



Hedging U.S. Recessions

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Introduction

- With the Federal Reserve Bank of New York predicting a **57.77% chance of the U.S. entering a recession in the next 12 months** using credit spreads ^[1], it seems more likely than not that the we will see some sort of pullback in the coming months
- In addition to this looming recession, significant **inflationary pressures on typical safe havens, such as the U.S. dollar, & its projected weakening** against other currencies, it's critical that investors are aware of other investment vehicles to place their wealth in
- We will be **assessing the ability of alternative asset classes to hedge against U.S. market volatility**, especially during recessionary periods, & how investors should be employing them

[1] Federal Reserve Bank of New York. (2023). Probability of U.S. recession Predicted by treasury Spread. Retrieved from https://www.newyorkfed.org/medialibrary/media/research/capital_markets/Prob_Rec.pdf



Alternative Asset Classes & Indices

- **Nasdaq Composite** (QQQ)
- **Dow Jones Industrial Average** (DIA)
- **iShares 1-3 Year Treasury Bond ETF** (SHY)
- **iShares 7-10 Year Treasury Bond ETF** (IEF)
- **iShares 20+ Year Treasury Bond ETF** (TLT)
- **Vanguard Real Estate Index Fund** (VNQ)
- **ICE Futures US Dollar Index** (DX-Y.NYB)
- **S&P 500 Consumer Staples Sector** (^SP500-30)
- **Gold** (GC=F)
- **Bitcoin** (BTC-USD)
- **Ethereum** (ETH-USD)
- **Brent Crude Oil** (BZ=F)
- **Corn Futures** (ZC=F)
- **CBOE Volatility Index** (^VIX)
- **CME Eurodollar Futures** (GE=F)
- **Chicago SRW Wheat Futures** (ZW=F)



Sourcing Data

- Daily data was sourced from **Yahoo Finance API** for all the assets & indices under consideration, as well as the benchmarks for comparison, e.g, Market Returns: S&P 500 & Market Volatility: VIX
- **Adjusted Close Prices & Volume** were pulled for all the assets, indices, & benchmarks that are under evaluation
- Data was preprocessed by **interpolating** null values, calculating **daily returns** using percent change & then taking the log to identify **log returns**, for normalization purposes



Methodology

- In order to test asset classes & indices ability to hedge against the overall U.S. market, we designed **two asset portfolios** combining each asset class or indice with the S&P 500, equally weighted
- By **analyzing statistics** of these individual assets & indices, as well as the statistics of each of their respective portfolios, we will be able to **determine which assets are likely to perform best** as a hedge
- Ultimately, **assessing the performance** of these portfolios **in aggregate** against overall market behavior, especially **during recessionary & bullish periods**, will allow us to **understand** the extent of these asset's **ability to hedge**



Recessionary Periods

1953-07-01 to 1954-05-01

1973-11-01 to 1975-03-01

2001-03-01 to 2001-11-01

1957-08-01 to 1958-04-01

1980-01-01 to 1980-07-01

2007-12-01 to 2009-06-01

1960-04-01 to 1961-02-01

1981-07-01 to 1982-11-01

2020-02-01 to 2020-08-07

1969-12-01 to 1970-11-01

1990-07-01 to 1991-03-01

Present?



Bullish Periods

1949-06-01 to 1956-08-01

1970-05-01 to 1973-01-01

2002-10-01 to 2007-10-01

1957-10-01 to 1961-12-01

1974-10-01 to 1980-11-01

2009-03-01 to 2020-02-01

1962-06-01 to 1966-02-01

1982-08-01 to 1987-08-01

2020-08-07 to 2021-12-31

1966-10-01 to 1970-05-01

1987-12-01 to 2000-03-01

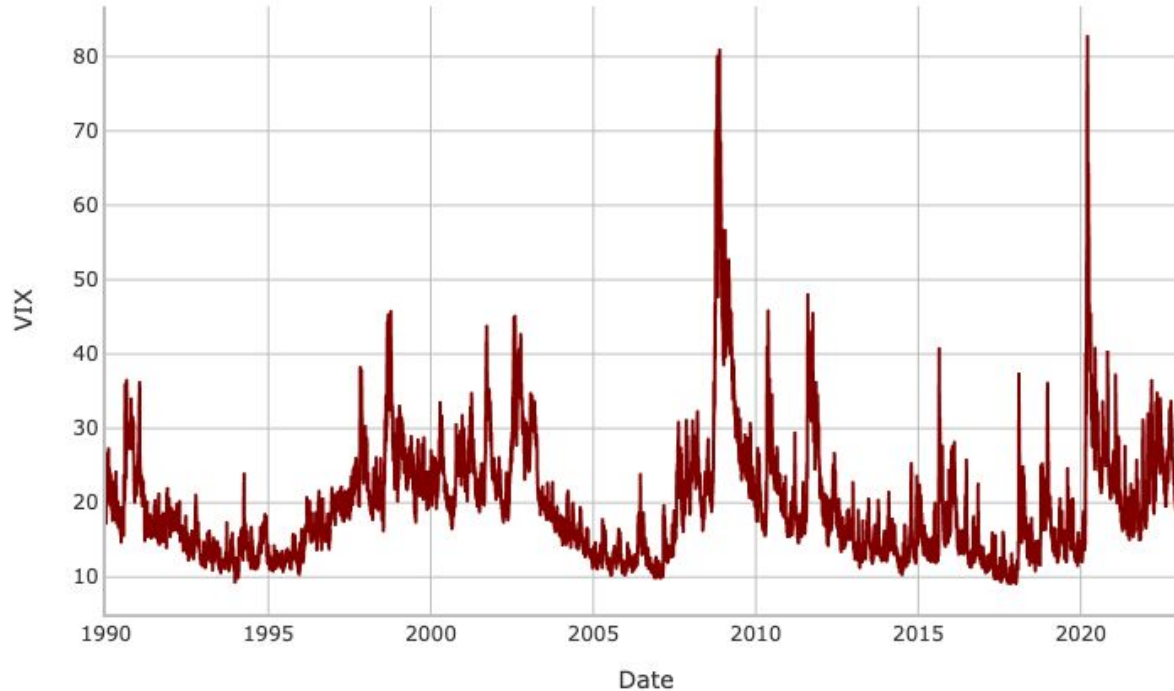
Future?



U.S. Market Across Recessionary Periods



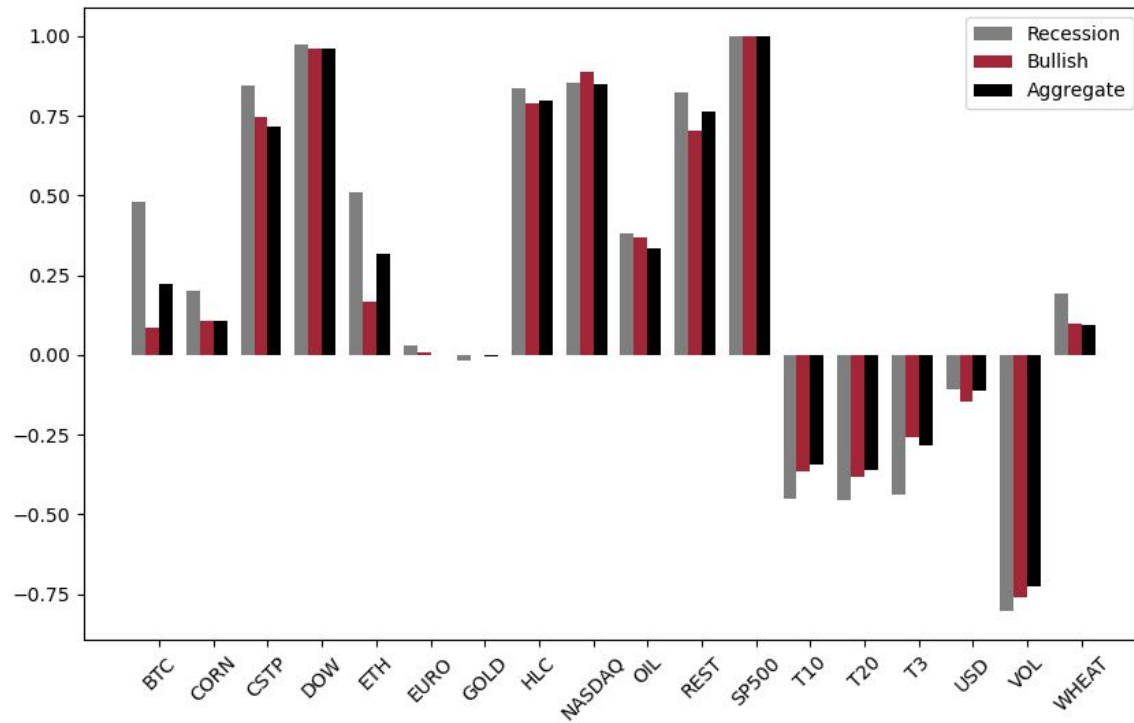
U.S. Market Volatility Over Time





Portfolio Analyses

Correlation Comparison

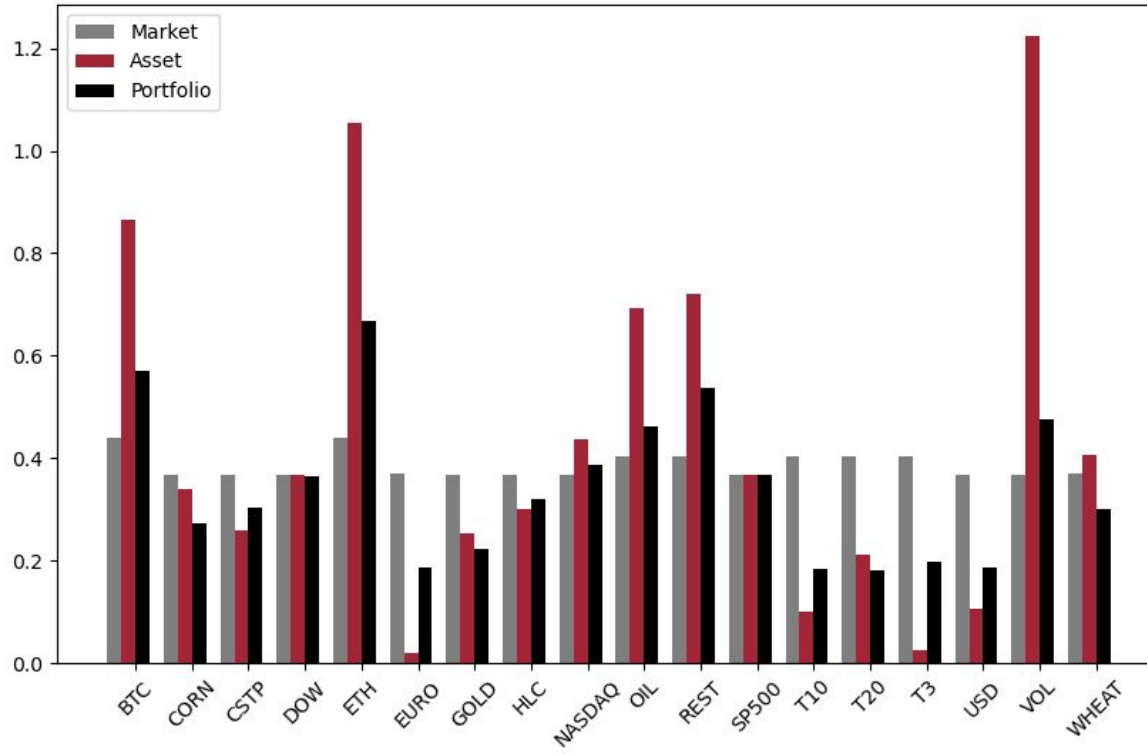


Correlation Analysis

- Indices such as the Nasdaq, Dow Jones, Consumer Staples, HealthCare, and Real Estate are evidently not good hedges with high correlations with the market
- The lesser correlations of Bitcoin, Ethereum, Corn, Euro, Gold, Wheat & Oil could be indicative of some power in hedging, however, ideally we would like assets that are negatively correlated with the overall market
- The T-bills, USD, & the VIX show a negative correlation with the overall market & even, which is a good indication of a hedge, as would be expected for these typical safe haven assets



Risk Comparison in Recessionary Periods

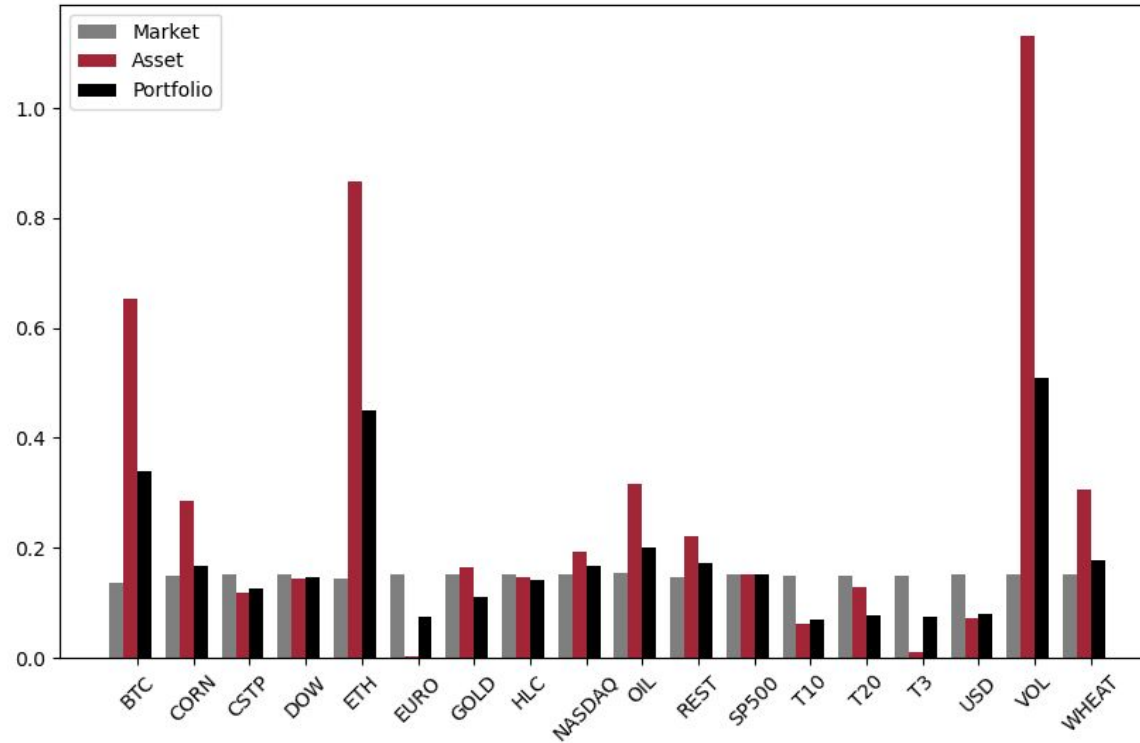


Risk Comparison in Recessionary Periods

Is Portfolio Volatility Statistically Different?																		
BTC	0	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1
CORN	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CSTP	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0
DOW	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	1
ETH	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
EURO	1	1	1	1	1	0	1	1	1	1	1	1	0	0	0	0	1	1
GOLD	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
HLC	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0
NASDAQ	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	1
OIL	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
REST	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
SP500	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	1
T10	1	1	1	1	1	0	1	1	1	1	1	1	0	0	0	0	1	1
T20	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1
T3	1	1	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	1
USD	1	1	1	1	1	0	1	1	1	1	1	1	0	0	0	0	1	1
VOL	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1
WHEAT	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0
	BTC	CORN	CSTP	DOW	ETH	EURO	GOLD	HLC	SDAQ	OIL	REST	SP500	T10	T20	T3	USD	VOL	WHEAT



Risk Comparison in Bullish Periods



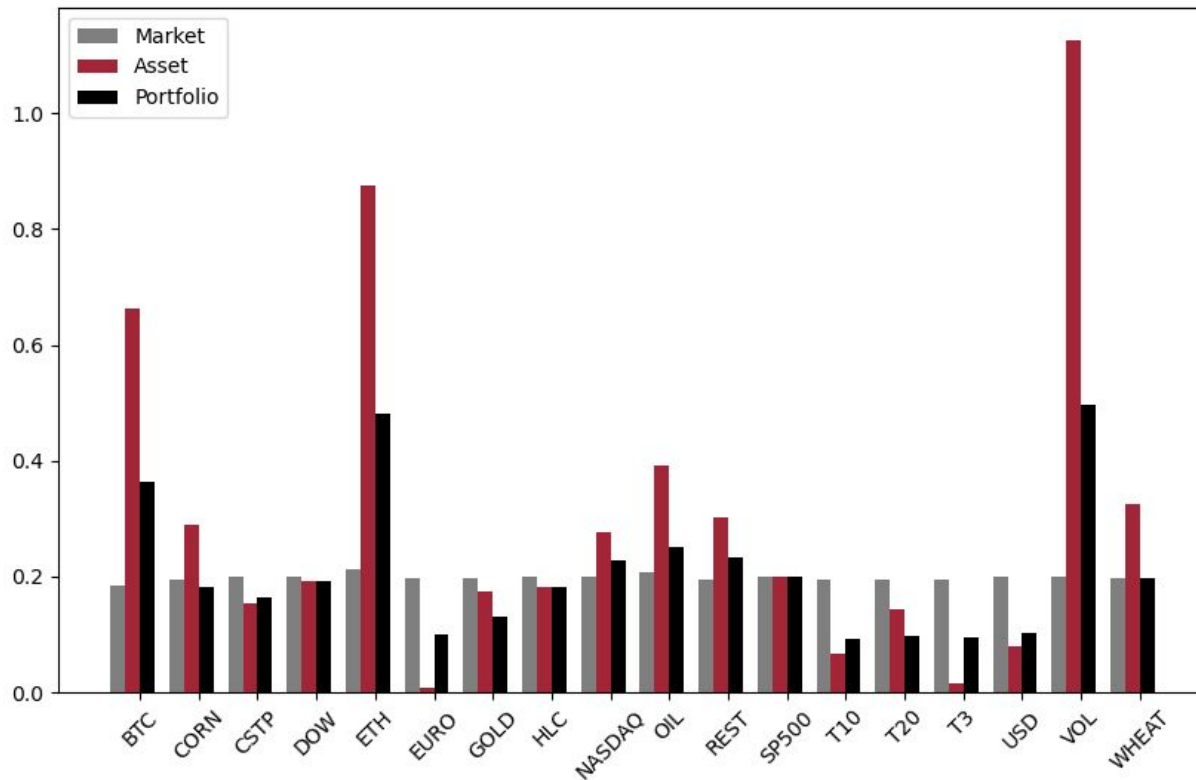
Risk Comparison in Bullish Periods

Is Portfolio Volatility Statistically Different?

BTC	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
CORN	1	0	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	
CSTP	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
DOW	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	
ETH	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	
EURO	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	
GOLD	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	
HLC	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	
NASDAQ	1	0	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	
OIL	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	
REST	1	0	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	
SP500	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	
T10	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	
T20	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	
T3	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	
USD	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	
VOL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	
WHEAT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	
	BTC	CORN	CSTP	DOW	ETH	EURO	GOLD	HLC	SDAQ	OIL	REST	SP500	T10	T20	T3	USD	VOL	WHEAT



Risk Comparison in Aggregate



Risk Comparison in Aggregate

Is Portfolio Volatility Statistically Different?																		
BTC	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CORN	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
CSTP	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
DOW	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ETH	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1
EURO	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1
GOLD	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
HLC	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
NASDAQ	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1
OIL	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
REST	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1
SP500	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0
T10	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
T20	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	1	1	1
T3	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1
USD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
VOL	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1
WHEAT	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0
	BTC	CORN	CSTP	DOW	ETH	EURO	GOLD	HLC	SDAQ	OIL	REST	SP500	T10	T20	T3	USD	VOL	WHEAT

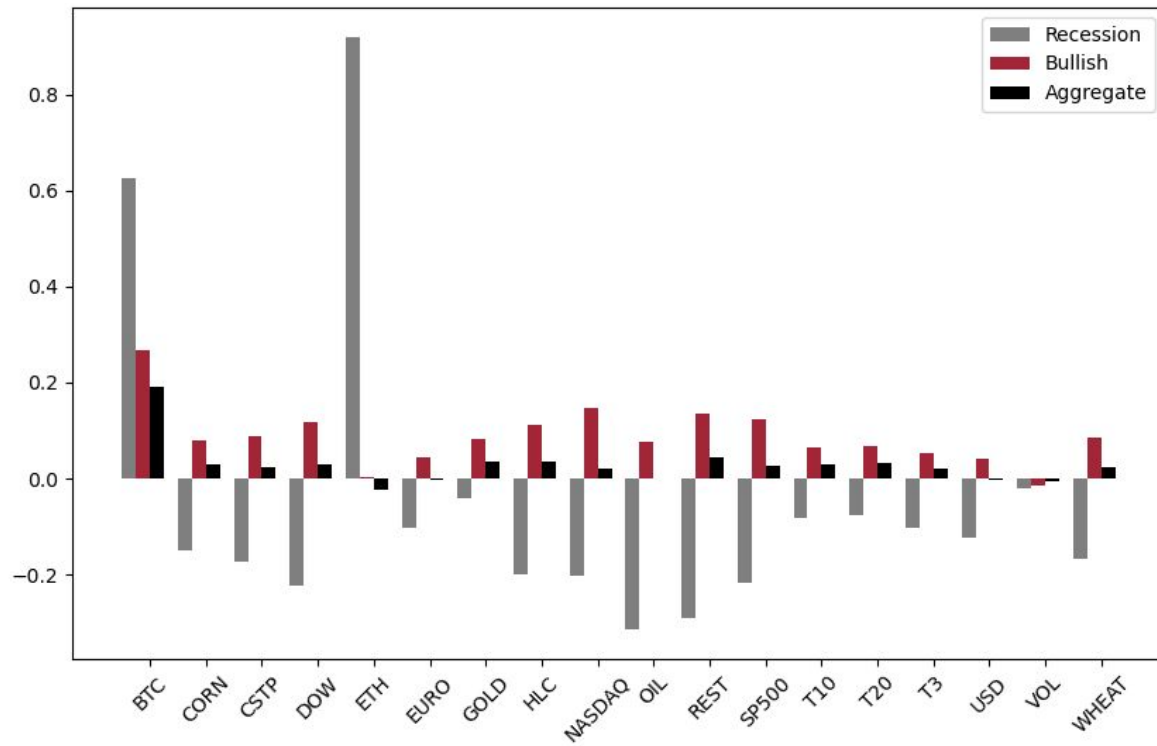


Risk Analysis

- For almost all of the portfolios, their volatility is statistically different from the overall market during recessionary periods, with the exception of the other market indices, indicating that these assets under consideration provide dampening effects for portfolio volatility
- In aggregate, we can see that all of these assets result in aggregate portfolios that have significantly different risk than that of the market, further indicating that these assets are good considerations
- ETH & VIX result in the highest risk portfolios during all the periods and the Treasury Bills & USD result in the least risky portfolios, as was to be expected



Excess Return Comparison



Are The Excess Returns Significantly Greater than 0?

Are Portfolio Returns Statistically Greater than Risk-Free Rate?

BTC	1	1	1
CORN	0	1	1
CSTP	0	1	1
DOW	0	1	1
ETH	1	0	0
EURO	0	1	0
GOLD	0	1	1
HLC	0	1	1
NASDAQ	0	1	1
OIL	0	1	0
REST	0	1	1
SP500	0	1	1
T10	0	1	1
T20	0	1	1
T3	0	1	1
USD	0	1	0
VOL	0	0	0
WHEAT	0	1	1
	Recession	Bullish	Aggregate

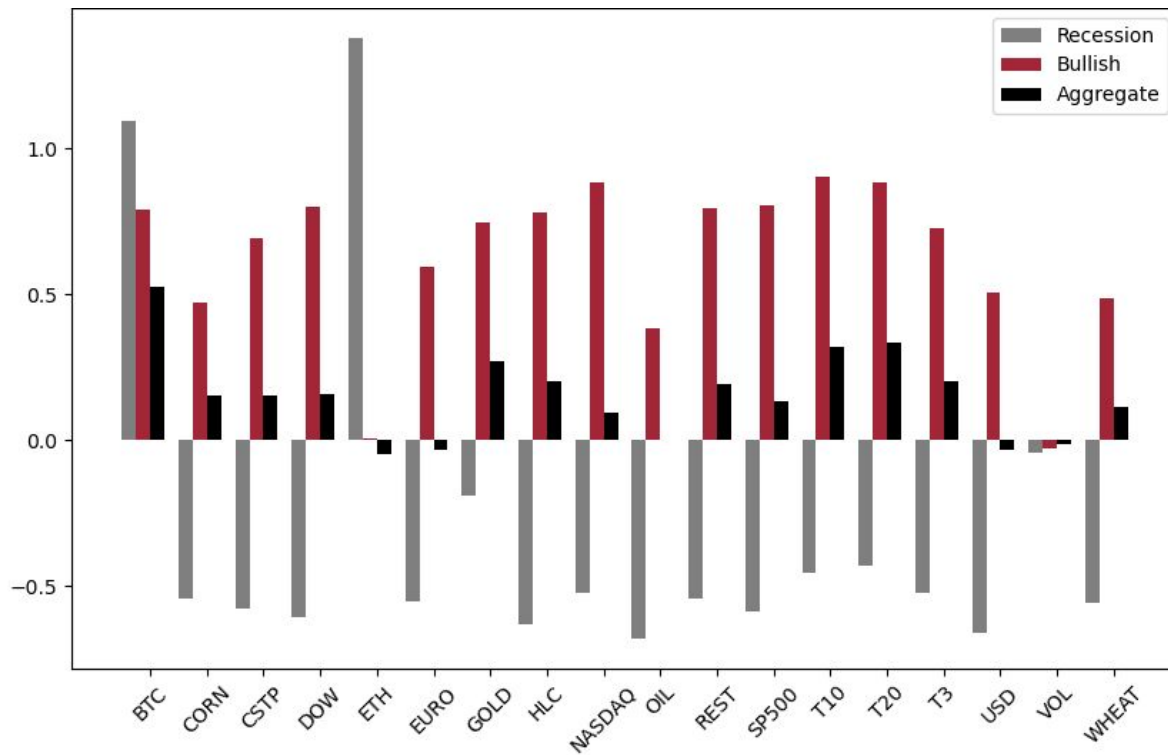


Excess Return Analysis

- If we take a look at the aggregate excess returns of the portfolios, we see that The Bitcoin Portfolio has the overall highest excess return averaging about 0.2 more than the risk-free rate (at the level it is now).
- But if we look specifically at the performance during recessionary periods, we see the Ethereum and Bitcoin portfolios with very high excess returns suggesting high compatibility with hedging the market.
- Almost all the other portfolios had lower returns than the risk-free rate during a recession making them bad choices to hedge.



Sharpe Ratio Comparison



Sharpe Ratio Analysis

- As we can see, Ethereum has the best return relative to risk during recessionary periods, followed by Bitcoin, however, this is limited to recessionary periods
- In bullish periods, indices, long-term treasuries, & cryptocurrencies provide the best risk-return tradeoff
- In aggregate, Bitcoin, long-term T-bills, & Gold produce the best risk-return tradeoff in a portfolio context, with ETH, USD, & the Euro producing the worst portfolios



Conclusions

Correlation

- Long-term treasury bills & VIX appear to be the best hedge for the U.S. market

Risk

- Euro & T-bills produced the best portfolios in terms of Risk

Excess Return

- Bitcoin & Ethereum appear to be good hedges in terms of relative excess returns



Sharpe Ratio Conclusions

Recessionary

- Bitcoin & Ethereum produced the best portfolios during recessionary periods

Bullish

- Indices & T-bills produced the optimal portfolios in bullish markets

Aggregate

- Bitcoin & the T-bills produced the best portfolios in aggregate





Thank You

Questions?