

How to Diversify with Crypto



**AN ANALYSIS,
BY NICOLE ROBERTS**

INTRODUCTION:

Crypto's correlation with the stock market

In 2018, the National Bureau of Economic Research concluded that “**Cryptocurrencies have no exposure to most common stock market and macroeconomic factors.**” During this time, the risk-return dynamics of cryptocurrencies were distinct from those of stocks, currencies, and precious metals. Changes in the value of cryptocurrencies did not mirror changes in the value of stocks, permitting crypto to serve as a way to buffer stock market losses and vice versa.

However, times have changed, along with **cryptocurrency's correlation with the stock market.**



ANALYSIS

Hypothesis

PART I

Cryptocurrencies appear to be highly correlated with one another:
the idea of "cryptodiversification" does not exist, or does so minimally.

PART II

Cryptocurrency prices are increasingly becoming exposed to the behavior of the S&P & 500, specifically to risk factors including **market cap size and value.**



Investigation

- 1.** Analyze cryptos together to compare risk/return profiles and correlations.

- 2.** Determine BTC's covariance and correlation to the S&P 500 and NASDAQ 100.

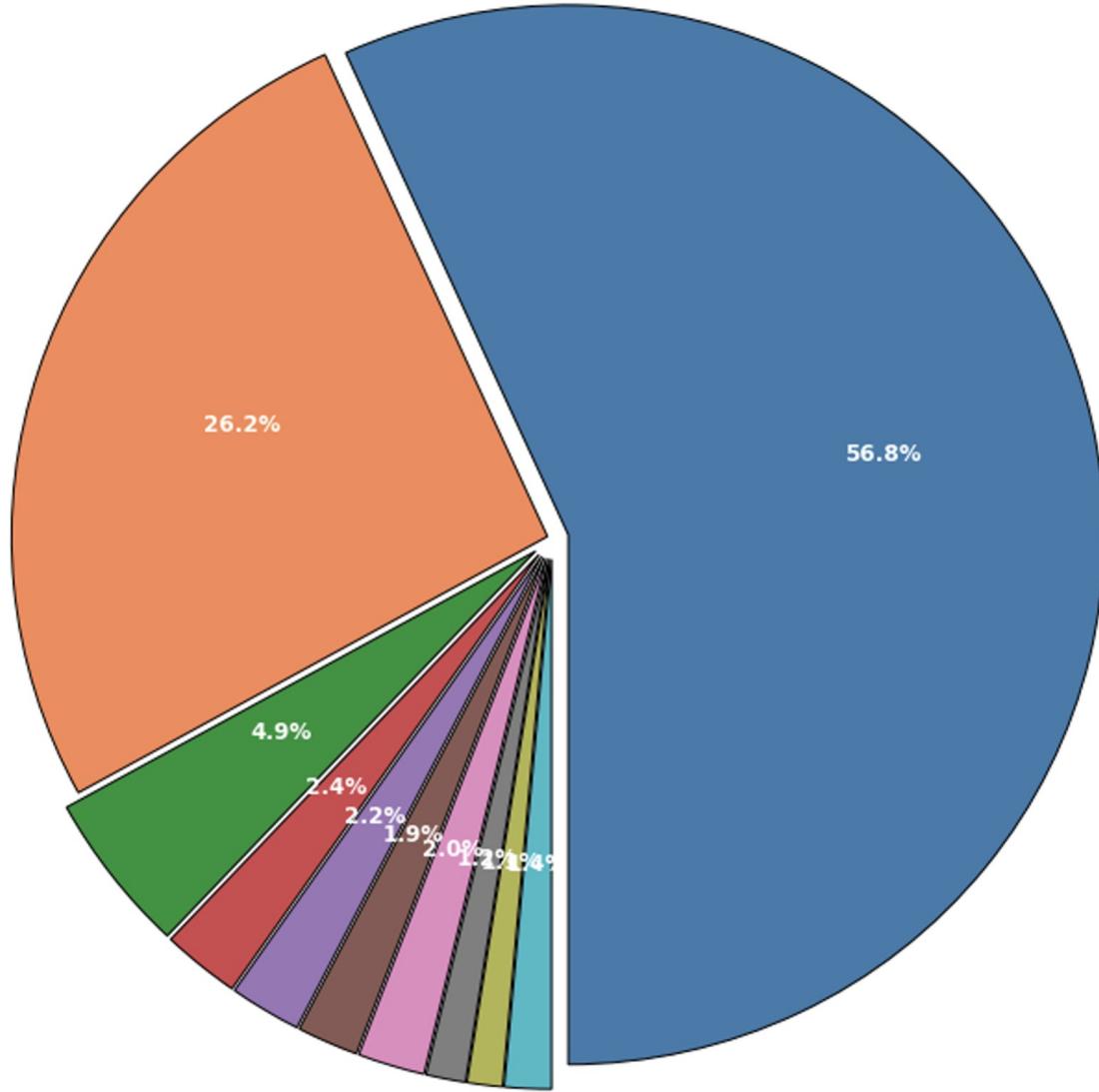
- 3.** Analyze BTC's exposure to value and size risk factors of the S&P 500.



PART I:

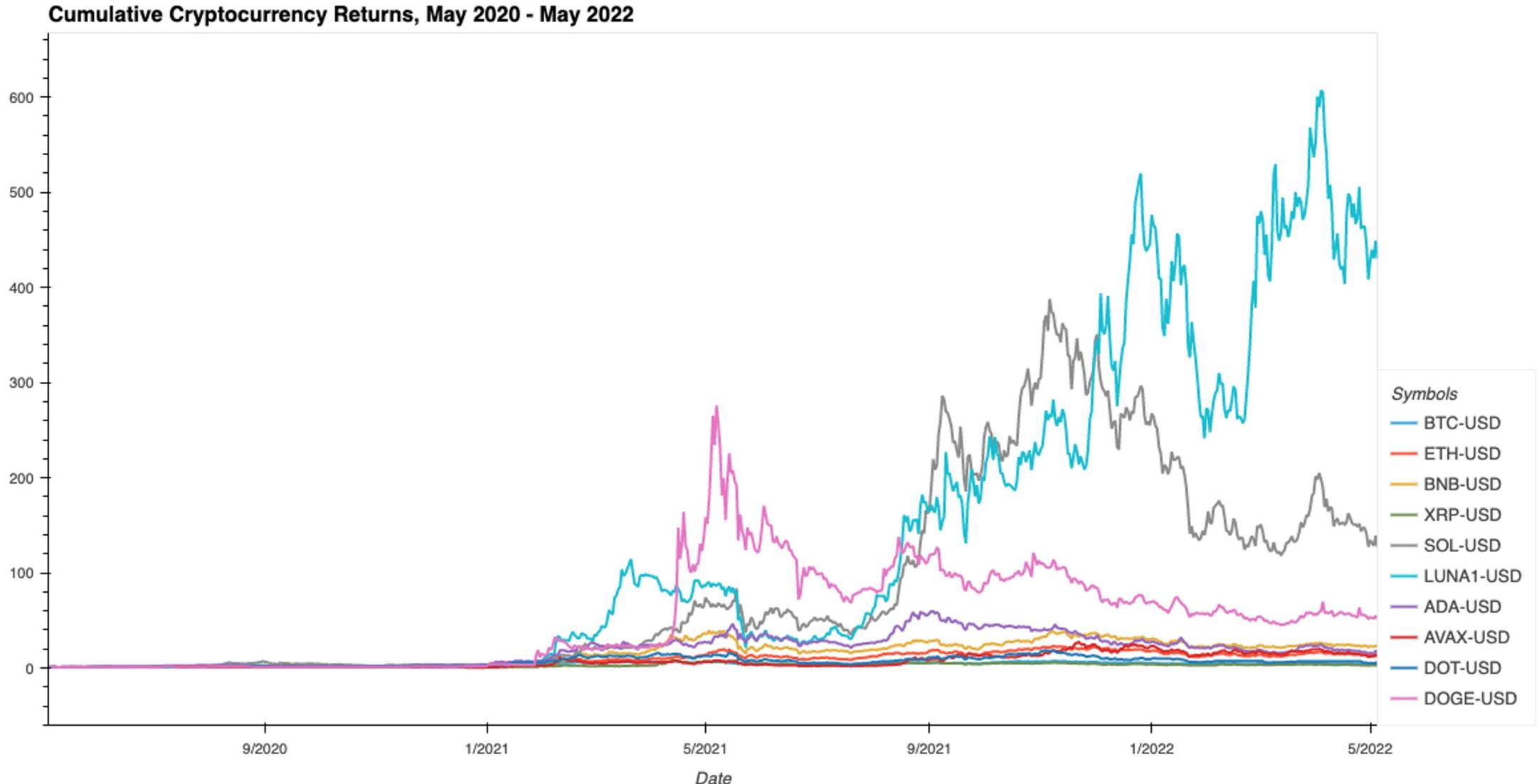
Snapshot of Top 10 Cryptocurrencies by Market Cap

Coins
BTC-USD
ETH-USD
BNB-USD
XRP-USD
SOL-USD
LUNA1-USD
ADA-USD
AVAX-USD
DOT-USD
DOGE-USD



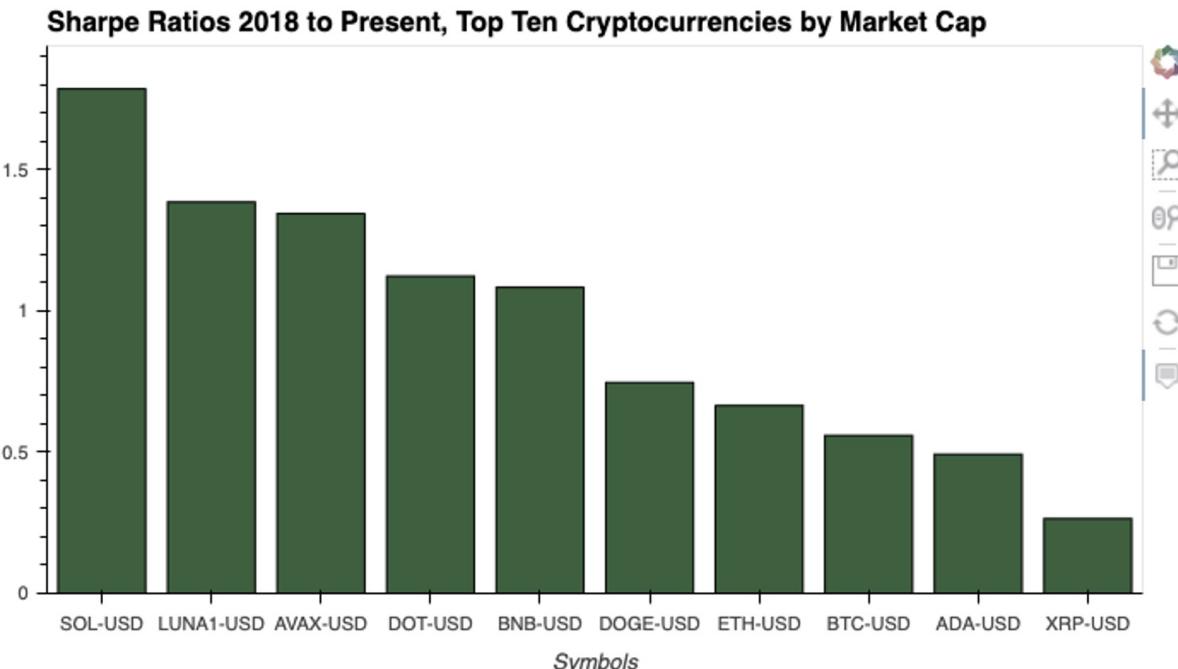
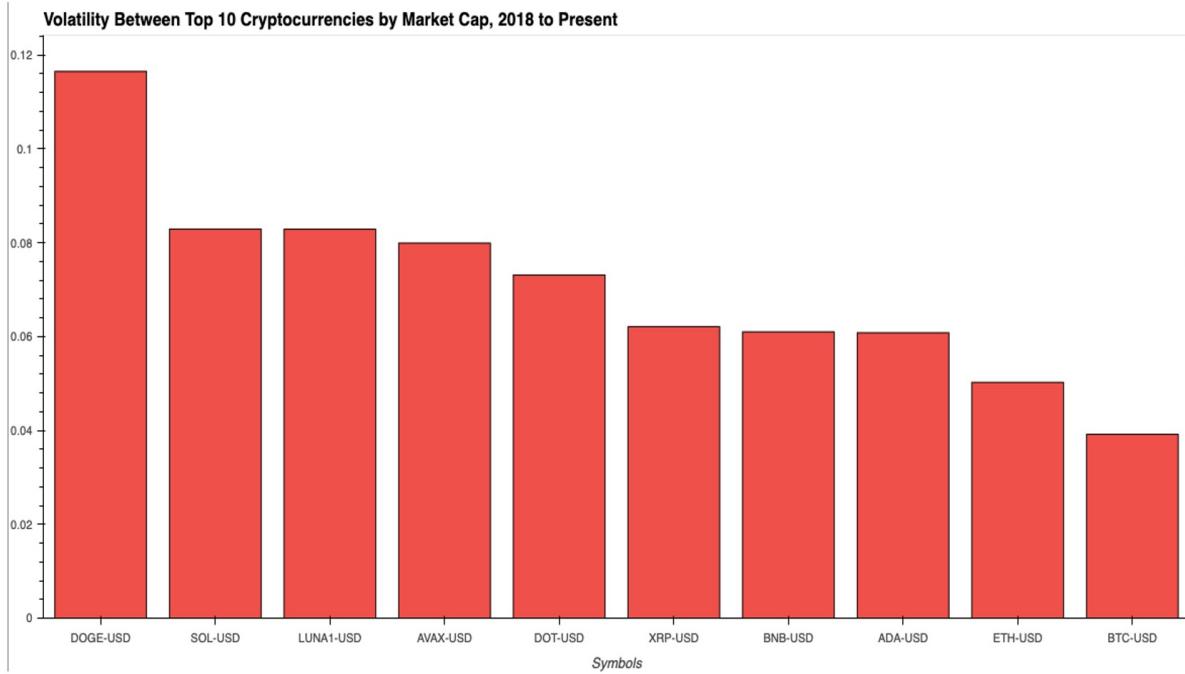
PART I:

Cumulative Returns, Top 10 Cryptocurrencies by Market Cap



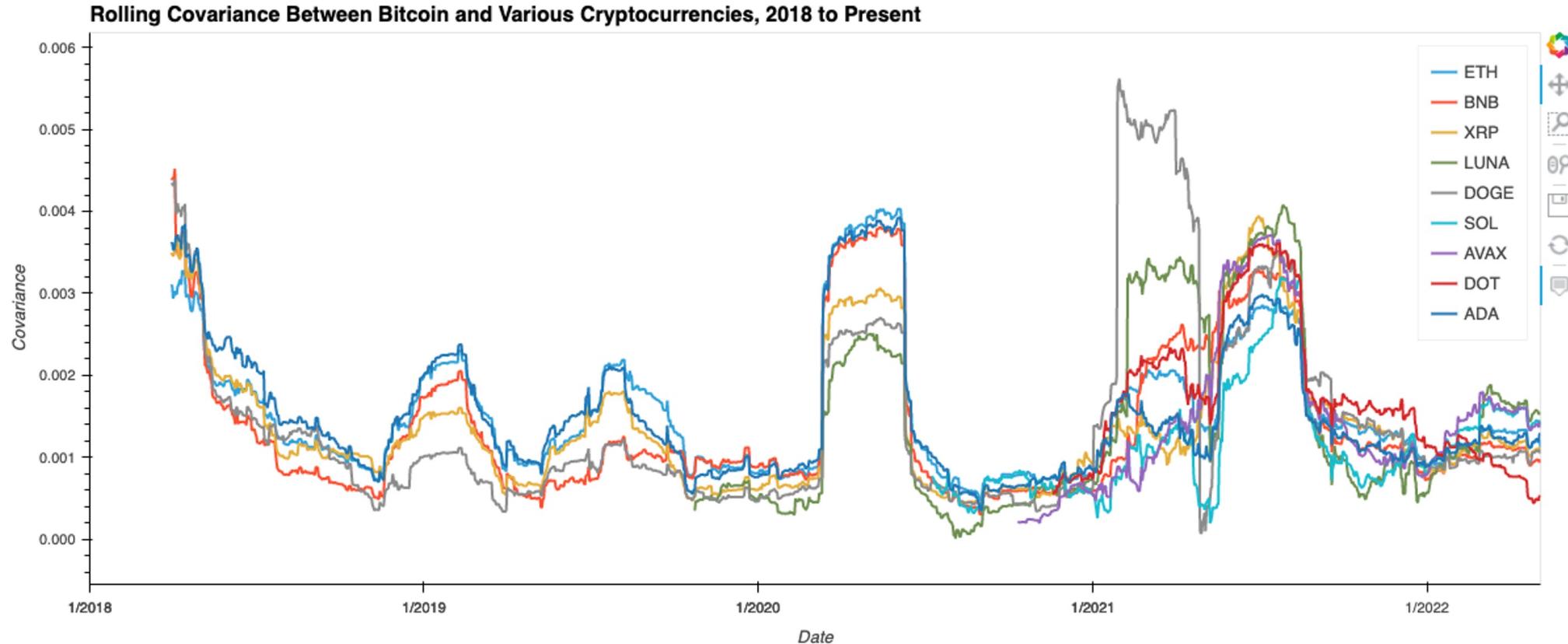
PART I:

Cryptocurrency Risk / Return Profile, 2018 to Present



PART I:

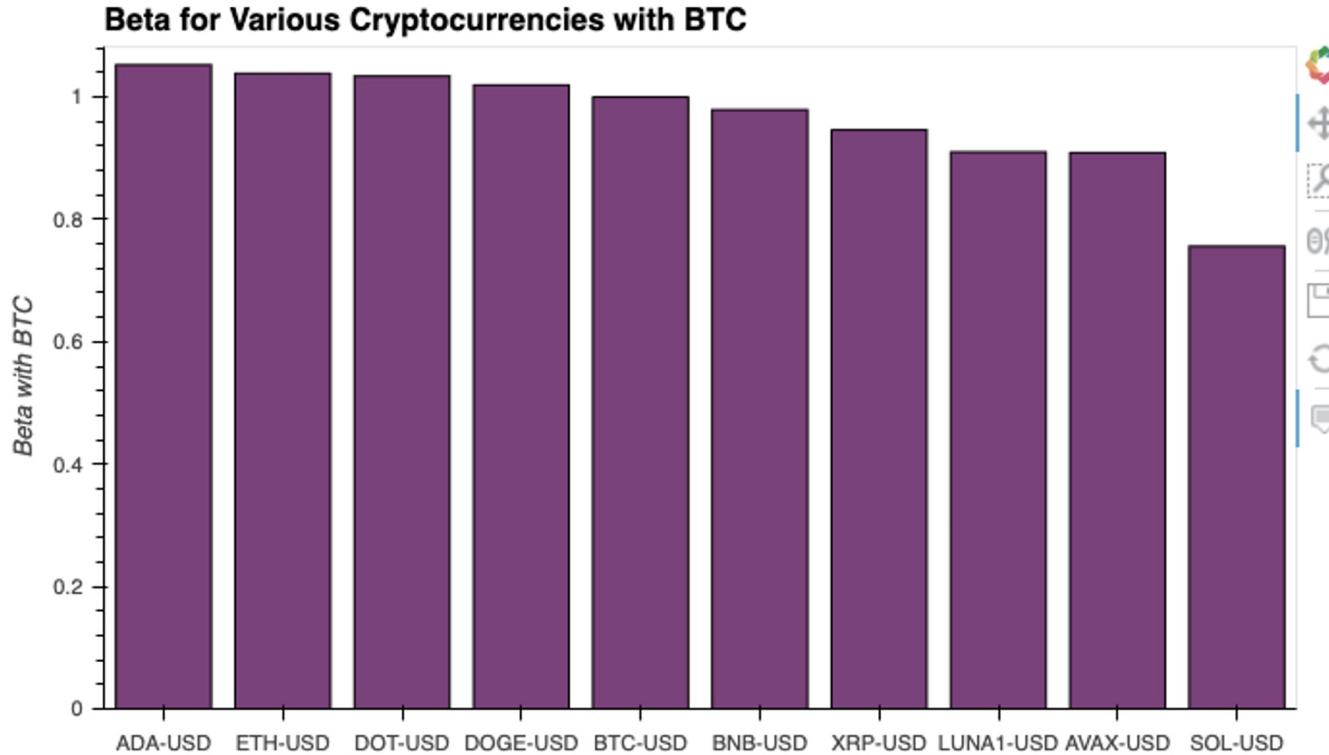
Rolling Covariance for BTC and Cryptos, 2018 to Present



- All cryptos maintained a **positive covariance with BTC** .
- Each crypto's covariance appears to follow a similar trend, **tracking one another**.
- All cryptos appear to offer **little downside protection** against BTC losses (poor diversification).

PART I:

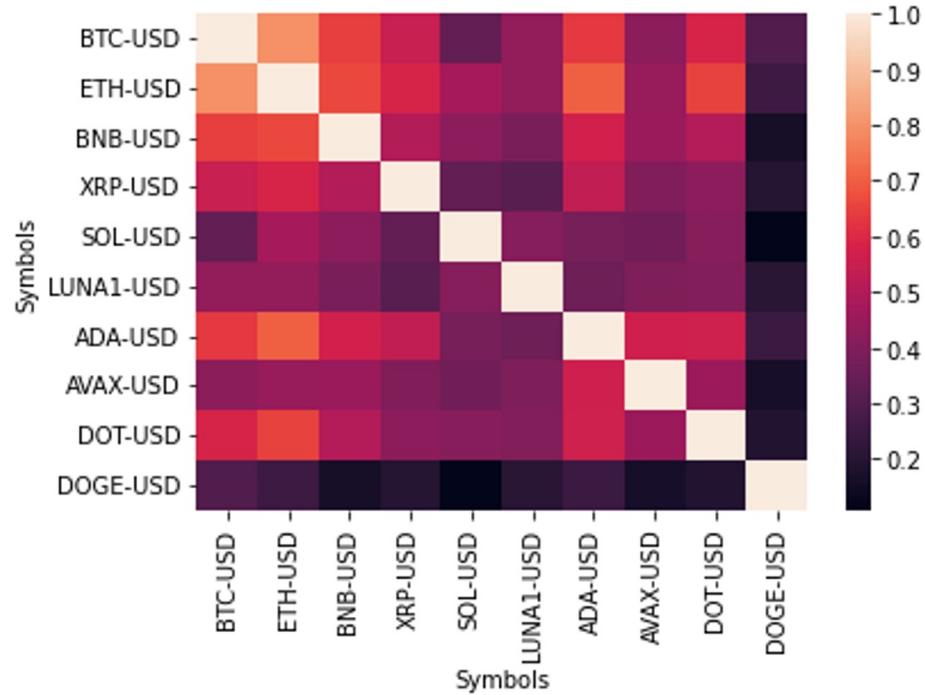
Beta for Various Cryptos with BTC as Index, 2018 to Present



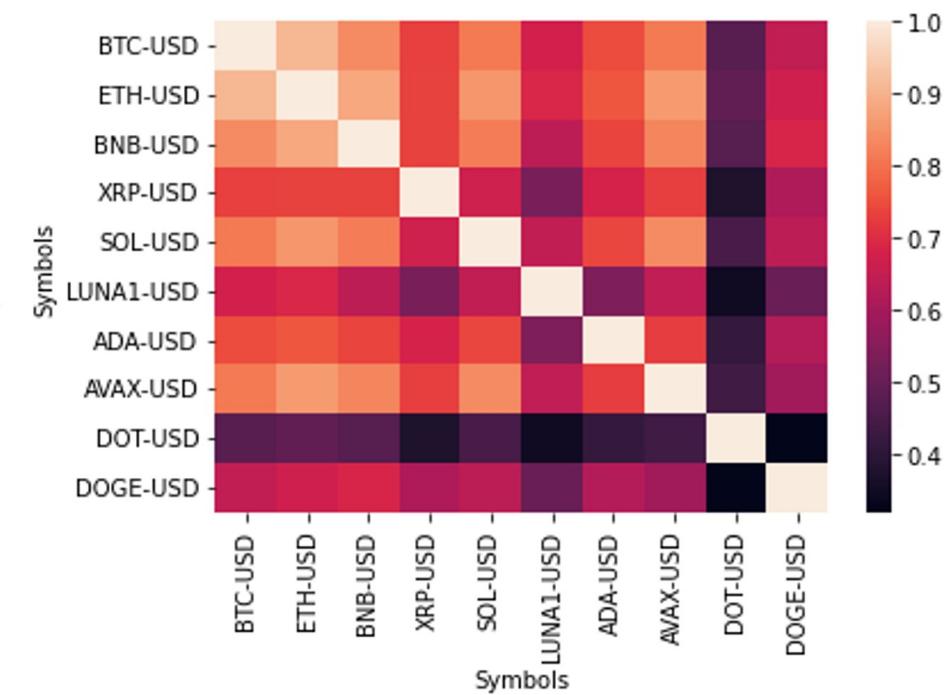
- **Using BTC as the index for cryptocurrency**, here beta is the return generated that can be attributed to overall BTC returns. It is the sensitivity to BTC's movements.
- Except for SOL, given these cryptos have similar betas ~1, **they all move relatively in sync with BTC**.

PART I: *Crypto to Crypto Correlations*

2020-2021



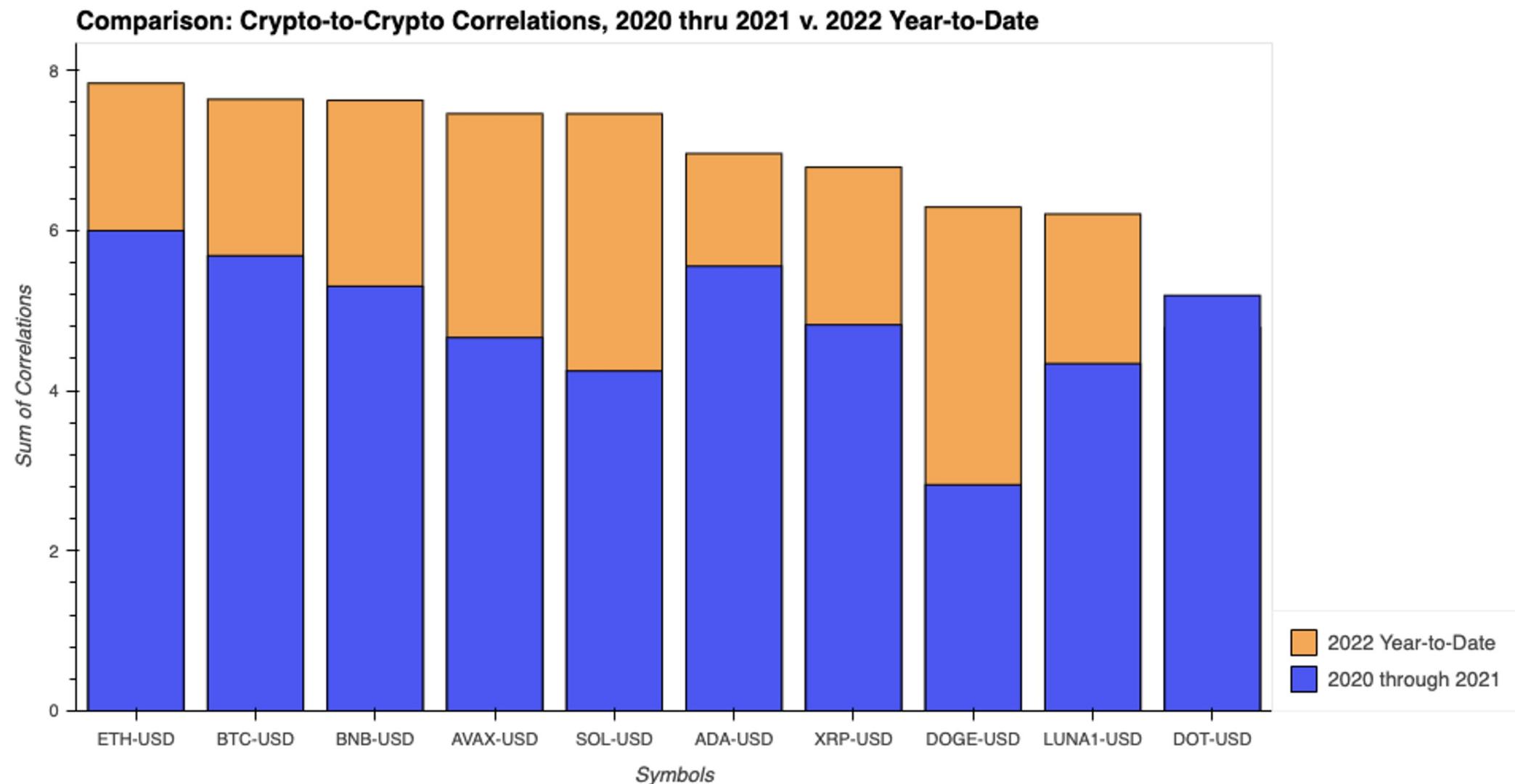
2022, YTD



- Darker tonality in 2020-2021 implies less correlation when compared to the lighter tones in 2022.

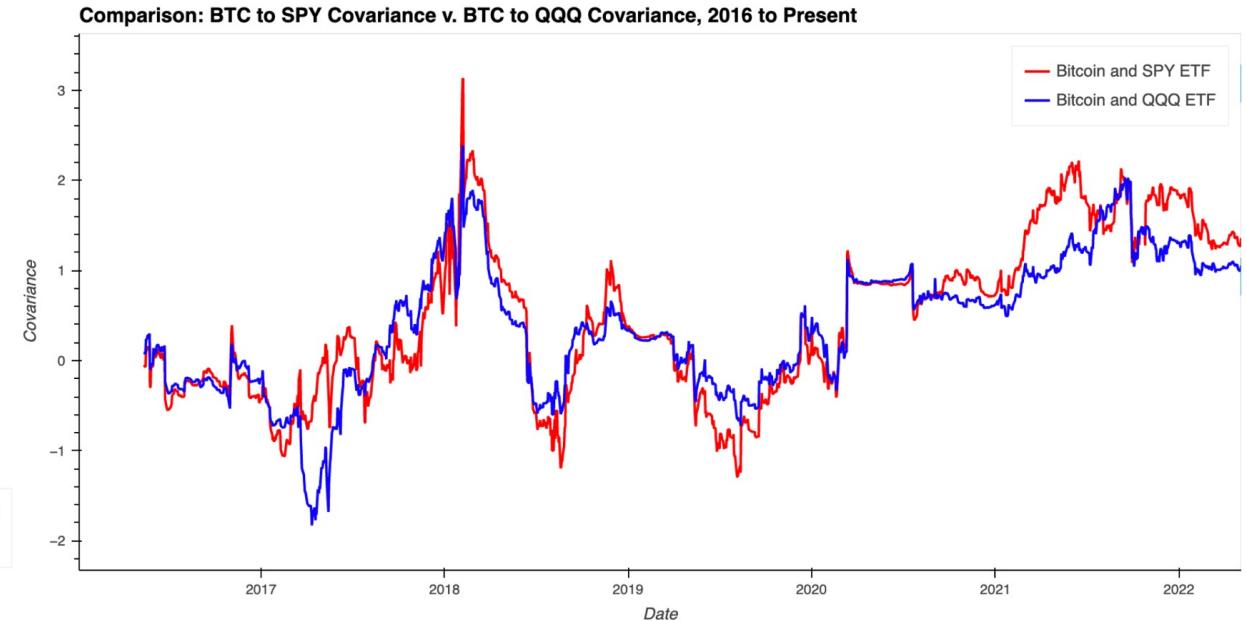
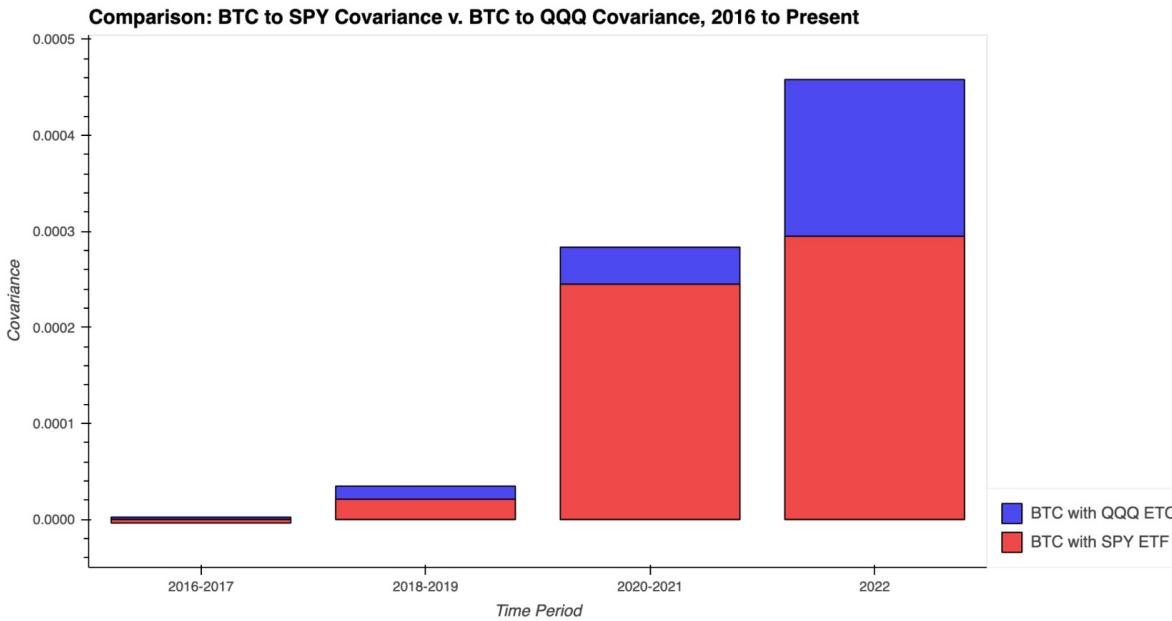
PART I:

Crypto to Crypto Correlations



PART II:

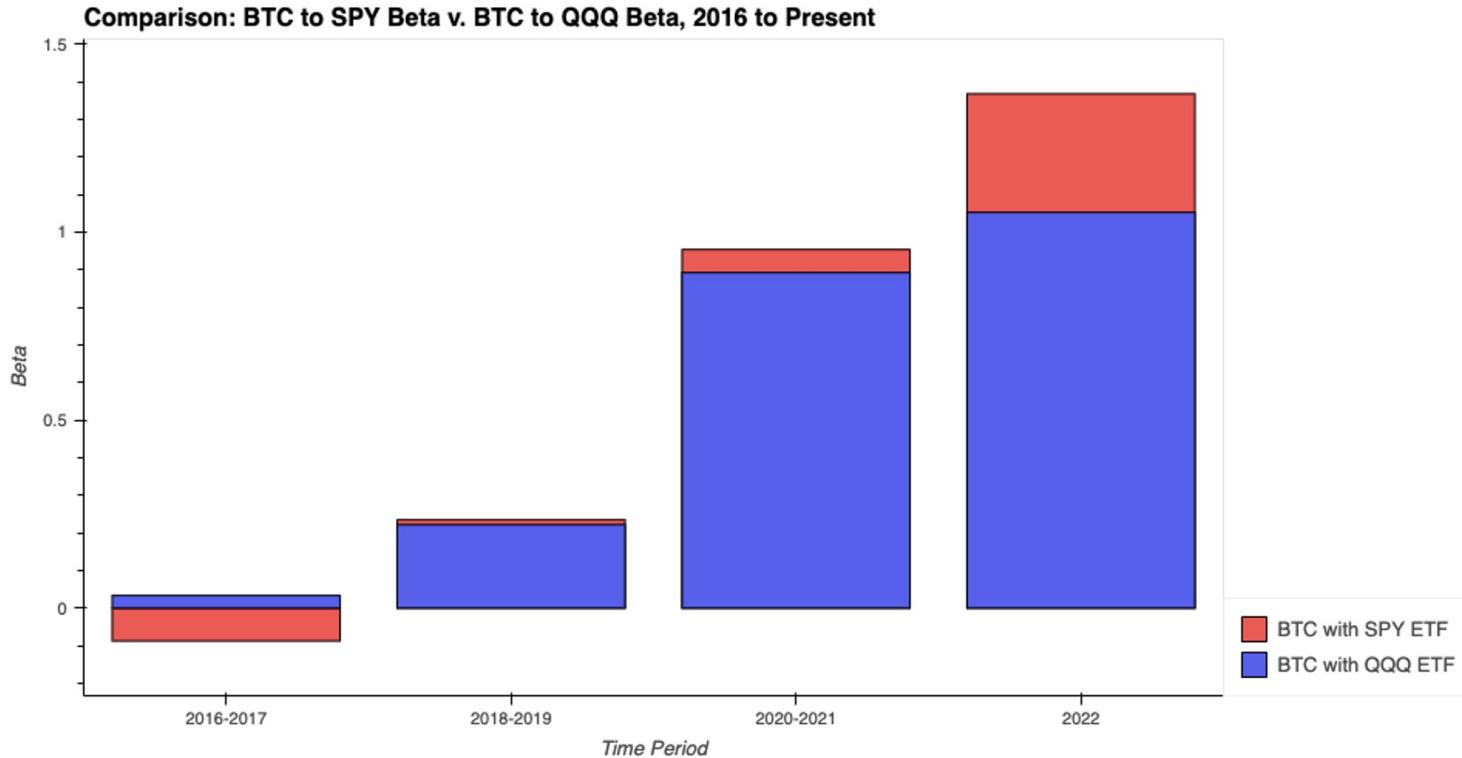
Covariance of Bitcoin with the S&P 500 and NASDAQ 100



- **BTC's covariance has been increasing** with both the S&P 500 and the NASDAQ 100.
- Since the pandemic rebound, BTC's rolling covariance with both the S&P 500 and the NASDAQ 100 has remained positive.

PART II:

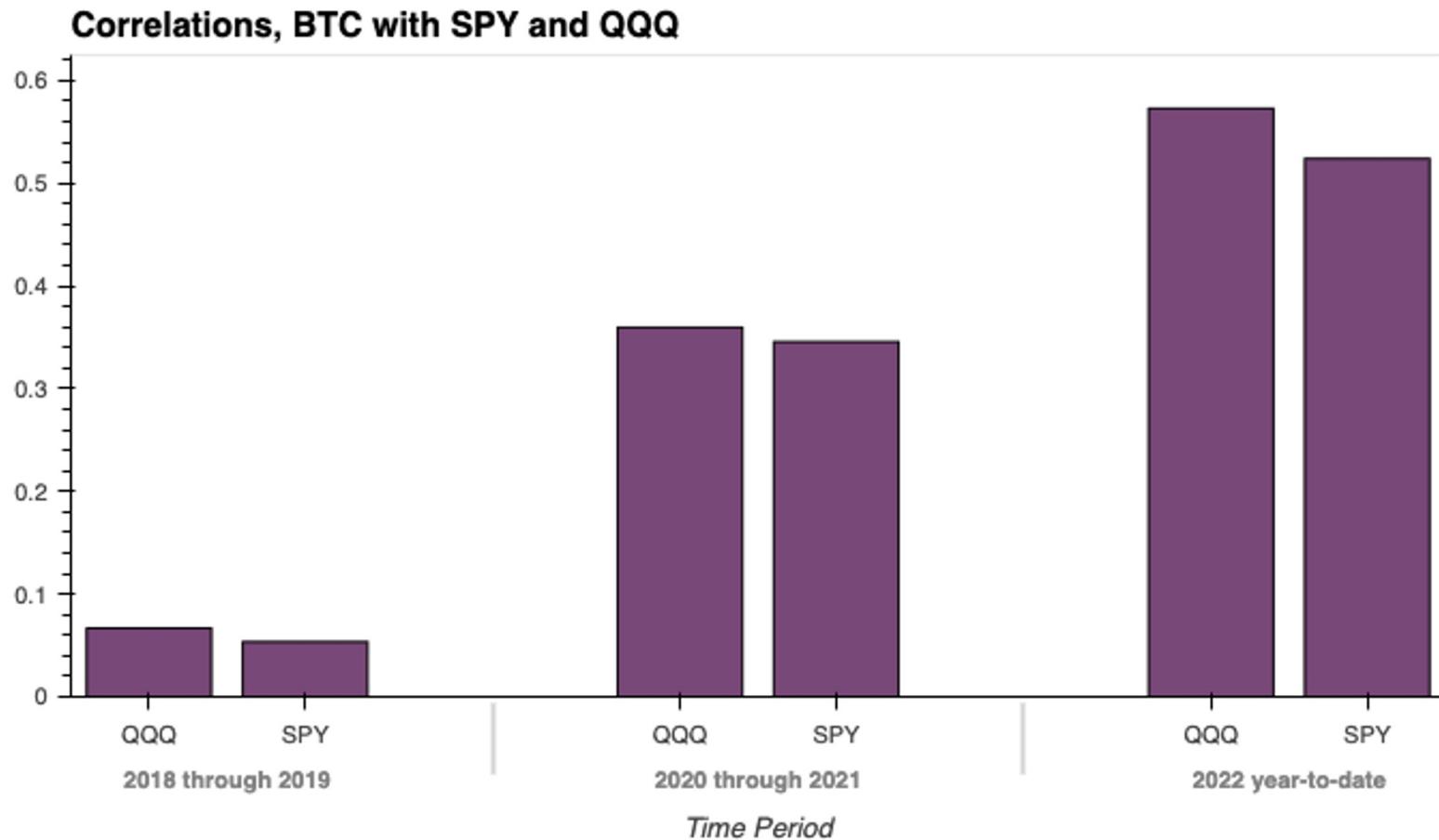
Beta of Bitcoin with the S&P 500 and NASDAQ 100



- **BTC's beta has been increasing** with both the S&P 500 and the NASDAQ 100.
- Since the start of 2022, in this new inflationary era, BTC's beta with the S&P 500 has particularly seen a large increase.

PART II:

Correlations, BTC with the S&P 500 and BTC with NASDAQ 100



- Correlations between both BTC to the S&P 500 and BTC to the NASDAQ 100 are increasing with time.

PART III: Fama-French Factors, 2018 thru 2019

With training and testing the data,

0% of BTC's excess return on the market is explained by these factors.

OLS Regression Results										
Dep. Variable:	BTC-RF	R-squared:	0.003	coef	std err	t	P> t	[0.025	0.975]	
Model:	OLS	Adj. R-squared:	-0.003	const	-0.0085	0.002	-4.597	0.000	-0.012	-0.005
Method:	Least Squares	F-statistic:	0.5827	Mkt-RF	0.2518	0.197	1.275	0.203	-0.136	0.640
Date:	Tue, 10 May 2022	Prob (F-statistic):	0.627	SMB	-0.1580	0.369	-0.428	0.669	-0.883	0.567
Time:	17:51:05	Log-Likelihood:	889.10	HML	0.0986	0.327	0.302	0.763	-0.544	0.741
No. Observations:	503	AIC:	-1770.	Omnibus:	35.806	Durbin-Watson:	2.009			
Df Residuals:	499	BIC:	-1753.	Prob(Omnibus):	0.000	Jarque-Bera (JB):	136.669			
Df Model:	3			Skew:	0.124	Prob(JB):	2.10e-30			
Covariance Type:	nonrobust			Kurtosis:	5.542	Cond. No.	202.			

MARKET RISK

SIZE

VALUE

PART III: Fama-French Factors, 2020 thru 2021

With training and testing the data,

12.22% of BTC's excess return on the market is explained by these factors.

		OLS Regression Results							
Dep. Variable:	BTC-RF	R-squared:	0.162	coef	std err	t	P> t	[0.025	0.975]
Model:	OLS	Adj. R-squared:	0.157	const	0.0027	0.002	1.471	0.142	-0.001 0.006
Method:	Least Squares	F-statistic:	32.19	Mkt-RF	0.9685	0.112	8.666	0.000	0.749 1.188
Date:	Tue, 10 May 2022	Prob (F-statistic):	4.82e-19	SMB	0.7593	0.214	3.542	0.000	0.338 1.181
Time:	17:51:38	Log-Likelihood:	903.14	HML	-0.3253	0.133	-2.454	0.014	-0.586 -0.065
No. Observations:	505	AIC:	-1798.	Omnibus:	87.502	Durbin-Watson: 2.106			
Df Residuals:	501	BIC:	-1781.	Prob(Omnibus):	0.000	Jarque-Bera (JB):	665.314		
Df Model:	3			Skew:	-0.496	Prob(JB):	3.38e-145		
Covariance Type:	nonrobust			Kurtosis:	8.535	Cond. No.	120.		

MARKET RISK

SIZE

VALUE

PART III:

*BTC's exposure to SIZE and VALUE with Monte Carlo analysis,
2 years historical data (2020-2021), projecting 1 year,
\$100k investment, 50/50 weightings*

GROWTH: "VOT" ETF

VOT alone: \$8,435 profit
VOT, BTC: \$59,431 profit

Combination added **\$50,996**

VALUE: "TWS" ETF

IWS alone: \$10,654 profit
IWS, BTC: \$66,569 profit

Combination added **\$55,915**

SMALL CAP: "EWSC" ETF

EWSC alone: \$17,084 profit
EWSC, BTC: \$67,339 profit

Combination added **\$50,255**

LARGE CAP: "MCG" ETF

MCG alone: \$12,091 profit
MCG, BTC: \$68,463 profit

Combination added **\$56,372**

BTC diversified best with *Large Cap* and *Value* equities:

~10.9% more profit when paired with value instead of growth
~9.6% more profit when paired with large caps instead of small caps

2020-2021



PART III: Fama-French Factors, 2022 YTD

With training and testing the data,

41.22% of BTC's excess return on the market is explained by these factors.

OLS Regression Results						
Dep. Variable:	BTC-RF	R-squared:	0.230	coef	std err	t
Model:	OLS	Adj. R-squared:	0.190	const	0.0038	0.005
Method:	Least Squares	F-statistic:	5.762	Mkt-RF	0.9763	0.417
Date:	Tue, 10 May 2022	Prob (F-statistic):	0.00161	SMB	0.2639	0.679
Time:	17:52:16	Log-Likelihood:	120.23	HML	-0.3382	0.433
No. Observations:	62	AIC:	-232.5	Omnibus:		Durbin-Watson:
Df Residuals:	58	BIC:	-224.0	Prob(Omnibus):	0.000	Jarque-Bera (JB):
Df Model:	3			Skew:	1.039	Prob(JB):
Covariance Type:	nonrobust			Kurtosis:	6.688	Cond. No.
						155.

MARKET RISK

SIZE

VALUE



Conclusion

Correlations between individual cryptocurrencies appears to be steadily increasing, **making it difficult to diversify between cryptocurrencies.**

Likewise, since 2018, there **appears to be an increasing correlation between prices on the stock and cryptocurrency markets.** Increased and growing awareness from retail and institutional investors since 2017 is likely a factor responsible for this increasing correlation.

Further, in this new inflationary environment that has been sufficiently pronounced during 2022 year-to-date, cryptocurrency appears to be entering yet a new era. Time will tell how this new asset class behaves in relation to other asset classes, and thereby inform how to aptly diversify with cryptocurrency.