Digital Tools

Can crypto-currencies be hedged by classical assets

Mohammad Charagh Alam 21-741-509
Angela Du 21-741-947
Julian Fischer 17-927-203

Faculty of Business, Economics and Informatics
University of Zurich

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Outline

Introduction

Recent global events such as the Covid-19 pandemic have caused massive movements in the financial markets.

The already volatile cryptocurrency scene also underwent major changes due to new regulations that caused an extreme price rally which ended with a huge crash.

For investors, large swings in Bitcoin prices can be extremely off-putting and terrifying while others see a great opportunity.

Crypto hedging has become a huge topic that investors are salivating about and thus we will examine whether cryptocurrencies can be hedged with traditional assets.

Outline

Data Processing

Data for the traditional assets were downloaded from Bloomberg while the cryptocurrency data was retrieved from CoinMetrics. This was then cleaned so that all assets had data points on all the given dates.

We then calculated the daily returns of the assets which allowed us to conduct the exploratory data analysis.

For comparability reasons, the futures were rolled on a monthly basis. All price time series start on 30/09/2015 and end on 18/11/2022. For the main part of the following analysis, a time period beginning in 2020 was used.

An Asset class is an effective hedging tool if its returns are negatively correlated to those of crypto currencies.

Correlation

We created a heatmap of the correlations between the assets. This allowed us to construct our hedging portfolios.

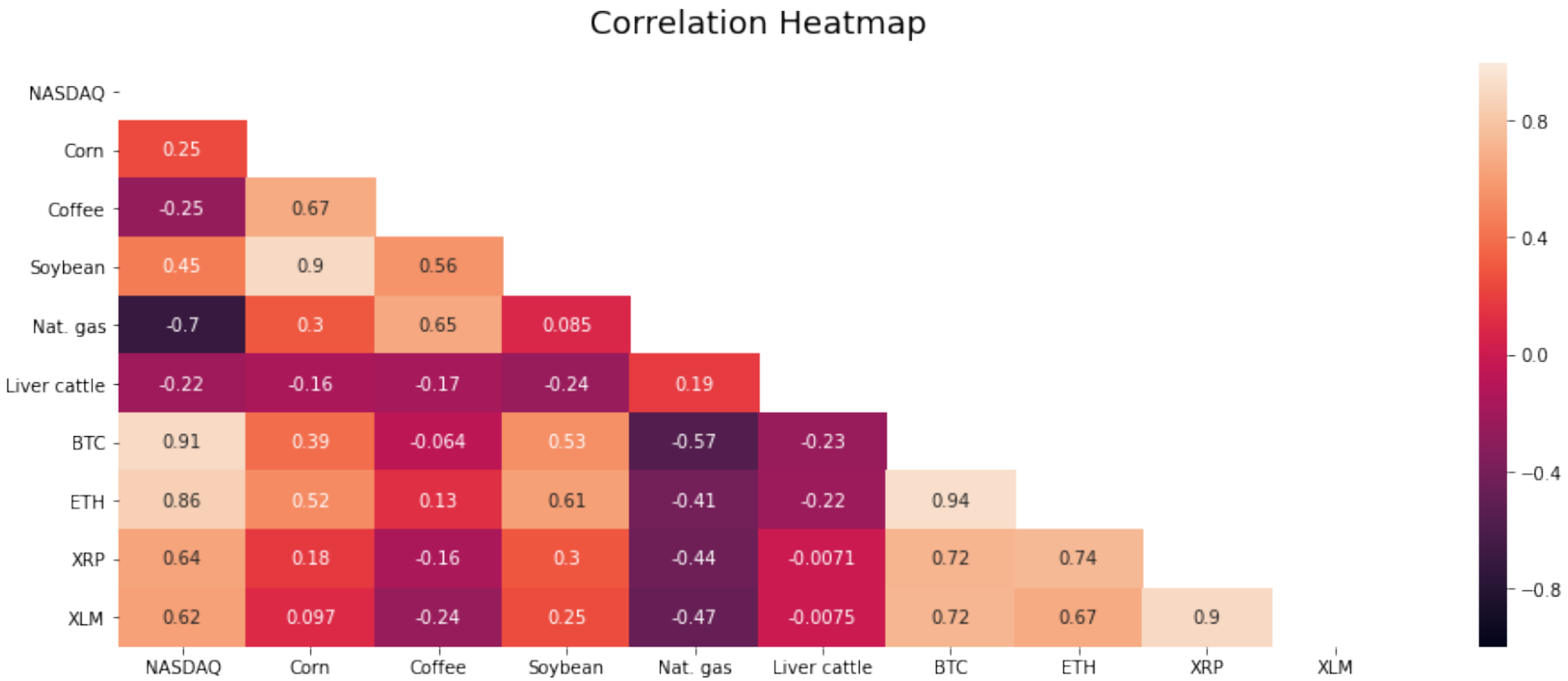

Figure: Correlations between asset classes.

Hedging Portfolios

Each portfolio contained an equally weighted investment part (the cryptocurrency) and a hedging part.

The generalised construction of the daily return of such a portfolio on day t is given by:

$$\mu_t^{PF} = \frac{1}{2} \cdot \left(\frac{\sum_{i=1}^{K} \mu_t^i}{K} + \mu_t^{Hedge} \right) \tag{1}$$

Where μ is the time series of returns of a given portfolio consisting of $K + 1$ components.

The following performance metrics were then calculated to evaluate the potential of the hedged portfolios: Mean Return, Sharpe Ratio, Skewness and Excess Kurtosis.

Portfolios

The portfolios we decided on (using the heatmap) are:

- Bitcoin and Natural Gas
- Bitcoin, Soybean and Corn
- Crypto portfolio composed of Bitcoin, Ethereum, XRP and Stellar (XLM)
- Crypto portfolio as listed above and Natural Gas
- Crypto portfolio as listed above and Live Cattle

As a baseline, a portfolio containing NASDAQ and NASDAQ hedged with coffee futures is added.

Outline

Period: 2015-current

This period coincides with the crypto boom era where investors saw an euphoric bull run phase.

	Mean Return (an.)	**Sharpe Ratio**	**Skewness**	**Excess Kurtosis**
NASDAQ	0.009	0.66	-0.495	4.966
NASDAQ/Coffee	0.0046	0.363	-0.126	-0.801
BTC	0.055	1.182	-0.07	2.716
BTC/Nat. Gas	0.0282	0.994	-0.162	0.358
BTC/Soybean & Corn	0.021	1.175	-0.176	1.379
Crypto PF	0.087	1.444	2.657	39.56
Crypto PF/Nat. Gas	0.0445	1.289	1.602	19.82
Crypto PF/Live Cattle	0.0442	1.426	2.418	35.256

Table: Performance Statistics 1 (2015-today)

Period: 2020-current

This period coincides with the start of the Covid-19 Pandemic.

	Mean Return (an.)	**Sharpe Ratio**	**Skewness**	**Excess Kurtosis**
NASDAQ	0.007	0.401	-0.42	2.297
NASDAQ/Coffee	0.0063	0.416	-0.129	-1.092
BTC	0.036	0.776	-0.775	5.213
BTC/Nat. gas	0.0269	0.869	-0.498	0.42
BTC/Soybean & Corn	0.0224	1.21	-0.652	2.864
Crypto PF	0.057	1.03	0.012	4.41
Crypto PF/Nat. gas	0.0378	1.075	-0.013	0.945
Crypto PF/Live Cattle	0.0284	0.98	-0.082	4.563

Table: Performance Statistics 2 (2020-today)

Period: Year to Date

This period coincides with the big drop in crypto value that occurred in 2022.

	Mean Return (an.)	**Sharpe Ratio**	**Skewness**	**Excess Kurtosis**
NASDAQ	-0.02	-0.999	0.075	-2.951
NASDAQ/Coffee	-0.02	-1.285	0.165	-2.797
BTC	-0.057	-1.373	-0.942	2.115
BTC/Nat. gas	-0.0009	-0.025	-0.536	-0.933
BTC/Soybean & Corn	-0.0073	-0.408	-0.466	0.036
Crypto PF	-0.049	-1.017	-0.532	0.748
Crypto PF/Nat. gas	0.0034	0.096	-0.409	-0.811
Crypto PF/Live Cattle	0.0232	-0.95	-0.602	1.036

Table: Performance Statistics 3 (YTD)

Outline

Conclusion

To assume that there is an easy and time-independent asset to hedge cryp- tocurrencies is too simple.

The tremendous total return of cryptocurrencies over the considered period makes it difficult to obtain an improved Sharpe Ratio when a hedge is introduced.

The opportunity costs of not being fully invested in cryptocurrencies is simply too high. For our dataset, any non-crypto addition resulted in a lower Sharpe Ratio. This means that a constant allocation doesn't seem to pay off.