CRYPTO COMPARE

Cryptoasset

Taxonomy Report

2018

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1

EXECUTIVE SUMMARY

1 EXECUTIVE SUMMARY

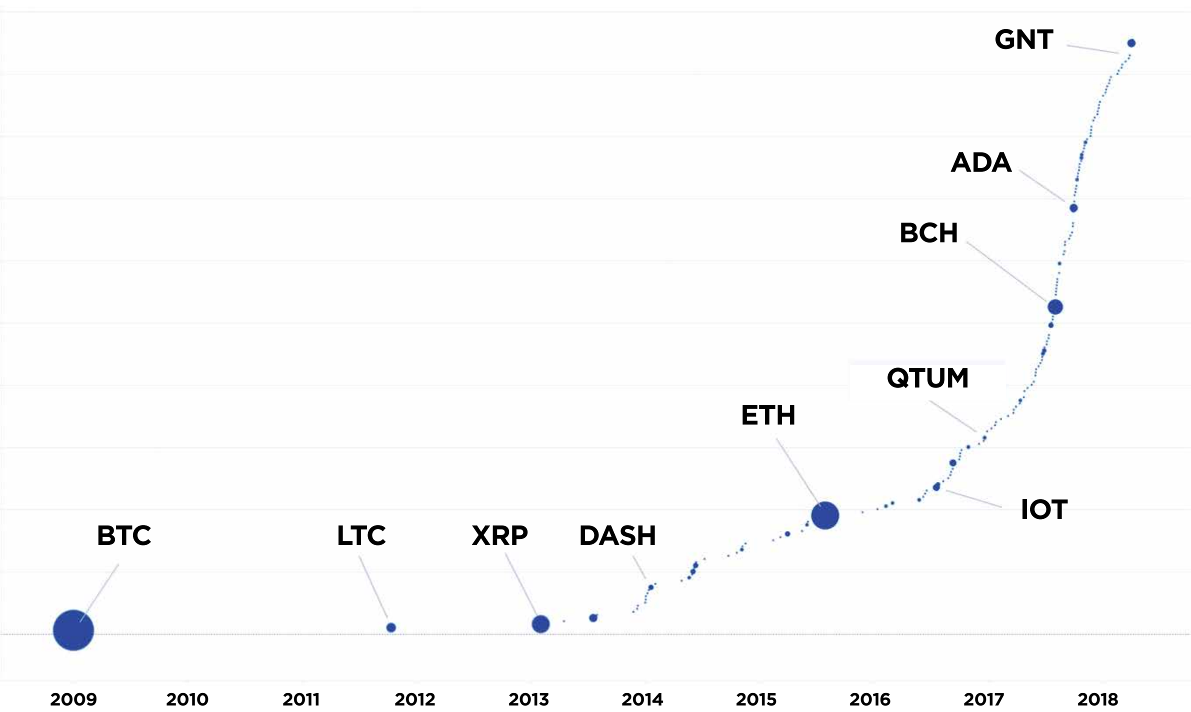
More than 1,000 cryptoassets have emerged in the last year alone. Each of these cryptoassets can be categorised and understood using numerous frameworks. There is a clear requirement for a unified approach on how to categorise and treat these assets in order to make well-informed investment decisions.

The purpose of this taxonomy is to provide an independent classification of cryptoassets, based on the depth, breadth and scope of our global data sets, while adhering to our rigorous data standards to ensure data integrity and accuracy. The taxonomy offers a framework to help retail and institutional investors, regulators and the industry as a whole gain a holistic understanding of the cryptoasset landscape.

The methodology of this taxonomy is not purely theoretical, but instead the result of bottom-up analysis across a number of parameters for hundreds of cryptoassets. We analyse the classification of cryptoassets based on a variety of attributes, including: regulatory, level of decentralisation, supply issuance, economic incentive, industrial classification, supply concentration to name but a few.

The taxonomy also offers a summary classification – the CryptoCompare archetypes. This reflects what we see as the most natural grouping of cryptoassets at this moment in time.

Figure 1: Evolution Of Cryptoassets



Cryptoasset Classification

- Ranked by market cap, BTC, XRP and BCH dominate payment/store of value use cases, while platform-based utility tokens, such as ETH and EOS, dominate smart contract and decentralised application (DApp) use cases.
- Of the top 200 cryptoassets by market cap, utility tokens constitute roughly half in number.
- While growing, the number of asset-security tokens remains very small (just 3%).

Utility tokens

- While utility tokens exhibit lower market capitalisation than payment-based cryptoassets, they are significantly more numerous and boast a wide array of use cases. Most utility tokens are non-platform-based and are designed for a defined network.
- The majority of the higher market cap non-platform utility tokens use Ethereum (ETH) as their smart contract platform.

Industry Classification

- In terms of industry classification, Financial and Insurance Activities dominate the cryptoasset ecosystem.
- Standard ONS Industrial classification was applicable to 75% of the cryptoassets in the taxonomy. The remainder were assigned to a 'Blockchain-Specific Application' category.
- The vast majority of the cryptoassets were attributed to Financial and Insurance Activities (constituting 40% of the total number). Cryptoassets in the finance and insurance sectors typically had higher market capitalisation compared to other industry classifications.

FINMA Regulatory Classification

- According to FINMA guidelines, at least 54.8% of the publicly funded cryptoassets are considered securities.

Governance

- Most cryptoassets are centralised in some form; this trend is being driven by the increase in centralisation from non-platform-based utility tokens focussing on defined networks.
- Considering the Burniske-Tatar archetypes, "cryptocommodity" governance tends to be semi-decentralised whereas "cryptotokens" exhibit markedly more centralisation compared to other cryptoassets.

Supply

- Payment based cryptoassets exhibit far lower concentration of ownership levels compared with utility and asset-security cryptoassets.
- Tokens designed for prediction markets and trading represent the most concentrated utility token use cases.
- Cryptoassets that utilise masternodes (DASH, NEM) exhibit a materially different ownership distribution compared with other cryptoassets.

Data Structure

- Just under half of all cryptoassets in the study were ERC-20 tokens built on the Ethereum platform.
- Roughly 9% of all tokens were based on a non-Ethereum blockchain.

Trading

- The data showed a linear relationship between the log of 24h USD trading volume and the log of market cap across all cryptoassets. This implies a non-linear, exponential relationship between market cap and volume, i.e the higher the market cap, the higher the rate of growth of token volume. This is significant given that trading volume is typically seen as a sign of health of a cryptoasset. It is also a demonstration of network effects within the cryptoasset ecosystem.

2 INTRODUCTION

2 INTRODUCTION

A Brief History

In 1983 David Chaum conceived of 'an anonymous cryptographic electronic money'[1] referred to as ecash; this was subsequently implemented through Digicash in 1995. Nakamoto famously created Bitcoin, the first decentralised cryptoasset, in 2009 which he described as a '...purely peer-to-peer version of electronic cash which would allow online payments to be sent directly from one party to another without going through a financial institution...'[2]

New cryptoassets of various stripes emerged shortly afterwards. In 2011, Namecoin, the second decentralised cryptoasset, was created not as an attempt to create a digital currency, but rather a decentralised DNS (Domain Name Service). Later that year Litecoin iterated on Bitcoin with introduction of a new hashing algorithm, block times, supply etc.

Nevertheless, several early cryptoassets were merely clones of Bitcoin with tweaks of some parameter or another. Substantive innovation was to be found either in the way the cryptoasset worked (e.g. how consensus in the network was achieved) or the actual functionality of the cryptoasset (is it electronic cash or is it meant to serve a different purpose?)

At the time of their launch, Peercoin, Ethereum and IOTA all represented some step change in cryptoasset innovation.

Ethereum is particularly noteworthy. It offered a decentralised computing platform with 'smart contract' capabilities as well as featuring its own Turing-complete programming language. This enabled the creation of decentralised applications (DApps) many of which have their own native cryptoasset.

Other cryptoassets since designed to support DApps are now in development: Dfinity, Rootstock and Neo to name a few.

[1] https://en.wikipedia.org/wiki/Cryptocurrency#History
[2] https://Bitcoin.org/Bitcoin.pdf

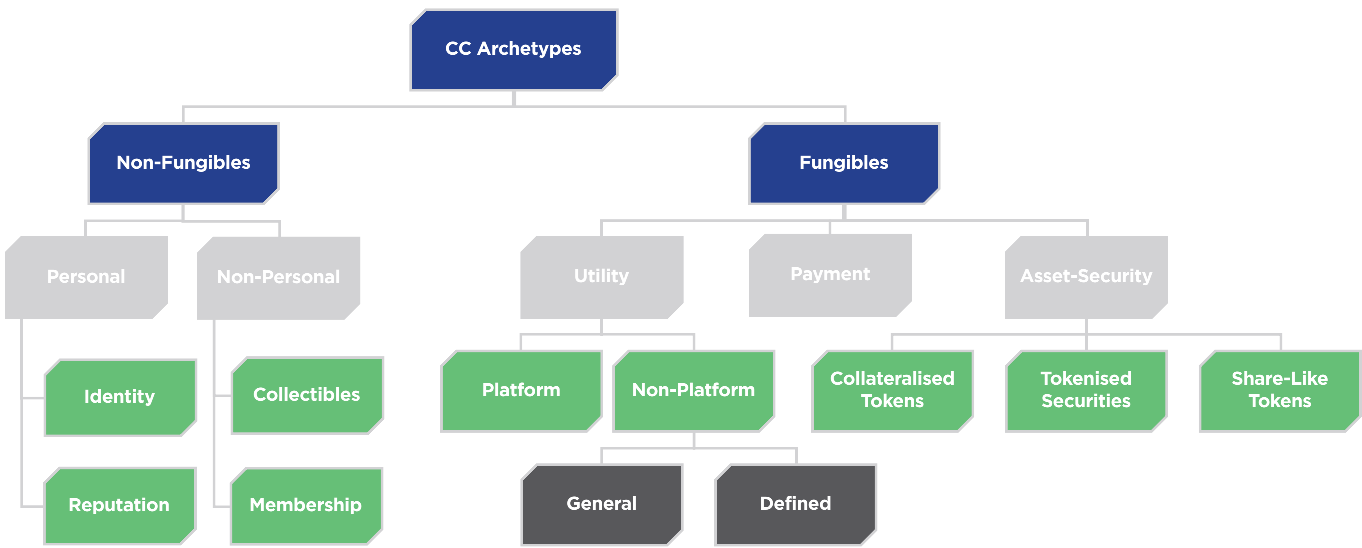
3 FRAMEWORK FOR CLASSIFYING CRYPTOASSETS

3 FRAMEWORK FOR CLASSIFYING CRYPTOASSETS

A cryptoasset is a digital asset that operates within a peer-to-peer network governed by a consensus mechanism which is controlled by a public key infrastructure. The rules governing the system are verified by network participants; these nodes can verify the entire transaction history of the shared ledger.

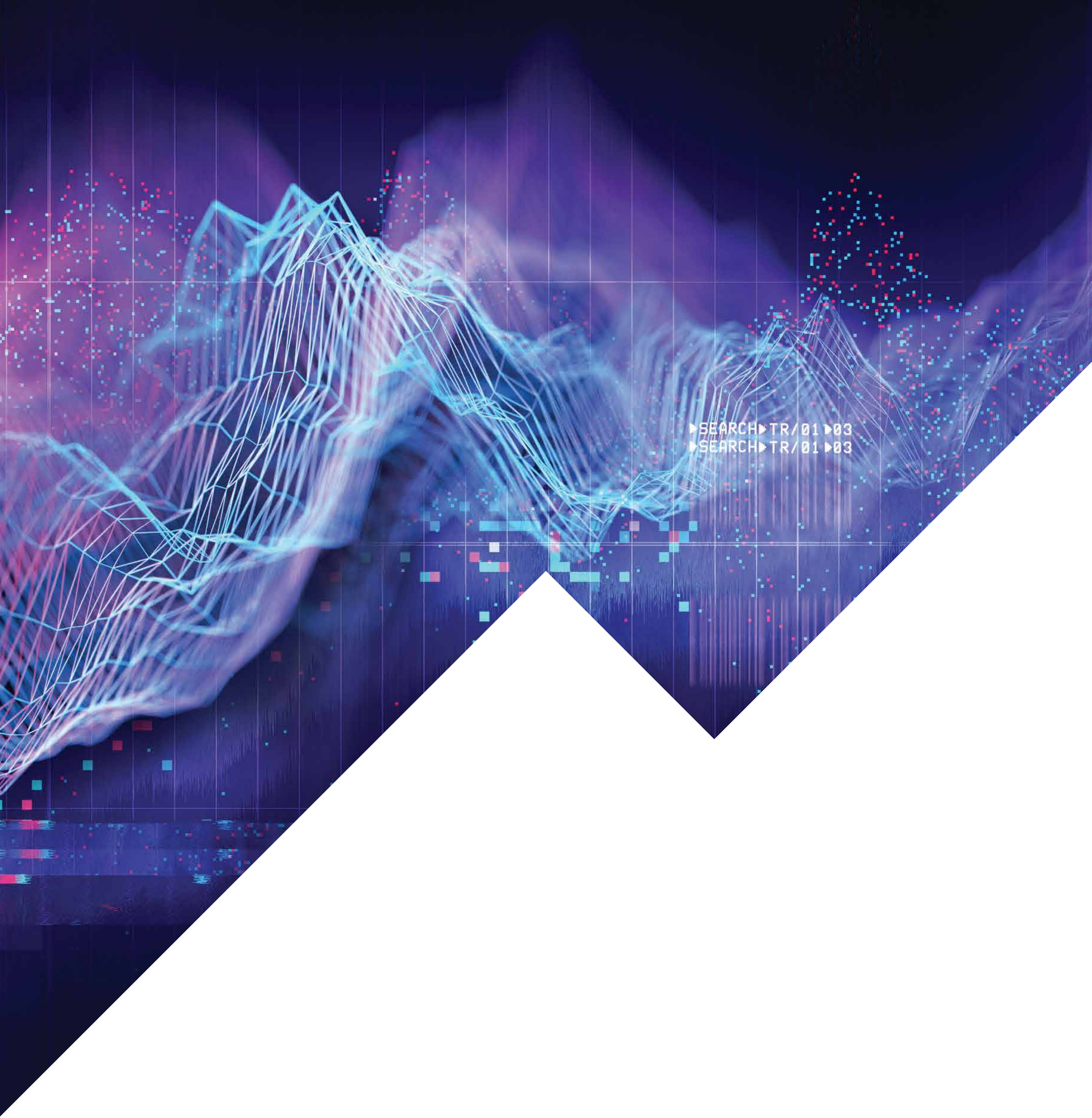
The transition from early money-like cryptoassets, to cryptoassets offering provision of a digital resource (hardware or software) to the final end-use case of a decentralised app, forms the logic of the classification breakdown for the CryptoCompare taxonomy. Several approaches have been made to distinguish particular cryptoassets from one another. The illustration below represents our best approximation of the most important distinctions between cryptoassets. Please note that for the purposes of this taxonomy, the terms "cryptoasset" and "token" are used synonymously.

Figure 2: CryptoCompare Archetypes Summary



This taxonomy represents a deep dive into 200+ cryptoassets along more than 30 unique attributes. These attributes cover a range of economic, legal and technological features. While the archetypes above represent our best understanding, the most "natural" grouping depends on one's perspective. In order to make these ideas more explicit, the following pages offer an insight into 4 of the most interesting "natural" cryptoasset groupings. We then reintroduce the CryptoCompare archetypes offering a fuller explanation of the figure shown above. We then proceed to discuss methodology, definitions and visual representations of the findings in the taxonomy analysis.

4 NATURAL CRYPTOASSET GROUPINGS



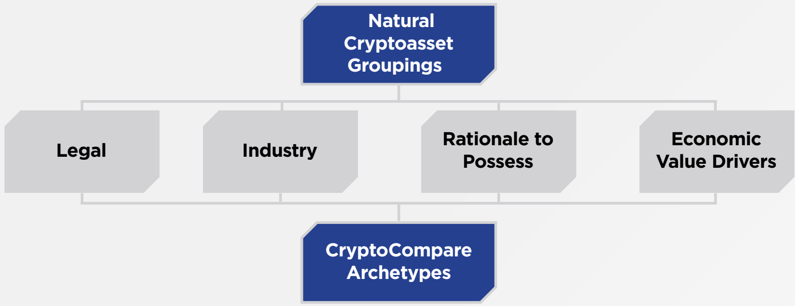
4 NATURAL CRYPTOASSET GROUPINGS

A taxonomy is a classification of things into logical groups. There are many dimensions along which a cryptoasset may be defined and it is impossible to avoid some subjectivity in the process. Precisely what defines a "natural" grouping will inevitably vary from one reader to the next.

This particular taxonomy has taken a "ground up" approach to classification. We have gathered data and performed analysis across a number of technological, economic and legal properties. This rich dataset has helped inform our understanding of the cryptoasset space in a dynamic fashion.

Given this dataset, we suggest five ways to group cryptoassets. The first four are driven by "real-world" questions. For example: what is a given cryptoasset used for? How is it designed to retain value? Is the token effectively controlled by a central counterparty? Or, simply, why would anyone hold this cryptoasset? Following these questions, the taxonomy offers a general classification referred to as the CryptoCompare archetype groupings. For reference, we also offer the Burniske-Tatar archetypes for comparison. The archetype groupings are designed to capture significant meaning given the current state of the cryptoasset ecosystem, while remaining as simple as possible. By design, there is notable overlap in these archetype groupings and some of the previous natural groupings.

Figure 3: Natural Cryptoasset Groupings Summary



4.1 Legal

4.1.1 Centralisation and Counterparty

The first natural grouping is along legal dimensions. We identify two ways to think about this. The first is concerned with the categorisation of cryptoassets according to any recourse the holder of a cryptoasset may have to a possible counterparty.

The jury is clearly still out on what denotes a security. The Howey test is frequently cited as a test that the SEC could use to determine whether or not a cryptoasset sale classifies as an investment contract (and hence as a security). Initially some projects may be seen to be securities in as much as they initially relied on the efforts of a promoter – a key feature in the Howey test. Nevertheless, there is some guidance on this issue. Gensler noted that Bitcoin is almost certainly not a security due to the lack of identifiable common enterprise (counterparty) upon on whom the holder of the cryptoasset would rely upon for the expectation of profit. And while Gensler has also noted that both Ethereum and Ripple could be classified as securities[3], he added that the case would be stronger for Ripple compared to Ethereum due to the *differing levels of decentralisation*. The fundamental point here is that decentralised and open source projects may not rely on a central issuer. There is indeed a strong case for Ethereum's claim to be decentralised. Director

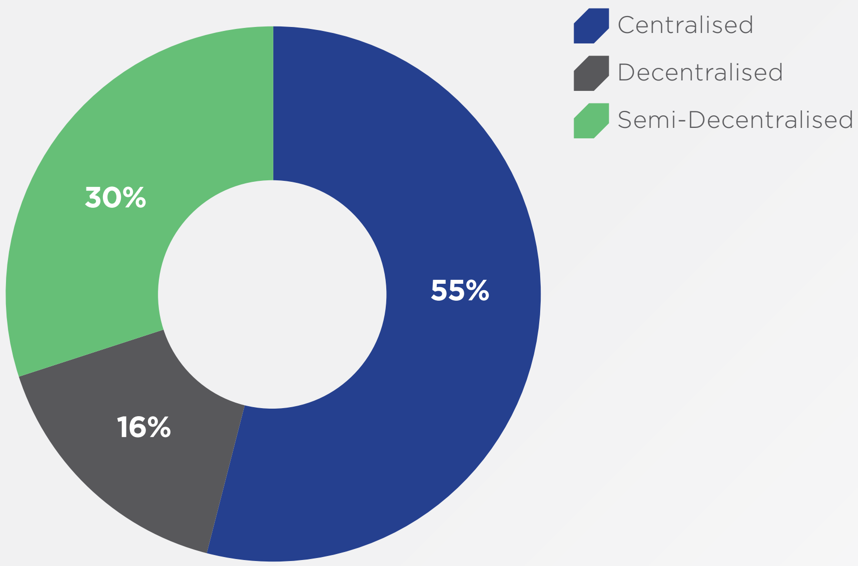
[3] https://www.bloomberg.com/news/articles/2018-04-23/ether-ripple-may-be-securities-former-cftc-head-gensler-says

of research at Coin Center, Peter Valkenberg, has argued for the classification of Ethereum as a non-security by emphasising what he refers to as "the reliance of the many, not the few"[4]. Valkenberg notes that:

"The running Ethereum network's continued vitality is dependent on hundreds of independent software developers, thousands of independent nodes, and millions of users."

Drawing on this distinction of centralisation, this taxonomy has explored the extent to which cryptoassets are, de-facto, decentralised. The figures below show the results of this analysis[5].

Figure 4: All Cryptoassets



[4] https://coincenter.org/entry/no-ether-is-not-a-security
[5] Note that the degree of centralisation pays no regard to the intent of the designers of the cryptoasset

Figure 5: Utilities

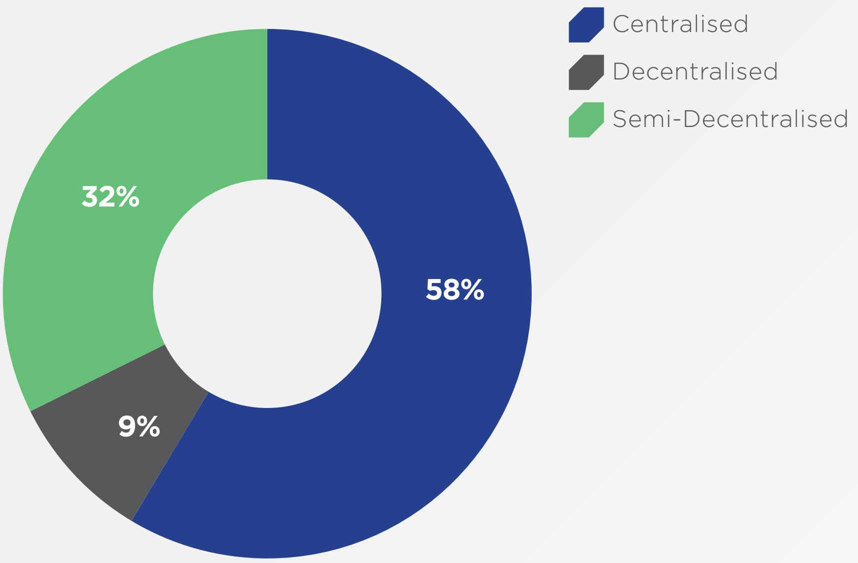


Figure 6: Payment Tokens

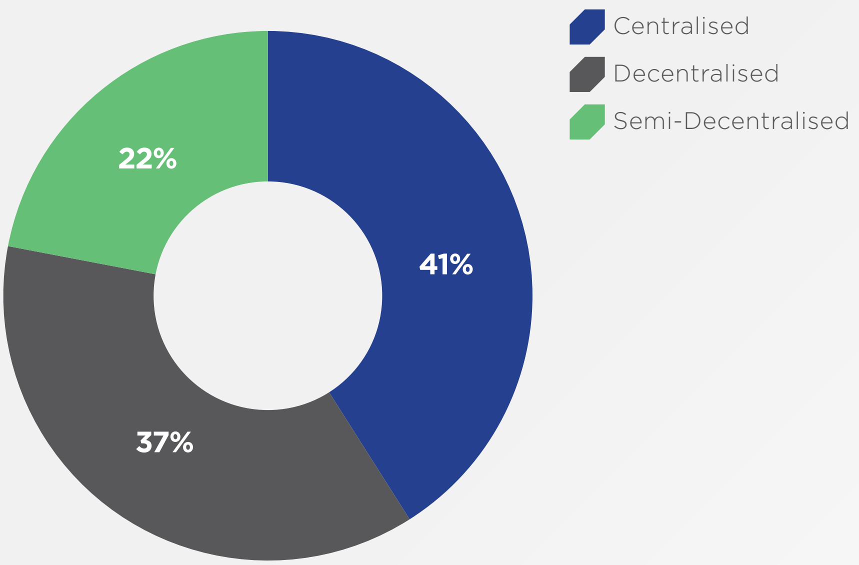
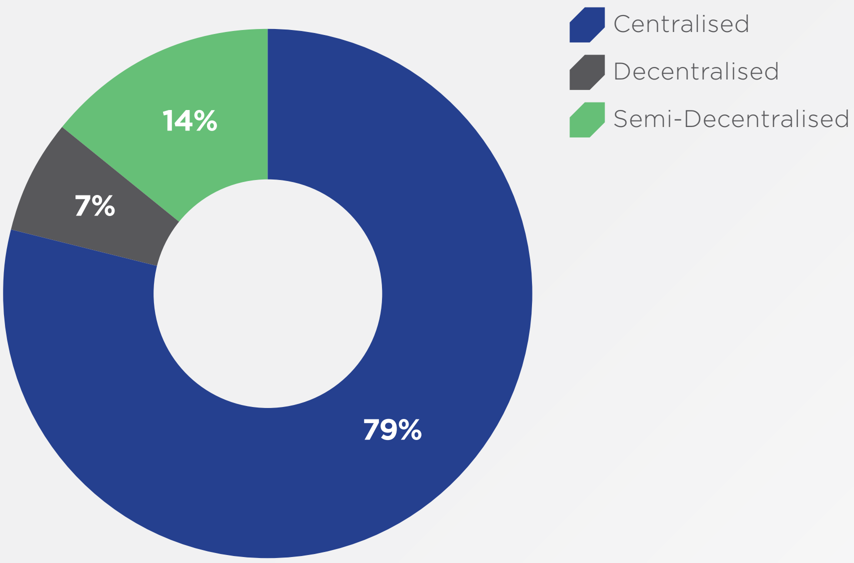


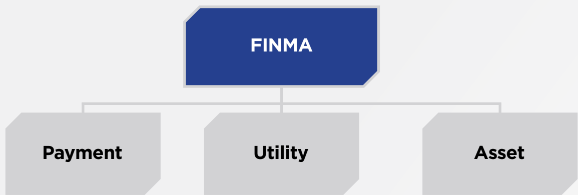
Figure 7: Assets – Financial



4.1.2 FINMA

An alternative legal classification may focus instead on the *intended use* of the token. FINMA identifies three types of token according to their intended use: payment, utility and asset tokens.

Figure 8: FINMA Classification Summary



With respect to existing "issuer vs investor" laws, **payment tokens** are typically not seen to be securities. This is because the intended use is to provide a means of payment or value exchange. As such, these cryptoassets do not confer any claims upon the issuer.

Conversely, **asset tokens**, as understood by FINMA, would typically be construed as securities. This is due to the fact that the intended purpose of these tokens is a promise on future cash flow or some claim to the ownership of a company. In this sense, they are equivalent to traditional financial assets (equities, bonds, futures, options etc) for which there is clear existing legislation.

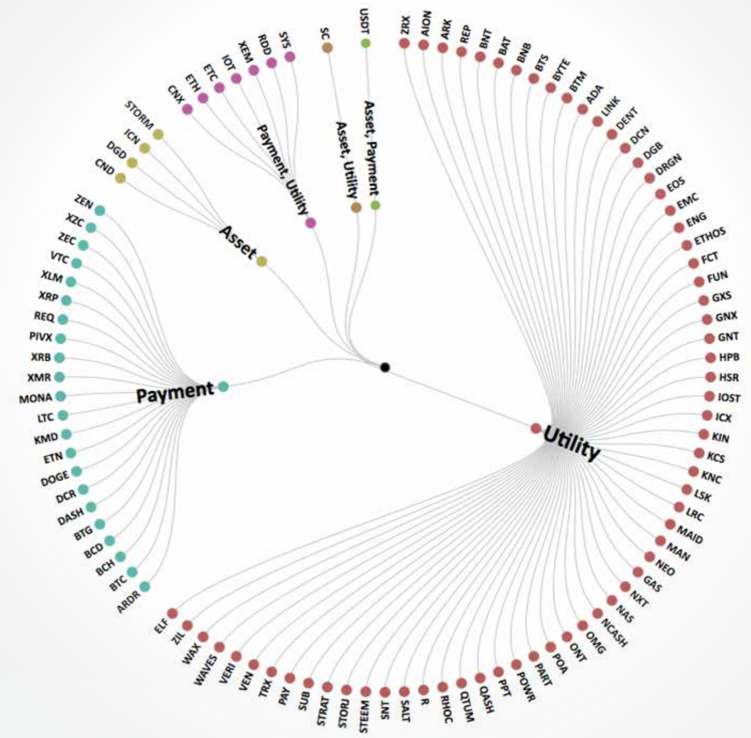
Utility tokens, as understood by FINMA, are somewhat ambiguous as they do not sit neatly in the investor / issuer framework. Their intended purpose is to provide access to an infrastructure or service via the blockchain. Prima facie, the extent to which a token offers claims against an identifiable counterparty is unclear. Ultimately, there may be a demarcation between pre and post ICO utility tokens, the level of centralisation of a given utility token (as highlighted in 5.1.1) and other factors.

Finally, the FINMA regulations are clear that tokens that are not functional (with respect to their intended use) but are tradeable – are to be classified as securities.

Table 1: FINMA Snapshot

Function	Token not functional but the claims are tradeable	The token exists
Payment	Security	**Not Security**
Utility	Security	**Not Security:** If exclusively a functioning utility token **Security:** If also or only an investment function
Asset	Security	Security

Figure 9: Swiss FINMA Regulatory Use-Case Of Top 100 Cryptoassets (by market cap):



Following Swiss FINMA regulatory use-case classifications, 65% of the top 100 cryptoassets by market cap are considered utilities, 22% are payment tokens, and the remaining 13% are either asset tokens or combination use-cases.

Using the FINMA classification we find the following results:

Of the 200 cryptoassets 157 (78.5%) have been classified as receiving some sort of funding (ICO, Pre-sale) making the FINMA ICO security guidelines applicable to this subclass. The FINMA guidelines consider all 'assets' and pre-financed 'utilities' to be securities and all 'payments' and 'deployed' 'utilities' to be non-securities.

FINMA guidelines state that 'If a utility token additionally or only has an investment purpose at the point of issue, FINMA will treat such tokens as securities (i.e. in the same way as asset tokens).' (FINMA, 2018). As such, according to FINMA guidelines, at least 54.8% (86/157) of the *publicly funded* cryptoassets are considered securities.

4.2 UK Standard Industry Classification

The second natural grouping focuses on the economic properties of cryptoassets. The Office of National Statistics (ONS) uses the UK Standard Industrial Classification (SIC) system to assign an index to industry activities[6]. It is divided and coded into 21 high-level industry sectors, each with their own sub-industry divisions arranged in a hierarchical format. For the purpose of classification, we have used the first layer of the SIC system as a foundation for high-level industry sectors[7], extending it to include 'Blockchain-Specific Application' for any cryptoassets that failed to be placed within the SIC system. These high-level industry sectors are represented on the left-hand side of the diagram below. An additional layer of sub-sectors were combined with this format in order to place cryptoassets into a specific niche sector. These niche categories were created based on the best judgement of the research team, and are represented in the mid-section of the diagram below.

Figure 10: Industry Classification

Industry	**Financial and Insurance Activities**	Decentralised Exchange, Crypto Asset Management, Trading, Market Data Services, Prediction Markets, Credit and Lending, Payments, Privacy Payments, Exchange, Banking Cards, Real-World Assets, Smart Assets	**BTC, XLM, DASH, XMR, BNT, GNO...**
	Professional, Scientific and Technical Activities	Advertising, Gift Cards, Business Administration, Marketplace, Identity Verification, Invoicing, Online Reputation, Decentralised Marketplace	**BAT, DNT, REQ, KIN...**
	Blockchain-Specific Application	Blockchain Interoperability, Blockchain-as-a-Service, Smart Contracts and DApps, Cryptocurrency Mining,	**EOS, ADA, NEO...**
	Transportation and Storage	Supply Provenance	**VEN, AMB, MOD**
	Arts, Entertainment and Recreation	Media, Social Media, Online Casino, Video Gaming, Adult Entertainment, Content Creation and Distribution	**STEEM, TRX, XPA**
	Wholesale and Retail Trade	Real-World Goods, Energy Trade	**BAY, POWR**
	Information and Communication	Cloud Computing, Internet of Things, Data Security, Internet Protocol Virtual Reality, Smart Contract Audit, Mobile Data, Smartphones Messaging, Artificial Intelligence Data Storage, Telecom	**FCT, DATA, IOTA, FILE, GNT, TON...**
	Public Administration and Defence	State-Backed (Sovereign) Cryptoassets	**PTR**

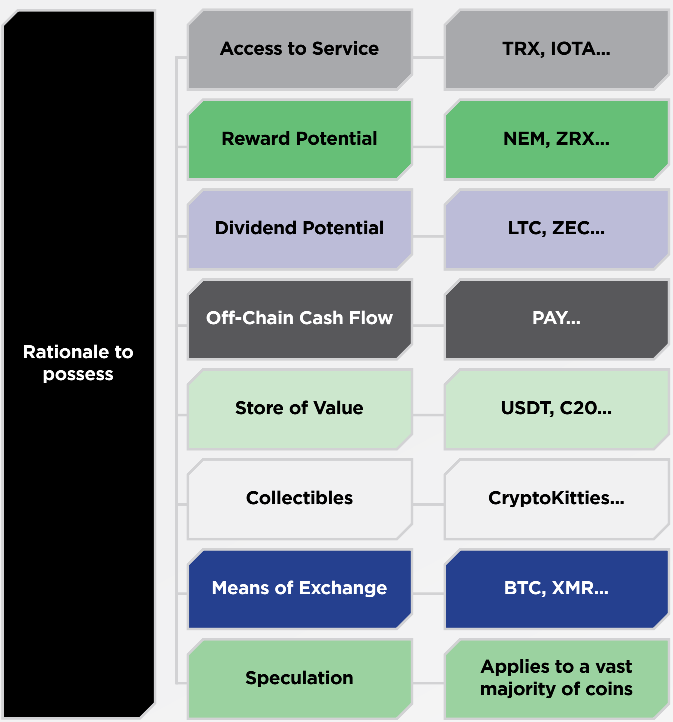
6 https://onsdigital.github.io/dp-classification-tools/standard-industrial-classification/ONS_SIC_hierarchy_view.html

7 These are referred to as "Upper Levels" in the Definitions section

4.3 Rationale to Possess

The third natural grouping centers on the reason for holding a cryptoasset. In 2009, Satoshi published the seminal Bitcoin whitepaper and described it as *"A purely peer-to-peer version of electronic cash [which] would allow online payments to be sent directly from one party to another without going through a financial institution. ….."*[8]. Since the publication of the Bitcoin whitepaper, the primary purpose of holding a given cryptoasset has evolved due to both technological and economic innovations as well as their limitations. Today, scalability issues have seen many Bitcoin enthusiasts focus primarily on the store of value rationale to possess Bitcoin, rather than possession designed primarily to facilitate a means of exchange[9]. Notwithstanding these scalability issues, both means of exchange and *store of value* are fundamental reasons that holders of Bitcoin possess the cryptoasset.

Figure 11: Rationale to possess a cryptoasset



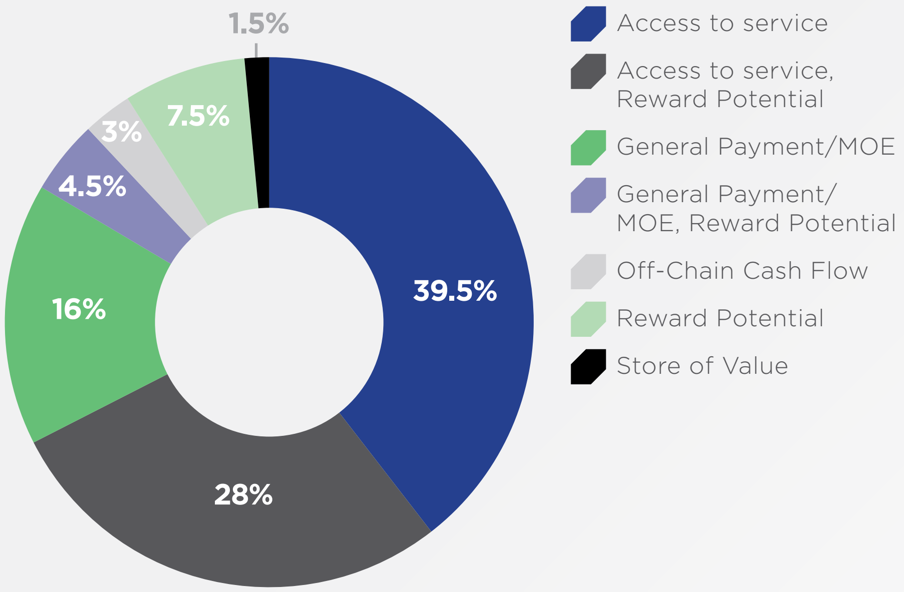
[8] https://Bitcoin.org/Bitcoin.pdf

[9] Although each of these reasons are similar and related, the consequence is that the "target market" is quite different – means of exchange speaks to "broad money like" qualities (e.g. USD c. 100 trillion USD market cap) whereas store of value suggests "gold like" qualities (c. 7 trillion USD market cap).

This following classification does not seek to make a claim as to which of these purposes is more important but, instead, seeks to examine the following question: for a given cryptoasset, what are the principal reasons to hold it?

This taxonomy suggests 8 reasons to possess a cryptoasset: access to a service, reward potential, dividend potential, rights to off-chain cash flow, store of value, collectibles, means of payment and pure speculation. Pure speculation is a derivative of the other 7 reasons. It merely represents the extent to which a speculator believes that some other party will pay more for a given cryptoasset than she did. To a large extent, the speculation rationale applies to all cryptoassets currently (and hence is not meaningful as a way to group cryptoassets) – therefore we have decided to exclude this rationale from our deep dive (although it is listed in the framework for completeness.)

Figure 12: Rationale to Possess



As per the above, these categories are certainly not exclusive. There may be a number of quite distinct reasons to hold a given cryptoasset. A fuller explanation of these terms is offered below:

4.3.1 Access to a Service

Ownership of the cryptoasset provides access to a network to pay for decentralised storage or, perhaps, decentralised computing power. One potential subset of this "access to a service" rationale is the perpetual discount token. In this case the owner of a cryptoasset enjoys a discount on the network's underlying service.

4.3.2 Reward Potential

Ownership of the cryptoasset gives the right to a reward or the right to do some work for a reward by virtue of ownership. This might include staking in the case of Gnosis (GNO) tokens. In this example locking GNO tokens offers the potential to receive OWL tokens depending on the time of lock up and the supply of OWL in the market. Conversely, owning a token may permit a user to participate in a TCR (Token Curated Registry). In this case, the right to vote on a registry (and the subsequent potential to be rewarded for this) is the reason to hold the cryptoasset. It should be noted that the "risk" in the case of TCRs is that the token holder is also subject to the possible forfeit of the tokens held.

4.3.3 Dividend Potential

Ownership of the cryptoasset is required in order to benefit from the generation event of new cryptoassets. This includes, but is not limited to: hard forks, soft forks and airdrops. These generation events may be well telegraphed (as was the case of the 2017 Bitcoin cash hard fork) or, somewhat more opportunistic. There have been a large number of airdrops on major blockchains (ETH, BTC in particular) by projects attempting to piggyback on their larger network, user adoption and awareness. An important empirical observation for this rationale is that, unlike a typical equity "share split", a number of hard forks have, in the short term, resulted in a net higher aggregate market cap across the original cryptoasset and the newly forked cryptoasset. This implies either that crypto markets remain somewhat unsophisticated and inefficient or that these particular forks offered some unexpected value-added functionality.

4.3.4 Rights to Off-Chain Cash Flow

Ownership of the cryptoasset promises a share in the future earnings of a project. These may be valued using traditional financial techniques. Typically, these will represent tokenised securities (bonds, equities and derivatives) and "share-like" cryptoassets.

4.3.5 Store of Value

Ownership of the cryptoasset represents a store of value relative to other assets[10]. Typically, these will be either collateralised tokens. i.e. token backed by USD or gold or a successful general payment cryptoasset. Censorship resistance and high divisibility are the principal advantages of using cryptoassets as a store of value rather than gold.

4.3.6 Collectibles

Ownership of the cryptoasset is deemed to have value in its own right. Currently, the most renowned example of a collectible is CryptoKitties. These cryptoassets are non-fungible and are somewhat analogous to that of an art or wine investment. They act both as a fashion good and offer signalling akin to that of a status symbol.

4.3.7 Means of Exchange

Ownership of the cryptoasset is for generic payment purposes. This implies the ability to pay for services outside of a given cryptoasset network (i.e. applicable in many places). Currently this space is dominated by Bitcoin and Ethereum. There is also a sizeable minority of privacy-based payment cryptoassets.

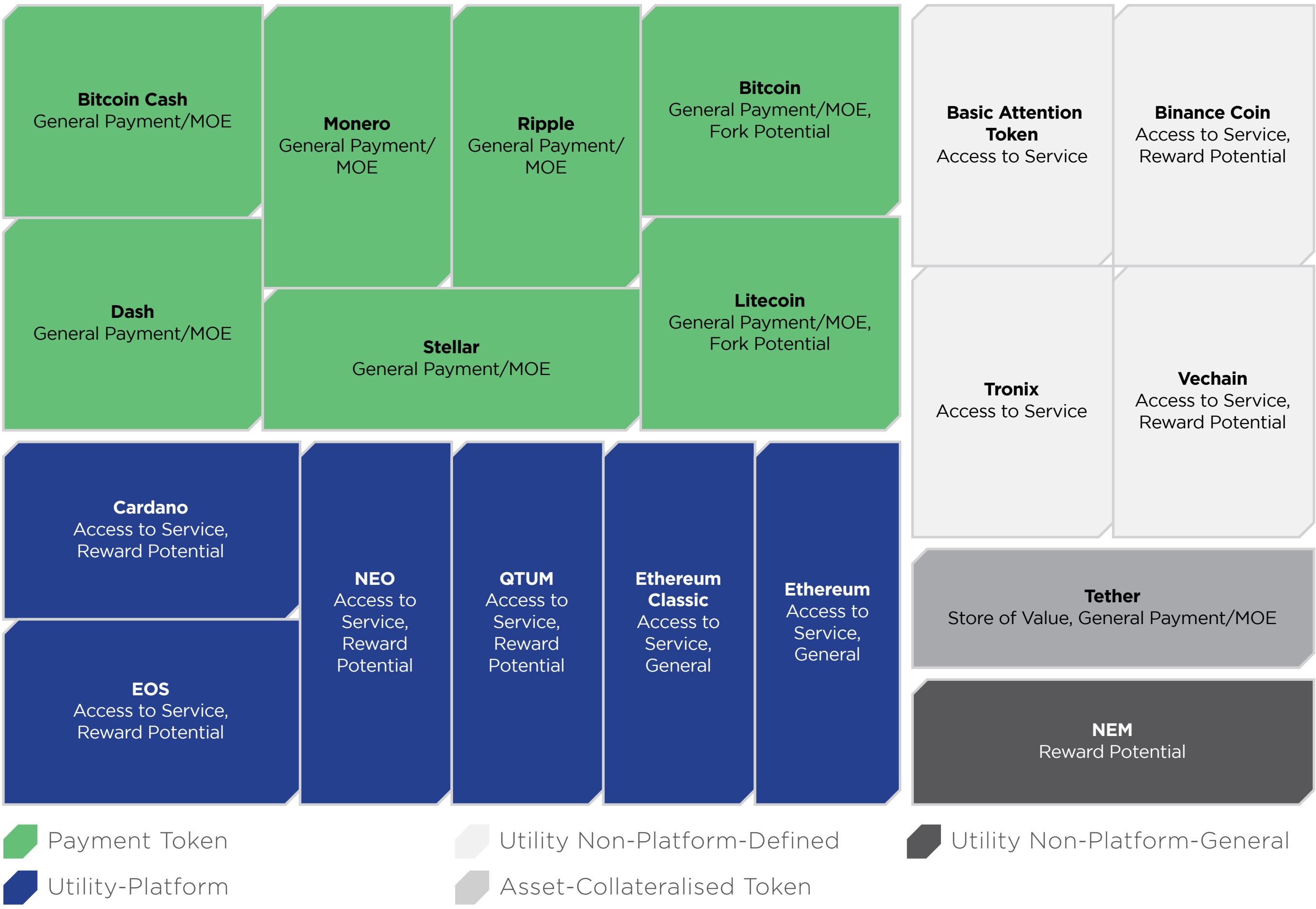
4.3.8 Speculation

Ownership of the cryptoasset is purely for the purpose of speculation.

As the use case for cryptographic assets grows, there may be more reasons to hold them. Ownership focussed cryptoassets may, for example, confer intellectual property rights, may be used for identification or indeed for reputation verification. As such, the above should be seen as dynamic and not mutually exclusive.

[10] Clearly this is a relative concept in cryptocurrencies which often exhibit extremely high volatility. However, it should be noted that gold, the traditional store of value, exhibited significant annualised volatility in the 1970s, shortly after the United States abandoned the gold standard.

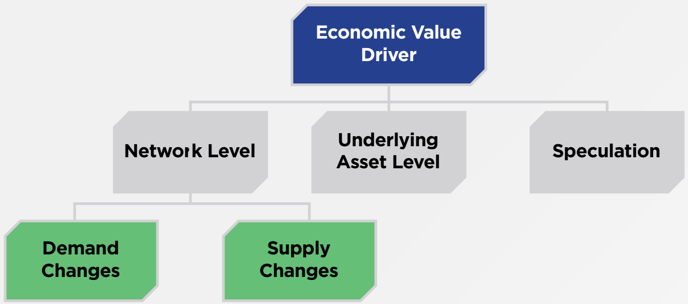
Figure 13: Top 20 Cryptoassets categorised by CryptoCompare Archetypes and Primary Rationales to Possess



4.4 Economic Value Drivers

The fourth natural grouping focuses on the driver of economic value. A number of frameworks exist which seek to value cryptoasset networks; notably, Metcalfe's Law and the quantity theory of money. The following classification explores price maintenance and incentives across cryptoassets. Specifically, this simple framework identifies price drivers along three levels: the network level (change in the marginal demand or change in the marginal supply of the cryptoasset), the underlying economic asset level or at the speculative level.

Figure 14: Economic Value Driver Summary



4.4.1 Network Level Demand Changes

Most cryptoassets rely on network driven demand for price maintenance. In this case, more usage of a cryptoasset denotes higher demand for it which, given a fixed or controlled supply, causes an increase in the price of the cryptoasset. This increased usage may be due to an increase in user demand to access a given service; this is a *demand push* dynamic. Demand-pull may also come from inducements such as discount tokens or share-like tokens.

4.4.2 Network Level Supply Changes

Token value accretion may occur given direct supply changes. In this event, supply schedules can be altered through burn and mint methods, forced staking or other methods. These are implemented through smart contracts and, initially, may serve to also reduce token velocity.

4.4.3 Underlying Asset Value Changes

Standard discounted cash flow (DCF) analysis may serve to value "share-like" or "fixed income debt-like" cryptoassets. In this case, price maintenance is served by thorough analysis of the cash flows of off-chain assets. Price changes in the cryptoasset may be directly attributed to changes (or expected changes) in future cash-flows. Similarly, the value of cryptoassets that are collateralised against other assets (e.g. gold, copper, USD) is materially affected by changes in these (typically) off-chain assets. Broadly speaking, the changes in underlying asset values follow traditional financial valuation techniques.

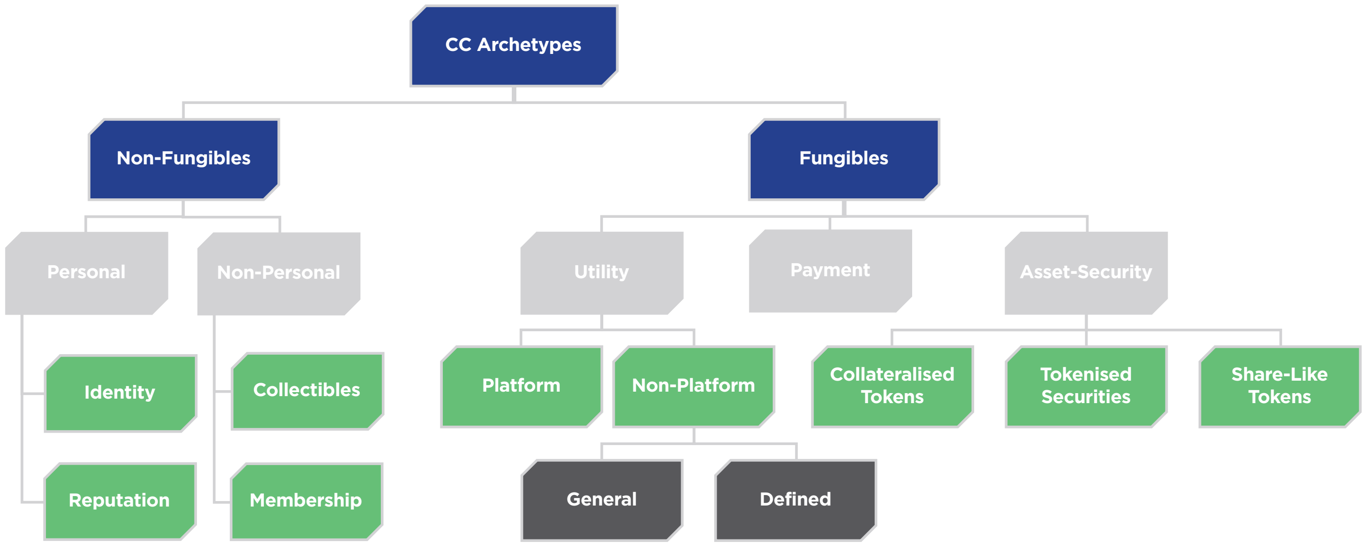
4.4.4 Speculative Demand Changes

Speculative demand is clearly a key economic driver for cryptoassets. This includes expectations of change in network effect demand, supply and underlying asset value.

4.5 Archetypes

4.5.1 CryptoCompare Archetypes

Figure 15: CryptoCompare Archetypes Summary



Given the four natural groupings listed earlier, we offer the tree above which lists the main archetypes identified in this taxonomy. It seeks to capture, in a simple form, the **most meaningful grouping of cryptoassets**.

The **CryptoCompare archetypes** also seek to understand the *current* state of the cryptoasset ecosystem. As innovation develops and the sector matures, we expect certain types of cryptoassets to become more prevalent and for the archetypes above to change.

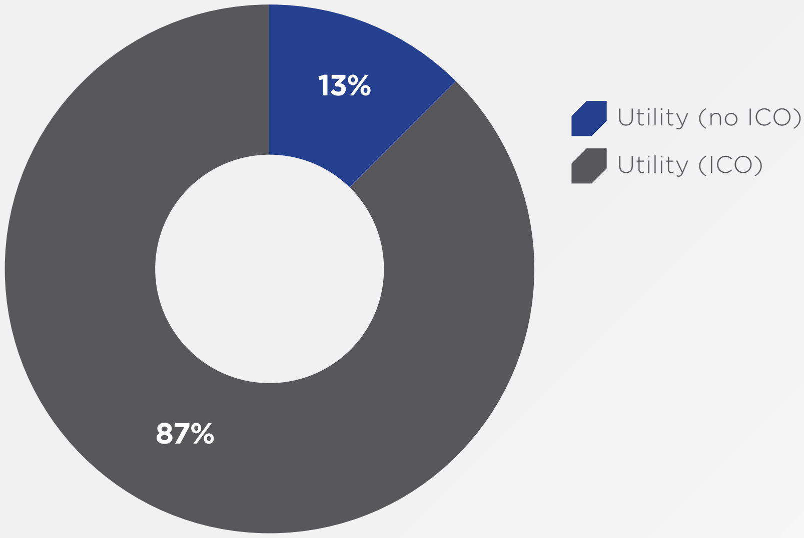
The archetypes classification begins with a fungible vs non-fungible distinction. Fungible tokens are perfectly interchangeable with other identical tokens. Traceability issues aside, one unit of Bitcoin is literally as good and as useful as any other. Non-fungible tokens – or NFTs – are tokens that are unique and hence not interchangeable with any other token. As such NFTs create digital scarcity which – as with fungible tokens – do not need a central counterparty to confirm their authenticity. CryptoKitties represent one special case of a collectible NFT. NFTs may also be particularly useful in the case of digital assets that represent either the identity or the reputation of specific individuals going forward. Although the taxonomy has focussed on fungible tokens, the number and variety of NFTs is likely to grow substantially in the near future.

Fungible tokens represent the vast majority of the tokens that exist. The archetypes classification distinguishes these fungible tokens broadly as: utility, payment and asset-security tokens. Utility tokens are designed to offer digital access to an application or to some service using the blockchain. Payment tokens are designed to be used as a general purpose (across all networks) means of exchange or store of value. Asset-security tokens represent assets which confer a financial claim (e.g. debt or equity claim) on an issuer or assets that grant explicit governance rights to token holders. These include tokens that enable trading of both physical and non-physical assets on the blockchain.

It remains unclear how utility tokens as defined here will be treated by the SEC. The majority of utility tokens in this taxonomy have undergone an ICO (although we have not explored how or to whom the ICO was marketed in each case).

Utility tokens vary significantly in their degree of centralisation and the extent to which they grant rights toward a particular counterparty. Some utility tokens are more "infrastructure" based and akin to what Chris Burniske refers to as "cryptocommodities". The first archetype under the utility section in the CryptoCompare archetypes is the "platform-based" utility token. These are tokens that are used to gain access to general purpose decentralised networks for a wide range of possible applications. As such, these platform utility tokens exhibit considerably less centrality.

Figure 16: Percentage of Utility tokens with ICO



Platform-based utility tokens are also highly represented in the "blockchain-specific" application use case from the industrial classification earlier in the taxonomy. Non-platform-based utility tokens, on the other hand, are generally understood as either "general" or "defined". Currently, Ethereum is the best example of the platform-based utility token. The emergence of a Turing complete scripting language was essentially the defining feature for Ethereum[11]. Turing completeness allowed more complex and sophisticated logic in smart contracts. Buterin emphasises that this Turing completeness laid the foundation for the "rich statefulness"[12] of Ethereum – it allowed the system to remember things at the blockchain level.[13]

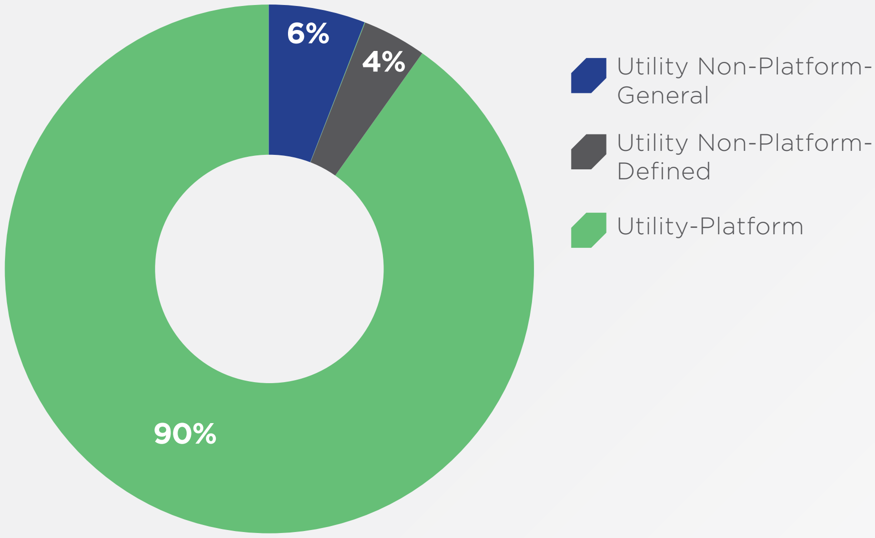
Non-platform-based general utility tokens are open networks (hence the "general" requirement) designed for a *specific* application or use case. Decentralised exchange tokens are a prime example. Defined non-platform-based utility tokens are more similar to what one might term a *consumer token* as the primary use is to provide access to a particular set of goods or a service – a sizeable number of which may be classified according to existing industrial framework classifications. The tokens here are used on the network of a single project. However, this can clearly change and become more "general" with time.

11 Programming languages may be thought of as similar to virtual machines which takes programs and runs them. A language may be said to be "Turing complete" if it can run any programme – irrespective of language – that a Turing machine can run given enough time and memory. If not, the language is Turing incomplete.

12 https://twitter.com/vitalikbuterin/status/854271590804140033?lang=en

13 Although Post's Theorem demonstrates that Turing completeness may not be necessary for the running of smart contracts, the emergence of additional functionality has led to a plethora of possible new cryptoassets.

Figure 17: Blockchain-Specific Industry Classification Weighted by Archetype Frequency



Compared to platform-based tokens, these defined non-platform tokens are at once more centralised, more numerous, more likely to have undergone an ICO and are more likely to be dependent children of other native blockchains (in particular Ethereum, but also BTC, NEO, EOS etc).

While the claims on the issuer of utility tokens remains somewhat uncertain, payment tokens *typically* give rise to no claims on the issuer. They are more decentralised than utility or asset-security tokens, boast larger market capitalisation, are almost always permissionless, are less likely to have ICO and have less concentrated ownership.

Asset-security tokens represent financial claims on an issuer or grant explicit governance rights to token holders. For example, this includes tokens that offer the rights to specific cash-flows (e.g. from centralised exchanges) and are akin to what we term "share-like tokens". Tokens that are collateralised by fiat (e.g. TrueUSD collateralised by USD) or non-fiat assets (e.g. Digix collateralised by gold) are akin to what we term "collateralised tokens". Asset-security tokens derive their value principally from the economic value of the underlying asset (or cash flow) as opposed to the growth of the network (like, say, payment tokens). The main industrial classification for these tokens is financial.

A note on stablecoins and governance

Stablecoins

Stablecoins deserve a special mention. While it should be made clear that they differ significantly with respect to mechanism design, for the purposes of this taxonomy, it is illustrative to focus on the special case of MakerDao.

On the face of it, there are three main types of stablecoins. The first are centralised asset-backed pegs. Examples of these include: TrueX (backed by gold), TrueUSD and Tether.

A second type are collateralised pegs such as MakerDAO or haven. Typically, these include one coin which represents the stable coin – and another coin which fluctuates in value and is used to incentivise market participants to maintain stability.

In the case of MakerDAO there are two coins: "Maker" and "Dai". In this case, Dai represents the stablecoin and would be analogous to a payment token in our cryptoasset taxonomy. It is generated as ETH (or other tokens) and is placed into a CDP (collateralised debt position). The stablecoin gives one the right to redeem the CDP to receive back the initial ETH deposit (in practice this is PETH or pooled Ethereum). Maker, on the other hand, is used to pay fees into the system and offers dividends in the form of buy-backs when CDPs are generated. Hence there is a reward to hold Maker. The risk is that if the system becomes undercollateralised, then Maker is inflated to pay off the debt that has been accrued. In this case, Maker is explicitly a financial instrument with incentives in place to encourage participants to provide collateral and stability to the MakerDAO ecosystem. Maker, in this case, would be an "asset-security" cryptoasset.

A third type of stablecoins are, effectively, seignorage-shares which act as decentralised algorithmic banks. Shareholders determine an inflation rate. Examples include basis coin and carbon. If the system becomes undercollateralised, bonds are issued at discounted rates which have a given rate of return. They are issued and are designed to take the stable coin out of circulation (hence stabilising value). It requires a continual increase in the GDP of the system to function. The bonds here – to the extent that they are cryptoassets, would fall squarely into the asset-security category. Again, the stablecoin itself would be a payment token.

Governance

Another question that remains to be tackled relates to what the implications of voting are for the classification of a cryptoasset.

One argument suggests that voting introduces concepts from traditional financial markets (voting rights) into the cryptoasset world. In this sense, they could also be considered as collective investment schemes.

One possible way to understand the question is whether or not the decentralised voting speaks specifically to technological matters or whether it is regarding primarily business decisions. The former certainly not being a security (i.e. likely a non-platform-based utility or payment token – the other likely being an asset or financial-based security).

In the case of MakerDao, Maker also offers some voting rights to participants later in the roadmap of the project. This may, for example, include one-off voting events or indeed the specification of stabilisation parameters.

There may be at least 4 options:

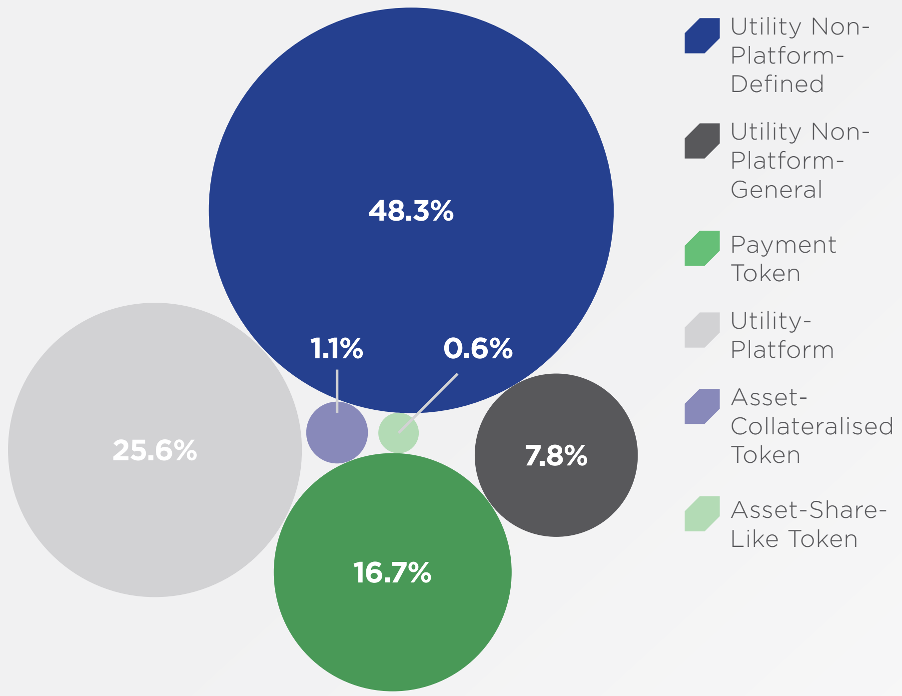
- **Option 1:** Is it a decentralised infrastructure (like Ethereum) or not? (e..g Is there an Ethereum Inc?) If there are governance rights with regard to such infrastructure (e.g. mining / proof of work / proof of stake / proof of authority), then there is no income-generating business / enterprise per se – hence it is not an asset-security token.
- **Option 2:** Is it a partnership? i.e. do the members run it themselves? This would require a legal qualification of the holders of a cryptoasset to be a "partner".
- **Option 3:** Is it just "suggestions" but no decision power? i.e. The holder doesn't really have voting rights.
- **Option 4:** Is it related to equity / investment contract and a 3rd party runs the business? In this case it is most probably asset-security token.

It is beyond the scope of this taxonomy to ascertain the status for the projects as most voting mechanisms are still in their infancy both in thought and in practice. As the cryptoasset universe matures, this will become an area that requires further research/study.[14].

[14] Thanks to Thomas Linder from MME for his perspective on this. https://www.mme.ch/de/magazin/bcp_framework_for_assessment_of_crypto_tokens/

Finally, tokenised securities, one of the subsets of asset-security tokens, allow bonds, stocks, equities and commodities to be traded as digital tokens. To this extent, this archetype does not represent a new asset class (i.e. cryptoassets) per se but instead constitutes an upgraded wrapper for the equity, bond, commodity asset class. As such, traditional legal frameworks and pricing methodologies exist for these assets. Nevertheless, the terminology and the interest in the industry is such that these upgraded wrappers deserve their own archetype as a way of understanding their valuation and legal position in relation to other tokens. Moreover, as these tokenised securities grant more explicit governance rights to token holders, they may exhibit properties more similar to other cryptoassets like Ethereum or Bitcoin and less similar to typical equity or bond assets.

Figure 18: Archetypes Weighted by Frequency

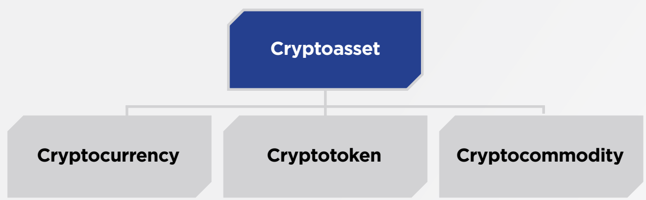


These archetypes capture meaningful distinctions between groups of tokens in the crypto ecosystem today. On the margin, a very successful non-platform defined utility token may become a general token. And, indeed, a successful platform token, like Ethereum, may become so widely used that it also becomes a payment token. However, these events are likely to be the exception rather than the rule. Archetypes are not "one-size-fits-all", we expect classifications to change over time; for example, cryptoassets typically become more dentralised with age. Such a development is just one possibility as to how we may change the way we view the most natural grouping of cryptoassets. Burniske has noted that cryptoassets represent the native asset class to information networks: setting up a means of both capitalisation and monetisation. As information networks grow and mature, so will our understanding of the archetypal tokens in the crypto ecosystem.

4.5.2 Alternative Archetypes: Burniske – Tatar

We also offer an alternative archetype which is the work of Chris Burniske and Jack Tatar[15]. They divide cryptoassets into three main classes: cryptocurrencies, cryptotokens, and cryptocommodities:

Figure 19: Burniske-Tatar Taxonomy Framework



4.5.2.1 Cryptocurrencies

In this taxonomy, cryptocurrencies refer to cryptoassets which exhibit the properties of money. An asset's usability as money depends on how well the asset serves as a store of value, medium of exchange and unit of account. These functions operate as a hierarchy; i.e. they are not equivalently important. A gold tooth may be a store of value but it is not used as a means of exchange. To function as a means of exchange, an asset requires two parties to treat it is as a store of value at least temporarily. To serve as a unit of account, that asset must be used as a medium of exchange across a time, across a number of parties and across a variety of transactions. As such, the unit of account measure is perhaps the most important property of money. Cryptocurrencies refer to cryptoassets which may be said to fulfil these three properties.[16]

[15] Cryptoassets: The Innovative Investor's Guide to Bitcoin and Beyond: Chris Burniske and Jack Tatar 2018

[16] At least relative to other cryptoassets – compared to fiat, the volatility of cryptoassets are problematic with respect to the 'unit of account' property.

A given cryptocommodity or cryptotoken may be said to also become a cryptocurrency over time. This is due to the fact that money itself is a social construction (or convention). One accepts the value of a piece of paper, a physical coin or a digital holding because we expect others to do so quickly and easily. Given the divisible and electronic nature of cryptoassets, a coin that starts its life as a cryptocommodity or cryptotoken may, over time, also become a cryptocurrency. On the margins, this will affect a few classifications within the taxonomy.

Table 2: Summary and FAQs

	Cryptocurrencies	Cryptocommodities	Cryptotokens
What are they?	Cryptoassets used primarily as a means of exchange and store of value. Use as a unit of account comes with wide adoption of the cryptocurrency..	Cryptoassets designed to offer access to a scarce digital resource.	Cryptoassets that provide access to a platform and its associated goods and services, or act as network facilitators for specific platforms.
Examples	• Bitcoin (BTC) • Litecoin (LTC) • Dash (DASH)	• Golem(GNT): CPU Power • Storj (STORJ): Cloud Storage • Ethereum (ETH): Smart Contracts	• Gnosis (GNO): Prediction Markets • Digix (DGX): Gold-backed token
What is their intended use?	Intended predominantly as a store of value and a mediunm of exchange for both digital and physical goods and services.	Much like physical commodities, cryptocommodities can be considered as 'building blocks' for digitally-based goods and services. For example, computing power might be used to operate certain decentralised applications.	They represent a wide spectrum of use cases, ranging from enabling the creation and consumption of content on a specific platform, or used as a means of blockchain to blockchain communication. They can also represent ownership of a company and as such, generate dividends or enable participation in voting processes.

	Cryptocurrencies	Cryptocommodities	Cryptotokens
How can they be obtained?	Cryptoassets can be obtained on exchanges, or via a private sale or ICO, either with fiat or with other cryptoassets. In addition, some can be generated through either mining or staking depending on the consensus mechanism of the underlying blockchain. Other distribution mechanisms include 'airdrops', 'bounties', or 'snapshots'.		
Who controls a cryptoasset's network and its technological development?	The governance mechanisms that dictate how technology develops within a given network varies by cryptoasset. Certain cryptocurrency networks, such as that of Bitcoin or Litecoin, are effectively decentralised; they are self-governed by their own democratic communities and built-in consensus mechanisms. Other networks such as Ripple are more centralised and are developed by private entities.		
Is permission required to participate in a cryptoasset's network?	The level of permission required to participate in a cryptoasset's network will vary by cryptoasset. In this context, 'permission' relates to the possibility that use of a cryptoasset might be interrupted by a powerful minority or central authority. Many networks are completely permissionless (Bitcoin) while others are semi-permissioned (Binance Token). I.e. It is possible for a participant to be blocked or interrupted from using the cryptoasset for its intended use.		

4.5.2.2 Cryptocommodities

Cryptocommodities are designed to offer a scarce digital resource; an exchange of information which has a core non-monetary function. These are sometimes referred to as general protocols. Burniske and Tatar note that these digital resources are analogous to the raw material building blocks which serve as inputs into finished products.

Digital resource provision could mean scarce computing power, as is the case with Ethereum. It could also mean decentralised cloud storage, anonymised bandwidth or perhaps memory. Equally, it could refer to crucial infrastructure style resource provision such as protocol tokens. For example, the 0x protocol allows for trustless p2p exchange (off-chain orders) of ERC-20 tokens via Ethereum smart contracts; it permits anyone to create a decentralised exchange (referred to as relayers).

Moreover, many side-chains are best understood as cryptocommodities given that they often assist with scalability and provide resources to innovate on the mainchain; for example, Rootstock.

In some cases, it is quite possible that the native token of a DApp may in fact be understood to be a cryptocommodity rather than a cryptotoken. Storj, Status, and Golem are notable examples. In sum, these cryptoassets offer both scarce digital resources as well as infrastructure level services.

4.5.2.3 Cryptotokens

Cryptotokens typically refer to the cryptoassets which are needed for the use or monetisation of a DApp[17]. Cryptotokens typically do not operate on their own blockchain. Instead, they are built on top of a cryptocommodity's blockchain. These native cryptotokens will then use a cryptocommodity (Ethereum, Stellar, etc..) to pay the cryptocommodity it is built upon to execute certain transactions.

These cryptotokens are not difficult to create and have contributed significantly to the proliferation of cryptoassets on cryptoexchanges globally.

Specification to a particular industry reduces the potential for a given cryptotoken to be seen as a unit of account. For this reason, they tend not to exhibit money-like qualities and are not considered cryptocurrencies.

[17] The Value of AppCoins by David Johnston https://github.com/DavidJohnstonCEO/TheValueofAppCoins

5 METHODOLOGY

5 METHODOLOGY

5.1 Introduction

The 200 cryptoassets with the largest market capitalisation, according to CryptoCompare data, have been chosen for this report[18].

The publicly available and free CryptoCompare API was used to collect a wide array of data on each of the 200 cryptoassets. The data was fact checked and supplemented with additional information, typically found on: cryptoasset whitepapers, blogs and websites.

Three challenges have been identified:

1. Incompleteness
2. Subjectivity
3. Survivorship bias

1. **Incompleteness:** Many of the younger and lower market capitalisation cryptoassets had a relative dearth of reliable information in comparison to the well-researched and peer reviewed cryptoassets like Bitcoin, Ethereum or Ripple. Whitepapers have become progressively less technical and illustrative (sometimes with significant plagiarism).
2. **Subjectivity:** Many of the classifications used are subjective. For example, 'Governance' is defined as 'the level of decentralisation regarding the technological development as well as the maintenance of the cryptoasset'. This definition and the applicable tags – Decentralised, Semi-Decentralised, Centralised – are therefore open to interpretation. This also applies to other subjective classifications: Governance, Access, Dominant Use, FINMA Classification, Industry Sector and Niche.
3. **Survivorship bias:** As we have taken a snapshot of the current top 200 cryptoassets, the data is subject to survivorship bias. Not including the cryptoassets that have failed will skew the data towards trends that are prevalent today. Some of the more experimental approaches may not be fully represented.

[18] As of May, 2018. We expect the majority of classifications to remain fairly static, however, some are likely to have changed in this time.

5.2 Clarification of Specific Terms

5.2.1 FINMA Classification

In line with FINMA, cryptoassets were assigned a regulatory classification using 'payment', 'utility' and 'asset' tags. These have been used sparingly with the intention of creating a more meaningful dataset.

5.2.2 Industry Sector and Niche

Each cryptoasset was assigned to an industry group using the ONS classification system (Office for National Statistics) where possible. For example, Bitcoin has been placed within 'Financial and Insurance Services' industry within the niche sector of 'payments'. However, cryptoassets such as Ethereum which has a 'dominant use' of 'smart contracts' have been placed outside the ONS framework, defined as a 'Blockchain-Specific Application'.

5.2.3 Dominant Use

Refers to the principal use case of the cryptoasset. This may differ from the claims on the whitepaper. For example, the Bitcoin whitepaper describes Bitcoin as a form of cash payment. In reality, Bitcoin is currently used predominantly as a store of value.

5.2.4 Governance

Governance speaks to the degree of centralisation of a cryptoasset. This is understood as a subjective measure which considers decision-making procedures and centralisation of the maintenance process (e.g mining). For example, Ethereum is assigned the tag 'semi-decentralised'. The development of the Ethereum project involves relatively centralised decision-making (e.g. the hard fork resulting in Ethereum Classic), but a large and decentralised mining group. The code that the miners run is open-source and subject to change by the community. For example Monero's Proof-of-Work algorithm changes periodically to reduce miner centralisation.

5.2.5 Access

It is possible that nodes or centralised groups on the network may attempt to block and restrict access to the average user. One edge-case here was Ripple where a relatively small number of trusted nodes can interfere with access to the cryptoasset.

5.2.6 Burniske-Tatar Archetypes

The Burniske-Tatar classification framework has various edge cases that in theory can be placed in multiple categories and some that are simply not clear. Tether is a good example as it seems that it can be placed in the 'cryptocurrency' and 'cryptotoken' buckets.

On the one hand, Tether operates as a 'dependent child' of the Omni protocol which is a cryptocommodity; this is a defining feature of most cryptotokens (4.1.3). However, we argue that Tether has transitioned from a cryptotoken to a cryptocurrency given its current usage as a de facto stablecoin. Tether's performance as a form of money (store of value, medium of exchange and unit of account) is sufficient to warrant its classification as a cryptocurrency.

5.3 General Definitions

The following section lists definitions for the classifications and tags used within the taxonomy. Some tags have required human judgement in order to populate. For these tags, an explanation of the human judgement process is added within the definition.

Table 3: Classification and Tag Definitions

Term	Definition
Ticker	Abbreviation used to identify a cryptoasset, corresponding to the trading ticker that is used at CryptoCompare.
Start Date	Date at which the cryptoasset is 'Deployed' and technically functional. For cryptoassets that are 'In-development' but have significant monetary value generated by trading, ICO or Airdrops an 'economic start date' has been chosen. E.g. EOS
Development Stage	The extent to which the cryptoasset fulfills its 'dominant use'.
Deployed	The cryptoasset fulfills its 'Dominant Use' on a mainnet according to the intended design.

Term	Definition
In development transferable	A cryptoasset that can be transferred via a protocol but cannot fulfil its 'Dominant Use'. Typically the cryptoasset is only used for speculative trading on secondary markets at this stage of its lifecycle.
In development non-transferable	Contributions from the 'ICO' or 'TGE' have been recorded but are not transferable. Therefore the cryptoasset cannot be traded on secondary markets. Typically the contributions are recorded either centrally by the team or decentrally on a blockchain database. In most cases the contributor provides an address that they wish to receive the cryptoasset when 'Deployed'.
Dominant Use	The dominant ways in which the cryptoasset is used by holders, excluding financial speculation. The tags are placed in order of importance.
Governance	The level of decentralisation regarding the technological development as well as the maintenance of the cryptoasset.
Decentralised	All aspects of technological development and maintenance are widely dispersed over a varied demographic and geography.
Semi-Decentralised	Some aspects of technological development and maintenance are controlled by a powerful minority.
Centralised	A small group, usually the company or foundation, is responsible for the majority of decision-making regarding technological development and maintenance.
Access	The ability to participate in the primary function of the asset without obstruction from powerful minorities.
Permissionless	All users have equal and unobstructed access to all functionalities of the cryptoasset. This access cannot be taken away by any group.
Semi-Permissioned	All users have equal and unobstructed access to all functionalities of the cryptoasset. However, this access can be revoked easily by a small minority.
Permissioned	All users must seek and receive permission from a controlling group to use the cryptoasset. Users access can be revoked easily at any time.
Consensus Mechanism	The mechanism that authenticates and validates a set of values or a transaction without the need to trust or rely on a centralised authority. It aims to bring all network participants to a common agreement regarding the contents of the cryptoasset's respective data structure.
Hashing Algorithm	Hashing algorithm directly used in the consensus mechanism.
Mineable	The asset 'outsources' computing resources to validate data integrity in Proof-of-Work consensus mechanisms.

Term	Definition
Data Structure	Data structure specifies the technological format in which new data is added and old data is stored in the cryptoasset's respective database.
Current Form	If the cryptoasset has an economic value whilst 'In-Development', what form does the cryptoasset take prior to being 'Deployed'?
Family	The relationship of one cryptoasset to another with regards to its technology and dependency. Relationships can take many forms such as: forks, DApps and copied codebases.
Parent	A cryptoasset that provides either a platform for a token/sidechain/layer-two protocol to operate (BTC-OMNI) or provides the majority of the code to the child (BTC-LTC).
Child	A cryptoasset that contains significant amounts of code from a parent, usually as a fork of the parent. The child would continue to exist if the parent was compromised.
Dependant Child	A cryptoasset that relies on a parent to operate, usually in the form of a token or sidechain. The child would cease to operate if the parent was compromised.
Cryptoasset Classification	Each cryptoasset has been defined either as a cryptocurrency, cryptocommodity or cryptotoken. Please see Framework section for a detailed explanation.
Cryptocurrency	Cryptocurrencies exhibit the properties of money. An asset's usability as money depends on how well the asset serves as a: store of value, medium of exchange and unit of account.
Cryptocommodity	Cryptocommodities represent coins or tokens designed to offer a scarce digital resource: an exchange of information which has a core non-monetary function.
Cryptotoken	Cryptotokens typically refer to the cryptoassets which are needed for the use or monetisation of a decentralised application. Cryptotokens typically do not operate on their own blockchain. Instead, they are built on top of a cryptocommodity's blockchain.
CryptoCompare Archetypes	A "natural" grouping of cryptoassets according to legal, economic and technological properties. Research, data and analysis from CryptoCompare.
Non-Fungibles	Unique and noninterchangeable tokens.
Personal - NFTs	NFTs that pertain to an attribute which is specific to a single entity; not merely tokens that are unique, but tokens that are unique to a unique person. The examples given in the taxonomy are reputation and identity.

Term	Definition
Non-Personal - NFTs	NFTs that are not unique to a particular entity.
Fungibles	Perfectly interchangeable tokens.
Utility Tokens	Tokens designed to offer digital access to an application or to some service using the blockchain.
Utility - Platform	Tokens that are used to gain access to general purpose decentralised networks for a wide range of possible applications.
Utility Non-Platform - General	Open networks designed for a given use case (as opposed to platforms which have multiple use cases). Decentralised exchange tokens tend to be a good example of this.
Utility Non-Platform - Defined	Tokens used on a single network and for a given use case.
Payment	Tokens designed primarily to exhibit properties of money.
Asset-security Tokens	Umbrella term used to describe tokens which either confer a financial claim on an issuer or an asset which grants explicit governance rights to a token holder.
Collateralised Tokens	Tokens that are collateralised by fiat (e.g. TrueUSD, collateralised by USD) or non-fiat assets (e.g. Tiberius, collateralised by metal). This definition includes the three types of stablecoins mentioned in section 4.
Tokenised Securities	Tokenised securities allow “real-world” assets like bonds, stocks, equities, commodities to be traded as digital (and hence fungible) tokens..
Share-like Tokens	Tokens that offer the rights to specific cash-flows.
Collateralised Tokens	Tokens that are collateralised by fiat (e.g. TrueUSD, collateralised by USD) or non-fiat assets (e.g. Tiberius, collateralised by metal). This definition includes the three types of stablecoins mentioned in section 4.
Tokenised Securities	Tokenised securities allow “real-world” assets like bonds, stocks, equities, commodities to be traded as digital (and hence fungible) tokens..
Share-like Tokens	Tokens that offer the rights to specific cash-flows.

Term	Definition
FINMA Classification	This classification uses the popular Swiss FINMA guidelines (FINMA, 2018). A single cryptoasset can have multiple regulatory classifications.
Payment	A cryptoasset that is synonymous with a cryptocurrency and has no further function or link to other development projects. Cryptotokens may in some cases only develop the necessary functionality and become accepted as a means of payment over a period of time.
Asset	A cryptoasset that represents participation in physical goods, companies, income streams, or an entitlement to dividends or interest payments. In terms of their economic function, cryptotokens are analogous to equities, bonds or derivatives.
Utility	Cryptoassets that are cryptotokens that are intended to provide digital access to an application or service.
Industry Sector	The industry sector reflects the general economic function of the cryptoasset and the section of the economy it belongs to. The Office for National Statistics (ONS, 2018) 'UK Standard Industrial Classification (SIC) Hierarchy' has been used as a framework to assign cryptoassets by their industry. The industry sector 'Blockchain Specific Application' has been added to accommodate all cryptoassets that lie outside of the realm of the ONS framework.
Niche Sector	The specific economic area in which the cryptoasset belongs to. Each niche sector belongs exclusively to its industry sector. This specification is unique to CryptoCompare.
Funding	The method through which a given cryptoasset raised capital from investors to fund the development of the project.
Supply	Supply specifies whether the total supply of the cryptoasset is capped or uncapped.
Volume	24 hour trading volumes aggregated across all cryptoasset pairs. Data from CryptoCompare.
Market Cap	Current Supply x Price (USD). Data from CryptoCompare.
Economic Model	The method through which a cryptotoken accrues economic value. The taxonomy refers to four models.
Economic Model 2	The specific categories within each of the following economic models: Work Tokens, Burn & Mint tokens, Discount Tokens, Means of Payment and Collateral Backed Tokens.
Generation	Refers to how a cryptoasset's supply was initiated (at Genesis), and how additional cryptoassets (if any) have since been created (post-Genesis).

Term	Definition
Genesis	Refers to the point in time in which the first initial supply of a cryptoasset came into existence. This may have occurred in three main ways: **1. Bulk event** – this is defined as a single point in time in which an amount of cryptoasset supply instantaneously came into public existence. Examples of how this event can occur includes cryptoassets that went through an ICO or those that were "insta-mined". **2. Premine** – algorithmically generated, however, the mining is closed to the public and opened after a certain percentage of the cryptoasset has been generated. **3. Single Genesis Block** – this is defined as a generation event in which the cryptoasset is created through an algorithm that initiates a cryptoasset's supply from a single initial block.
Post-Genesis	Refers to how a cryptoasset has been generated post-genesis. This can be done algorithmically, arbitrarily, or neither: 1. Algorithmic – There is a protocol that is predefined, which automatically dictates a cryptoasset's supply schedule over time. 2. Arbitrary – Refers to changes in a cryptoasset's supply that are arbitrarily dictated at various points in time. 3. Neither – No cryptoasset generation post-genesis (i.e. fixed supply)
Control	Refers to the ability for any individual or minority group of individuals to make changes to the existing means of cryptoasset generation – i.e. changes to the generation algorithm, or arbitrary increases or decreases in supply. Here we have assigned two possible tags: 1. Control – Refers to the possibility that an individual or minority group can decide to make changes to the underlying generation algorithm or arbitrarily dictate future cryptoasset supply. 2. No control – No individual or minority group can dictate current or future cryptoasset generation decisions, whether this be through arbitrary means or changes to the algorithm.
Genesis/Post-Genesis Ratio	Refers to the overall means of generation (bulk vs algorithmic), taking into account genesis and post-genesis generation. The ratio does not consider future generation methods. There are four possible tags: 1. Algorithmic - all cryptoassets created through algorithmic means 2. Mostly Algorithmic - >50% of cryptoassets generated through algorithmic means 3. Mostly Bulk - >50% of cryptoassets created through bulk means 4. Bulk - all cryptoassets created through bulk means

<table>
<tr><th>Term</th><th colspan="5">Definition</th></tr>
<tr><td rowspan="5">Summary of Generation Tags</td><td>Genesis/Post-Genesis Ratio</td><td>Genesis</td><td colspan="2">Post-Genesis</td><td>Control</td></tr>
<tr><td>Algorithmic</td><td>(single genesis block)</td><td colspan="2">Algorithm</td><td>0 (no control)</td></tr>
<tr><td>Mostly Algorithmic</td><td>(bulk event)</td><td colspan="2">Arbitrary</td><td>1 (control)</td></tr>
<tr><td>Mostly Bulk</td><td>Premine</td><td colspan="2">None / Arbitrary</td><td>1 (control)</td></tr>
<tr><td>Bulk</td><td>Premine</td><td colspan="2">None / Arbitrary</td><td>1 (control)</td></tr>
<tr><td rowspan="4">Generation examples</td><td>Cryptoasset</td><td>G/P-G Ratio</td><td>Genesis</td><td>Post-Genesis</td><td>Control</td></tr>
<tr><td>Bitcoin</td><td>Algorithmic</td><td>(single genesis block)</td><td>Algorithm</td><td>0 (no control)</td></tr>
<tr><td>Ethereum</td><td>Mostly Bulk</td><td>(bulk event)</td><td>Algorithm</td><td>0 (no control)</td></tr>
<tr><td>Ripple</td><td>Bulk</td><td>(bulk event)</td><td>None</td><td>1 (control)</td></tr>
<tr><td>Airdrop – Free data</td><td colspan="5">Process whereby a given cryptoasset enterprise distributes cryptotokens to the wallets of some users free of charge.</td></tr>
<tr><td>Public ICO</td><td colspan="5">Cryptoassets (typically BTC or ETH) are sent to a smart contract which then returns the donor/investor with the ICO cryptoasset.</td></tr>
<tr><td>Restricted ICO</td><td colspan="5">Similar to a ‘Public ICO’, however, the distribution of the ICO cryptoasset is subject to certain terms. Usually KYC/AML identity checks, certain jurisdictions may be banned from the process and in some instances only accredited investors are allowed to take part.</td></tr>
<tr><td>Private ICO</td><td colspan="5">The distribution of the cryptoasset is managed by a team that only accepts investment from a select group of investors. The process is typically not controlled via a smart contract.</td></tr>
<tr><td>Treasury Awards – Varied</td><td colspan="5">Treasury supply (TS) is sent to liquid supply at the discretion of the treasury, the process is controlled and can be changed by the company/controlling team (see Ripple).</td></tr>
</table>

6 DATA FINDINGS AND VISUALISATIONS

6 DATA FINDINGS AND VISUALISATIONS

The visualisations and commentary that follow represent key findings from the analysis of the dataset on 200 cryptoassets featured in the taxonomy. This section is split across: archetypes dominance, dominant use cases, market and volume data, access and governance, data structure, industrial classifications, parent-child dependencies, distribution and generation and, finally, supply concentration. All definitions for classifications and tags can be found in the methodology.

6.1 Archetypes Dominance

The figures demonstrate the significant degree of overlap between the Burniske-Tatar and the CryptoCompare archetypes. In particular, "cryptotokens" tend to be analogous with non-platform utility tokens. More recently, share-like tokens have emerged as a growing category in the cryptoasset ecosystem.

Figure 20: Evolution of Burniske Archetypes Weighted by Frequency

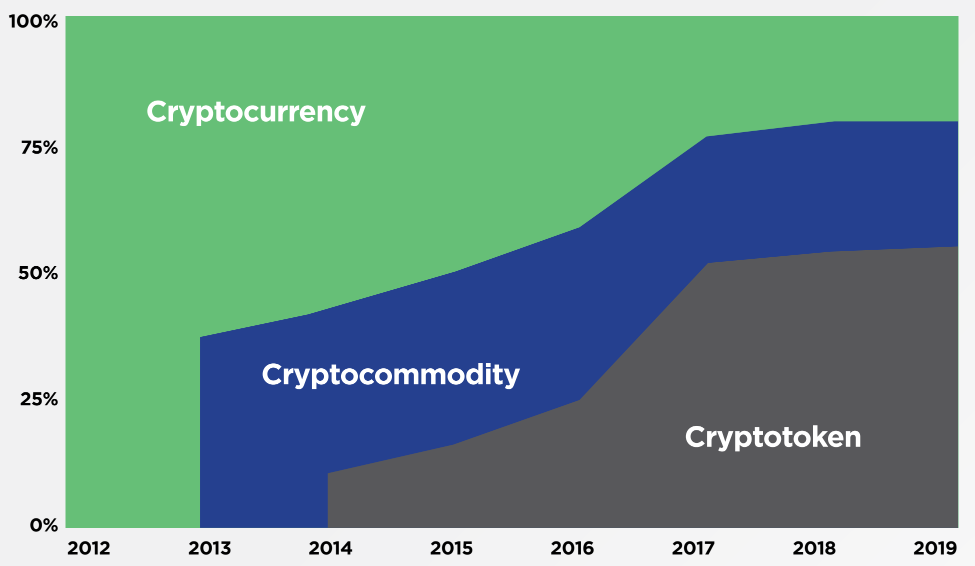
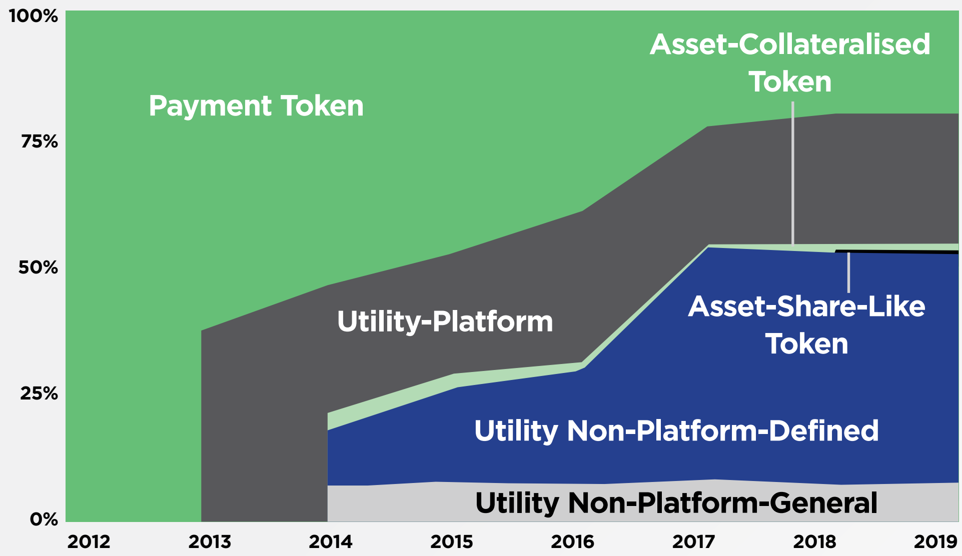


Figure 21: Evolution of CryptoCompare Archetypes Weighted by Frequency



6.2 Dominant Use Cases

The top 20 cryptoassets by market cap are dominated by payment and platform use cases. Notable exceptions include: NEM, which is focussed on asset registry, BNB (Binance coin), which is an exchange coin and VET (Vechain), which is focussed on supply chain tracking.

Figure 22: Dominant Use Cases for the Top 20 Cryptoassets Weighted by Frequency

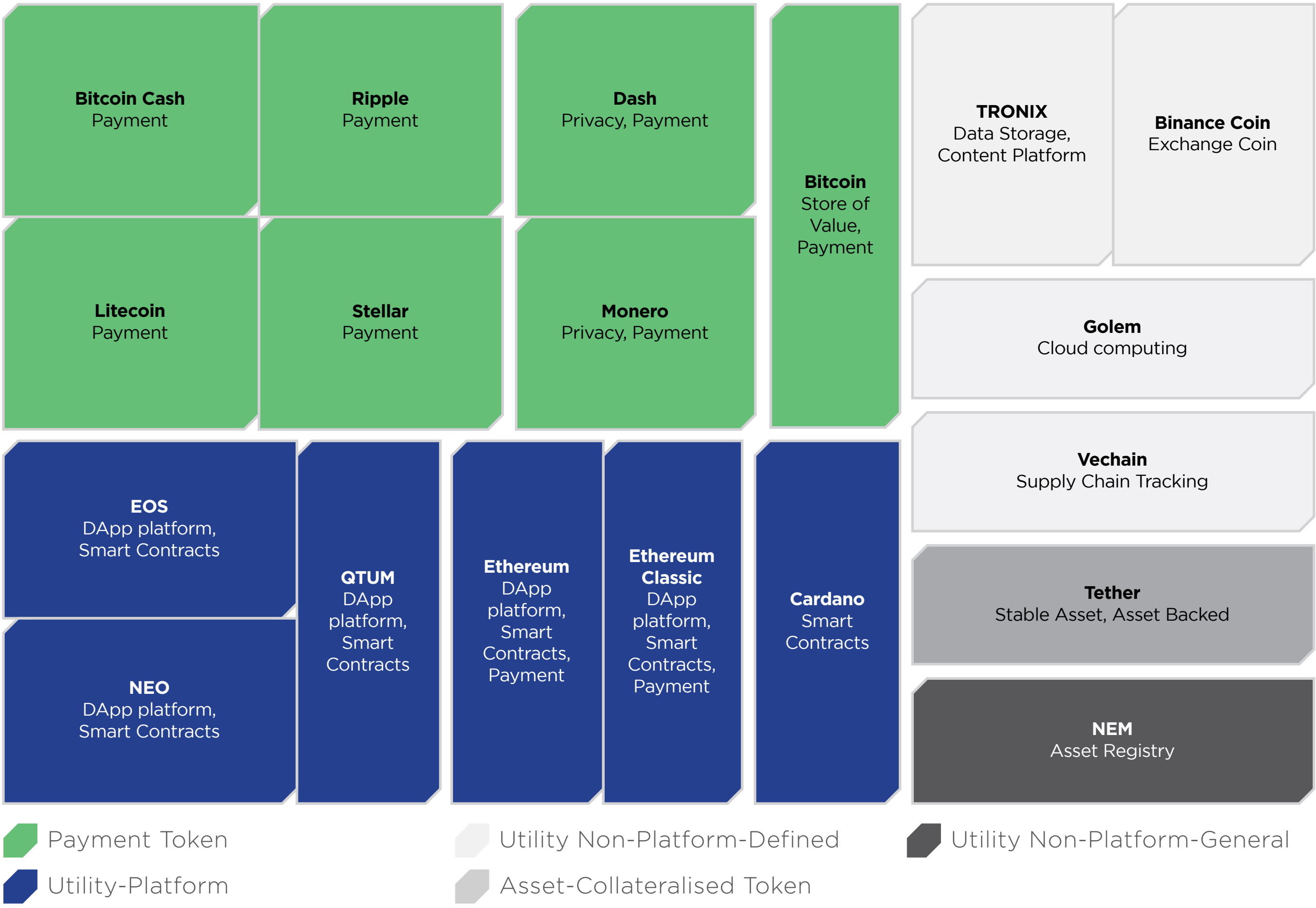
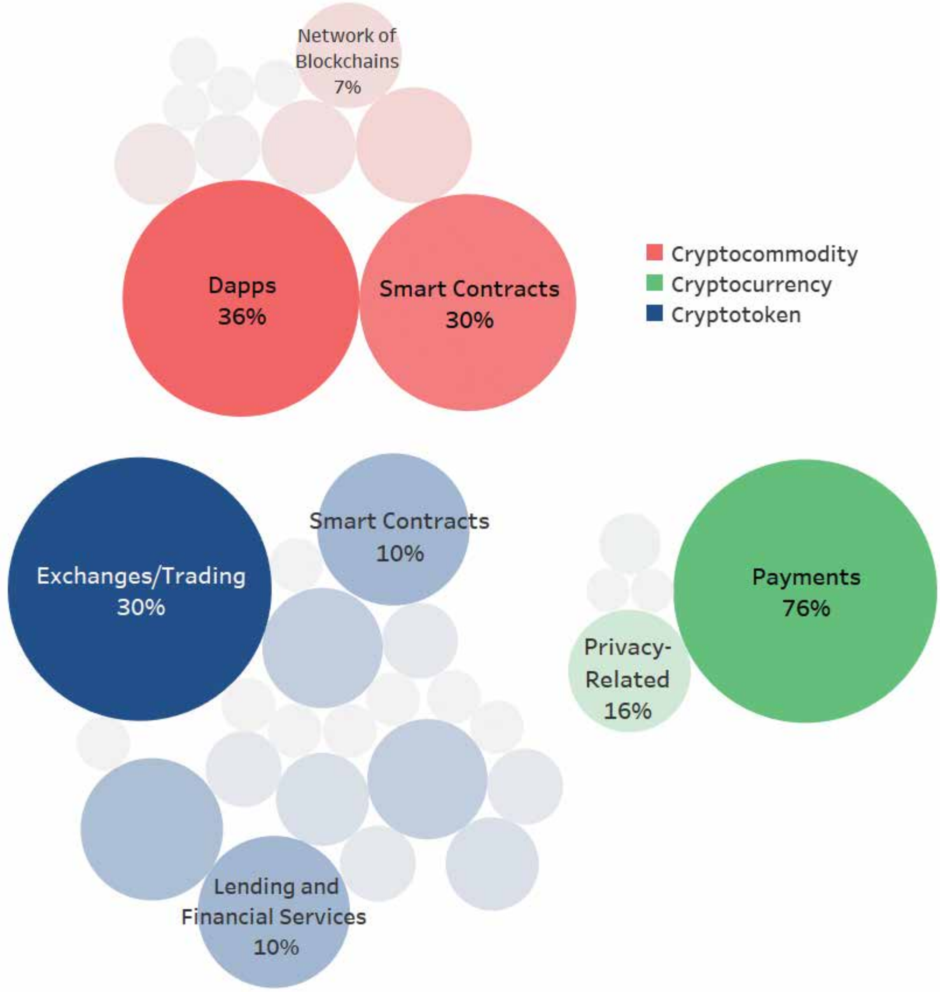


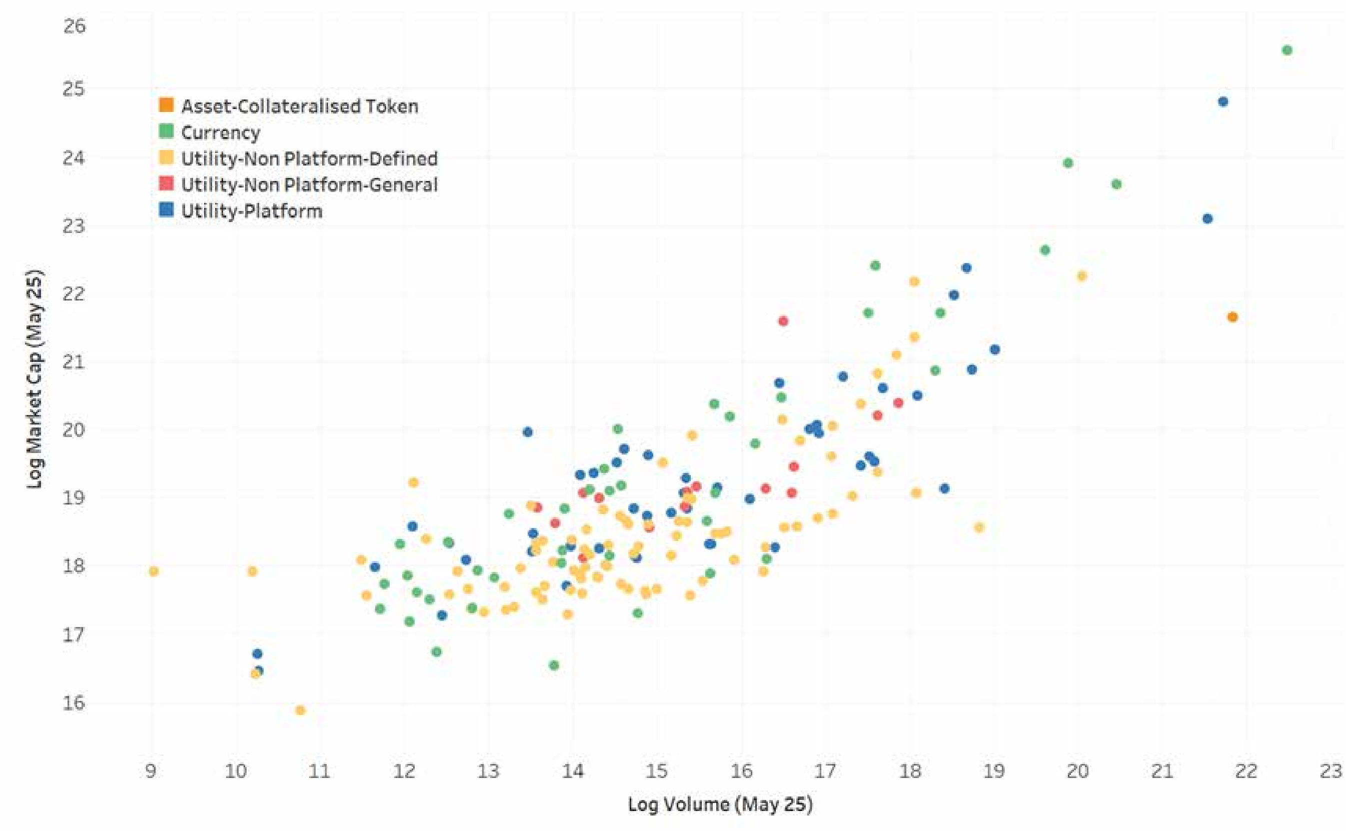
Figure 23: Dominant Use Case by Cryptoasset Classification Weighted by Frequency



6.3 Market Cap and Volume Data

Many non-platform-based defined utility tokens boast relatively high market cap valuations with paltry daily trade volume. On the other hand, a high cryptoasset price stimulates attention, which in turn stimulates more trading which often results in higher prices. These observations offer an explanation for the finding below that higher cryptoasset market caps correlate with an exponentially larger trading volume.

Figure 24: Relationship of the Log Market Cap vs Log 24h Trading Volume across all Cryptoassets



6.4 Access and Governance

The popularity of utility platform tokens has seen an increase in the number of semi-decentralised tokens. As mentioned earlier, this is a subjective measure that considers the decision-making procedures and the centralisation of the maintenance process. The majority of *centralised* tokens below are non-platform utility tokens with a defined network scope. These tokens are normally controlled by a small group of developers who have conducted an ICO and deployed a token for use solely on one network. All asset-security tokens are centralised.

The majority of payment-based cryptoassets are decentralised and permissionless; e.g. Bitcoin, Monero, Z-cash and Litecoin. A notable exception in our data is Ripple which is a payment-based cryptoasset that is both centralised and permissioned.

Figure 25: Stacked Breakdown of Governance Weighted by Frequency

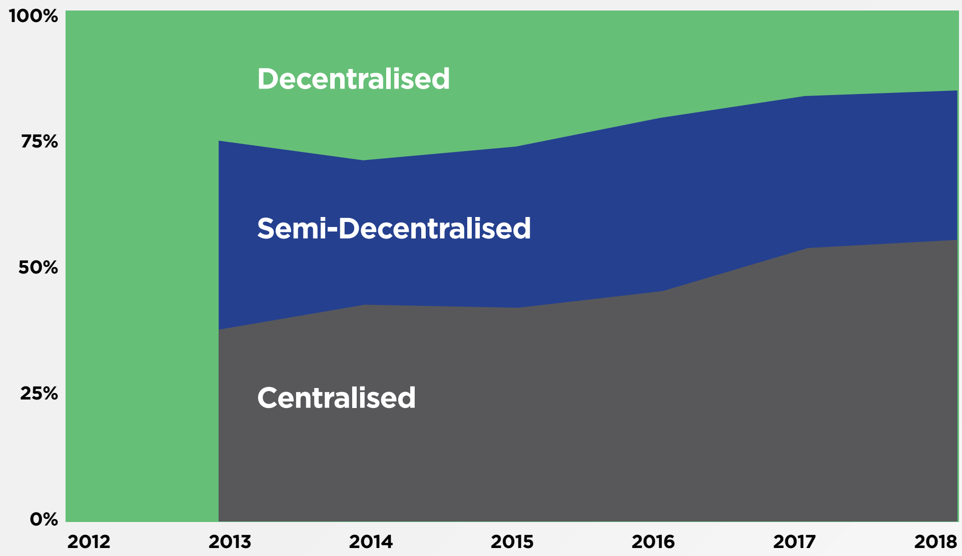


Figure 26: Stacked Breakdown of Governance Weighted by Market Cap

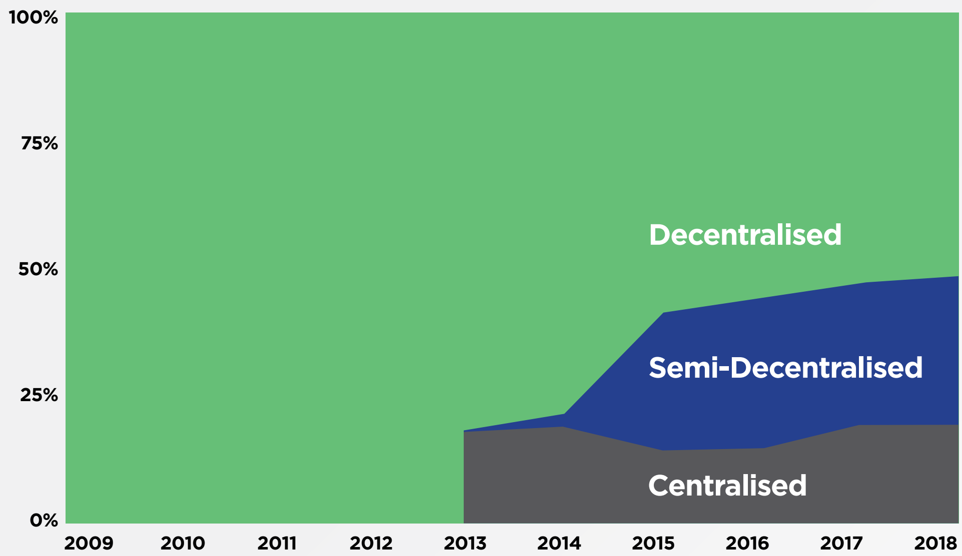


Figure 27: Stacked Breakdown of Access Weighted by Frequency

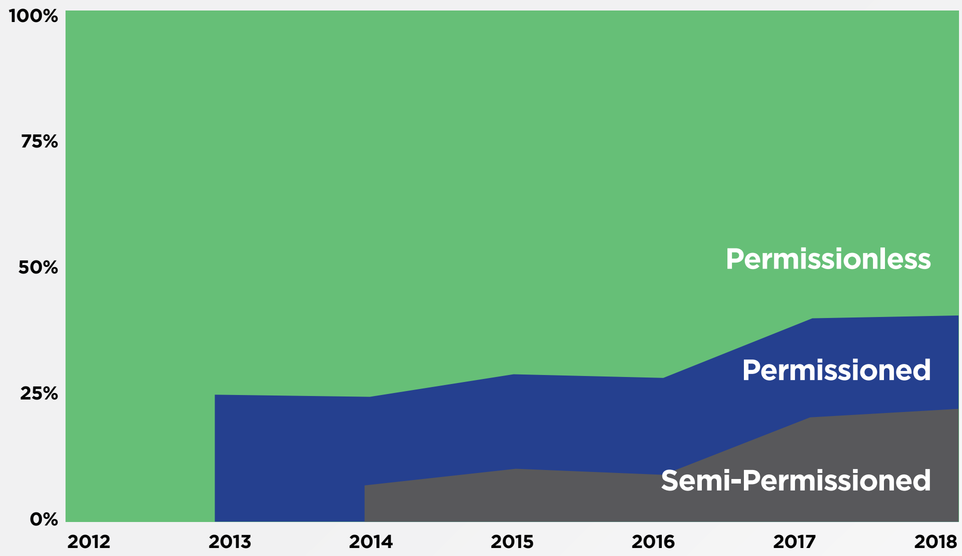
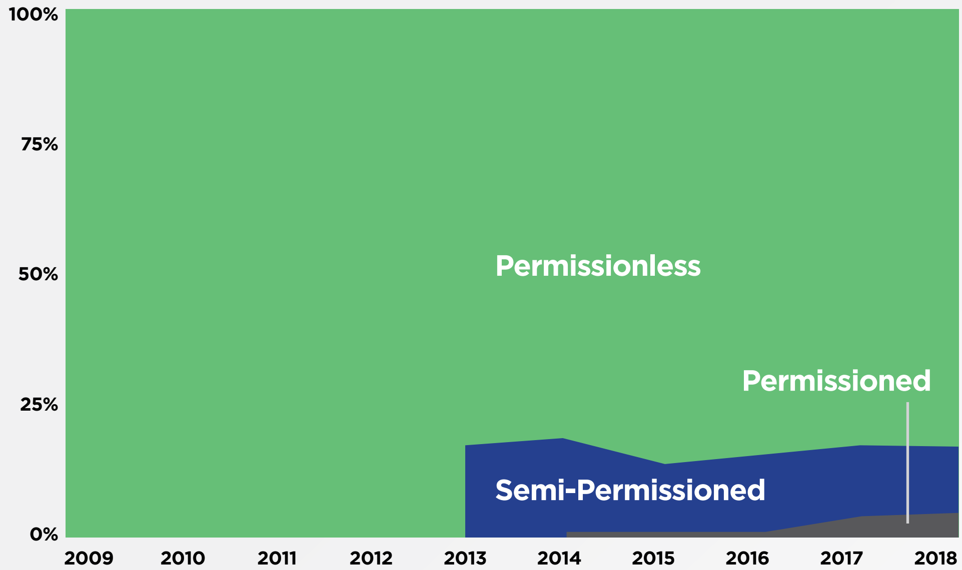


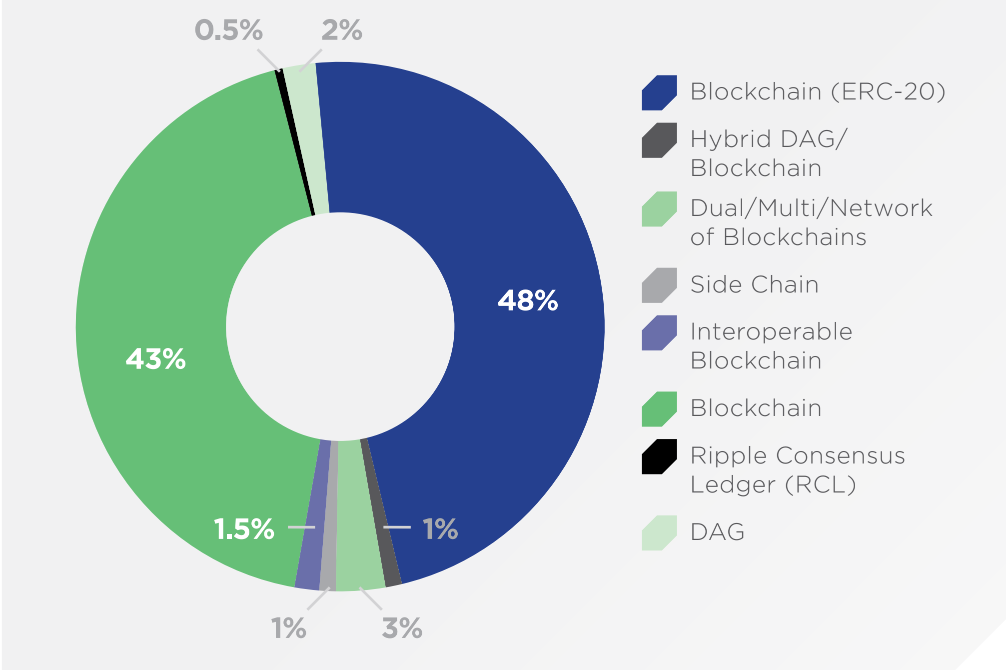
Figure 28: Stacked Breakdown of Access Weighted by Market Cap



6.5 Data Structures

While 43% of the cryptoassets were native to their own blockchain, just under half of the cryptoassets in this study were ERC-20 tokens (based on the Ethereum blockchain). This is a significant number and explains the fierce competition and relatively high valuations among platform utility tokens. Notable exceptions include IOTA (Direct Acyclic Graph – DAG), Cosmos and Polkadot which we have categorised as networks of blockchains. Both these data structures are still, however, somewhat rare.

Figure 29: Summary of Data Structures



6.6 Industrial Classifications

The figures below focuse on utility tokens. Each colour represents a given industrial classification using the ONS industrial classification method and an additional category labelled “Blockchain-Specific Application”. The size of the coloured boxes represent the frequency (see Figure 30) and the relative market cap (see Figure 31) for tokens belonging to this industrial classification (see legend beneath the figure). Within each box, we name the specific industrial use-case and the percentage of frequency or total market cap that this use-case owns.

Figure 30: Cryptoasset SIC Industry Groups Weighted by Frequency

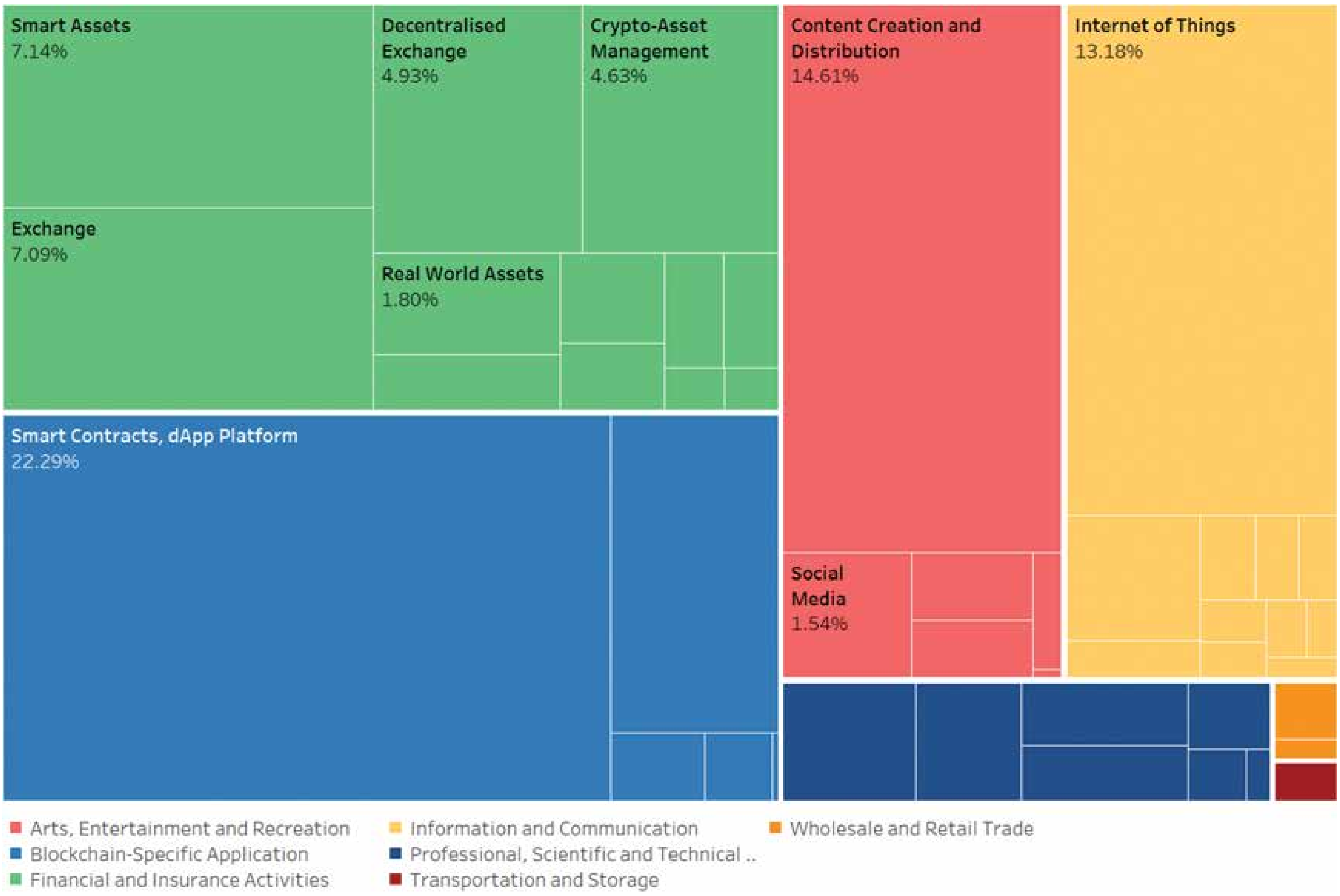
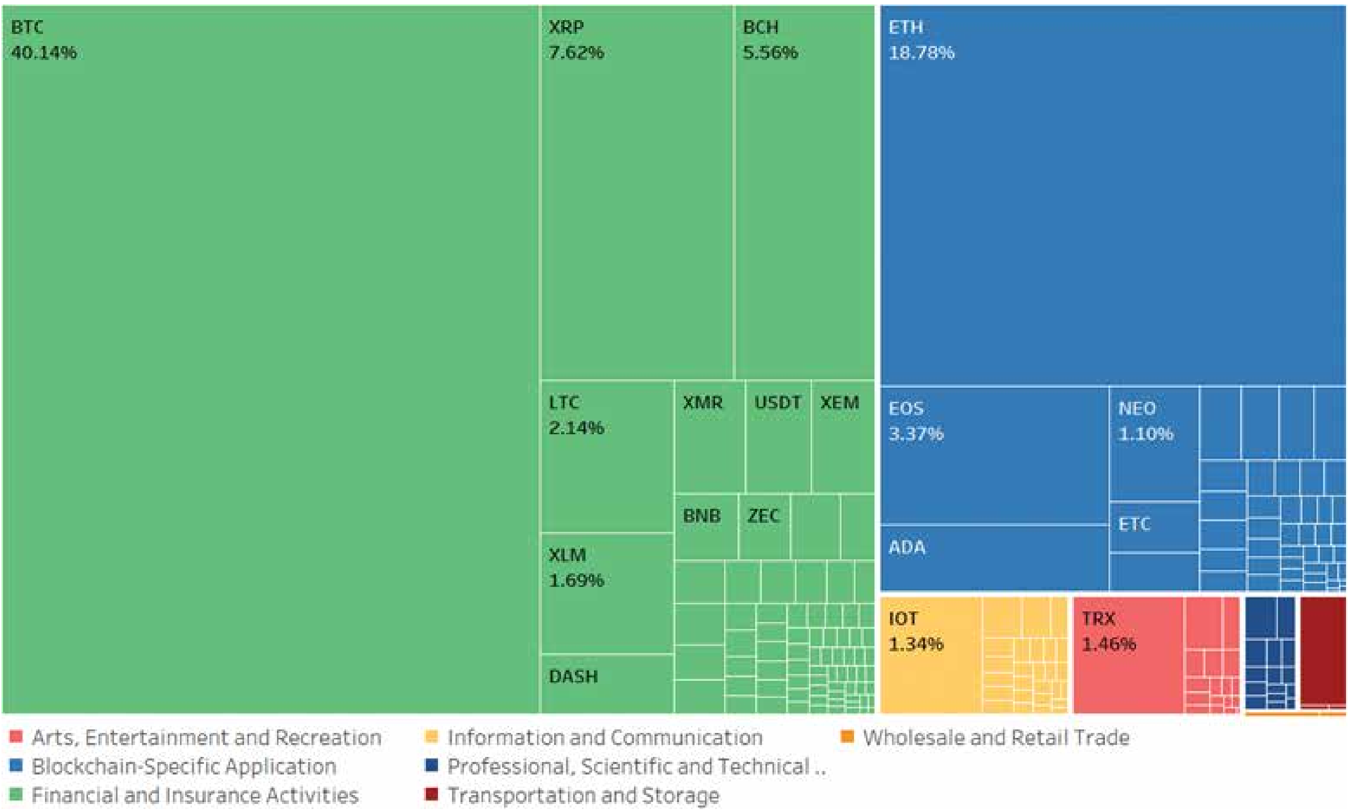
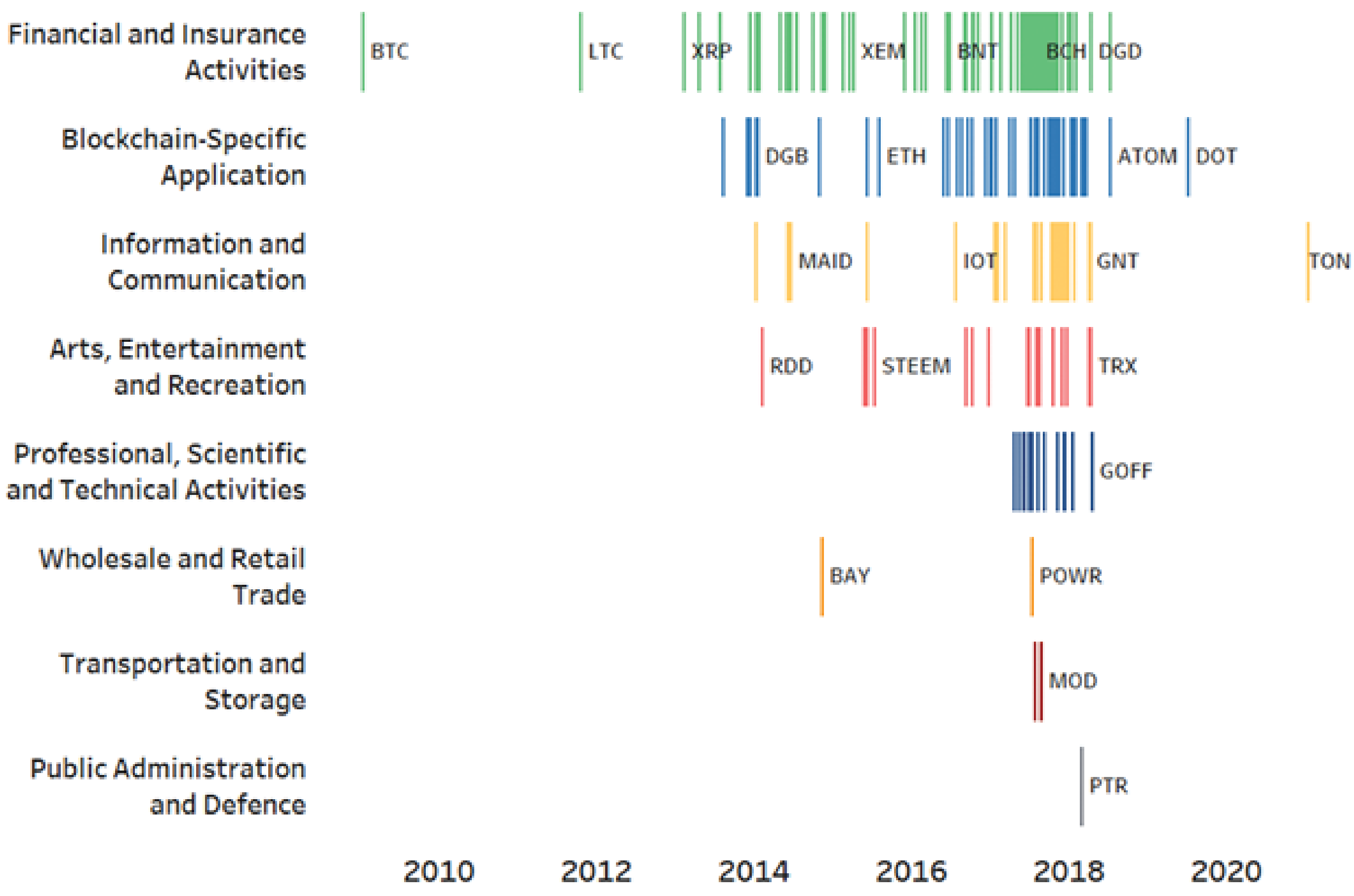


Figure 31: Cryptoasset SIC Industry Groups Weighted by Market Cap



The figure below features the specific launch date of all cryptoassets grouped by the ONS industrial classification. It shows that the early tokens – and the most numerous – are focussed on financial and insurance activities. Blockchain-specific applications, information and communication and arts, entertainment and recreation have all emerged as the other major industrial classifications for tokens. In particular, 2014 saw their numbers grow following the inception of DGB, MAID and RDD. More recently, tokens have focussed on public administration and defence (PTR).

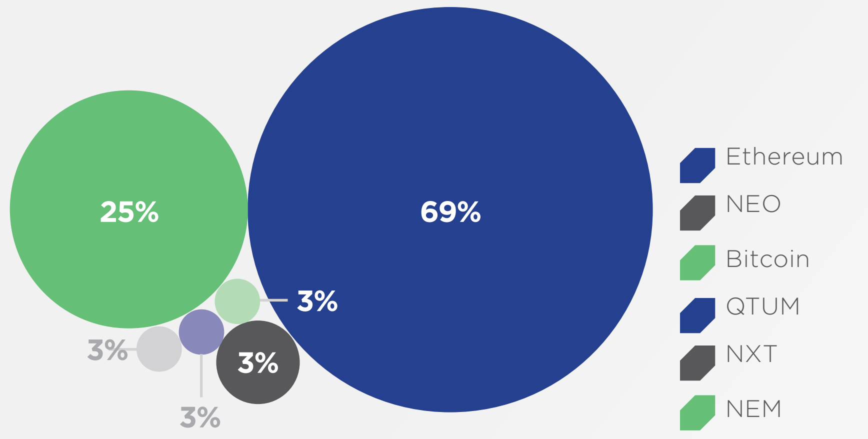
Figure 32: Cryptoasset Launch Date Sorted by Industry Classification



6.7 Parent – Child Dependencies

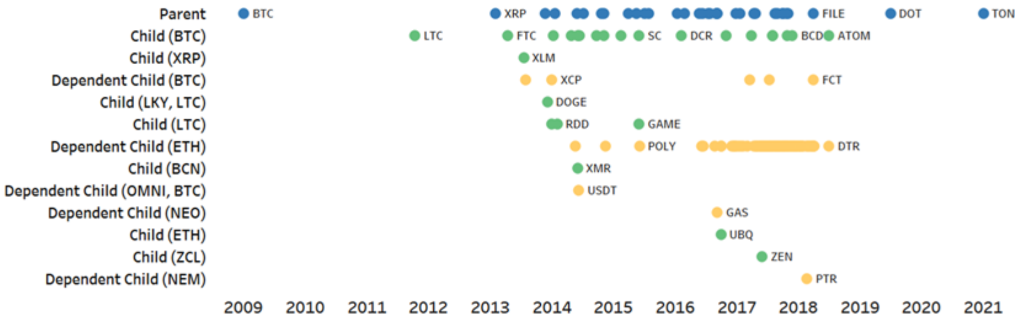
The bubble size represents the number of dependent children for each respective cryptoasset. It should be noted that this study has considered 200 cryptoassets. There are likely to be many more dependent children of NEO, QTUM and many others which we have not considered.

Figure 33: Child Dependencies of Major Parent Cryptoassets



The price explosion of cryptoassets in 2017 saw a huge increase in the number of dependent children on the Ethereum blockchain. The graphic in Figure 34 shows that Q3-Q4 2017 was a particularly intense launch period for these tokens. The launch of cryptoassets native to their own blockchain has been fairly constant over the last 5 years. Notable non-Ethereum-based cryptoassets which are dependent children include ONT (LTC) and FCT (BTC). The size of the network and the extent of the developer support on the BTC and the ETH networks make these cryptoassets ideal choices for investors to hold (in order to receive dividends) and for projects to build their own cryptoassets upon.

Figure 34: Cryptoasset Launch Date Sorted by Dependency

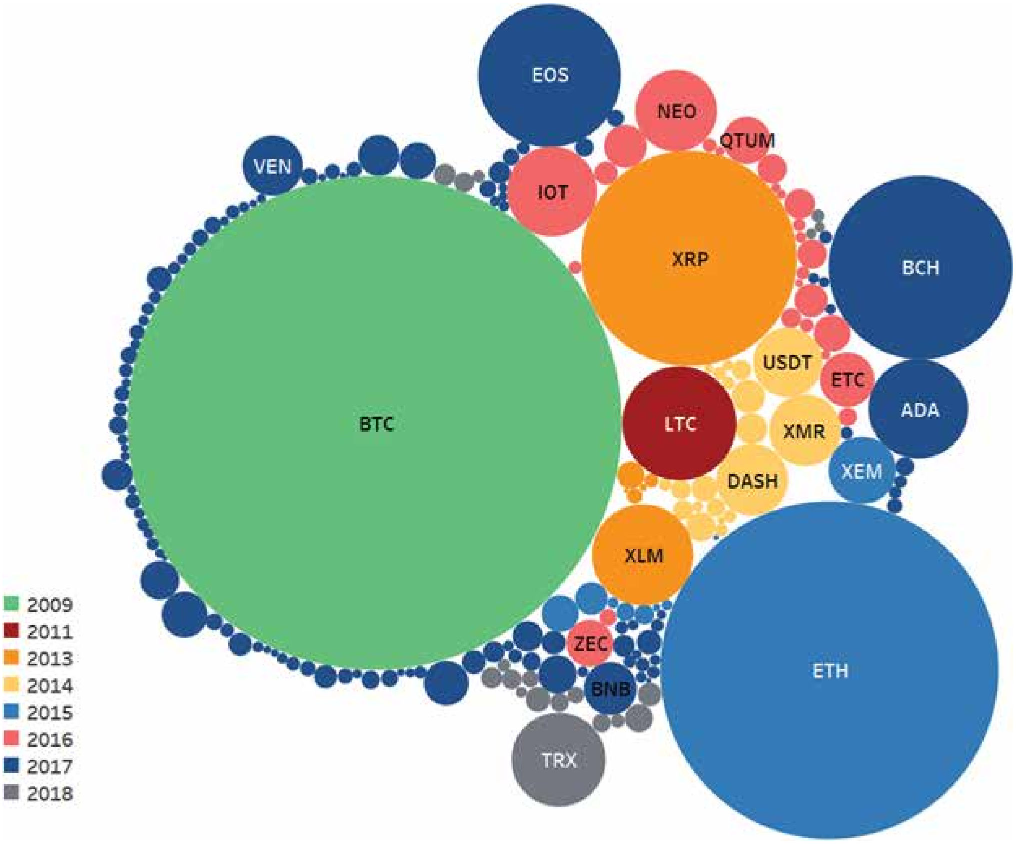


Each dot in the above graph represents a unique cryptoasset.

6.8 Distribution, Generation and Control

The following figure demonstrates the sheer number of new cryptotokens launched in 2017 – illustrated in blue. Only a few utility tokens truly stand out in terms of market cap: Tronix, Cardano, IOTA and NEM.

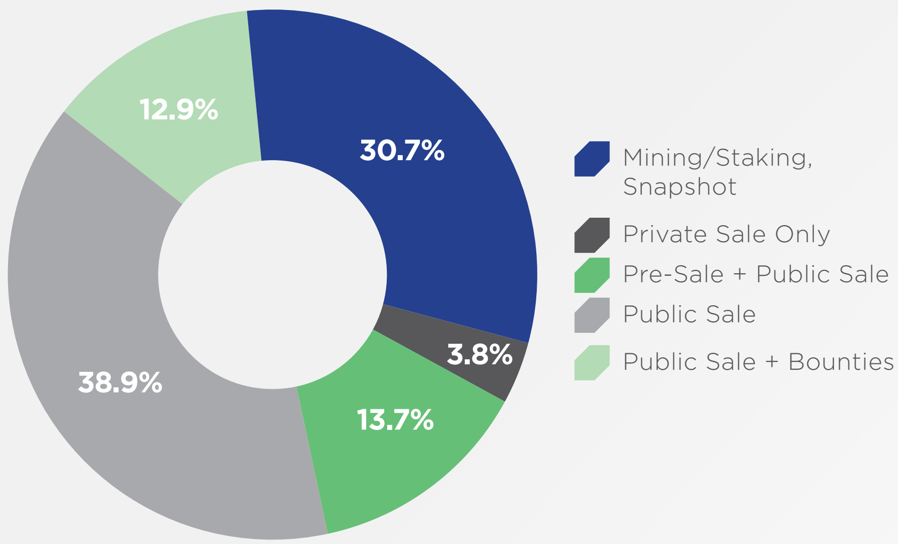
Figure 35: Year of Cryptoasset Deployment Weighted by Market Cap



Bubbles sized by relative market cap, 25 May 2018

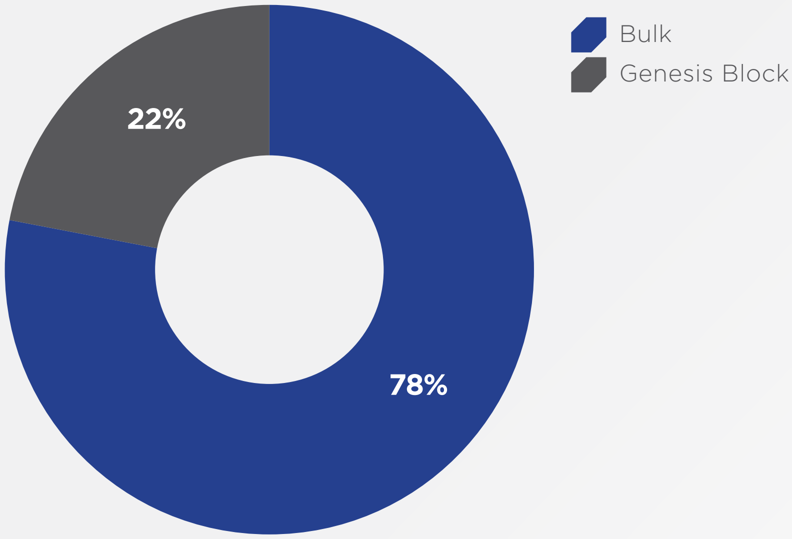
The figure below highlights the primary method of initial token distribution across all cryptoassets. The most popular form of initial distribution is a public sale: 41% of tokens used this as the primary method of distribution, compared to just 3% that used an ICO, 6% that used a private sale and 1% that used a premine.

Figure 36: Frequency of Token Distribution Mechanism



At the point when the first initial supply came into existence, 24% of cryptoassets had their supply created by an algorithm that initiated the supply from a single initial block. The remainder experienced bulk events which include: an ICO, "instamine" or, in the case of Dash, a premine.

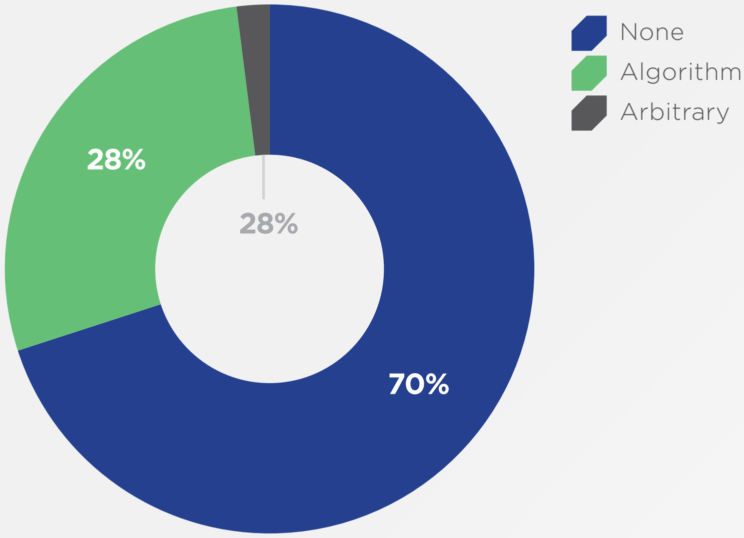
Figure 37: Frequency of Token Generation Mechanisms[19] at Genesis



Similar to the above, the post-genesis creation tab merely refers to how the cryptoasset has been generated post-genesis. This can be done algorithmically, arbitrarily or not at all.

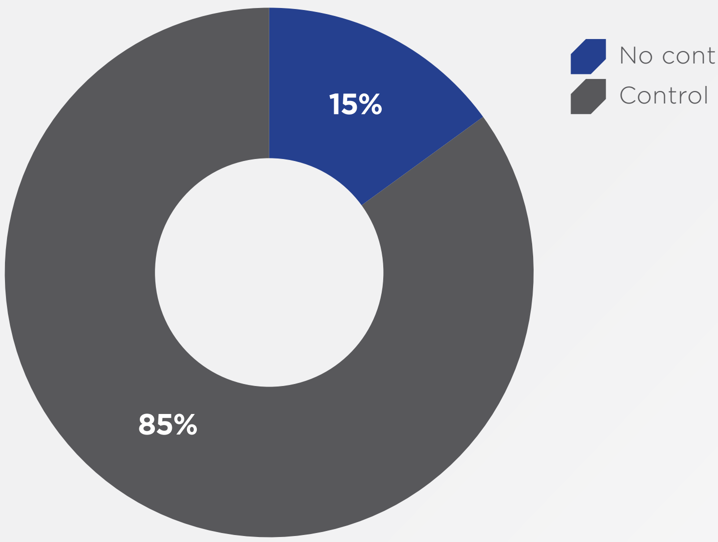
[19] See general definitions for more colour on the meanings of "genesis" and "bulk"

Figure 38: Frequency of Subsequent Token Creation Methods (i.e. post-genesis)



The figure below indicates whether or not a project team has control or decision-making authority to alter a cryptoasset's protocol at their own discretion.

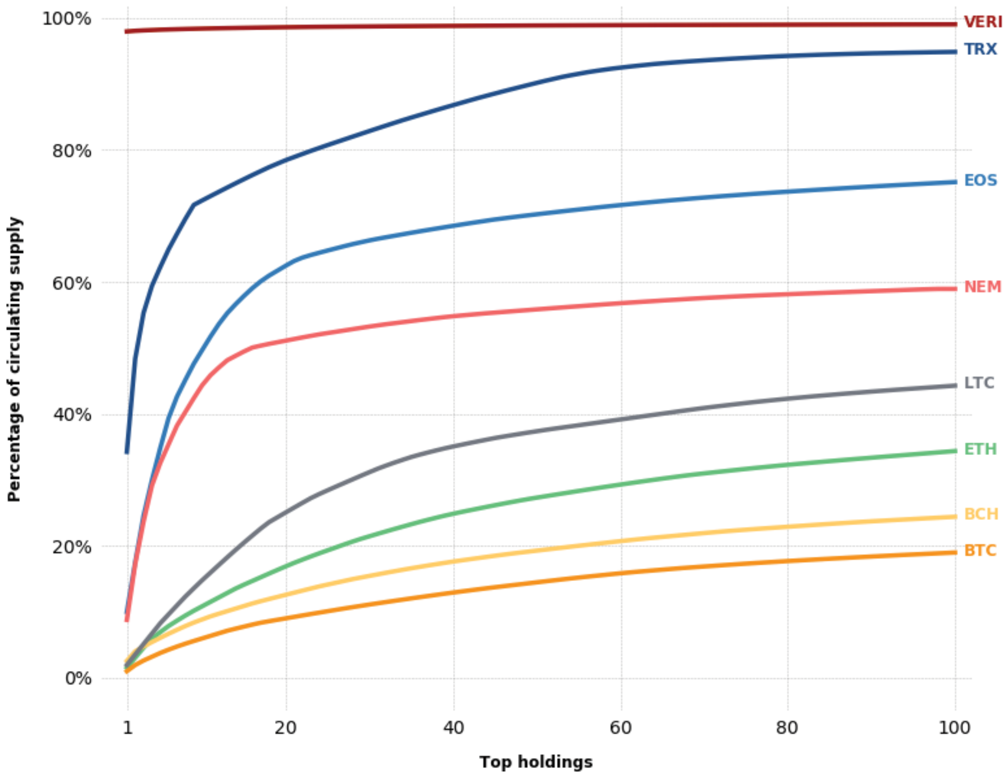
Figure 39: Frequency of Control Authority Post-Genesis



6.9 Supply Concentration

Using block explorers[20], it is possible to analyse circulating supply concentration for the largest wallets for the most prominent tokens. The figure below demonstrates that while the major cryptocurrencies exhibit slightly *lower* concentration among the top wallets, there are notable exceptions such as Veritaseum:

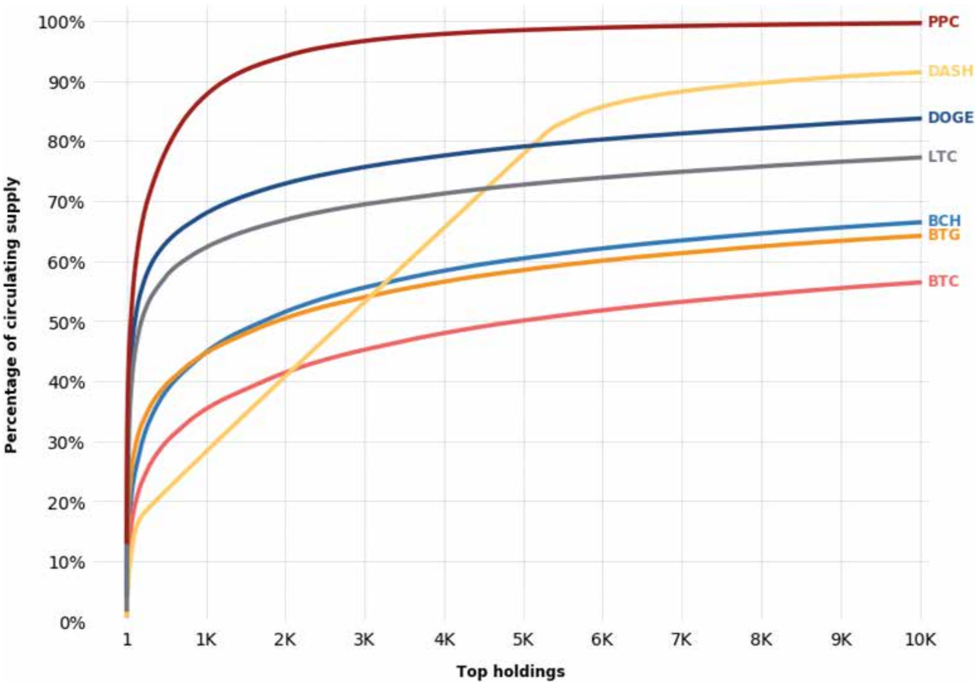
Figure 40: Percentage of Circulating Supply Owned by Top 100 Wallet Holders



[20] Etherscan and BitInfoCharts

The next figure (below) features the 'Bitcoin Peer Group' with a much larger sample size of wallets (in excess of 10,000). As expected, BCH and BTG, hard forks of Bitcoin, exhibit more similar supply concentration characteristics than non-Bitcoin forks.

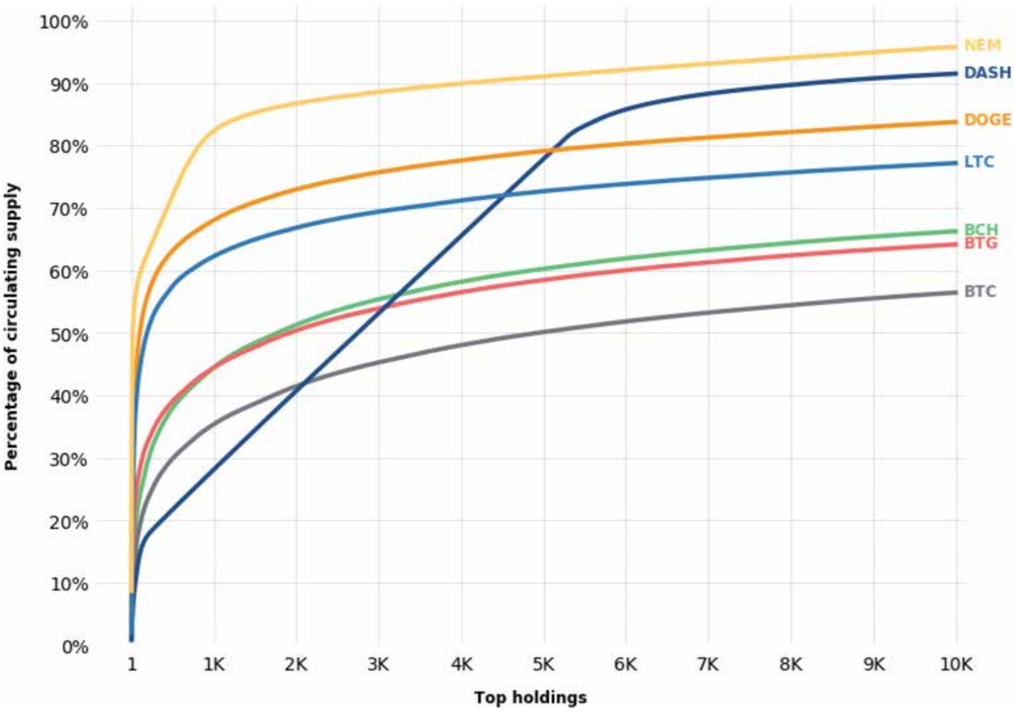
Figure 41: Percentage of Circulating Supply Owned by Top 10,000 Wallet Holders – Bitcoin Peer Group



While nearly all the BTC peers share a very similar large-scale distribution pattern, DASH is undoubtedly an unusual case, because of the masternodes. While the top wallet holding of DASH is one of the smallest in the crypto universe, the masternodes represent a set of holdings of approximately the same size, leading to seemingly linear growth of cumulative DASH holdings. This contrasts with the logarithmic growth in the case of the rest of the coins, with concave distribution curves.

This hypothesis was confirmed after analysing the distribution of NEM, which also has Masternodes:

Figure 42: Percentage of Circulating Supply Owned by Top 10,000 Wallet Holders – Bitcoin Peer Group (NEM Included)



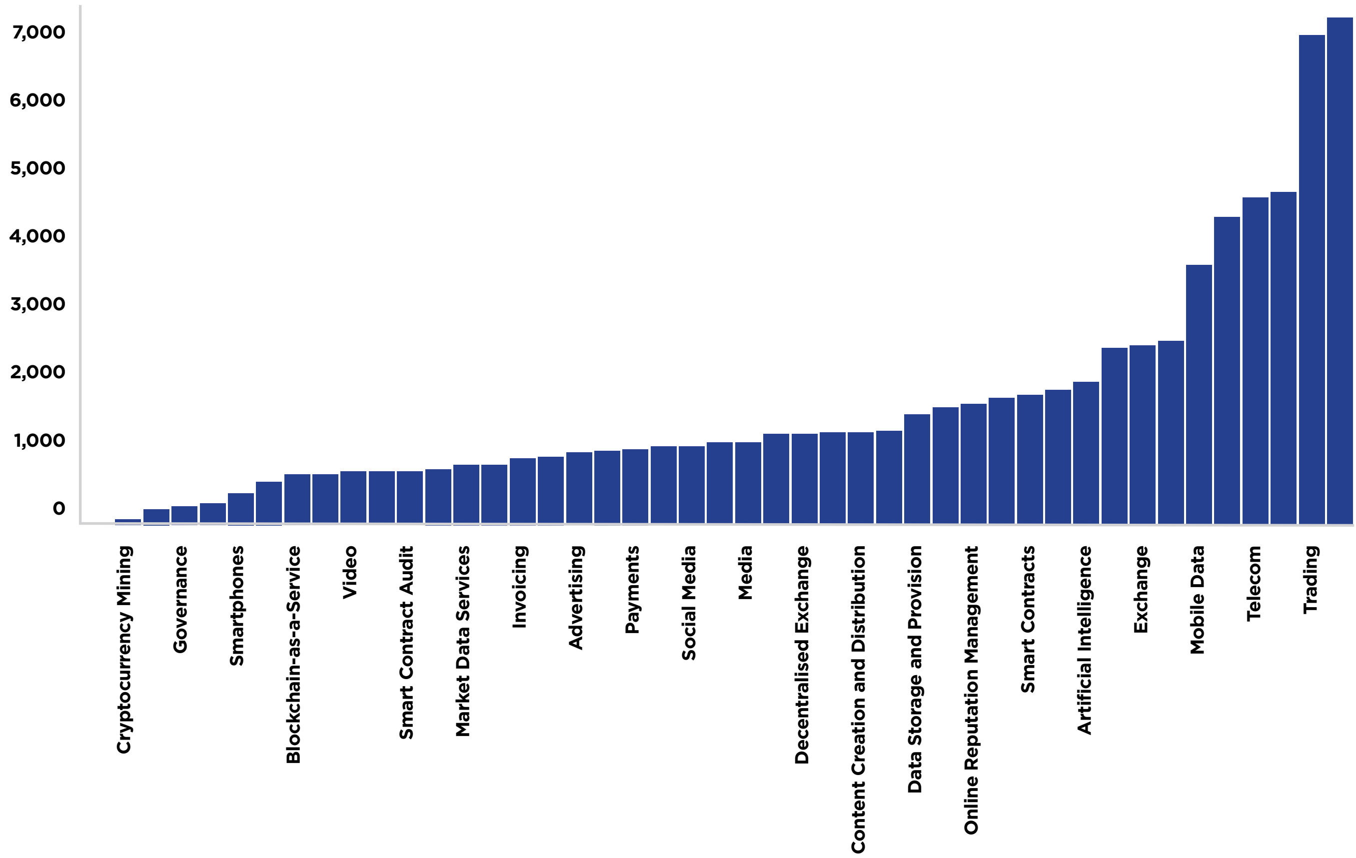
While there is a linear growth part for NEM, it is considerably shorter compared to DASH, corresponding to the difference in masternodes' numbers and sizes.

To measure distribution inequality more precisely, a *Herfindahl-Hirschman (HH) Index* adapted to cryptocurrencies has been used (see Figure 43).

In this taxonomy, we define the HH index as the *sum of squares of top 50 holdings*[21] of a token. It measures how consolidated or monopolised the token's supply is. The index is borrowed from the domain of microeconomics[22] – where it is one of the most popular inequality measures.

[21] Using the top 50 holdings only is a convention.
[22] Used to determine the degree of consolidation in a particular industry.

Figure 43: Average Herfindahl Hirschman Index by CryptoCompare Niche Industry Group



7 REFERENCES

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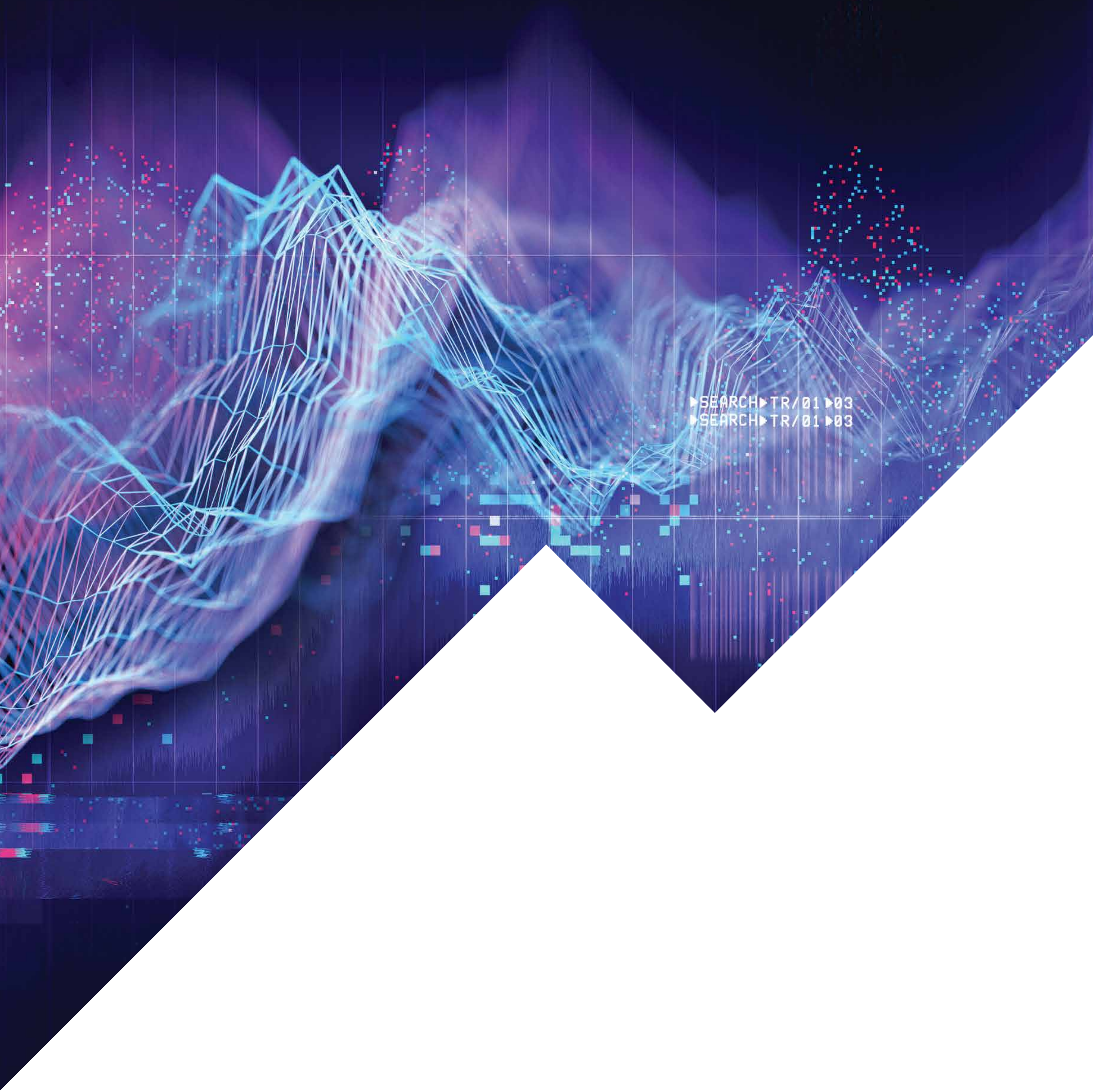
8 AUTHORS



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9 APPENDIX – TAXONOMY SUMMARY

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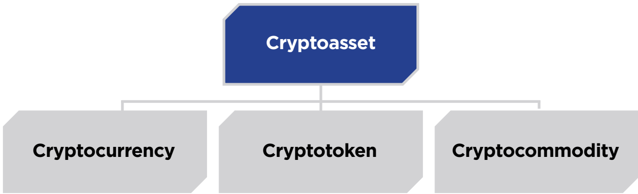
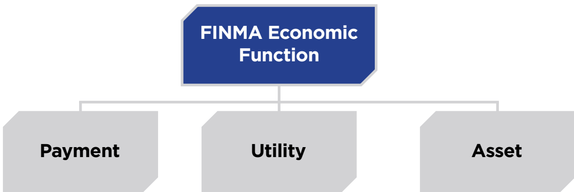
Industry Classification

Industry	Financial and Insurance Activities	Decentralised Exchange, Crypto Asset Management, Trading, Market Data Services, Prediction Markets, Credit and Lending, Payments, Privacy Payments, Exchange, Banking Cards, Real-World Assets, Smart Assets	BTC, XLM, DASH, XMR, BNT, GNO...
	Professional, Scientific and Technical Activities	Advertising, Gift Cards, Business Administration, Marketplace, Identity Verification, Invoicing, Online Reputation, Decentralised Marketplace	BAT, DNT, REQ, KIN...
	Blockchain-Specific Application	Blockchain Interoperability, Blockchain-as-a-Service, Smart Contracts and DApps, Cryptocurrency Mining,	EOS, ADA, NEO...
	Transportation and Storage	Supply Provenance	VEN, AMB, MOD
	Arts, Entertainment and Recreation	Media, Social Media, Online Casino, Video Gaming, Adult Entertainment, Content Creation and Distribution	STEEM, TRX, XPA
	Wholesale and Retail Trade	Real-World Goods, Energy Trade	BAY, POWR
	Information and Communication	Cloud Computing, Internet of Things, Data Security, Internet Protocol Virtual Reality, Smart Contract Audit, Mobile Data, Smartphones Messaging, Artificial Intelligence Data Storage, Telecom	FCT, DATA, IOTA, FILE, GNT, TON...
	Public Administration and Defence	State-Backed (Sovereign) Cryptoassets	PTR

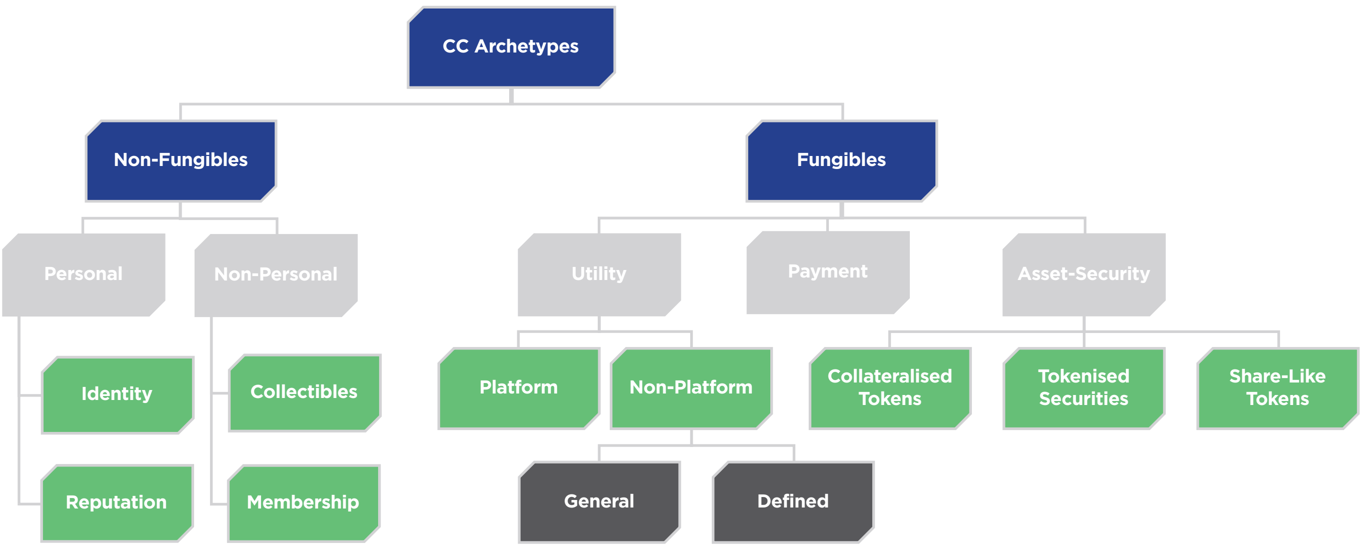
Burniske-Tatar Archetypes



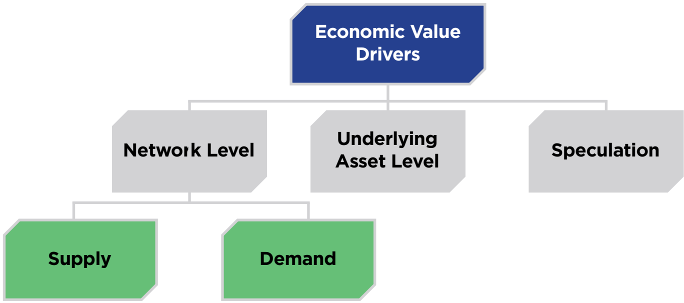
Regulatory (FINMA) Classification



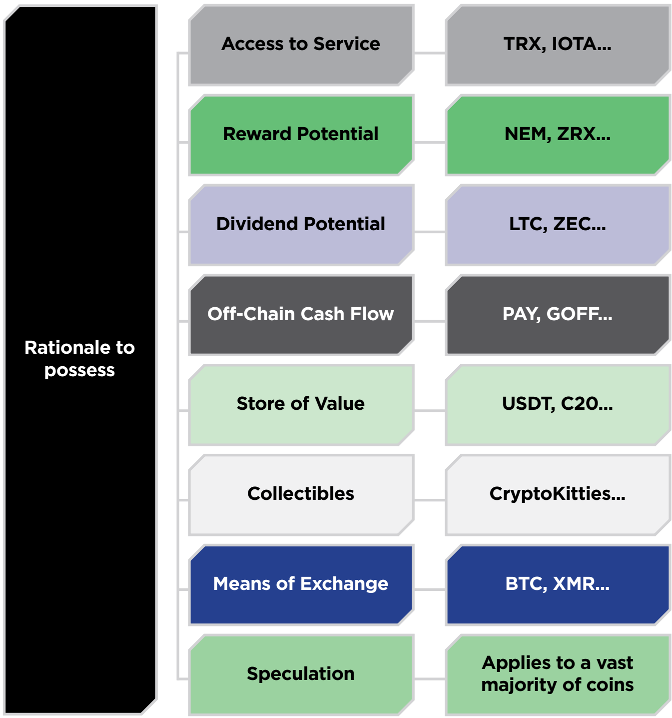
CryptoCompare Archetypes



Economic Value Driver Classification



Rationale to possess a cryptoasset



Published by CryptoCompare, October 2018
For more information about the Taxonomy Report please contact info@cryptocompare.com

CryptoCompare is the global cryptocurrency market data provider, offering retail and institutional investors real-time, high-quality and reliable market and pricing data on 5,000+ coins and 200,000+ currency pairs globally, bridging the gap between the cryptoasset and traditional financial markets.

By aggregating and analysing tick data from globally recognised exchanges and seamlessly integrating different datasets in the cryptocurrency price, CryptoCompare provides a comprehensive overview of the market and a fundamental value matrix. At a granular level, CryptoCompare produces cryptocurrency trade data, order book data, block explorer data and social data, reports and a suite of cryptocurrency indices.

Acting as gatekeeper for reliable, accurate and clean data that can be trusted as the basis for investment decisions, CryptoCompare adheres to rigorous standards to safeguard data integrity, normalising global data sources to ensure consistency and confidence in the market.

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