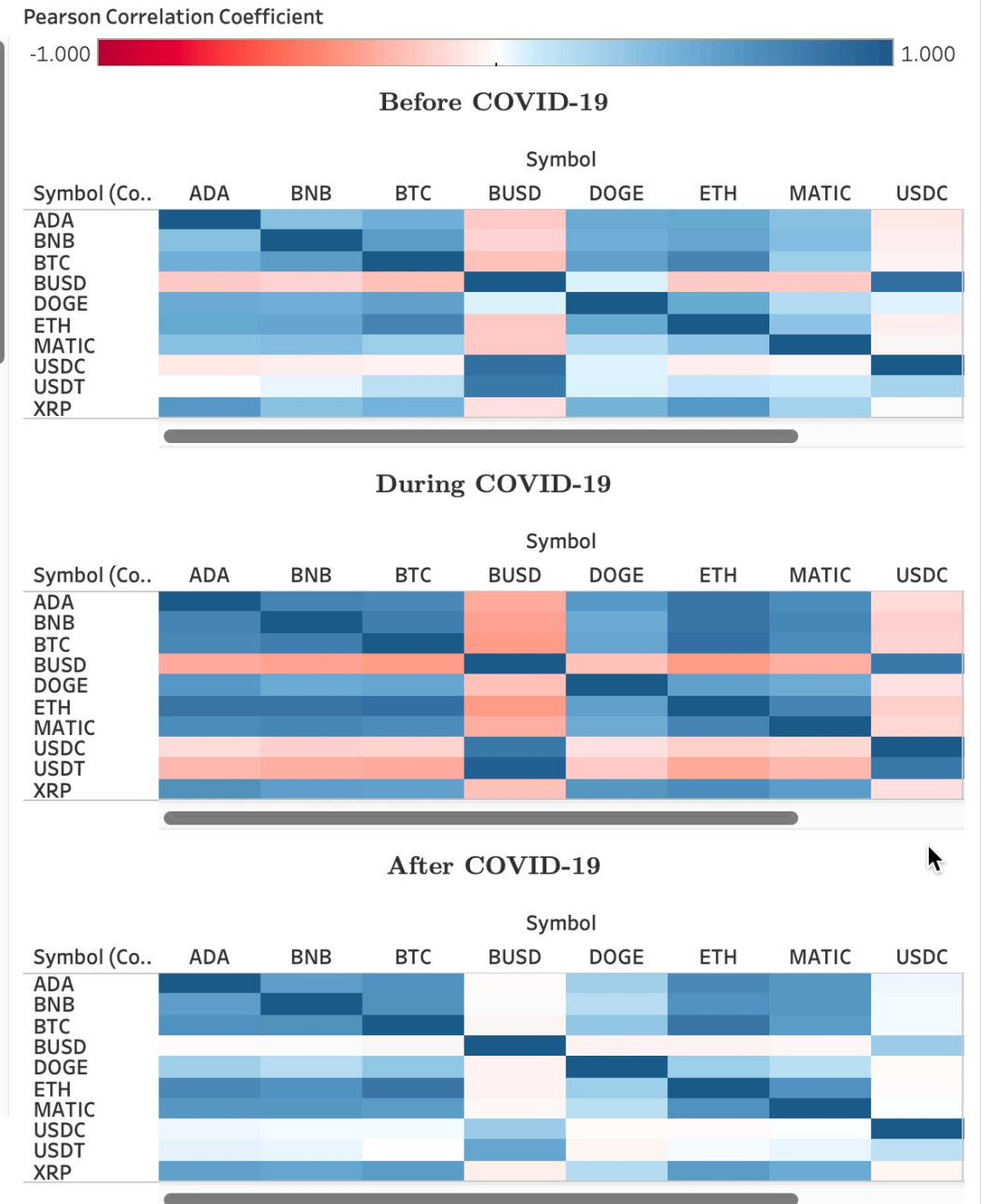
Impact of COVID-19 on Cryptocurrencies and the Power of Bitcoin & Ethereum

Symbol ADA BNB BTC BUSD DOGE ETH MATIC USDC USDT XRP

Moving Average, % Change in Price, Volatility during COVID-19



Pearson Correlation Matrix



Summary of Results

Research Question	Findings
RQ 1: COVID-19 Impact on Crypto Market	<ul style="list-style-type: none">• Slight price increase for ADA, XRP, BNB, ETH, MATIC, DOGE, and BTC during the pandemic, with a significant peak afterwards.• Price fluctuations for USDC, USDT, and BUSD during the pandemic, followed by stabilization.• Increased market volatility during the pandemic for certain cryptocurrencies. - No significant change in trading activity during the pandemic.
RQ 2: Influence of Major Cryptocurrencies on the Market	<ul style="list-style-type: none">• Strong correlations between price movements of Bitcoin and Ethereum and the rest of the market.• Granger causality tests indicate significant influence of Bitcoin on XRP, MATIC, ADA, BNB, and BUSD, and of Ethereum on USDT, XRP, MATIC, BUSD, and DOGE.

Thank you for your attention!

Questions?

