In summary, and very simplistically, we can compare crypto-assets either to (i) a digital coin from a parallel monetary system (cryptocurrencies), (ii) a token with a particular form enabling access to a usage right, like starting a car wash (token) or (iii) a financial right (dividends).

Within these categories, crypto-assets take on multiple realities through the combination of different settings. According to Richard Olsen, the founder of the exchange platform Lykke, "There won't be millions of tokens. There will be millions of kinds of tokens"[2].
In this context, a single classification and analysis framework seems essential from a regulatory, strategic and financial perspective. We propose an interpretive framework aiming to capture all projects and covering the following criteria: usage, origin, offer, existence of the crypto-asset, technology, associated rights, and degree of centralisation.

A. USAGE

Here, we classify crypto-assets by their objectives:

- Financial usage: the token represents a financial asset (security tokens).
- Utilitarian usage: the token provides access to a specific service or product (utility).
- Monetary usage: the token in itself is the usage/purpose of the network (store of value and transactions).
- Hybrid usage between monetary usage and the development platform (generally associated with Chain Producers).

B. ORIGIN

Here, we classify the players who have the right to issue the crypto-asset within the ecosystem:

- Unique issuer: this is the case for the vast majority of utility tokens. The tokens are created one time by the business and then put on sale during the ICO phase.
- Groups of issuers: this could be a committee of issuing nodes, in the case of a permissioned blockchain, for example.
- Decentralised issue: anybody in the network participates in the monetary creation process. This is the case for Bitcoin notably with the mining process, where the miner is remunerated for his or her 'work'.

C. TYPE OF OFFER

The crypto-asset offer corresponds to the number of units to be created by the authorised participants. We distinguish between the following:

- Fixed offer: the case in the majority of ICOs, the total supply is written in the White Paper and auditable in the blockchain.
- Continuous but limited offer: this is the case with Bitcoin. We know the total number of bitcoins (21 million), but the monetary creation process is progressive through mining.
- Unlimited offer: this would be the case for the tokenisation of a consumer product. For example, if a concert hall issued tokens representing concert tickets, they could be issued without limit.

[2] *Extract from The token handbook, David Siegel, https://hackernoon.com/the-t oken-handbook-a80244a6aacb*

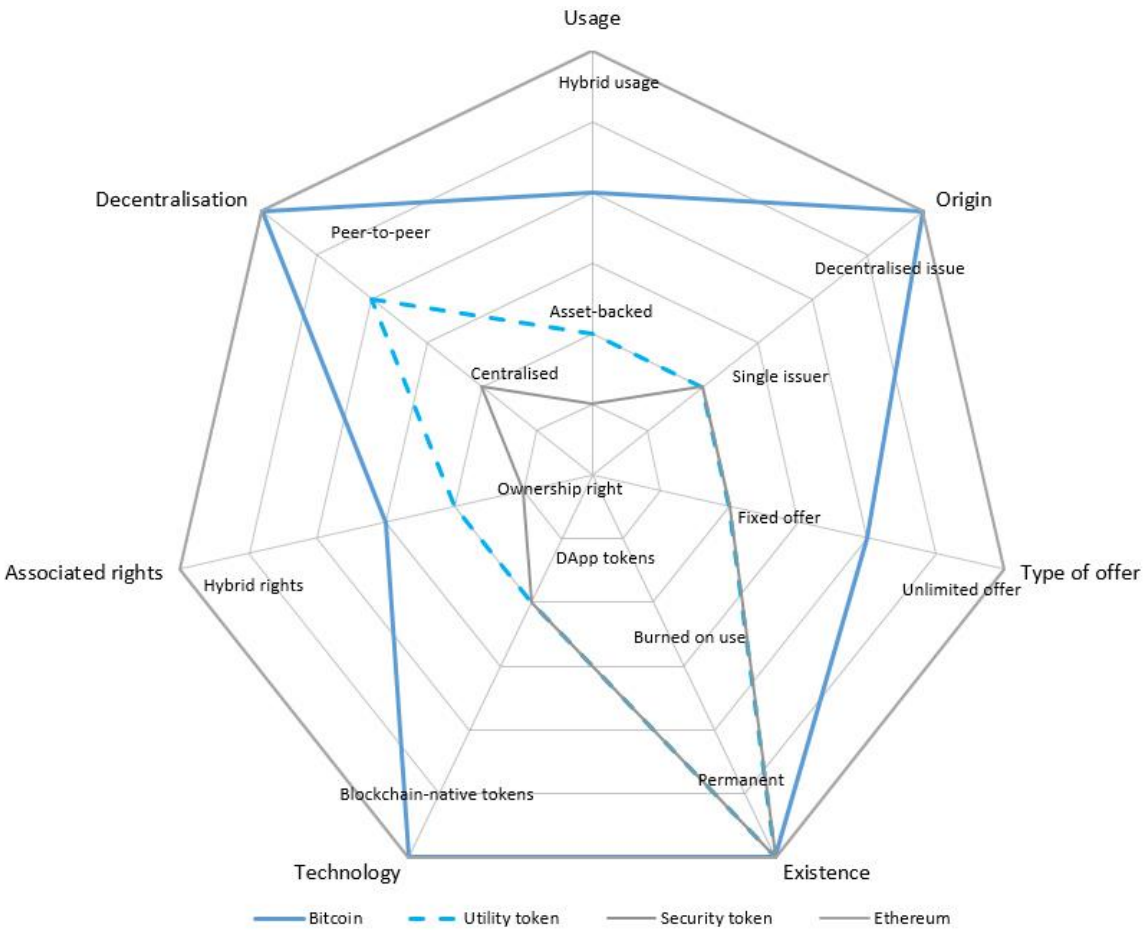
G. DECENTRALISATION OF THE MODEL

Blockchain technology is often associated with the concept of decentralisation, loyal to the philosophy of its pioneers and the promise of technological horizontality. In reality, interactions between different players and the economic transformation in progress is much more complex than a simple shift from centralisation to decentralisation. The degrees of centralisation therefore vary widely, including in the initiatives from the so-called “new economy”. We distinguish between the following types of projects:

- Centralised: to use the service of a business, the consumer pays with a token. In this way, it functions similarly to a traditional business, except that it collects its revenues in tokens and not in traditional currency.
- Semi-centralised: the use is submitted to certain network nodes; this is particularly the case for permissioned blockchains.
- Decentralised: once the crypto-asset is issued, it circulates freely from peer to peer, without the intervention of any central body.

By integrating these parameters on a scale of 0 to 3, we obtain the diagram below, which allows us to compare the crypto-assets themselves. Such an analysis enables an entrepreneur to make ‘token economy’ financial decisions in line with his or her strategic objectives; it allows investors to characterise their investments; and it is important for rationalising the value and price of these new different assets. We have included below the four types of crypto-assets identified previously: Bitcoin, representing pure cryptocurrencies; Ethereum, representing Chain Producers; a standard utility token; and a security token.

Classification framework for crypto-assets



2. ATTEMPTING TO RATIONALISE PRICE INDICES AND VALUE

In this context, we aim to bring rational reasoning to crypto-assets, classify them, compare them with traditional assets and question their valuation methods – which are certainly imperfect at this stage – enabling us to rationalise existing price indices.

In his article and book[4], Chris Burniske builds on the work of Robert J. Greer's *What is an asset class, anyway?* and identifies three asset categories: cash-generating assets (based on discounting future cash flows to present value, such as shares, debt and property); consumable and transformable assets (commodities, precious metals); and "store of value" assets, which are not consumable and do not generate cash flows (precious metals, currencies, works of art).

Following the same logic, Damodaran[5] distinguishes between:

a. Currencies: they constitute a medium of exchange, store of value and work as a unit of account. They are used to exchange assets, denominate cash flows from these assets and can constitute stores of value for investors deciding not to invest. As they have no cash flows, they cannot be valued, but they can be priced against each other. If market movements and monetary policy can influence their prices in the short term, those with greater acceptance as a medium of exchange and with greater purchasing power should see their prices rise relative to others in the long term.

b. Cash-generating assets (shares, debt, property, options): they give the right to future cash flows and can be valued on this basis, whether these rights are established contractually or contingently on certain factors (options). Cash-generating assets can be valued classically by discounting the future cash flows to present value. They can also be valued relative to each other by using a common metric (e.g. Price Earnings Ratio, Enterprise value/EBITDA, Price to Book, etc. in relation to shares). A business can be considered as an asset and can therefore be valued by discounting its future cash flows to present value. The value of the shares is then determined by subtracting the value of the debt.

c. Commodities (wheat, precious metals, etc.): they essentially constitute industrial resources and derive their value from a fundamental need (energy, food, etc.). They can theoretically be valued by looking into modelled supply and demand. According to Damodaran, they are generally priced, throughout their cycles, relative to their own historical price or those of other commodities.

d. Collectibles: the art and emotion market. Their value is guided by aesthetics and emotion, the degree of desirability and rarity. Works are therefore priced generally and deliver no cash flows.

[4] *Cryptoassets: The Innovation Investor's Guide to Bitcoin and Beyond, Chris Burniske and Jack Tatar*
[5] *The Bitcoin Boom: Asset, Currency, Commodity and Collectible, Aswath Damodaran, 24/10/2017. http://aswathdamodaran.blogspot.fr/2017/10/the-bitcoin-boom-asset-currency.html*

2.1. CAN CRYPTO-ASSETS FALL INTO THESE CATEGORIES?

2.1.1. AT FIRST GLANCE, CATEGORISING THEM IS NOT OBVIOUS.

According to Melamed (chairman emeritus of the Chicago Stock Exchange), Bitcoin will become an entirely separate class of asset, which will be regulated according to its own rules similarly to gold or shares[6].

In his blog article dated 24 October 2017, Damodaran explains on the contrary that Bitcoin does not constitute a new class of asset that will call into question the fundamentals of risk, investment and management[7]. The professor of finance classifies Bitcoin as a currency – albeit imperfect – and not as an asset, concluding that it cannot therefore be 'valued' but only 'priced'. In this context, investing in Bitcoin would make sense, and any rational agent would be limited to trading operations.

Though Bitcoin can theoretically fulfil the economic definition of a currency (albeit an imperfect one), it does not have legal tender status and therefore is not considered a currency from a regulatory standpoint. It was also treated as a commodity by a US federal judge, therefore allowing its regulation by the US Commodity Futures Trading Commission (CFTC) listing futures contracts[8].

From a statistical perspective, do crypto-assets correlate (separately or uniformly) with traditional assets? We have searched for correlations between the principal crypto-assets (Bitcoin: BTC; Litecoin: LTC; Ripple: XRP; and Ether: ETH) and traditional assets (market indices such as Eurostoxx or the CAC 40, Brent, gold, euro, dollar, level of interest rates, etc.)[9]. The results demonstrate an absence of correlation between crypto-assets and 'classic' variables: Bitcoin, for example, appears to develop without any link to gold, oil, the dollar or Eurostoxx. However, we note a very strong correlation between the different crypto-assets themselves, even those with different natures: Bitcoin, Litecoin, Ether and Ripple correlate highly with each other. This statistical homogeneity between them and the absence of correlation between this group and the other assets leads to two conclusions: (i) these assets can be considered as a separate asset class and (ii) the absence of correlation is an important factor in constituting the 'store of value' aspect of these new media because this absence of correlation with the other variables would protect an investment from variations in the global economy. However, if Bitcoin or Ether came to be used more widely, could we not reasonably assume that their correlation with the indices of global economic parameters would increase? We can also note different correlations between the crypto-assets themselves: Bitcoin (BTC) appears to correlate more closely with Litecoin (LTC) in particular, rather than with Ether (ETH) or Ripple (XRP).

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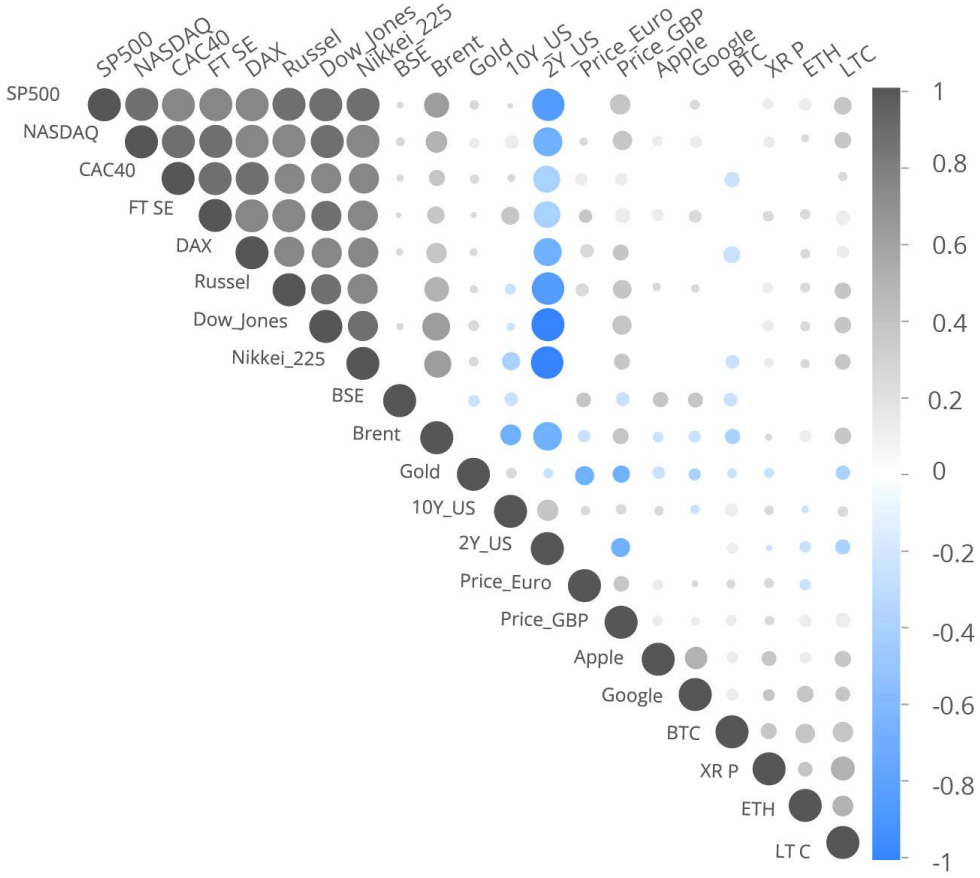
[6] Interview: Bitcoin a new asset class, not a crypto-currency – CME's Melamed, Tomo Uetake & Hideyuki Sano, 7/11/2017. https://www.reuters.com/article/cme-group-bitcoin/interview-bitcoin-a-new-asset-class-not-a-crypto-currency-cmes-melamed-idINKBN1D7159

[7] The Bitcoin Boom: Asset, Currency, Commodity and Collectible, Aswath Damodaran, 24/10/2017. http://aswathdamodaran.blogspot.fr/2017/10/the-bitcoin-boom-asset-currency.html

[8] Cryptocurrencies like Bitcoin are commodities, Federal Judge says. Here's why that matters, David Mayer, 07/03/2018. http://fortune.com/2018/03/07/bitcoin-cftc-commodities-coin-drop-markets/

[9] Analyses of correlations on daily yields over 2017 realised on R Studio. Financial data was extracted from Bloomberg for traditional assets and Kaggle for crypto-assets.

Summary of correlation analysis realised[10]



2.1.2. ATTEMPT AT CLASSIFICATION

Let's go back to the distinction made previously between cryptocurrencies and tokens.

2.1.2.1. CRYPTOCURRENCIES

When considering Bitcoin, we know the following.

a. It has monetary characteristics: store of value, transactions and unit of account. As we have seen, cryptocurrencies can claim, under certain hypotheses of the Austrian school of thought, the designation of an imperfect currency. All crypto-assets, or almost all of them, have parities in Bitcoin or in Ether, and the performance of various tokens is always shown by reference to the dollar, Bitcoin and Ether. These could indeed constitute a sort of reference metric. From a more subjective standpoint, it is interesting to note the perception of the crypto-asset as a unit of account built by the members of this blockchain community. For them, a Bitcoin represents the medium of exchange of reference, and its parity in dollars seems to be of secondary importance. By way of example, we have found a number of projects that remunerate their stakeholders with a fixed amount of Bitcoin, irrespective of the development of its price index.

b. It has the characteristics of a commodity due to its rarity programmed by the code which cannot be challenged.

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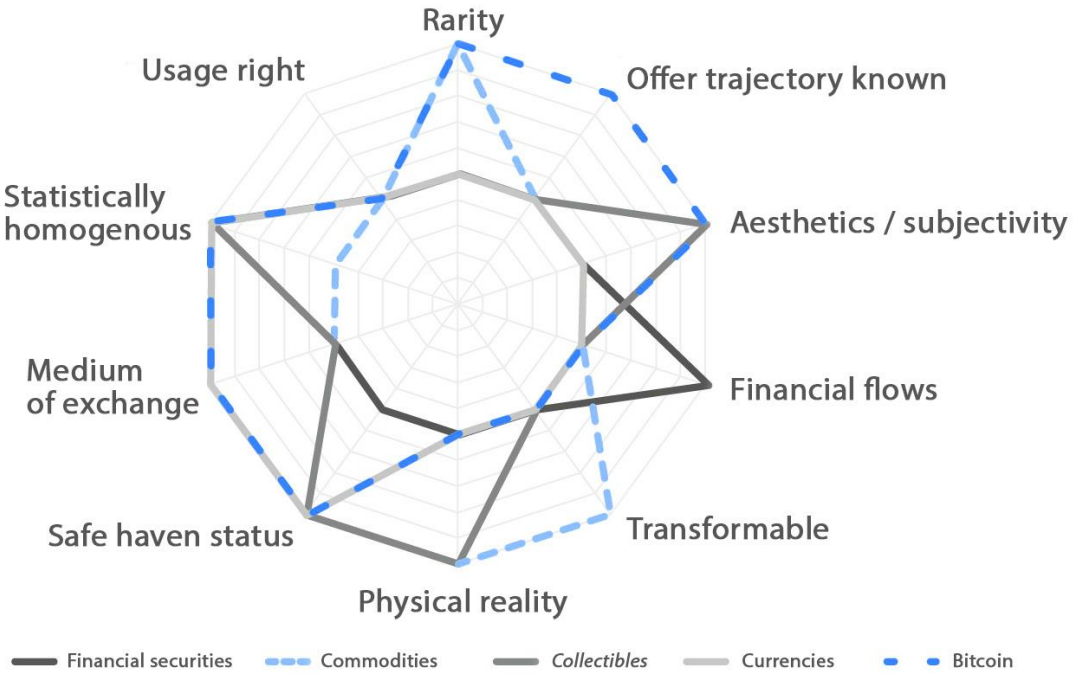
[10] Daily yield correlations matrix: The coloured boxes represent a strong correlation (positive, i.e. developing in the same sense, or negative, i.e. developing in the opposite sense). An uncoloured box represents assets which do not correlate with each other. By way of illustration, Bitcoin is not correlated with any asset from the traditional financial world.

c. This rarity is particular because, as Chris Burniske demonstrates, the trajectory of the Bitcoin offer, both logarithmic and predetermined by the code, differs drastically from that of the traditional money offer (the evolution of the creation of money in dollars is highly erratic and barely seems to consider the 'rarity' criterion anymore).

d. It can also show, to a certain extent, common traits with collectibles. But crypto-assets, and Bitcoin in particular, exhibit a highly subjective aspect that goes beyond fashionable or collectible considerations because of its strong philosophical and political aspects. This phenomenon makes Bitcoin a sort of subjective totem, an idea particularly present in the Bitcoin community and among Bitcoin gurus (individuals who swear only by Bitcoin).

Ultimately, Bitcoin seems to be financially closer to a currency but with individual characteristics found in other classes of assets, thus distinguishing it from traditional currencies.
This can be generalised to the entirety of pure cryptocurrencies but not to the cryptocurrencies of Chain Producers (e.g. Ether), which combine a monetary function and a usage.

Situational analysis of asset classes and differentiating characteristics



2.1.2.2. CHAIN USER TOKENS

We have not dealt with security tokens as, from a financial perspective, they almost perfectly resemble shares.
Utility tokens present a very similar profile to financial assets, with the exception of the trajectory offer, which is known in advance and programmed. The characteristics of the financial flow are also different as, in the case of a utility token, it relates to the future monetisation of a given usage.

Situational analysis of asset classes and differentiating characteristics