



Global Investment Research | Digital Assets

# Digital Assets – evolution and correlations with other asset classes

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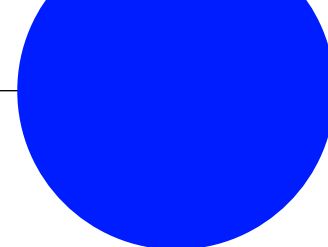


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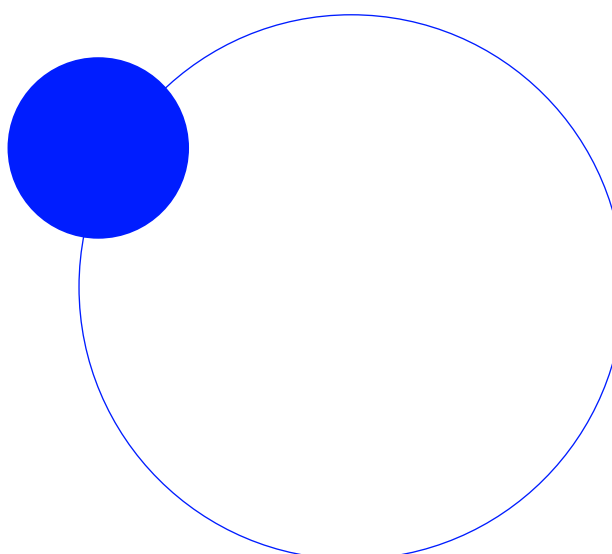
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# Introduction

Since the arrival of Bitcoin in 2009 and Ethereum in 2015, Digital Assets (DAs) have gained significant attention from retail and institutional investors alike. Most broadly, DAs are any assets that can be created and stored digitally, and contains or stores value, enabling digital transfer of ownership. The arrival of cryptocurrencies in 2009, and blockchain<sup>1</sup> technology, ushered in a new wave of DAs, moving beyond stores of value, to non-fungible tokens (NFTs) which grant access to, or ownership of virtual items, including games, and virtual land, stable coins, central bank digital currencies, and security tokens for underlying financial assets.

While initially designed as decentralized mediums of exchange, DAs now play a number of different roles, driving the growth of a heterogeneous asset class in which different DAs perform different functions on a blockchain. We note the distinction between the broader set of DAs, and cryptocurrencies, which are a smaller subset of DAs, and principally used as mediums of exchange.

Growing interconnectivity between cryptocurrencies and traditional financial markets raise key questions about their relationships with other asset classes, particularly as cryptocurrencies have developed as investment assets in the global financial system. In recent years, some of the key developments have been:

- **October 15, 2021:** The U.S. Securities and Exchange Commission (SEC) approved the first Bitcoin futures exchange-traded fund (ETF), allowing investors to gain exposure to Bitcoin through regulated financial products
- **January 10, 2024:** The SEC granted approval for 11 spot Bitcoin ETFs, enabling direct investment in Bitcoin through traditional financial markets
- **May 23, 2024:** The SEC approved the first Ether ETFs, providing investors with regulated avenues to invest in Ether

In this paper, we examine the correlation of returns between DAs, and financial assets, using FTSE Russell index multi-asset class data since their inception. In that regard, the paper should be seen as complementary to our earlier paper on the Correlation of Multi-Asset returns<sup>2</sup>. Specifically, we examine:

1. **Cross-Correlations:** The static and time-varying relationships between cryptocurrency returns and traditional asset classes, including equity indices (Russell 1000 and Russell 2000), fixed income asset classes, and industry components from these indices across technology, energy, and alternative energy.
2. **Rolling Correlations and Betas:** The stability and evolution of these relationships over time is assessed, measured through rolling correlations and beta metrics, to capture shifts in market dynamics and potential regime changes.
3. **Macroeconomic Context:** We also assess the broader macroeconomic context and its influence on the correlations between cryptocurrencies and traditional financial assets, with a focus on inflation, monetary policy and financial conditions.

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<sup>1</sup> A blockchain is a secure database, which is shared across a network of participants, and with information available to all participants at the same time.

<sup>2</sup> ["Multi-asset return correlations – a new regime, or an era of instability"](#), FTSE Russell, June 2024.

# Correlations and portfolio diversification benefits from Digital Assets

Understanding the relationships both between DAs and other financial assets, and between individual DAs is key for evaluating their diversification potential, risk dynamics, and responses to shared market forces. Correlations offer a means of identifying and assessing these relationships, capturing the degree to which asset returns move together over time. Understanding the relationship between these asset classes is increasingly important, as investors seek diversification, hedging opportunities, and enhanced portfolio management strategies.

The paper addresses critical questions facing investors and asset allocators in the DA space, namely:

- 1. Do DAs exhibit consistent correlations with traditional asset classes, and how stable are these correlations?**
- 2. How have these relationships evolved in response to macroeconomic shocks, and what does this tell investors?**
- 3. Do the correlations reveal information about the underlying characteristics of DAs, i.e. is Bitcoin a commodity and digital gold?**
- 4. Do the correlations with DAs shift from one asset class to another?**
- 5. And what role can cryptocurrencies play in modern investment strategies?**

We do not address related questions about the liquidity, maturity and investability of DAs as an asset class for institutional investors. Nor do we assess notions of underlying intrinsic, or fair value in DAs, in this paper, but intend to address those topics in future research. We do observe however, that DAs are not unique in being devoid of universally accepted metrics for fair value, including gold.

## Assessing Bitcoin and Ether correlations with traditional asset classes

To answer these questions, we assessed the (3 month rolling) Pearson correlations of DA returns with traditional asset classes, using monthly FTSE Russell data since 2011. Since Bitcoin and Ether are the DAs with the longest time series, and are most frequently traded, we used monthly FTSE Russell data on these DAs. [Indeed, we note that Bitcoin and Ethereum have a market capitalisation weight of around 90% of all DAs \(from the FTSE Digital Asset Total Cap Index\).](#)

The time series for these DAs is also long enough to capture the structural economic shocks from Covid 19, and the inflation and monetary tightening that followed it, enabling the impact of macroeconomic shocks and the stability of the correlations to be assessed. The results are shown in Table 1.

**Table 1 Correlation of asset returns between DAs and other asset classes**

| Correlation of returns<br>Asset class | Bitcoin<br>2013-<br>2024 | Pre-<br>Covid<br>2013-<br>2020 | Post-<br>Covid<br>2020-<br>2024 | Ether<br>2013-<br>2024 | Pre-<br>Covid<br>2013-<br>2020 | Post-<br>Covid<br>2020-<br>2024 |
|---------------------------------------|--------------------------|--------------------------------|---------------------------------|------------------------|--------------------------------|---------------------------------|
| Bitcoin                               | 1.00                     | 1.00                           | 1.00                            | 0.47                   | 0.38                           | 0.75                            |
| Ether                                 | 0.47                     | 0.38                           | 0.75                            | 1.00                   | 1.00                           | 1.00                            |
| R1000                                 | 0.18                     | 0.09                           | 0.58                            | 0.20                   | -0.05                          | 0.62                            |
| R2000                                 | 0.16                     | 0.06                           | 0.56                            | 0.14                   | -0.15                          | 0.59                            |
| US Tech.                              | 0.16                     | 0.08                           | 0.52                            | 0.23                   | 0.05                           | 0.59                            |
| US Financials                         | 0.18                     | 0.11                           | 0.53                            | 0.07                   | -0.22                          | 0.50                            |
| US 7-10 yr Treas.                     | 0.03                     | 0.00                           | 0.09                            | 0.17                   | 0.17                           | 0.16                            |
| US 7-10 yr inflation<br>linked        | 0.08                     | 0.00                           | 0.35                            | 0.16                   | 0.16                           | 0.49                            |
| US IG credits                         | 0.11                     | 0.04                           | 0.34                            | 0.20                   | 0.09                           | 0.41                            |
| US HY credit                          | 0.15                     | 0.06                           | 0.49                            | 0.22                   | 0.01                           | 0.55                            |
| Gold                                  | -0.05                    | -0.08                          | 0.15                            | 0.17                   | 0.23                           | 0.13                            |
| US dollar                             | -0.01                    | -0.03                          | -0.22                           | -0.22                  | -0.24                          | -0.22                           |

Source: FTSE Russell Monthly data 2011 to 2024

## A striking increase in correlations of DA returns with risk-on assets post-Covid, emerges

Several key results emerge from Table 1. Perhaps most strikingly, the correlation of returns between the selected DAs and other asset classes has (a) not been consistent, and (b) for risk-on assets, has generally increased sharply since the Covid-shock in 2020. Furthermore, the overall correlation between Bitcoin and Ethereum is 0.47, signalling the different functions these DAs play with Ether now a key alternative cryptocurrency, particularly in decentralised finance. The correlation between Bitcoin and Ether returns also increased sharply after the Covid-shock, from 0.38 to 0.75, which may be due to the dominant impact of higher rates across investment asset classes.

....with low, or negative correlations with safe havens like Treasuries and US dollar...

7–10 year US Treasuries are the only asset class with which DA correlations did not increase meaningfully post-Covid, and the US dollar the only asset showing negative correlation to Bitcoin and Ether since Covid (see Chart 1 below). Since 10-year US Treasuries and the US dollar are generally regarded as risk-off financial products, assets of choice during financial shocks, this is provisional evidence that Bitcoin and Ether are risk-on assets.

....but much stronger correlation with high yield indices and the Russell 1000 and 2000

Indeed, this is confirmed by risk-on assets, like the FTSE Russell 1000 and 2000, showing the highest correlation of all asset classes with DAs, post-Covid, at 0.56 – 0.62. And again, the correlations of BTC and Ether (ETH) with US high yield, the most “risk-on” of fixed income asset classes, are significantly higher than with US Treasuries or higher quality investment grade credits, at 0.49 – 0.55 post-Covid.

Recent DA correlations with fixed income point to inflation-hedge / store of value?

Within fixed income, it is also notable that although the correlation between conventional US Treasuries and DAs increases only marginally, post-Covid, the correlation with US Tips, or inflation linked bonds does increase quite sharply, from zero to 0.35 post-Covid, for Bitcoin, and a similar increase in correlation occurs for Ether with US Tips, after the Covid and inflation shocks. This may suggest Bitcoin and Ether share some inflation-hedge/store of value characteristics with US Tips.

## Multi-asset correlations increased sharply after Covid inflation and rates shock...

The 36-month rolling correlation between Bitcoin and US equities is shown in Chart 1 below, since 2014. The Chart shows that correlations increased steadily across a range of assets with both Bitcoin and Ether, between 2020 and 2022, where they have remained since. However, the increase is not as dramatic as the correlation between bonds and equity returns, which increased later but much faster, coincident with the US Fed raising interest rates from March 2022 to July 2023.

## ...as higher discount rates crushed the present value of future cash flows

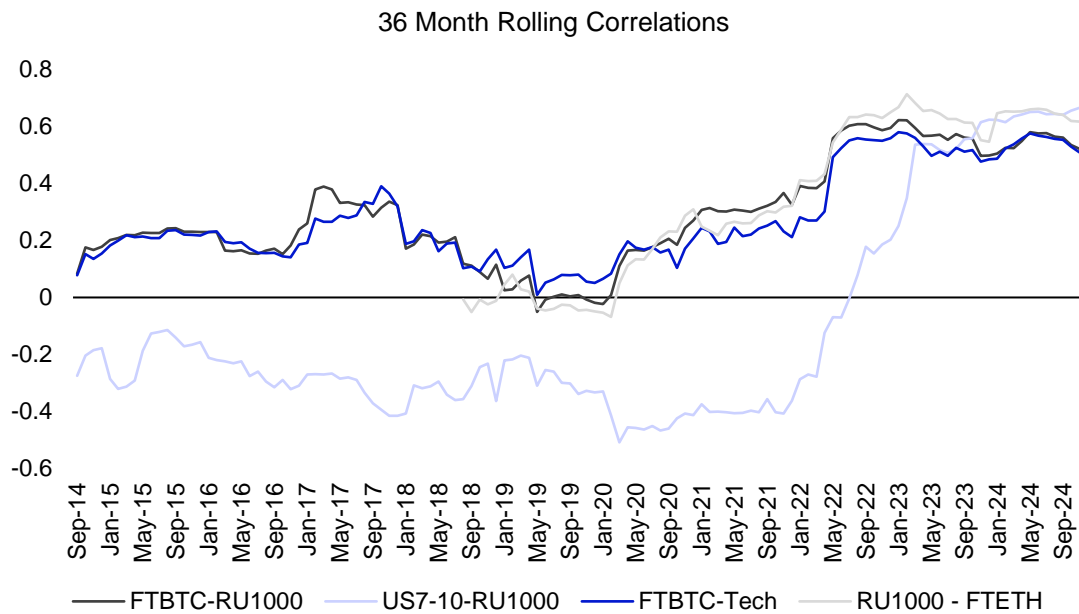
Different theories can fit the same set of facts, but a plausible narrative here is that the macro-economic shock of higher inflation, and interest rates, became the dominant driver of (negative) returns across asset classes in this period, causing the correlation of returns to increase sharply. With much higher discount rates applied to future cash flows, the present value of future cash flows was reduced across asset classes in this period, for both safe havens and risk-on assets alike.<sup>3</sup>

The other feature of Chart 1 is that the rolling correlation for returns appears to have converged between 0.5 and 0.6 for most asset classes, consistent with “higher for longer” Fed interest rates. Looking at equity sub-sectors, Bitcoin correlations with the Tech sector do not diverge significantly from those with the Russell 1000, or Financials (see Table 1 above), which may partly reflect the high market weight of Tech in the Russell 1000 and a Fintech effect in Financials.

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<sup>3</sup> Also see [Time to trim some \(inflation\) hedges? | LSEG](#), January 2023.

**Chart 1: Rolling correlations of DAs with selected asset classes**



Source: FTSE Russell, data from September 2014 to September 2024, monthly data.

## A note of caution in interpreting the results and the transitional regime

Clearly, the relatively short time series on which the correlations are based means caution is required in interpreting the results. The scale of the macroeconomic shocks from both Covid and then inflation from 2020-2023 also occurred during the early years of DA development, so extracting true financial signals from the noise is more challenging. Correlations may also change as the blockchain settles down and transitions to a more stable regime, and as investors become more comfortable with investment use cases and notions of fair, or equilibrium value. This may contribute to lower volatility in DAs over time, as the asset class matures.

## Bitcoin – a fool’s gold or digital gold?

Prima facie, one of the more surprising of the correlation results in Table 1 is that the correlation of the gold price with Bitcoin only turns positive after Covid, particularly if Bitcoin and Ether correlations with US Tips suggest they hold some store-of-value characteristics. In addition, both gold and Bitcoin are alternative assets that face restrictions on supply. Fed Chairman Powell recently noted “(Bitcoin)... is just like gold, only it’s virtual. It’s digital..... It’s highly volatile”<sup>4</sup>. Several earlier studies have stressed the similarities between gold and Bitcoin, from the supply constraints, to the decentralised and distributed mining and ownership<sup>5</sup>. But if Chairman Powell is correct, and Bitcoin is just like gold, why is the correlation with the gold price barely positive?

<sup>4</sup> Fed Chairman Powell interview at Dealbook Summit, Dec 4, 2024.

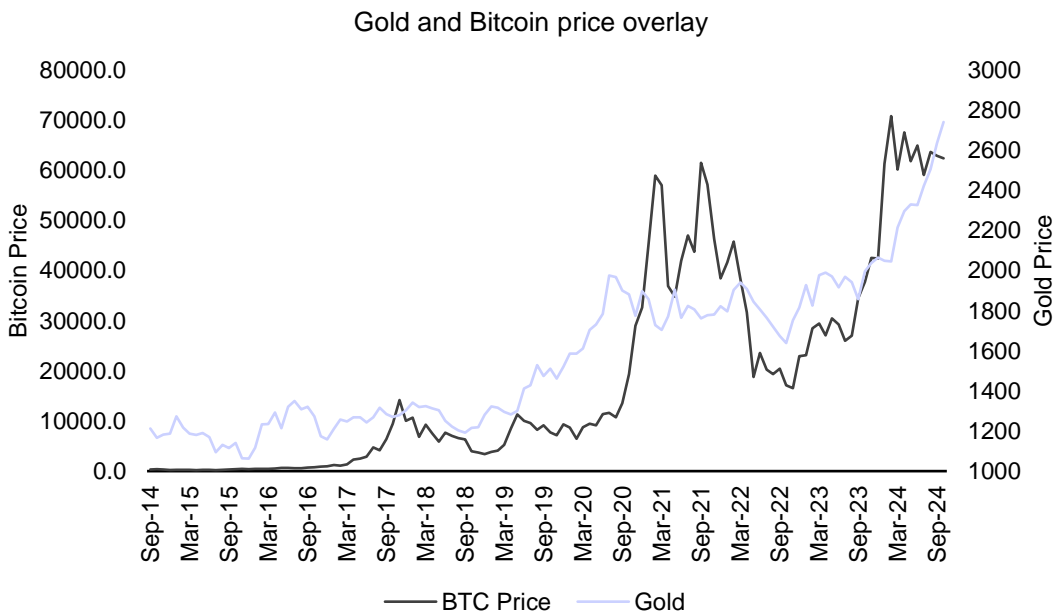
<sup>5</sup> Is Bitcoin the new digital gold?



# Can the low gold / Bitcoin correlation puzzle be resolved?

To assess this, we first present the gold and Bitcoin prices overlaid in Chart 2. Both asset classes did well in 2019-2020, as the Fed first eased policy, then adopted a zero-rate policy, in March 2020, and flooding markets with liquidity and QE asset purchases, though the gold price peaked much earlier, in July 2020. Indeed, Bitcoin prices did not peak until September 2021, and the correlation of returns collapsed in 2020-2021. Both asset classes fell during the monetary contraction in 2022, before bottoming out in November 2022, well before the Fed finished raising rates in July 2023. But note the correlation between gold and Bitcoin prices rose during the inflation spike in 2021-2022, perhaps suggesting new institutional demand for Bitcoin as a store of value.

**Chart 2: Gold and Bitcoin prices**



Source: FTSE Russell, monthly data from September 2014 to September 2024.

The other feature of Chart 2 to note is that the volatility of the Bitcoin price remains much higher, even if directionally, there has been a positive correlation of 0.15 between gold and Bitcoin since 2020 particularly, and both have performed well as stores of value, since 2019. Gold's relatively low volatility increases its appeal as a store of value.

## Underlying gold / Bitcoin correlations may be depressed by a substitution effect...

High volatility in Bitcoin prices, and the variation in the importance of safe haven and store of value characteristics in financial markets may obscure the underlying or “true” correlation between gold and Bitcoin returns, resulting in the low correlations found in empirical work<sup>6</sup>. Alternatively, there could be a substitution effect at play, whereby investors switch from gold to Bitcoin, or vice versa, depressing the correlation found between the two asset classes<sup>7</sup>.

## ...Or the true correlation may just be low, as gold’s correlations are with other assets

But the true correlation may simply be low, reflecting the fact that Bitcoin and Ether are predominantly risk-on assets, whereas gold has a long-established trading history as a “safe haven” asset, even if they do share some store of value characteristics. Due to its long history, gold also has a range of well-established use cases both as a “safe haven”, and store of value, including central bank reserves, long-term investments and global savings, as well as jewellery and industrial uses. After all, the Gold Standard was the foundation of the international monetary system from 1870 – 1914, designed to prevent excessive liquidity creation and inflation.

This diversity of demand, zero coupon and range of uses, means the relative volatility of gold, and correlations with other asset classes is low<sup>8</sup>. In contrast, it could be argued Bitcoin’s strongest use case is still to reflect blockchain adoption, hence the stronger correlation to US Tech stocks, shown in Table 1.

Chart 3 shows the highly variable correlation in returns of Bitcoin, Ether and gold prices since 2014. Note that in periods of extreme financial stress, like the initial outbreak of Covid in March 2020, the correlation of Bitcoin and Ether with a safe haven like gold does fall sharply, as Bitcoin shows risk-on characteristics, and falls with equities, before recovering when the Fed adopts QE purchases and floods markets with liquidity. This is consistent with some of the early econometric work on Bitcoin<sup>9</sup>.

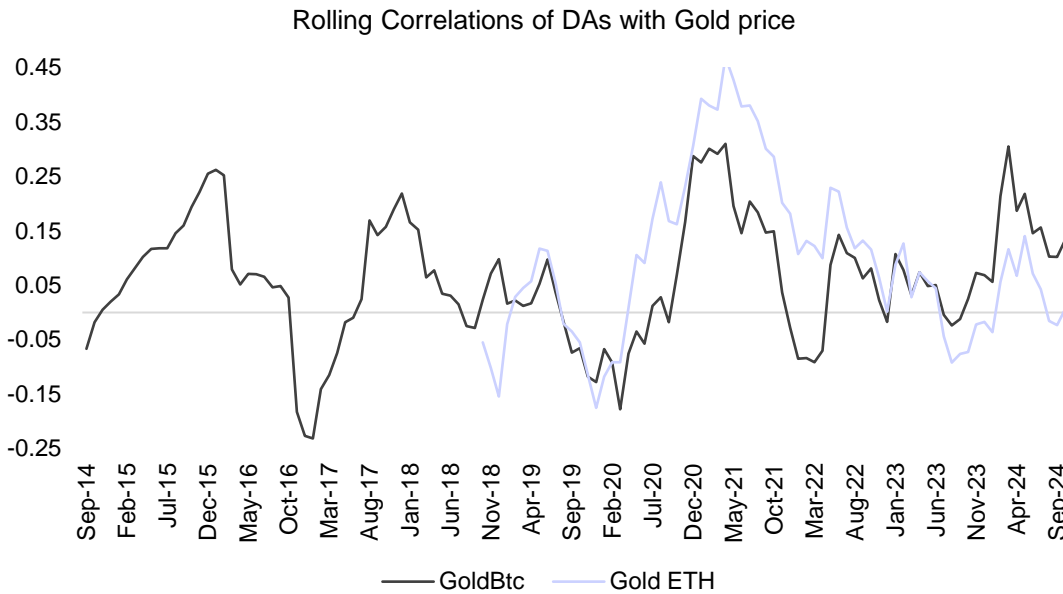
<sup>6</sup> See “Dynamic linkage between Bitcoin and Traditional Financial Assets: A comparative Analysis of Different Time Frequencies”, Panpan Wang, Xiaozing Liu and Sixu Wu, Entropy, Basel, October, 2022.

<sup>7</sup> See “The Bitcoin gold correlation puzzle,” Dirk Baur, Lai Hoang, Journal of Behavioural and Experimental Finance, December 2021.

<sup>8</sup> See [Asset Allocation Insights – December 2024 | LSEG](#)

<sup>9</sup> “Bitcoin is not the New Gold – A Comparison of Volatility, Correlation, and Portfolio Performance” – Tony Kleina, Hien Pham Thuc, Thomas Walthera, International Review of Financial Analysis, 2018.

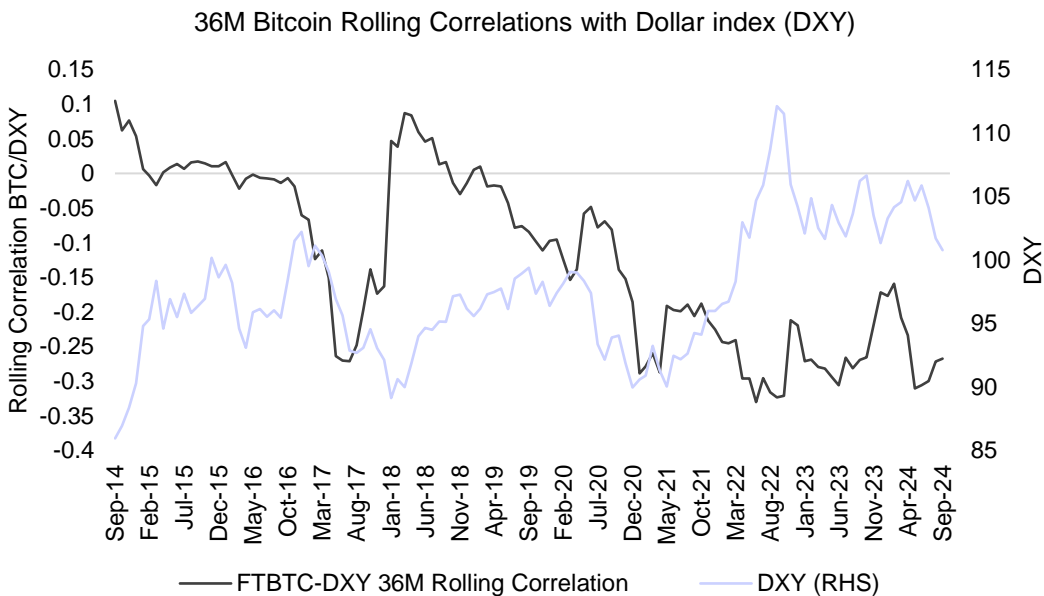
**Chart 3: 36 Month rolling correlation of DAs with gold price**



Source: FTSE Russell, monthly data from September 2014 to September 2024.

Further evidence that Bitcoin and Ether are not risk-off assets may be found in the very low, and negative correlations with the US dollar index, of 0.22 shown in Table 1, post-Covid for both DAs. These negative correlations have predominated for Bitcoin since 2014, as Chart 4 shows, and actually become greater since Covid. This also suggests Bitcoin and Ethereum could play a role as hedges against US dollar weakness in multi-asset portfolios, given the negative correlations now emerging.

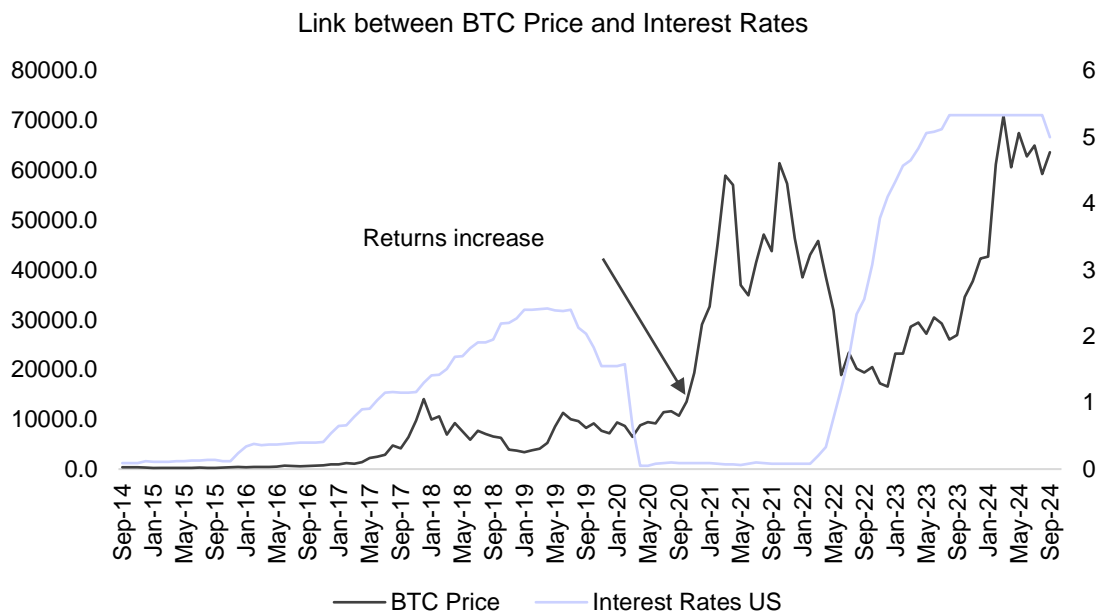
**Chart 4: Rolling correlations of Bitcoin with the US dollar index**



Source: FTSE Russell data from September 2014 to September 2024. Correlation of monthly returns data.

Because the period of pronounced US dollar index strength since early 2022 has been combined with a sharp increase in US short interest rates, until September 2024, US dollar short interest rates may also be a driver of this low correlation. To assess this, we examined the relationship between both US short interest rates and broader US financial conditions, and Bitcoin returns. Chart 5 shows Bitcoin prices appreciated in the early phase of the 2017-2018 Fed tightening cycle, but did fall back sharply in 2018 and again in 2021-2022, peaking in September 2021, before the Fed began raising rates in March 2022. The Chart also shows Bitcoin prices tend to move in advance of Fed short interest rate changes, reflecting changes in risk appetite, most notably in 2023-2024.

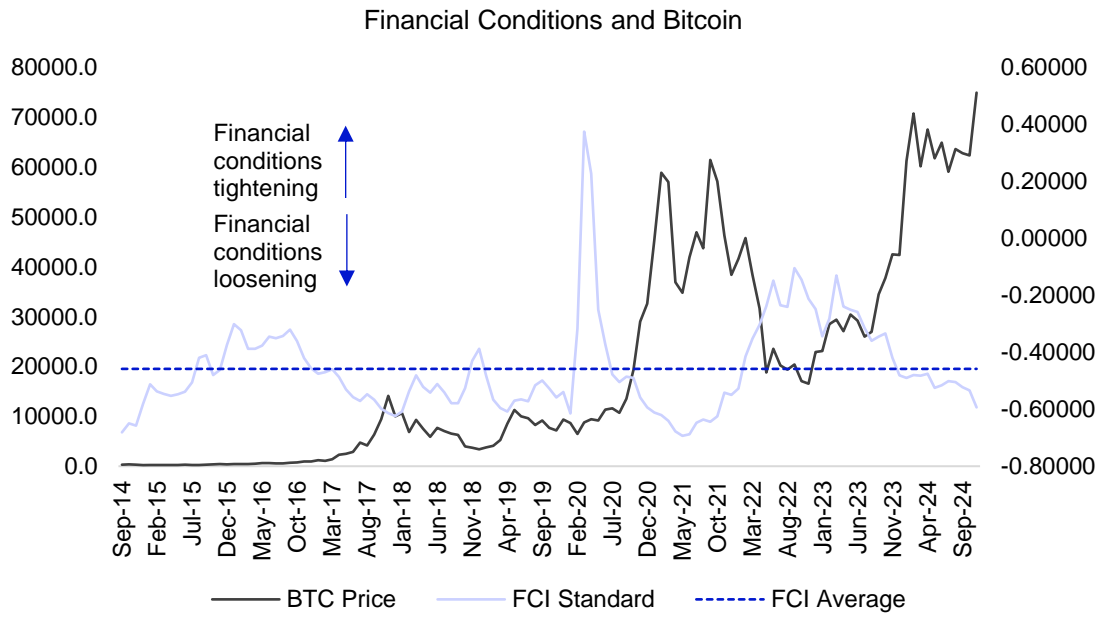
**Chart 5: Bitcoin prices and US short interest rates**



Source: FTSE Russell and LSEG data from September 2014 to September 2024.

Since policy rates alone do not dictate broader financial conditions and risk appetite, which often adjust in advance of short interest rates in response to central bank signalling, we looked at broader financial conditions and Bitcoin pricing. Perhaps unsurprisingly, given the evidence Bitcoin and Ethereum are risk-on assets, looser financial conditions have been correlated with positive Bitcoin returns, and vice versa. This is shown in Chart 6, which uses the Chicago Fed Financial conditions index, and shows the surge in Bitcoin prices began from October 2023, coincident with the risk rally and easing in financial conditions, and almost a year before the Fed finally reduced short rates in September 2024.

**Chart 6: US financial conditions and Bitcoin prices**



Source: FTSE Russell, US Federal Reserve. Monthly data from September 2014 to September 2024. Bitcoin Prices (left-hand axis), Chicago Fed financial conditions index (right-hand axis).

## Summary and conclusions

Drawing these strands together, we reach the following conclusions on the DAs Bitcoin and Ethereum, and their performance correlations with other asset classes since 2014, measured by FTSE Russell index data.

Firstly, the rolling correlations of DA returns – measured by Bitcoin and Ethereum-have increased sharply with risk-on assets since Covid in 2020, in equities and high yield credit. US Technology financials, and the Russell 1000 and 2000 and high yield credit all show positive correlations of 0.5 to 0.6 for 2020-2024, versus correlations near zero pre-Covid. In contrast, DA correlations have increased only modestly with risk-off, or safe haven assets like US Treasuries, to 0.2, since 2020, and remain negative with the US dollar, giving dollar hedging possibilities. The low correlations with risk-off assets have also been more stable over the period since 2014. At this early stage in their history, these correlations suggest DAs may be predominantly risk-on assets.

Secondly, DAs have shown high betas in response to macro-economic shocks like Covid, and the higher inflation and interest rate regime that followed. For investors, this increased volatility after macro-shocks suggests DAs have not yet developed stable store-of-value characteristics, in contrast to gold, which has lower volatility, reflecting a wider, and more established, investor base. However, we would note DA returns show higher correlation with US Tips returns, than US Treasuries, suggesting some investor perception of inflation protection.

Thirdly, since DAs like Bitcoin and Ethereum do not possess the fiat currency fundamental characteristic of being backed by government, and are not generally legal tender, unsurprisingly their performance returns are not strongly correlated with the primary reserve currency in the global financial system.

Fourthly, on the basis of correlations alone, from the short time series currently available on Bitcoin and Ethereum, they do not fall neatly into the category of either commodities or currencies. However, they have some characteristics of both and perhaps could be described as hybrid assets in that regard – or, more generally, constitute an entire brand-new asset class.

Finally, notwithstanding the increase in correlations since Covid, we note that despite the high volatility in DA returns, the skewness in DA returns increases their appeal for portfolio diversification purposes. Incorporating Bitcoin and Ethereum into a portfolio presents an opportunity for higher returns, but must be traded off against increased volatility, consistent with the principles of financial theory. To navigate this risk, while capturing growth potential, investors may benefit from a diversified strategy that includes stable-coins and a mixture of traditional assets.

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