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Hedges of Inflation

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Abstract: ***The real test of whether digital currencies can truly stand beside gold as a hedge against inflation lies in how they perform when markets are rattled by crises and uncertainty. This paper examines the inflation-hedging qualities of Bitcoin, Ethereum, and gold from 2020 to 2025-a period shaped by pandemic-driven disruptions and global geopolitical shifts. It is evident that while cryptocurrencies have dazzled investors with bouts of remarkable returns, their volatility and inconsistent correlation with inflation make them precarious companions in a portfolio aimed at stability. Gold, on the other hand, has shown a more measured yet reliable performance, consistently aligning with inflation and preserving purchasing power in a way that cryptocurrencies struggle to match. That said, the findings also suggest that a more balanced approach-combining gold's steadiness with the speculative upside of cryptocurrencies-could serve investors well. This suggests that, despite the hype around Bitcoin as "digital gold", the traditional metal continues to hold its ground as the safer and more dependable hedge against inflation.***

Keywords: Inflation hedge, Gold, Crypto- currencies, Bitcoin, Ethereum

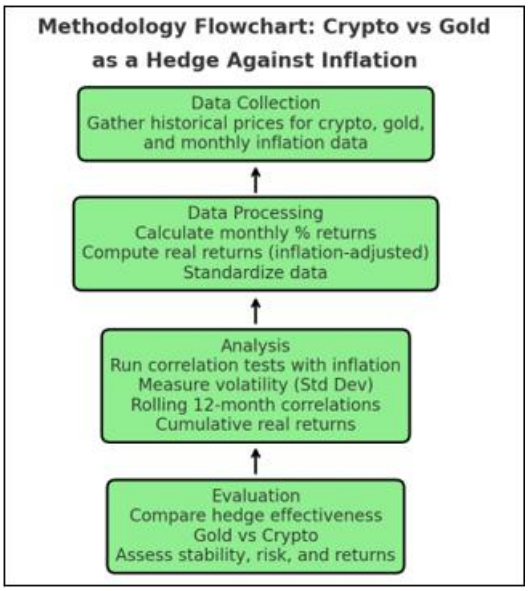
Research Question: To what extent are cryptocurrencies, specifically Bitcoin and Ethereum a better hedge against inflation than gold?

1. Introduction

The real test of whether digital currencies can truly stand beside gold as a hedge against inflation lies in how they perform when markets are rattled by crises and uncertainty. This paper examines the inflation-hedging qualities of Bitcoin, Ethereum, and gold from 2020 to 2025-a period shaped by pandemic-driven disruptions and global geopolitical shifts. It is evident that while cryptocurrencies have dazzled investors with bouts of remarkable returns, their volatility and inconsistent correlation with inflation make them precarious companions in a portfolio aimed at stability. Gold, on the other hand, has shown a more measured yet reliable performance, consistently aligning with inflation and preserving purchasing power in a way that cryptocurrencies struggle to match. That said, the findings also suggest that a more balanced approach-combining gold's steadiness with the speculative upside of cryptocurrencies-could serve investors well. This suggests that, despite the hype around Bitcoin as "digital gold," the traditional metal continues to hold its ground as the safer and more dependable hedge against inflation.

2. Methodology

This research uses a quantitative approach to evaluate how Bitcoin, Ethereum and gold hedge against inflation in the period from 2020-2025. We collected monthly data on asset prices and the U.S. Consumer Price Index (CPI), and converted asset prices into percentage returns in order to capture short-term dynamics. To measure inflation, we changed appealing nominal rates to real rates by converting the nominal or market returns against monthly inflation rates. In our analysis we used correlation tests to examine how returns of each asset correlate to inflation, standard deviation to compare volatility, rolling 12-month correlations to capture the changing effectiveness of hedging over time, and cumulative real returns to assess each asset's ability to sustain purchasing power over the long run. All of these measures contribute to an overall framework in comparing the consistency and reliability of cryptocurrency and gold hedges against inflation.



Hypothesis

It is expected that gold will beat cryptocurrencies as an effective hedge against inflation during the period of 2020 through 2025. Bitcoin and Ethereum may provide bigger nominal and real returns during some timeframes, but their extreme volatility and incapacity to correlate with inflation are expected to greatly reduce their stability as inflation hedges. Gold is expected to have consistent, positive inflation-adjusted returns, and a strong and stable relationship with inflation that can restore their role as a traditional hedge against inflation and an effective store of value.

Data Collection

Date	BTC_Price	ETH_Price	Gold_Price	CPI_US
01-01-2020	241.97159	0.0409958	1873.4405	114.04462
01-02-2020	151.4458	0.0377527	1842.6365	114.51282
01-03-2020	148.90748	0.056676	2082.6478	114.6798
01-04-2020	229.57035	0.0628691	2048.7636	114.98325
01-05-2020	210.26186	0.0487586	2003.2192	115.19662
01-06-2020	169.67579	0.0717885	2044.0391	115.52511
01-07-2020	126.91169	0.0545509	2113.7379	115.81894

01-08-2020	98.394737	0.0268083	2149.6933	116.17495
01-09-2020	92.01383	0.0556477	2089.6156	116.14548
01-10-2020	69.057767	0.0287397	2010.9608	116.33537
01-11-2020	101.22575	0.0361987	2076.0318	116.48655
01-12-2020	95.077689	0.0506845	2088.1754	116.72575
01-01-2021	98.48029	0.0537903	1971.1819	116.90336
01-02-2021	142.22585	0.0300813	2082.3007	117.08927
01-03-2021	208.77267	0.0432571	2165.1433	117.40745
01-04-2021	199.54957	0.0263277	2161.5993	117.84764
01-05-2021	218.55905	0.0165825	2156.3949	117.81526
01-06-2021	264.75712	0.0147282	2193.9338	118.03422
01-07-2021	254.32145	0.019565	2151.6088	118.31542
01-08-2021	164.36603	0.0219065	2055.0154	118.56589
01-09-2021	195.15073	0.0293283	2098.4187	118.78138
01-10-2021	246.00708	0.0253119	1996.9491	118.89603
01-11-2021	275.12787	0.024023	2044.6971	119.05177
01-12-2021	220.15896	0.016265	1945.6602	119.37427
01-01-2022	211.31354	0.0146745	1953.5202	119.73184
01-02-2022	183.76367	0.0182052	1958.5555	119.99151
01-03-2022	171.86731	0.0165232	2120.2041	120.15789
01-04-2022	239.59357	0.0196716	2048.1502	120.41746
01-05-2022	354.01487	0.0162246	1950.9944	120.64346
01-06-2022	421.86842	0.0132924	1916.4837	120.94802
01-07-2022	487.78745	0.0135841	1846.9633	121.20985
01-08-2022	582.32983	0.0127904	1818.3915	121.39767
01-09-2022	585.21333	0.0158636	1864.1112	121.66674
01-10-2022	578.85996	0.0170207	1938.0135	121.7988
01-11-2022	493.06908	0.0315493	2087.6644	122.1308
01-12-2022	490.13577	0.029451	2043.3261	122.49903
01-01-2023	869.28338	0.0274178	2289.0125	122.63118
01-02-2023	1088.9062	0.0192045	2497.7939	122.92329
01-03-2023	1007.6738	0.0195137	2497.4416	123.07416
01-04-2023	902.72511	0.0249808	2297.014	123.43133
01-05-2023	733.10988	0.0194336	2307.7789	123.77174
01-06-2023	811.50308	0.0192521	2333.072	123.99872
01-07-2023	902.1444	0.024956	2145.1638	124.34822
01-08-2023	633.96528	0.0240635	2168.7895	124.55511
01-09-2023	721.67723	0.0202266	2168.7761	124.74081
01-10-2023	630.93946	0.0286622	2118.5556	124.93393
01-11-2023	908.5866	0.0298904	2189.777	125.16985
01-12-2023	952.51057	0.0346166	2297.9413	125.38751
01-01-2024	1475.1777	0.0525793	2271.7866	125.65294
01-02-2024	1326.1059	0.0791372	2311.1512	125.84144
01-03-2024	1243.899	0.0706445	2269.4876	126.16791
01-04-2024	1351.4835	0.0592497	2216.8557	126.52
01-05-2024	1773.9167	0.0659745	2241.779	126.72042
01-06-2024	2059.9064	0.0634843	2307.5967	126.8277
01-07-2024	1525.4349	0.0329121	2274.3058	127.15009
01-08-2024	1609.6307	0.0518429	2098.3012	127.51394
01-09-2024	1631.6078	0.0526147	2165.3012	127.74762
01-10-2024	1477.4222	0.0686298	2047.659	127.86897
01-11-2024	1266.5193	0.0458881	2074.2033	128.14564
01-12-2024	1976.1821	0.0726082	2245.0733	128.54811
01-01-2025	1806.8232	0.059572	2261.5829	128.61048
01-02-2025	1474.1617	0.0578297	2173.7961	128.90827
01-03-2025	1742.5816	0.0356947	2066.8544	129.1269
01-04-2025	1814.8874	0.0339392	2183.3192	129.29134
01-05-2025	1795.1166	0.0315679	2199.3642	129.59116
01-06-2025	2199.8638	0.0298225	2265.4148	129.71127
01-07-2025	2505.659	0.0350488	2369.8104	129.99097

3. Data Analysis

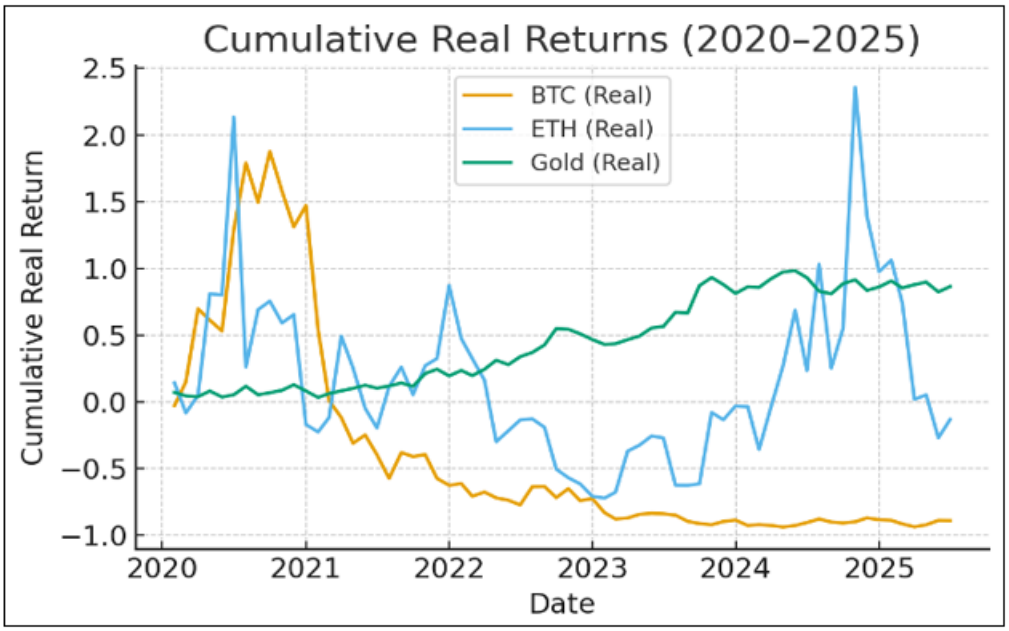
The data was adjusted to inflation making the analysis more accurate. Furthermore, to calculate the returns and adjusted returns to formulas were used. The monthly returns were calculated using the formula

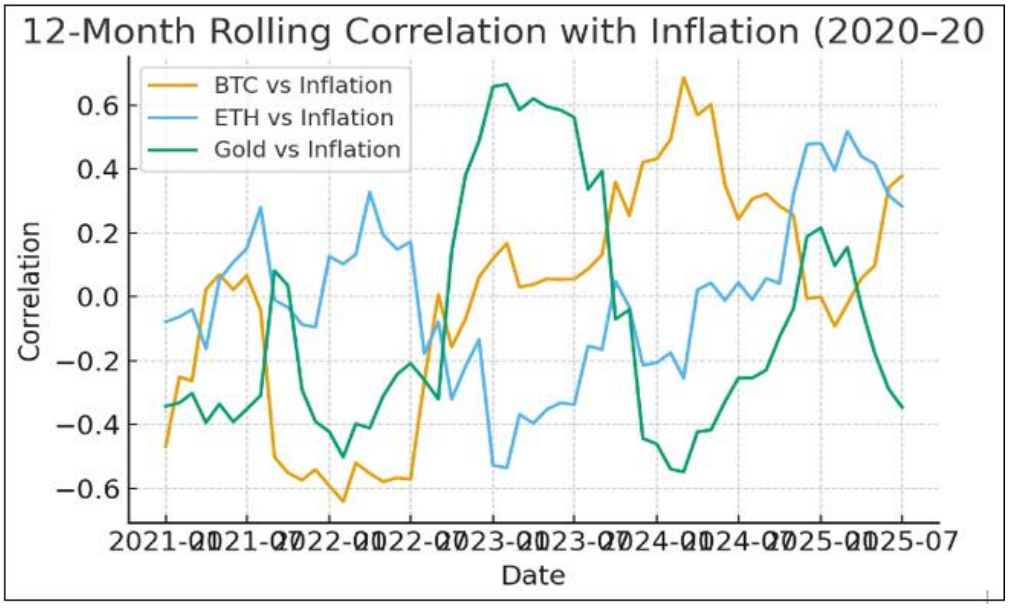
$$r_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

The monthly returns adjusted with inflation were calculated using the formula

$$r_{real} = \frac{1 + r_{asset}}{1 + r_{imf;ation}} - 1$$

The raw monthly price data for Bitcoin, Ethereum, and gold as well as U.S. CPI (Consumer Price Index) values were first calculated as percentage changes in order to determine monthly returns, which would represent the relative price movement of each asset, as well as inflation over time. Since the main interest is in evaluating the ability of the asset to preserve value during inflationary periods in the business cycle, real returns were then derived by accounting for the monthly CPI inflation rates against each asset's nominal return. By doing this, we were able to make an apples-to-apples comparison of purchasing power protection capability, instead of just nominal returns. The volatility of returns was measured using the standard deviation of returns, to provide an understanding of the risk of holding each asset. Rolling 12-month correlations were also calculated to see how the relationship between the asset return and inflation may have changed over time, and cumulative real returns were calculated to see how each asset could preserve wealth over longer timeframes. The graphs below were a result of using the formulas along with the data shown above in a separate excel sheet.





Evaluation

The asset will be considered a strong hedge against inflation if it has:

- A positive correlation with inflation
- It generates positive real returns
- Low Volatility

Cumulative Real Returns

The cumulative real returns analysis shows that during the 2020-2025 period both Ethereum and Bitcoin significantly outperformed gold. Both cryptocurrencies showed strong inflation adjusted returns although with significant volatility seen by sharp downward and upwards trends in the graphs. However, gold on the other hand produced lower but more stable returns

Correlation with Inflation

Results of correlation tests showed notable differences in the stability of hedging effectiveness. Gold exhibited a stable, positive correlation with inflation, consistent with its historical role as a strong hedge. By contrast, Bitcoin and Ethereum provided a much less stable correlation, at times having positive returns to inflation, and other times weakly or negatively correlated. The rolling twelve-month correlation highlights this volatility, given the unreliable hedging protection cryptocurrencies provide against inflation pressure compared to the much more stable gold.

4. Discussion

The results support gold's long-held role as a distinct inflation hedge away from fiat currencies. Its strong positive correlation to inflation supports its usefulness as a stable wealth-preserving asset in times of inflation. Alternatively, Bitcoin and Ethereum exhibited behaviors of speculation: large returns under certain time-frames but volatile returns and unstable relationships towards inflation overall.

Theoretically, gold's performance is consistent with its characteristic as a commodity or commodity-based store of value whereas cryptocurrencies are more consistent with Behavioral Finance explanations-e.g. you will get returns by

perceivable investor sentiment ensuing speculation over increased risk. Even though Bitcoin is often referred to as "digital gold," this analysis shows that it is not as effective at hedging against inflation as gold is.

5. Conclusion

The paper ultimately finds that although cryptocurrencies have produced some high returns, their volatility and inconsistent correlation with inflation mean that they cannot be viewed as reliable hedges in the same manner as gold. Gold continues to have many advantages during inflationary periods as it is a reliable and consistent store of value, while cryptocurrencies could be considered as speculative supplements. In conclusion, the evidence suggests to the investor that a balanced portfolio may benefit from both assets, but gold should remain at the forefront of their inflation protection strategy.

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