The abundance of blockchain projects as well as the huge enthusiasm observed for the technology have translated into massive movements of capital towards a new and parallel financial space around crypto-assets. ICOs (Initial Coin Offerings) are perhaps the most common example of this.

In this article, our objective is to outline this new market by defining and categorising crypto-assets from a financial perspective. This categorisation requires an understanding of the link between the various technologies at play and the purposes of their corresponding tokens. We also address the issue of rationalising price indices using a preliminary fundamental approach. This exercise is made difficult by the young age of the technology, the absence of a defined and stable framework and the highly specific characteristics of these new assets. These characteristics make it more complicated to apply current financial theories associated with classes of assets that we know; nevertheless, by taking multiple restrictive hypotheses, we present the stakes in a simplified way.
1. FINANCIAL OUTLINES OF A NEW WORLD

We often talk about tokens, cryptocurrencies and crypto-assets without distinguishing between them in order to avoid repetitions of style, insofar as these terms, broadly speaking, refer to the same object. But how should we define them? How do they differ from each other economically and financially speaking?

We choose here to use the term crypto-asset in a general and inclusive way to cover the entirety of these new items. Indeed, these items are in no way homogeneous. If the term cryptocurrency applied to Bitcoin is already controversial both economically and politically speaking, it seems even more inappropriate in the context of utility tokens, which generally correspond to a specific usage right (similarly to a laundrette token) rather than a monetary definition.

From a general perspective, a crypto-asset can be defined as the right of entry and exclusive unit of account in a created ecosystem (one crypto-asset per project).

Our analysis focusses on cryptocurrency creators, Chain Producers and Chain Users. All of these projects have crypto-assets associated with them, and their characteristics differ widely. We exclude from this part the service provider and private and permissioned blockchain projects as, in the majority of cases, they are not associated with a crypto-asset 1.

a. Cryptocurrency creators focus almost entirely on currency (transactional value and store of value) and rely on cryptocurrencies (Bitcoin, Dash, Litecoin, etc.).

b. Chain Producers are also blockchains with an associated cryptocurrency (e.g. Ethereum). Additionally, they build infrastructure, enabling users (Chain Users) to develop applications with associated tokens. The transactions in these applications are then processed and traced via the blockchain put in place by the Chain Producer. The crypto-assets associated with these players are therefore hybrid, as they are both monetary and utilitarian (development of applications).

c. Chain Users correspond to applications built on existing blockchains (e.g. a decentralised meeting application based on the Ethereum blockchain). From a financial perspective, it is worth acknowledging utility tokens, which represent the majority of tokens. The associated projects offer a service or a use which is only accessible via the token. The token’s initial purpose is not to constitute a currency per se (store of value or general medium of exchange) but to constitute a means of aligning interests within a network and/or to constitute the only medium allowing access to the proposed service. Security tokens themselves function very similarly to shares and do not change anything about classic financial mechanisms. The general objective of this type of mechanism is to associate an asset with a token, thereby introducing the asset into a blockchain via that very token. This operation therefore enables the asset to benefit from all the advantages of the technology (traceability, security, etc.), and we often talk about the tokenisation of assets, as a result.

1 There are exceptions, e.g. the Binance platform possesses a token, as does the permissioned blockchain Ripple.
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.

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\(^2\) Extract from The token handbook, David Siegel, [https://hackernoon.com/the-token-handbook-a80244a6a0c8](https://hackernoon.com/the-token-handbook-a80244a6a0c8)
D. EXISTENCE

The notion of existence covers the duration of an asset and can be broken down along the following axes:
- Single use: the crypto-asset, once used, is destroyed (burned in blockchain jargon). This could be the case for a digital asset representing a ticket for a show, for example.
- Multi-use: the asset is burned after a certain number of uses. We classify projects that expect to destroy their assets gradually in this category (e.g. 25% of values used are destroyed on the first use, 10% on the second …).
- Permanent: the crypto-asset, once issued, will not disappear. This is the case for the principal cryptocurrencies. We note, however, that certain experts consider that bitcoins “disappear” when their owners lose their private keys and therefore access to their cryptocurrencies.

E. TECHNOLOGY

We are not going to describe the technical capacity of the project here, nor the underlying blockchain, but instead understand the technical ‘layer’ in which the crypto-asset is installed. We distinguish between the following:
- DApps token: this is a crypto-asset enabling access to an application. It corresponds to the vast majority of Chain Users and security tokens. It is installed in the application layer lying on a blockchain’s infrastructure.
- Non-native protocol token: this type of token is implemented within an economic protocol, itself lying on blockchain infrastructure. This token is an integral component of the economic protocol and enables it to function. We have classified these projects within the Chain User category.
- Native token: this type of token is installed at the level of the blockchain protocol itself; they are critical to the blockchain’s functioning and form part of the consensus mechanism. This category mostly refers to pure cryptocurrencies and Chain Producers.

F. ASSOCIATED RIGHTS

The rights associated with a token differ in terms of their use. We distinguish between the following:
- Vote/Property: these rights are often associated with security-type tokens.
- Usage: this right is linked to the use of a service or the network.
- Work: this right represents the ability to contribute to the network. A participant must possess this asset to contribute to the network, which then remunerates its participants in crypto-assets. The simplest example of this is the use of Proof of Stake. This validation mechanism works on the same principle as escrow accounts: a user wishing to participate in the network places an amount of cryptocurrency in an escrow account that he or she will not be able to use but will serve to calculate his or her weight in the validation algorithm.
- Hybrid: multiple rights are associated with the crypto-asset. We refer, for example, to Dash, whose validation mechanism requires Dashes. Dashes are also the principal use of the network and give the right to use it. Similarly, Cardano and Ethereum, formerly under Casper⁢, fall into this category.

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⁢Casper is the name of the update to Ethereum’s validation mechanism. The mechanism will no longer need processing power (Proof of Work) but will only need ethers (Proof of Stake).
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 book⁴, 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, Damodaran⁵ 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
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 shares⁶.

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 management⁷. 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 contracts⁸.

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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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.
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