Token-Based Business Models

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Abstract Crypto assets can be classified into two main categories, according to their principal function: native coins and crypto tokens. Native coins, like Bitcoin, generally compete with the traditional forms of money providing both an alternative currency instrument and a payment infrastructure. Differently from native coins, crypto tokens are coins that embed some intrinsic values somehow linked to the quality of the issuing entity's business model and to the ecosystem it generates. This chapter explores the emergent start-up token funding model of Initial Coin Offering, which allows entrepreneurs to bypass the traditional capital market by issuing crypto tokens directly to investors. The positive feedback loop between an issuer's business model and the token funding model will be demystified.

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9.1   Introduction

Money is a social invention (Samuelson 1958; Menger 1892). A cryptocurrency is "a digital currency in which encryption techniques are used to regulate the generation of units of currency and verify the transfer of funds, operating independently of a central bank" (Oxford Dictionary). Nowadays, there exist several cryptocurrencies, more than one thousand, and in the years to come tens of thousands cryptocurrencies are expected to populate our economy in a sort of currency competition à la Hayek.

Most of these cryptocurrencies have a public common underlying ledger termed blockchain (see Chapter 10), where tamper-proof blocks of transactions are linked through an "append-only" logic following a predefined set of rules. The structure has been engineered in order to allow users to trust the process, not the counterparty. Thus, users can exchange valuable information or monetary value even without knowing each other, their geographical position, their affiliation or nationality and especially their reliability. For the sake of simplicity, we refer to blockchain as the larger family of distributed ledger technologies, which encompass also non-block-based ledgers (e.g., Ripple or IOTA).

Cryptocurrencies represent the latest step of technology evolution in terms of currencies: a long process that has unfolded through millenniums of trading from barter to the dematerialisation of banknotes that is bringing us to digital fiat. The recent development of peer-to-peer (P2P) networks, the Internet capacity transmission, computing processing, storage capacity and cryptography security, have fostered a technological and logical leap from the previous currency standards.

We refer to cryptocurrencies or crypto assets as the omni comprehensive family of digital tokens, which can be separated into *native coins* and *crypto tokens*. Native coins, like Bitcoin, represent a new asset class of electronic money universally accessible via peer-to-peer payment networks. Instead, crypto tokens are forms of "digital vouchers" that allow the token holders to get access to almost any type of service and assets: from monetary rewards, or commodities to loyalty points to even other cryptocurrencies. A token can either be fungible or non-fungible. Probably, at the moment, the most famous example of non-fungible tokens that hit the headlines are CryptoKitties. Each CryptoKitty is represented in the form of a non-fungible ERC-721 token, which allows for each entity to have specific attributes ("phenotype") determined by its immutable genes ("genotype") stored in the Ethereum smart contract.

The creation of new tokens is generally a less complex process than creating native coins as it does not require to modify the codes from a particular protocol or create a new blockchain from scratch. Moreover, the recent implementation of blockchain middleware and app development tools, Turing-complete codes for smart contracts on the blockchain allow crypto tokens to be easily created, published, shared and exchanged.

This chapter will not provide a taxonomy of cryptocurrencies but it will rather focus on crypto tokens as alternative funding instruments of new token-based business models. For a taxonomy of cryptocurrencies, we refer the readers to Bech and Garratt (2017).

9.2   Native Digital Assets

Native tokens are digital fungible assets created within a novel or "forked" off a pre-existing blockchain. A native token "a" exists and operates on the blockchain network "A" which allows peer-to-peer (sometimes, anonymous or pseudo-anonymous) transactions of "a" between different network participants. However, the reader should be aware that a native token needs a blockchain but a blockchain can function even without a token (Tasca and Tessone 2018).

In order to present the main features of native coins, we take the configuration proposed by Tasca (2016) who highlights a dual nature of Bitcoin: as a currency and as a payment network. In its first nature, Bitcoin operates as a currency. According to economic theory, a currency has three main features: it is a medium of exchange, a unit of account and a store of value. These frameworks can be extended beyond Bitcoin to analyse the characteristics of any other native coin.

Whether native coins could be considered currencies or not is an ongoing debate. As a matter of fact, the European Central Bank (ECB) and other financial market authorities do not confirm this view. For this reason, these institutions do prefer to use the term "digital tokens" instead of "cryptocurrencies" when referring to native coins. This thesis is supported by the fact that digital assets do not ensue a legal tender (Tasca 2015). Within a given jurisdiction, a legal tender is mandatory accepted, accepted at full-time value and it has the power to release debtors from paying their obligation. However, some jurisdictions have already begun the process towards legalisation of cryptocurrencies. For instance, in Japan the Financial Services Agency is working towards

the full regularisation of cryptocurrencies as a legal means of payment (Terazono 2017). Switzerland is also very advanced in this respect (FINMA 2018).

Despite the fact that native coins are not always perfectly designed and implemented, it is undoubted that they bring some features typical of money. Back to Bitcoin again, we can say that it acts as a means of exchange and allows counterparties to avoid the "coincidence of the wants"[1]: the number of daily transactions has grown over time from around 1000 in 2011 to around 200,000 in 2018. At the same time, Bitcoin is a unit of account since it is divisible (the smallest possible unit is called Satoshi: 1 satoshi = 0.00000001 Bitcoins), fungible and countable. At the same time, Bitcoin's deflationary property prevents it from being considered as a good store of value. The number of Bitcoins issued over time is destined to decrease geometrically with 50% reduction every 4 years (Tasca 2015). That being said, from a pure monetary viewpoint, native coins do not generally fulfil the properties of money (Tasca 2016).

A novelty of native coins with respect to more traditional forms of money is that they come together with a network infrastructure that enables a disintermediated peer-to-peer exchange of coins. They combine together the characteristic of money with those of the payment systems. To better understand this aspect, the framework proposed by Bradford and Keeton (2012) can be taken into consideration. It identifies four main relevant features of a payment network: speed, payer control, security and universality. As a matter of fact, a Bitcoin transaction takes 1 + hours to be settled in the ledger. However, other coins are much faster. Ripple, for example, takes 4 seconds per transaction to be registered (Morgan 2018). With respect to payer control feature, there is no limit as cryptocurrencies can easily and quickly be transferred without any working hours constraints from wallet app or other operators. From a security perspective, transfers in cryptocurrency networks happen

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[1] Coincidence of wants (also known as "double coincidence of wants") occurs when the supplier of good A is a demander of good B and vice versa. Without a medium of exchange, trades would be limited to this situation only (Jevons 1876; Ostroy and Starr 1990).

between hashed addresses so the risk of unauthorised transactions is very low (Antonopoulos 2014). However, wrong transactions cannot be cancelled but only adjusted with other transactions of opposite sign. Finally, from the perspective of universality, although cryptocurrencies count on a smaller network when compared with more traditional payment systems, we need to highlight the constantly growing trend of users that opt for cryptocurrency payment systems. It has been roughly estimated that, as of March of 2017, the number of active users of Bitcoin wallets was in the range of 2.9 million and 5.8 million (Hileman and Rauchs 2017). However, since then, proportional to the market valuation and price of Bitcoin, the cryptocurrency's user base has grown at a rapid rate. Coinbase alone, the global market's largest bitcoin brokerage and wallet platform, serves more than 13 million active users.

That being said, one should also consider that cryptocurrency payment networks are stand-alone systems: each native coin functions within its unique payment network without any possibility to interact with other networks. For this reason, the interoperability between different blockchain systems remains one of the major future challenges to be addressed (Bridgwater 2018). In this respect, it is worth mentioning that some new technological solutions have been proposed to overcome this problem, see, for example, Sidechains (Back et al. 2014) and Quant Overledger (Verdian et al. 2018).

9.3   Crypto Tokens

Since 2008, when an inventor (or group of inventors) under the pseudonym of Satoshi Nakamoto introduced Bitcoin (Nakamoto 2008), many other cryptocurrencies have been introduced by leveraging on the original Nakamoto's protocol or by elaborating new ones. The recent technological improvements have enhanced the number of applications of blockchain through smart contracts to automatically move digital assets according to arbitrary pre-specified rules (Buterin 2014). Specifically, crypto tokens give the opportunity to create businesses and automate them while maintaining the record of the different states of data exchanged in the blockchain. Token Market provides a quite exhaustive list of the tokens available in the market.

A commonly accepted taxonomy—adopted by many institutions including the Swiss Financial Market Supervisory Authority (FINMA 2018)—dentifies three main token classes:

- Payment tokens: these are synonymous with cryptocurrencies, intended as a means of payment for acquiring goods or services or as a means of money or value transfer;
- Utility tokens: these are intended to be the only way to provide digital access to applications and/or services (generally) built on the top of blockchain-based infrastructures.
- Asset/Debt tokens: they have a similar role as a share (Tasca et al. 2018), and for the investor they represent assets such as a debt or equity security owned.

There is then a fourth type of tokens (i.e., Hybrid) which are characterised by a mixture of the previous three features.

This classification does not implement a rigid distinction between native coins and tokens but it classifies important tokens, which will be specified later in the chapter.

Tokens play a vital role in the crowdfunding process of platform-based businesses and have been recently adopted by startups seeking to bypass the complicated and costly auditing and regulatory burden surrounding traditional funding models via banks or venture capitalists. Tokens represent then a means to raise funds from both platform users and sophisticated investors (Tasca et al. 2018). Much simpler than an Initial Public Offering (IPO), the Initial Coin Offering (ICO) process is composed of three distinctive phases:

1. The white paper announcement: the initial report or proposal where the company presents to potential investors and supporters of the business and other important features.
2. The release of tokens: often issued via smart contract whose code is public. Usually, the token generation is composed by two subphases: pre-allocation, granting a discount on the purchase of tokens and allocation, at full price.
3. Token listing: Complete the ICO, tokens are listed in one or more exchanges.

9.4   TOKEN-BASED BUSINESS MODELS

Having an idea is useless if one does not have enough capital to translate it into a reality. That is why capital raising is a vital process for any entrepreneurial endeavour, which allows the entrepreneurs to get the business off the ground or help them in the daily operations or business development.

With regards to capital raising, the last number of years have witnessed an exponential adoption of alternative token-based funding models. The lack of regulation and the relatively easy process of token creation engender the perfect conditions for a new funding trend: companies, especially start-ups, instead of raising funds through the traditional channels (equity issuing or taking out a loan) have been selling tokens in the market to the public and bootstrapping their own project based on the proceedings collected with the token allocations. There has been a massive adoption of this solution resulting in the proliferation of token-based business models. At the moment of writing we count about 800 tokens, which means an equivalent number of token-based business projects worldwide. Just to name a few, Nexo (www.nexo.io) is a token-based business that offers the opportunity to provide crypto-backed loans. Another example is Augur (www.augur.net) which is a decentralised oracle and prediction market. Coinlion (coinlion.com) distributes tokens to those who share information related to the portfolio management and trading of cryptocurrencies.

Apart from a few notable projects, the quality of token-based business models, whose number has skyrocketed in the last number of years, is generally very low (Tasca and Widmann 2017). Moreover, scams and frauds occur regularly. According to a recent study, 25% of the projects default in about 50 days after their token being listed in public trading markets (Tasca et al. 2018). As reported by Fortune, nearly half of ICOs started in 2017 failed by February 2018 (Morris 2018).

In order to protect investors and limit these frauds and excessive risks, regulators have started to develop the first regulatory frameworks and to promulgate the first official laws (Clayton 2017). On the other hand, a positive aspect of the token-based funding models is that investors are not locked-in for months or years as in the traditional VC market. Instead, tokens are tradable in the secondary market generally after a few weeks from the date of the ICO.

9.5   DRIVING FORCES BEHIND THE TOKEN-BASED BUSINESS MODELS

In the previous section, we have seen that new business models are designed and built around the concept, the meaning and the utility of "brand coins", which represent alternative funding instruments for the platform economy (Hayes and Tasca 2016). This is a remarkable novelty that stems from four major trends: (1) platform business models, (2) peer-to-peer networks, (3) open-innovation, and (4) crowdfunding.

Platform business models: These are "intermediaries that connect two or more distinct groups of users and enable their direct interaction" (Zhu and Furr 2016, p. 4). More recently, these platforms deal in not only market-mediated digitally-encoded information such as software, music and banking services, but also goods and services more generally. While, the first-generation platforms were online or digital only, the second generation of platforms has emerged operating "online to offline" (O2O) throughout the economy. Uber, Airbnb and Caviar are just a few examples of the myriad of O2O platforms operating across different sectors.

Three elements are recognised to make a platform business model successful (Boncheck and Choudary 2013):

- The *Toolbox*. It creates a connection by making it easy for others to plug into the platform;
- The *Magnet*. It creates a pull that attracts participants to the platform. For transaction platforms, both producers and consumers must be present to achieve critical mass;
- The *Matchmaker*. It facilitates the connections between producers and consumers or lenders and borrowers.

Most successful internet-based businesses recently developed, have adopted the platform business model because they use technology to connect people, organisations and resources in an interactive ecosystem in which value can be created and exchanged. In these cases, the companies scale up by building on their networks of users instead of accumulating inventories (Parker et al. 2016).

Peer-to-peer (P2P) networks: A peer-to-peer network is "group of computers, each of which acts as a node for sharing files within the group" (Technopedia). This form of network blossomed during the progressive

and constant increase in bandwidth Internet capacity registered during the 80s, 90s and 2000s (Oram 2001). P2P networks are built on disintermediation and share of content. Indeed, the robustness of the network itself is not provided by a single central entity or restricted group of peers anymore.

Open-innovation: This is important because it highlights organisations' need for a more enlightened role for R&D in a world of abundant information, better managing and accessing intellectual property, increasing future business (Chesbrough 2006).

Crowdfunding: Defined as an open call over the Internet for financial resources in the form of a monetary donation, sometimes in exchange for a future product, service or reward (Kleemann et al. 2008). The slow action by national and international regulators left a wide legislative space to new venture attracted by the opportunity to collect easily significant amount of funds from the retail market in non-traditional and not monitored ways. There are many facets of crowdfunding: (1) lending-based crowdfunding, which consists of loans which are repaid with interest, (2) equity-based crowdfunding in which investors receive shares of the startup company, (3) reward-based crowdfunding that involves rewarding funders with a product that has actual monetary value, often an early version of the product or service being funded, and (4) donation-based crowdfunding in which backers donate funds because they believe in the cause (Pelizzon et al. 2016). See Chapter 1 for further discussion of crowdfunding.

Token-based business benefits from those four drivers as they build on the principles of the platform models by providing a digital means of exchanging information and value. At the same time, they leverage the latest innovations in the blockchain space that enhance the potential of P2P decentralised networks. Moreover, in line with the open-innovation trend described above, blockchain software is generally based on an open-source license model. The open-source model allows everyone to audit and improve the source code of protocols and smart contracts. For example, Ethereum is licensed under GNU LGPLv3, Bitcoin Core is licensed under the MIT License and Hyperledger Fabric is licensed under Apache 2.0. At the same time, blockchain-based systems leverage a crowdsourced means of verifying transactions. In that sense, it is like Wikipedia, where community consensus governs what information is trusted to be accurate. This aspect of token-based business models refers

not so much to open source, but to open culture based on the participation of the crowd brought together to build, exchange and share.

9.6   Crypto Tokens to Enhance the Sharing Economy

There is no official definition of the Sharing Economy because it is a concept adapted to the context of reference. Some proxies enclose ideas of the Sharing Economy. Take for instance "access-based consumption" which represents a set of "transactions that can be market mediated but where no transfer of ownership takes place and differ from both ownership and sharing" (Eckhardt and Bardhi 2015). Also "collaborative consumption" is a proxy for Sharing Economy. In this respect, it can be defined as a "peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services" (Hamari et al. 2016, p. 2049).

Regardless of the different conceptual forms, it is inevitable that the Sharing Economy challenges the current economic institutional framework by shifting from a framework that protects people from each other, to a framework that helps people trust each other via the "trust machine" (*The Economist* 2015). This is achieved thanks to universally acceptable censorship-resistant ledgers that solve the double spend problem and allow anonymous users to achieve consensus on the states of the shared ledgers.

The blockchain platforms that empower the token-based business models have the potential to lead us towards a new economic paradigm: a shift from centralised to decentralised online marketplace solutions and from centralised two-sided platform business models—which market-mediate suppliers (lenders) and consumers (borrowers)—to P2P blockchain-based platforms on the top of open and decentralised networks where users are also producers/shareholders and where the value created is fairly and transparently redistributed.

We are already living in the so-called economy of Collaborative Commons characterised by the prevalence of sharing over ownership. This major structural and cultural change mainly applies to fungible products and services that can be easily standardised and automated, similar to the broad spectrum of services offered by traditional banks. But this is not necessarily the case. These platforms allow also for non-fungible assets and services to be exchanged. For example, Rent and

Runway is a platform that enables women to rent unique clothing and personal accessories online.

As this new economic paradigm is unfolding, now a hybrid economy is flourishing where some industries based on the Commons are starting to operate at near zero marginal cost, while other industries continue to cling to capitalist consumer markets. Companies like Uber and Airbnb will attempt to bridge the gap between the two economies and take advantage of both. Though, it is very likely that over the coming few years, new business models based on decentralised "dumb" platforms, such as Citi Arcade and LaZooz will continue to disrupt the Uber-like "smart" platform business models. Blockchain allows buyers and sellers or lenders and borrowers to do business directly with each other, without the intervention of a large commercial platform. In other words, as Ethereum founder Vitalik Buterin has put it: Blockchain does not make the taxi driver lose his job, the network technology makes Uber superfluous.

The introduction of token networks based on blockchain technology in such a dynamic environment could represent an additional stage towards a completely disintermediated sharing economy and distributed business models where the lines between users, producers and investors are blurred. Decentralied Collaborative Commons will expand across lateral networks, and as access will overcome ownership, competition will be superseded by cooperation, buyers (borrowers) and sellers (investors) will transition to *prosumers.*

Utility tokens will play an active role in this new system. A consumer who buys a utility token supports the network stability and liquidity. The more purchases and sales of services or goods happen in the network, the more effective the network will be. The use of utility tokens by new users increases the value of the tokens and consequently the investment value of the other users. More importantly, an investor using the utility token will increase the value of its investments while providing a better network for another user. Therefore, the distinction between stakeholders will fade: a customer will be an investor and vice versa. A business company based on utility tokens will potentially be favoured by a positive escalation effect where use of tokens will benefit users and platform originating a self-enforcement mechanism.

To conclude, we also want to emphasise that a token-based economy is not immune from hazards. Cascade-effects, scams and hoarding movements remain main risks to be addressed in order to smoothly evolve towards an authentic Sharing Economy.

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