

Crypto asset allocation strategies

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A comprehensive guide to
understanding, sizing & implementing
crypto asset allocations

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Introduction

Cryptocurrencies have been the best performing asset class every year bar two years since the market's advent over ten years ago, and in most years by a very long way.

As the asset class grew and matured in terms of market structure and the underlying technology, institutional investors have started to embrace it.

There are many good reasons to consider adding crypto assets to portfolios:

- The long term, structural, and largely recession-proof growth of blockchain technologies and the ever growing set of applications building on them
- The likely transformation of the financial markets by this technology
- The investment in the future of starting on an institutional learning curve by engaging with crypto assets
- The attractive portfolio diversification attributes of the crypto asset-class-allocating to crypto assets historically, not only improved portfolio returns, but in some instances lowered the overall portfolio volatility

Expectations of extraordinary returns over time from a megatrend based on the fastest growing technology in history, with a set of use cases still in its earliest stages, are leading many institutions to consider incorporating crypto assets in their portfolios.

However, there are many unanswered questions around how to approach a crypto asset allocation. This report aims to answer these questions and provide insights into:

- Whether cryptocurrencies should be treated as an asset class
- What benefit crypto assets bring to portfolios
- How to approach allocating for the various segments of the crypto asset universe
- Forecasting the parameters for asset allocation models
- Methodologies for sizing the allocation to crypto assets
- Issues around practical implementation

To support our clients, Sygnum Asset Management is creating a growing set of investment products to allow increasingly sophisticated implementation of views on the crypto asset class and its various market segments and sectors.





1. Is crypto an asset class?

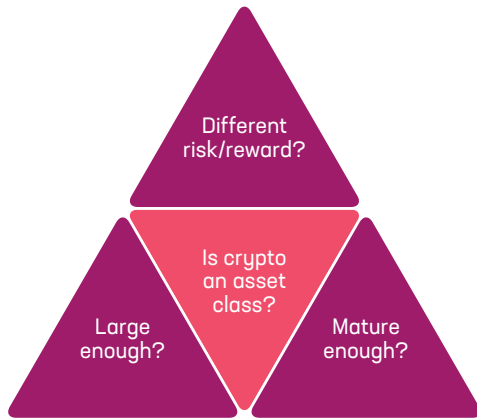
Whether cryptocurrencies are an asset class at the asset allocation level is a question that has arisen recently with the market's growth and increased maturity.

Before we delve into how to think about incorporating crypto assets in portfolios, we should consider whether cryptocurrencies satisfy the criteria to be regarded an asset class.

Asset class criteria

The first consideration is whether crypto assets have unique drivers of performance and volatility.

“Cryptocurrencies”, the native tokens of blockchain protocols, do satisfy the requirement of having distinct risk and reward characteristics, different from those of other asset classes.



Sufficient maturity and size/liquidity are further criteria for a group of assets to be treated as a legitimate asset class in portfolios. How much maturity is “sufficient” is of course a subjective consideration. However, it is clear that the crypto market has resolved many teething problems and has matured significantly.

In fact, the crypto industry has rebounded stronger from the shocks and challenges it has faced, demonstrating antifragility. Meanwhile technological innovation has resolved many of the initial weaknesses and bottlenecks.

THE CRYPTO INDUSTRY HAS REBOUNDED STRONGER FROM THE SHOCKS AND CHALLENGES

Whether the crypto market is large enough to be considered as a separate asset class in portfolios depends on the size of the portfolio. Larger institutions may instead treat it as a subset of the Alternative Investments allocation.

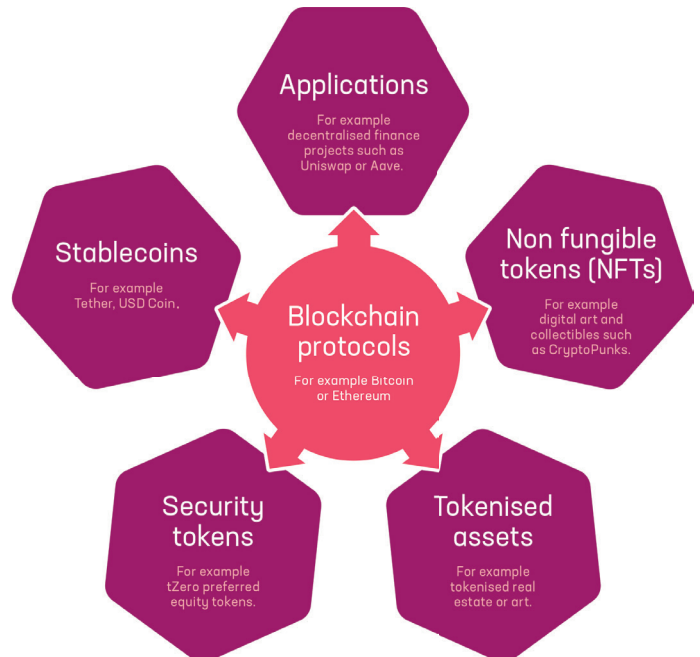
The crypto asset universe

It is important to recognise one important point: the crypto market is not one asset class, but rather it is made up of several market segments with different investment characteristics.

The crypto market is better described as an “investment universe” rather than a single asset class.

The native currencies of blockchain protocols, such as Bitcoin or Ethereum, are often referred to as “cryptocurrencies”. They are the foundation on which a new ecosystem of applications and tokens is being built – sometimes replicating their traditional counterparts, sometimes replacing them, sometimes introducing use cases that didn’t exist before.

The various types of tokens built on top of blockchains, including the tokens of applications such as gaming or decentralised finance built on the foundational protocols, are not the same “asset class” as the native tokens of the blockchain protocols.



Blockchain protocols sit at the centre of this asset universe, and they continue to make up almost 80 percent of the crypto market. This central segment of the crypto universe is an entirely new type of asset.

The other market segments building on top of these blockchain protocols resemble traditional assets at least to some extent, and in some cases are blockchain based equivalents.

Blockchain protocol layer as an asset class

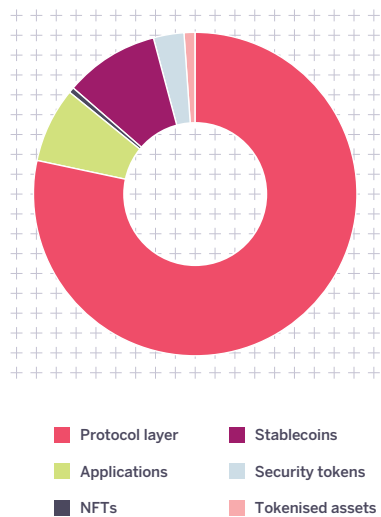
Calling the native tokens of blockchain protocols, such as Bitcoin or Ethereum, cryptocurrencies, is a slight misnomer as their use cases extend well beyond being purely a currency. We will interchangeably refer to them as cryptocurrencies or blockchain protocol tokens – the latter is a more accurate term but a bit of a mouthful. They are part currencies, part commodities, and part projects that earn fees from others using the platform, including other projects that build on top of them. This complex nature is what makes them materially different from other asset classes.

Certain protocol tokens are used much more as methods of payment, others are much more prominent as platforms other projects build on (“smart contract platforms”). However, all of them can serve all of the use cases, and what their primary use case is might change over time.

These use cases are more or less independent of each other and are driven by different factors. For example, growth in the use of cryptocurrencies in payments vs. growth in the application user base building on smart contract platforms occurs for several reasons. This contributes to the idiosyncratic nature of the asset class, and the low correlation to other asset classes.

As the protocol layer is by far the largest segment of the crypto asset market, it is often equated with it. But the other, at this point smaller but faster-growing market segments, have distinct return drivers and risk/reward characteristics that are fundamentally different from the protocol layer, and therefore they need to be considered separately at the asset allocation level.

BREAKDOWN OF THE CRYPTO MARKET BY MARKET SEGMENTS

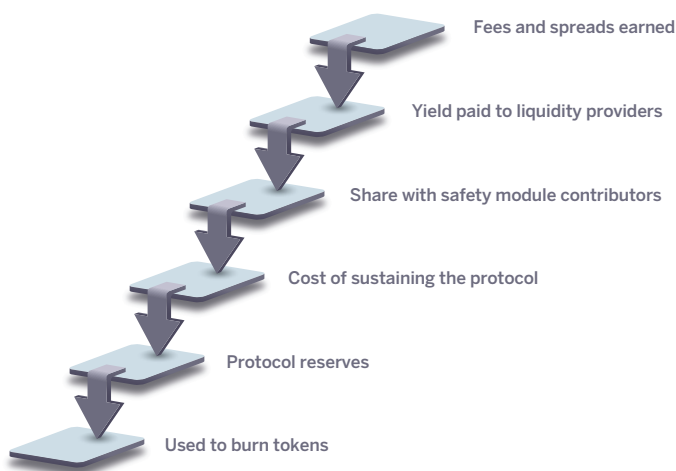


Application layer as an asset class

The tokens of applications building on top of blockchain protocols resemble equity like investments as they are projects with distinct revenue streams that in some way accrue to the token.

For example, a decentralised lending protocol would share part of the fees and spreads earned with the tokenholders. The mechanisms for this are still evolving but the most common approach is to use the amount to buy back and destroy (“burn”) tokens, thereby increasing their value through reducing the supply.

EXAMPLE OF DEFI PLATFORM REVENUE WATERFALL



A DECENTRALISED LENDING PROTOCOL WOULD SHARE PART OF THE FEES AND SPREADS EARNED WITH THE TOKENHOLDERS.



Because the mechanisms for capturing value are different from stocks, and there are additional risks relating to the technology and the platforms, application layer tokens may be considered a different asset class, or a special subset of equity portfolios.

Operational issues aside, sector portfolios can legitimately include a mixture of equities in the sector (e.g. gaming) as well as tokens of the decentralised projects in the same sector (e.g. blockchain-based gaming). Ultimately, many of the same trends drive the returns of the companies in each sector as the returns of the decentralised platforms in the same sector. And as in many cases, decentralised projects take market share from their traditional counterparts, sector portfolios that include both types of instruments hedge against this while maintaining exposure to the underlying trends driving the sector.

The application layer is still relatively small within the crypto market, but it is growing fast now that the foundational technology is sufficiently stable and scalable.

Crypto market segments that closely resemble traditional assets

Some crypto assets replicate existing assets through tokenization (backed by the underlying asset one-for-one) or by creating stablecoins that ensure a price peg either through reserves or through algorithms.

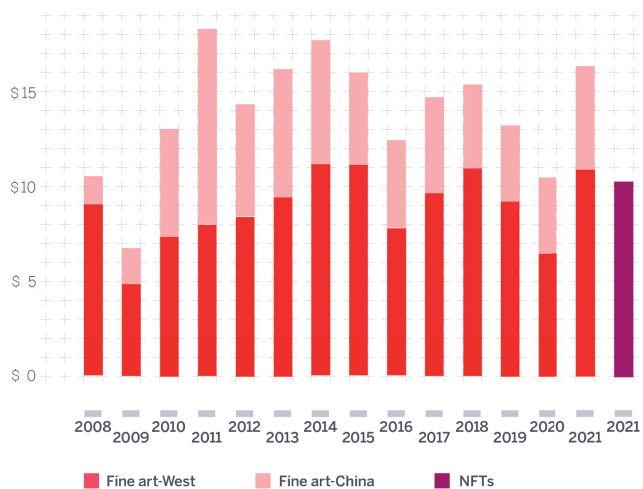
These segments of the crypto market do not introduce new risk/return profiles, but they may offer advantages in terms of liquidity (such as tokenized art or real estate), valuation, or transaction costs.

Security tokens are traditional securities (equities, bonds, or rights to cashflows) issued directly on the blockchain by centralised entities. Their inherent risk/reward characteristics are the same as those of the traditional securities they resemble. Please note we use the term “security token” in an economic sense, without considering the evolving legal/regulatory definitions around securities.

Although NFTs (Non-Fungible Tokens) are a new type of asset, they are very small still in terms of aggregate market capitalisation. The most common types (digital art, collectibles, and in-game items) somewhat resemble art as an asset class.

FINE ART MARKET VS THE NFT MARKET CAPITALISATION

(Billions)



Crypto strategies used to enhance traditional portfolios

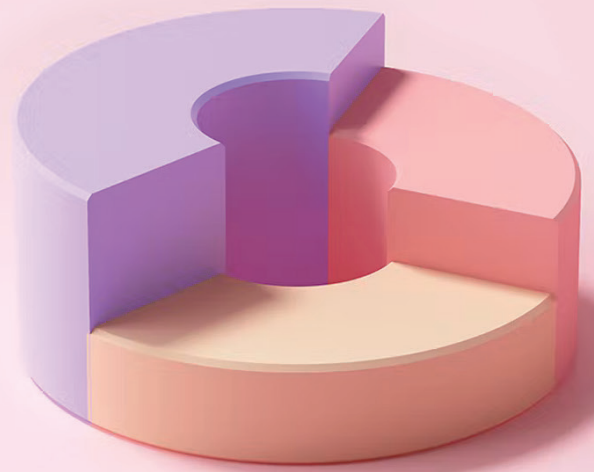
The crypto market also accommodates investment strategies such as absolute return investing, venture capital, and it has its own interest rate market allowing for yield-generating-strategies. Each offer far greater return opportunities than their traditional counterparts.

Investing in crypto yield, crypto venture capital, or alpha generating strategies in the crypto market enhances the returns of the corresponding traditional portfolios.

CRYPTO VS TRADITIONAL INVESTMENT STRATEGIES

Investment Strategy	Benefit Over Traditional Counterpart
Yield strategies	Yields in the crypto market are not artificially distorted by political decisions, and therefore much higher.
Absolute return	The early stage nature of the market means that the opportunities for excess returns from either asymmetric information or market inefficiencies are still substantial.
Venture capital	Strong returns, large number of unicorns, the time to liquidity events much shorter.

2. The rationale for allocating to crypto assets



Cryptocurrencies represent a new, now investable asset class. This alone, however, is not reason enough to include it in portfolios. It also requires the expectation that adding this asset class will make a positive contribution to the portfolio.

Qualitative rationale

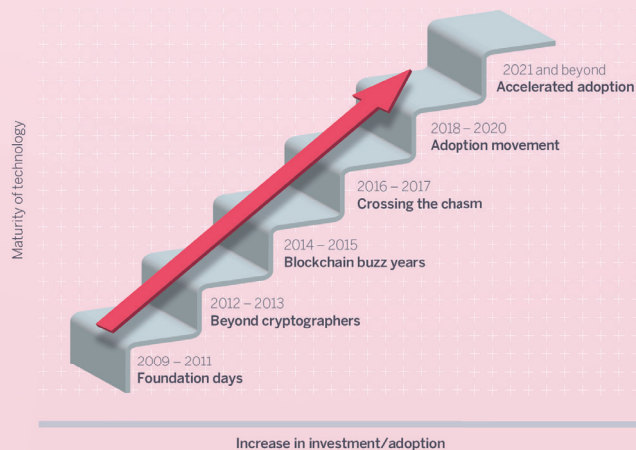
Before assessing the quantitative contribution of crypto assets to portfolios, it is important to consider the compelling reasons for allocating to crypto assets that go beyond the risk, return and correlation benefits the asset class can bring.

The adoption of blockchain and distributed ledger technologies across the economy is a megatrend still in its relatively early stages. The adoption of this transformational technology is similar to the trend towards personal computers in the 1980s, or the internet in the 1990s.

This implies long-term structural growth, largely independent of economic cycles.

This technological step change is likely to transform the financial markets too, impacting execution, settlement, and the form financial instruments take. Starting on the institutional learning curve is in part an investment in the future.

CRYPTO ADOPTION TRENDS



Quantitative rationale

Deciding to allocate to crypto assets should be done with the expectation that this will improve the portfolio's risk and return characteristics.

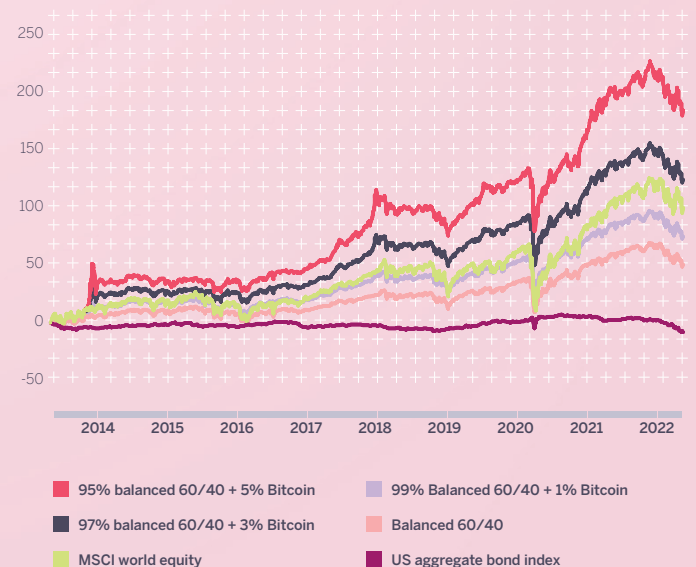
This certainly has been the case historically – albeit the asset class was too small and not mature enough to warrant institutional allocation.

It is reasonable to expect a positive return contribution to portfolios as well over the medium to long-term, due to the strong fundamental growth trends of this asset class tracking the foundational technology of the future.

In addition, the largely idiosyncratic nature of the factors driving the crypto market has translated into a low correlation with other assets, further contributing to the quantitative benefits to portfolios.

CUMULATIVE RETURNS OF EQUITY/BOND PORTFOLIOS WITH BITCOIN

Date range: 1/3/2017 to 30/4/2022; portfolios rebalanced quarterly



3. Asset allocation approaches

The still relatively small size of the crypto market and the complexity due to several market segments with unique investment characteristics, means that there are multiple approaches to allocating crypto assets to portfolios.

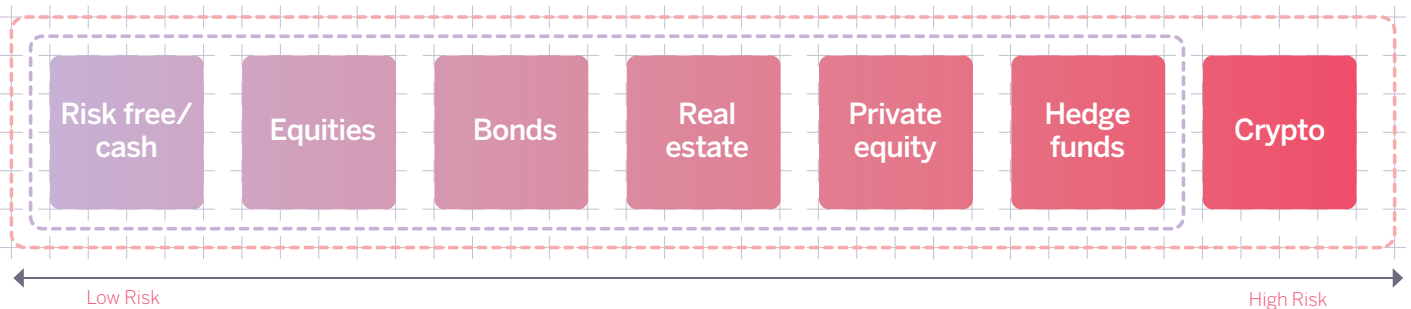
Carve out for crypto

Investors may choose to treat the blockchain protocol layer ("cryptocurrencies") as a distinct asset class that they allocate to at the portfolio level.

This is justified by the unique risk/reward characteristics of cryptocurrencies, as well as the trend towards blockchain protocols as the rails of tomorrow's economy.

The limitation is the size of the crypto market relative to the size of the portfolio. This approach will not be practical or feasible for large investment managers yet.

ALLOCATING TO CRYPTO AS AN ASSET CLASS



Alternative investments

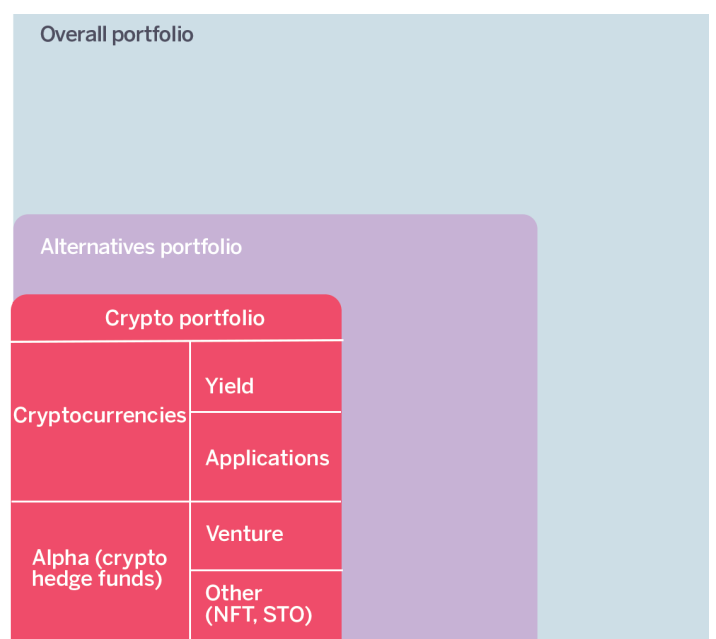
Institutional investors, especially the larger ones, may allocate to crypto assets as part of their Alternative Investments portfolio.

This approach can accommodate investing in various segments of the crypto market, building a composite crypto portfolio.

This could include:

- Beta exposure to the blockchain protocol layer (cryptocurrencies) which make up the majority of the crypto asset universe
- Beta exposure to various application layer sectors
- Exposure to alpha in the crypto market (crypto hedge funds)
- Crypto yield strategies
- Crypto venture capital
- Exposure to smaller market segments such as NFTs or security tokens

ALLOCATING TO CRYPTO WITHIN ALTERNATIVES PORTFOLIOS



Portfolio add-ons

An alternative approach is to add crypto assets to existing portfolios with a comparable (or identical) investment profile.

The table below summarises the opportunities for enhancing existing portfolios with crypto investments (+++/++/+ denotes strong/some/occasional opportunity).

COMPLEMENTING PORTFOLIOS WITH CRYPTO ASSETS

Traditional portfolio	Crypto equivalent or complement
Equities	++ Security tokens; maybe application layer tokens
Credit/bonds	+ Bonds issued as security tokens; DeFi safety modules
Money market	+++ Crypto yield market
Commodities	+ Tokenised commodities; gas tokens
Currencies	+ Cryptocurrencies; maybe stablecoins
Real estate	+ Tokenised real estate
Hedge funds	+++ Crypto hedge funds
VC/PE	+++ Crypto venture capital
Art/other alternatives	+++ NFTs

This approach is the least applicable to the core of the crypto market, the protocol layer tokens (“cryptocurrencies”), as they form an asset class with an investment profile that is not comparable to other assets.

However, some other strategies (yield, alpha, venture, or digital art NFTs) are directly comparable to the equivalent traditional investment strategies/portfolios, and they have outperformed their traditional counterparts significantly in each case.

4. Cryptocurrency asset class characteristics

In this section, we will only focus on the blockchain protocol layer (“cryptocurrencies”) as this is the market segment that form the majority of the crypto asset universe, and it is also the asset class with a truly different and unique risk/reward profile, while the other smaller market segments are closer parallels of traditional assets.

Volatility

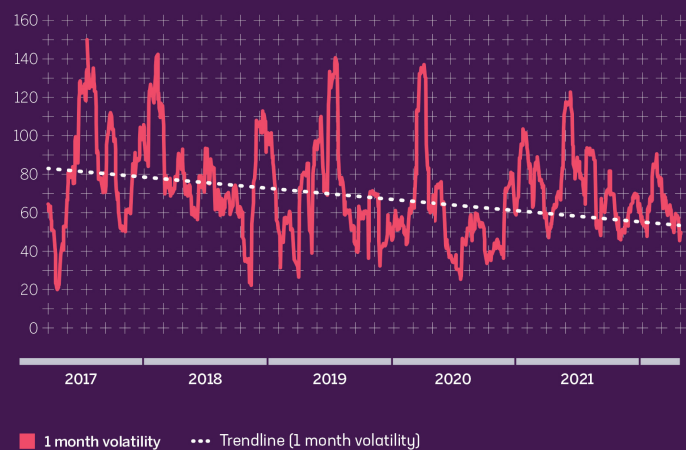
Cryptocurrencies have been a high risk/high return investment to date.

The high volatility of the asset class is in part a function of its still relatively small total capitalisation and liquidity.

As the asset class matures and liquidity increases, we see a declining trend in volatility. As the chart shows, the 3-month volatility of the broad crypto market index has declined from an average of over 80 percent at the beginning of 2017 to an average of close to 60 percent.

CRYPTO MARKET VOLATILITY

Date range: 1/3/2017 to 30/4/2022



We expect volatility to continue declining with increasing market capitalisation and liquidity. However, until the asset class becomes significantly larger, volatility is likely to remain in the 60 to 70 percent range.

It is also interesting to note that the volatility pattern in bear markets has been consistent, with an initial spike followed by generally low volatility, while bull market volatility has been inconsistent – bull markets were sometimes characterised by low volatility and sometimes by high volatility.

These patterns are different from those typical in the bond or equity markets. For example, the S&P500 has been strongly negatively correlated with its volatility (around -70 percent to -90 percent historically). Meanwhile the correlation between the crypto market index and its volatility has been close to zero (between 0 percent and -10 percent).

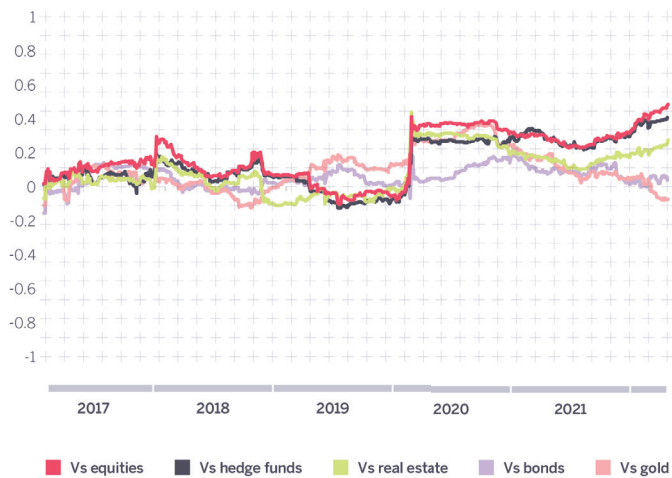
Correlation

Crypto assets have been largely uncorrelated with other asset classes to date. Correlation has been around 0 to 10 percent with most asset classes, and slightly over 10 to 20 percent with equities.

The March 2020 market shock was a very highly correlated single event. After this, correlation with asset classes declined until the end of 2021 when institutional investors started trading crypto as a risk asset.

CORRELATION OF THE CRYPTO MARKET WITH VARIOUS ASSET CLASSES

Date range: 1/3/2017 to 30/4/2022



CORRELATION IS CONDITIONAL ON THE FACTORS DRIVING THE ASSET CLASSES.

Correlation is conditional on the factors driving the asset classes. These encompass the drivers of valuations, fund flows and risks.

Some of the factors influence asset classes in the same direction (e.g. GDP growth being bullish for several asset classes), some in opposite directions (e.g. rising inflation being typically bearish for bonds but bullish for commodities). The picture is usually mixed with certain factors dominating at certain times. Over the longer term, correlation centres around levels that the majority of the factors dictate.

Fundamental factors affecting the value of crypto assets

Considering the factors affecting the crypto market gives insights into the expected correlation:

Growth

- Economic growth is positive for crypto assets as it is for most assets, and therefore it contributes to positive correlation
- Blockchain based/decentralised projects are in many cases taking market share away from their traditional counterparts (e.g. Bitcoin taking market share from gold, or decentralised finance from traditional finance) – this contributes to negative correlation with those assets
- Technological innovation creates new markets, and it is an idiosyncratic, uncorrelated driver of growth

Macro stability

- Assets with strong store-of-value properties correlate with each other and exhibit negative correlation with other assets in times of macroeconomic instability – Bitcoin (and some other leading cryptocurrencies) have often been treated as a “macro hedge”

Regulation

- When deregulation/regulation is a general trend affecting most asset classes (as was the case in the 1990s, for example), it contributes to positive correlation, when it is specific to one asset class (as is the case currently for crypto assets), it is an idiosyncratic event and therefore uncorrelated

Valuation models

- Assets that are valued based on Discounted Cash Flow (DCF) models are sensitive to the discount rate assumptions, and correlated with each other – cryptocurrencies are rarely valued in this manner; even where such an approach has validity, the uncertainty around the assumptions is far greater than the impact of the interest rate component, and it does not justify trading them in a positively correlated manner with assets that are valued with DCF models
- Supply/demand-based valuation models usually lead to uncorrelated performance or low correlation because the supply dynamics for asset classes are typically idiosyncratic, although the demand side may be more correlated – cryptocurrencies are often valued using these types of models, such as the equation of exchange applied to currencies, or the stock-to-flow model used to value scarce commodities

Factors driving fund flows

Interest rates/monetary policy

- Central bank action on interest rates is a driver of negative correlation between cryptocurrencies and assets that offer a higher yield when fiat interest rates rise – even though yield is available in the crypto market as well, it is driven by market forces not by central bank policy and therefore the yield differential will narrow or widen as central banks raise or cut rates
- Central bank liquidity injections (or withdrawals) affect all asset classes and contribute to positive correlation

Risk/volatility

- When the crypto market was dominated by retail investors, changes in volatility had no significant impact on investor flows, if anything retail investors welcomed higher volatility as it created greater opportunities
- Since the crypto market is now driven more by institutional investors, crypto assets have been traded more as a risk asset which has contributed to a higher correlation with other risk assets
- When risk/volatility changes in the crypto market due to idiosyncratic reasons (e.g. energy concerns) that do not implicate other markets, it contributes to lesser correlation with other asset classes

Adoption of a new asset class

- As crypto assets are embraced by the mainstream, it creates fund flows away from other assets and into cryptocurrencies – this contributes to negative correlation

Some of the investment decisions regarding fund flows are structural and follow from the mandates of certain institutions, others may be sentiment driven “knee-jerk” reactions which, if they contradict the fundamental drivers, may have a short-lived impact only.

Idiosyncratic asset class risks

- There are risks with the nascent and evolving technology underpinning cryptocurrencies
- As regulators are defining their approach to crypto assets, related positive and negative developments can significantly affect the crypto market

Both of the above, contribute to making cryptocurrencies generally uncorrelated with other asset classes.

The different drivers of positive, negative, or no correlation have tended to average around a largely uncorrelated state for cryptocurrencies vs. other assets, not least because a large percent of the factors affecting the crypto market are idiosyncratic.

Historically, correlation tended to be very low and close to 0 percent. At times, factors dictating negative correlation dominated. More recently the drivers of positive correlation have increased but on balance, we expect the idiosyncratic factors to dominate over the medium term.

We expect correlation to remain low, over the medium term in the 0 to 10 percent range, with a short-term range of -10 to 20 percent correlation with most asset classes. When it comes to risk assets such as equities, credit, real estate, we expect the correlation to average around 30 percent, with a range of 20 to 40 percent.

Correlation with hedge funds is slightly circular as many are increasingly involved in the crypto market, and it has increased over time from around 0 percent to closer to 30 percent.

THE EFFECT OF MARKET REGIMES ON THE CORRELATION BETWEEN CRYPTO AND OTHER ASSET CLASSES HAS BEEN INCONSISTENT.

The effect of market regimes on the correlation between crypto and other asset classes has been inconsistent. While in times of sustained growth, the equity-bond correlation tends to be positive and in times of sustained stress,

negative, the correlation of crypto with other assets has not shown a relationship with the prevailing market regimes. At times the crypto market has exhibited negative correlation with other assets in times of stress (trading as a de facto macro-hedge). More recently the correlation turned positive in response to macro stress as institutions started trading crypto as a risk asset.

Beta to balanced portfolio

We look at the historic beta of the crypto market and various equity+bond portfolios to get further insights into the characteristics of the crypto asset class based on the market history since early 2017.

The betas were high (between 1.8 and 3.2) vs. all of the portfolios, however, all with a low R-squared, i.e. weak explanatory power, and with most of the crypto market returns idiosyncratic (alpha).

It is also interesting to note that the largest drawdown in the crypto market was smaller as a percent of the volatility than in the case of all of the balanced portfolios.

The crypto market did not experience events outside 1.12 standard deviations over the period, while all the balanced portfolios had events between 2 and 3 standard deviations.

CRYPTO MARKET BETA TO VARIOUS EQUITY/BOND PORTFOLIOS

	Annualised return	Volatility	Sharpe ratio	Max drawdown	Maximum drawdown /volatility	Crypto market beta vs portfolio	R ²
Crypto market index	97.14%	77.64%	1.24	-87%	-1.12	–	–
60% Equites / 40% Bonds	6.69%	9.65%	0.59	-22%	-2.27	1.77	4.83%
40% Equites / 60% Bonds	4.8%	6.78%	0.56	-16%	-2.33	2.51	4.81%
20% Equites / 80% Bonds	2.81%	4.62%	0.39	-13%	-2.83	3.16	3.53%

Risk premium

While risk, volatility, and correlation are predictable with greater confidence, returns are largely unpredictable and the uncertainty over return forecasts, even if they are directionally accurate and well supported, is very large.

Assumptions about the long-run risk premia of asset classes are much debated, even in the case of an established asset class with a long history such as equities.

The crypto market's short history, most of which was spent in a nascent immature state, does not lend itself to extrapolating past returns, or calculating the historic excess return and use it as a risk premium assumption for asset allocation decisions.

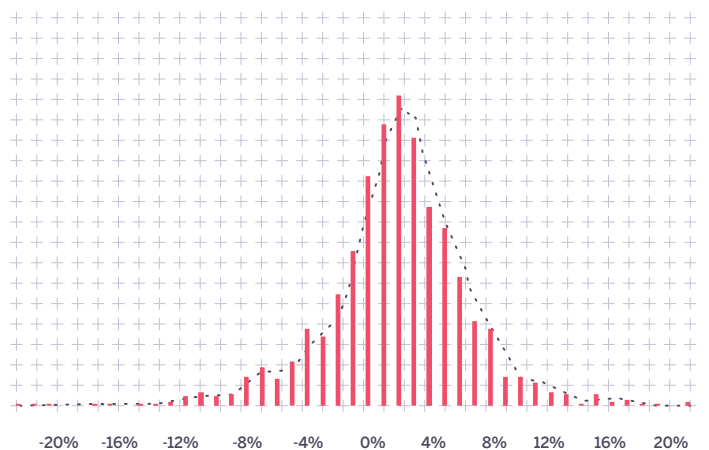
We can expect extraordinary returns over time from a megatrend-based on the implementation and proliferation of the fastest growing technology in history with a very broad set of use cases that are still in the earliest stages of being built. But quantifying the expected risk premium would be fallacious.

It is also important to consider the distribution of returns as this is a characteristic that is likely to remain reasonably stable.

The distribution of historic crypto returns has a negative skew, with a longer, fatter downside tail.

CRYPTO INDEX DAILY RETURN DISTRIBUTION

NB: risk free rate = 1%; portfolios rebalanced quarterly; period covered 1/3/2017 to 30/4/2022





5. Sizing the allocation

We applied different approaches and assumptions to estimate the appropriate allocation to crypto assets. We use the S&P Crypto Broad Market Index to represent the crypto asset class. The index contains data back to March 2017, covering both bull and bear markets.

Mean/variance optimisation

Based on historic risk, return and correlation parameters, adding crypto assets to portfolios would have enhanced Sharpe ratios significantly.

The table below shows the improvement in portfolio returns and Sharpe ratios by adding 1, 3 and 5 percent of crypto to the portfolios.

Despite the crypto asset class' significantly higher volatility, the largely uncorrelated nature of the returns meant that when adding 1 percent to portfolios, the returns increased substantially with only a marginal increase in volatility.

When adding higher percentages of crypto assets, the volatility of the portfolios increased but proportionately much less than the returns. The Sharpe ratios improved significantly in all cases.

These are, however, historic parameters, and we cannot apply them in a forward-looking manner. As discussed above, risk and correlation are quite stable and relatively easy to forecast. Return forecasts for a nascent asset class are, however, near impossible to make which makes using mean/variance optimisation problematic.

HISTORIC RISK/RETURN OF PORTFOLIOS WITH AND WITHOUT CRYPTO EXPOSURE

NB: risk free rate = 1%; portfolios rebalanced quarterly; period covered 1/3/2017 to 30/4/2022

	No crypto exposure			Adding 1% crypto			Adding 3% crypto			Adding 5% crypto		
	Annualised return	Volatility	Sharpe ratio	Annualised return	Volatility	Sharpe ratio	Annualised return	Volatility	Sharpe ratio	Annualised return	Volatility	Sharpe ratio
60% Equites / 40% Bonds	6.69%	9.65%	0.59	8.14%	9.80%	0.73	11.01%	10.44%	0.96	13.84%	11.40%	1.13
40% Equites / 60% Bonds	4.8%	6.78%	0.56	6.26%	7.0%	0.75	9.16%	7.85%	1.04	12.01%	9.08%	1.21

Risk budgeting

Because of the low correlation of crypto assets with most traditional asset classes, they can be added to portfolios without straining the risk budget. As we saw above, adding crypto assets to portfolios has led to a reduction in the portfolio volatility in some cases historically.

When the asset allocation approach involves risk buckets, cryptocurrencies will naturally belong in the high(est) risk bucket. When the barbell approach is used, i.e. minimising risk at one end of the barbell and maximising potential return at the other end, cryptocurrencies fit the latter category very well.

Another way of phrasing the question to manage the difficulty of forecasting future returns or risk premia is to ask what the minimum return required from cryptocurrencies is for the Sharpe ratio of the portfolio to remain stable, or in order to exceed a certain target Sharpe ratio.

In the table below, we detail an example.

MINIMUM EXPECTED CRYPTO MARKET RETURNS FOR VARIOUS TARGET SHARPE RATIOS

Investment horizon	Expected bond return	Expected equity return	Bond allocation	Equity allocation	Crypto allocation	Crypto return for Sharpe = 0.5	Crypto return for Sharpe = 0.75
1-year	2%	7.5%	77.5%	18.2%	4.3%	35%	75%
3-year	2.5%	8%	77.5%	18.2%	4.3%	24%	64%
5-year	3%	8.5%	77.5%	18.2%	4.3%	13%	52%

We assumed 1-, 3-, 5-year bond yields of 2%, 2.5%, and 3%, respectively, and a 5.5% equity risk premium. We used a risk parity portfolio of 77.5% allocation to bonds, 18.2% to equities, and 4.3% to crypto assets. This equity/bond portfolio (without crypto assets) had a historic Sharpe ratio of around 0.4 over the past 5 years. We will target 0.5 and 0.75 for Sharpe ratios after including crypto assets.

Targeting 0.5 Sharpe ratio for the portfolio including crypto assets, we find that we would require a 35 percent return on a 1-year horizon, a 24 percent annualised return on a 3-year horizon, and a 13 percent annualised return on a 5-year horizon.

If a Sharpe ratio of 0.75 is targeted, the required returns would be 75 percent, 64 percent, and 52 percent annualised over the 1-, 3-, and 5-year time horizons, respectively.

Instead of trying to estimate future returns for crypto assets, through this reverse engineering the question is whether a certain minimum return threshold is expected to be exceeded.

Equal Risk Contribution portfolios

To calculate the size of crypto allocations to portfolios, we have used the Equal Risk Contribution (ERC) methodology.

First, we modelled a simple scenario of adding crypto assets to an equity+bond portfolio. As larger institutions may find it more practical to allocate to crypto assets within an alternative investment portfolio, we then proxied alternative investments with the Morningstar Diversified Alternatives Index which includes several alternative investments such as private equity, infrastructure, managed futures, and hedge funds. We also created a modified alternatives basket where we complemented the Morningstar index with real estate and commodities exposures.

EQUAL RISK CONTRIBUTION PORTFOLIOS WITH CRYPTO ALLOCATION

Portfolio	ERC crypto allocation
Equity + Bond + Crypto	4.34%
Alternatives + Crypto	9.73%
Modified alternatives + Crypto	11.76%

The model allocated 4.34 percent to crypto assets when the three asset class choices were equities, bonds, and cryptocurrencies, and between 9.73 and 11.76 percent when we added crypto assets to alternatives.

The allocation will depend on the set of assets and the assumptions about volatilities and correlations.

Below we present two examples – one for a smaller institution that considers adding crypto as an asset class, the other for a larger institution that considers adding crypto to the alternative investment portfolio.

Example: Adding crypto assets to a balanced portfolio

We use the MSCI World index as represented by the iShares ETF to proxy equities, and the iShares Core Aggregate Bond ETF to proxy bonds. Crypto assets are represented by the S&P Crypto Broad Market Index. We estimated the covariance matrix on the basis of the historic time series starting on 1 March 2017 (the inception date of the S&P Crypto Broad Market Index), giving greater weight to the more recent data points using the EWMA (exponentially weighted moving average) methodology.

The equal risk contribution model allocated 18.17 percent of the portfolio to equities, 77.49 percent to bonds and 4.34 percent to cryptocurrencies.

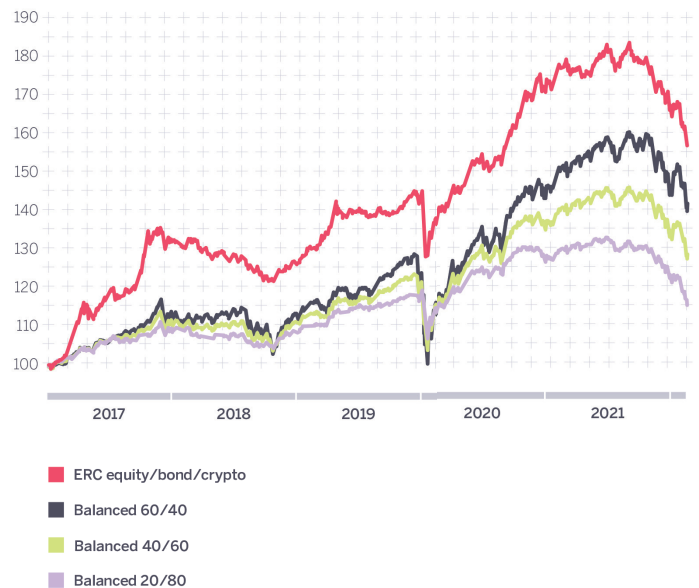
The historic performance of this portfolio produced an annualised return of 9.07 percent, in excess of the returns that equity/bond portfolios have produced which were between 2.8 and 6.7 percent for the 20/80 percent, 40/60 percent and 60/40 percent equity/bond portfolios.

The volatility of 6.85 percent falls in the middle of the volatility range for the portfolios without crypto (these were between 4.62 percent and 9.65 percent). The Sharpe ratio improved from 0.4-0.6 to 1.18.

The chart plots the 20/80 percent, 40/60 percent and 60/40 percent equity/bond portfolios as well as the Equal Risk Contribution portfolio with equities, bonds and crypto assets as the three asset classes.

BALANCED PORTFOLIOS WITH AND WITHOUT CRYPTO ASSETS

Date range: 1/3/2017 to 30/4/2022; portfolios rebalanced quarterly



Example: Adding crypto assets to an alternatives portfolio

In the second example, we use the ProShares Morningstar Alternatives Solution ETF as a proxy for an alternatives portfolio, and complemented this with the iShares US Real Estate ETF and the iShares GSCI Commodity Dynamic Roll Strategy ETF.

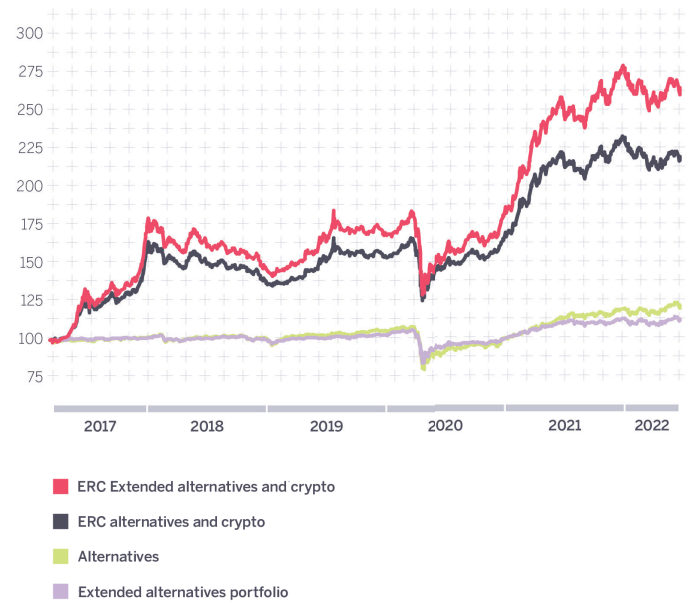
Alternatives were proxied as a single asset due to the difficulties in sourcing individual data series for several alternative asset classes. The ERC model allocated 9.73 percent to crypto assets when we used the Alternatives ETF, and 11.76 percent when we used the extended alternatives portfolio proxy.

The historic returns improved from 2.26 percent for the alternatives portfolio to 16.23 percent for the ERC portfolio when crypto assets were added. The volatility increased from 7.36 percent to 13 percent, with a dramatic improvement of the Sharpe ratio from 0.17 to 1.17.

The returns for the augmented alternatives portfolio of 65 percent Morningstar Alternatives Index, 25 percent real estate and 10 percent commodities improved from 3.71 percent to 20.39 percent when we added crypto asset. The volatility increased from 9.21 percent to 15.54 percent, with again a significant improvement in the Sharpe ratio from 0.29 to 1.25.

ALTERNATIVE PORTFOLIOS WITH AND WITHOUT CRYPTO ASSETS

Date range: 1/3/2017 to 30/4/2022; portfolios rebalanced quarterly



6. Implementation

The practical implementation of adding crypto assets to portfolios involves choices about market segments and about building in-house capabilities vs. outsourcing.

Key factors to consider

When implementing crypto assets in portfolios, there are a number of decisions to make:

- Which segments of the crypto market to include – just cryptocurrencies (blockchain protocols) which comprise the largest segment of the market, or also the tokens of application layer projects, tokenised assets, or NFTs
- The balance of yield vs. market exposure
- Which sectors (e.g. decentralised finance, layer 2 protocols, metaverse, centralised exchanges, etc.) to include based on their maturity and the in-house views and capabilities
- Whether to target market beta or alpha opportunities

The choice about whether to outsource may follow a timeline as resources are built and experience is gained gradually.

Active investment into crypto assets requires significant product and market expertise, as well as in-house infrastructure for trading, settlement, and custody of crypto assets. The dispersion in the performance of cryptocurrencies has been substantial and it is expected to remain so for some time as the technology matures and innovation creates fast successes at the expense of other projects. While the high dispersion creates tremendous opportunities for alpha-generation, it also comes with the risk of very significant losses and underperformance relative to passive products.

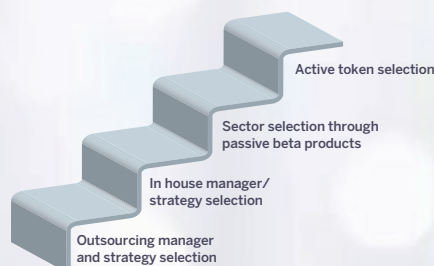
As the crypto market matures, an increasing number of investable sectors is available through beta products. Trading sectors such as decentralised finance vs. web3 or gaming creates alpha opportunities

without taking on idiosyncratic project risk. Beta products can also be used as a single proxy for the crypto asset class.

Alpha in the market may be initially accessed through outsourcing it to highly skilled managers.

However, the difficulties in selecting the right managers due to the short track records and often small teams and low Assets under Management (AuM) and the unique risks the asset class carries mean that it may also make sense at this stage to outsource the manager selection.

IN-HOUSE VS OUTSOURCING OPTIONS



Investment products

Performance will also depend on selecting the right investment products.

In the case of passive beta products, it is important to select well-constructed indices to track in order to avoid “accidental alpha”. When a passive product isn’t truly passive, the subjective component will not be backed by thorough research and a well thought through investment strategy as it would be in the case of active products, and therefore the subjective component will introduce randomness around the performance. The accidental alpha may produce “lucky” outperformance, but is just as likely to create underperformance.

When selecting alpha products, the strongest drivers of performance will be a sound investment strategy that is backed by resources and expertise and has long-term viability through the capacity of the strategy and the unique skills and advantages of the manager.

The operational risks and costs of various investment products have a far greater spread in the crypto market than in the traditional markets and are therefore even more important to be carefully considered. This doesn’t only apply to investment products, the costs and possible operational risks involved in investing directly in tokens can also be significant.

When multiple market segments, sectors and strategies are chosen to be included in a portfolio, it raises the question of how to size these allocations. The decisions may be driven by risk preferences or by views on expected returns, and default portfolios can be created that aim to track the full set of opportunities in this fast-evolving asset universe.



CONSTRUCTING A CRYPTO ASSET PORTFOLIO

	Beta		Alpha	Uncorrelated to market
Core	Cryptocurrencies	Applications	Crypto hedge funds	Yield products
Alternative	Crypto venture capital			NFTs, STOs

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