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Initial Coin Offering: From blockchain technology to a new method of raising capital

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ABSTRACT

The thesis aims to analyse Initial Coin Offerings (ICOs) as a new method of fundraising as well as an alternative to Initial Public Offering (IPOs) and crowdfunding. After the introduction of the financial technology framework, the innovation of blockchain technology is discussed, defining its mechanisms and applications. Moreover, cryptocurrencies' role and features are illustrated, studying the reference market, the regulatory context and risks associated with them. The analysis of the regulatory framework involves an overview of international economic institutions' laws along with United States, China and European Union cases. A comparison between ICO, IPO and crowdfunding follows, providing their characteristics, required processes and possible similarities. The Initial Coin Offering is then analysed from its historical evolution, to type - tokens distinction, stages of launch or important cases reporting. The methodology involves the creation of ICO projects database for the research and investigations of variables with the largest impact in terms of fundraising achievement. Data are collected from main trading platforms as well as articles, books and publications related to the thesis' key issues (cryptocurrency, ICO, IPO, crowdfunding, white papers and blockchain finance system).

Keywords: *Cryptocurrency, ICO, IPO, Blockchain, Crowdfunding*

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INTRODUCTION

The Initial Coin Offer (ICO), called also Initial Token Offer (ITO) or tokens sales, is leading to a series of important innovations in the world of business ventures and it is representing in some respects a sort of digital Initial Public Offer (IPO), entirely managed with cryptocurrencies and based on the blockchain system. The main purpose of the thesis is therefore to analyse this phenomenon as an innovative method that allows both established companies and start-ups to collect capitals, overcoming the strict rules of the valuation processes that are traditionally followed by funds and banks or central institutions. At the same time, the disadvantages and risks associated with both cryptocurrencies and ICOs process are highlighted, describing their legislative framework in force too. This study highlights the emergence of a lack of regulation, technological problems related to cyber security and cyber-attacks, and information asymmetries between companies and potential investors. These are therefore some obstacles' examples that the Initial Token Offer has yet to overcome. With the aim of defining the existing market, the thesis exposes and observes the most successful and fraudulent cases occurred in recent years, underlining also the main sectors and countries involved.

The first chapter examines the factors that contributed the most to the Initial Coin Offerings' development, namely the introduction of Fintech and the emergence of blockchain technology. The Financial Technology is described, defining also its characteristics, the impact on the market and how it arose. An explanation of blockchain technology follows, namely a system associated especially with virtual currencies and with a wide range of applications, both public and private. After including the information related to its mechanisms and components, the main cryptocurrencies with the highest market capitalization, such as Bitcoin, Ethereum or Tether, are listed and compared. Finally, the chapter provides an overview of the players of blockchain's environment.

The second chapter further scrutinizes the existing regulatory framework. Moreover, it identifies key issues and risks associated with digital coins, such as their acceptability as a means of exchange and payment, their volatility or use for illicit purposes, namely money laundering, extortion or tax evasion. A description of the existing legislative positions taken by central international authorities follows (for instance, the European

Central Bank and the Federal Reserve), adding then the perspective of the individual countries that to date have contributed the most in terms of cryptocurrencies' legislation.

From the third chapter, readers enter into the "heart" of the paper, which reports the methods currently available that firms can implement in order to raise the necessary capital, which enable them to conduct or to start their business. Initial Coin Offering, Initial Public Offering and finally the Crowdfunding systems are described and compared. For each of them, the main characteristics, development processes as well as the major differences, advantages and disadvantages are illustrated, posing afterwards an open question about the best financing method outline.

The fourth chapter studies the offer of tokens (ITO) even more closely, allowing to chart the chronological path of its launch and development. Later it focuses on the definition of tokens, namely a cryptocurrencies' subset that represents digitally any asset (as in the case of equity tokens) or function (utility tokens), and subsequently on the rights and benefits that they assign to their owners. Afterwards, the offers' launch stages and the characteristics of the white papers, i. e. the documents containing the main information on the offer, are introduced. The chapter ends with a presentation of the legislative framework of the ICOs and a "final balance" of this instrument.

The last chapter begins with an analysis of the markets trends, introducing also the Security Token Offerings (STO) phenomenon, or rather an ICO's subset whose tokens represent financial instruments classifiable as traditional assets, i.e., shares, bonds etc., and that therefore may confer voting or profit participation rights. The analytical framework provided presents an analysis of the five largest tokens sales (such as EOS or Telegram) and the largest frauds planned and carried out with the same instrument (such as Pincoin and iFan). The survey is concluded with the collection and examination of a sample of 360 projects launched from January 2016 to September 2020, aiming to conduct an analysis of the main impact factors from a statistical point of view (for instance the percentage of observed projects that allow a direct access on their own white paper) as well as from an econometric one, by means of a probit regression that defines the influence of these variables with respect to the achievement, by the concerned company, of the minimum capital that is necessary in order to start the production of the chosen good or service.

CHAPTER 1. FINANCIAL TECHNOLOGY (FINTECH): THE GENERAL FRAMEWORK

OVERVIEW: *1.1 What is blockchain? Basic concepts – 1.2 Cryptocurrencies - 1.3 Classifying cryptocurrencies and the Crypto-Market - 1.4 The players of blockchain's environment.*

In these latest years, the financial sector has been transformed by the new technological processes, which have radically changed society as well. Strong impacts on companies, banks and their business models have occurred too. These changes and these new technologies introduced "FinTech" (contraction of Financial technology), i.e. digital innovations and technology-enabled business model innovations in the financial sector. Financial services and information technology became interlinked and evolved together, allowing, lately, the development and the establishment of the Blockchain technology system, including cryptocurrencies, "new digital advisory and trading systems, artificial intelligence and machine learning, peer-to-peer lending, equity crowdfunding and mobile payment systems"[1]. Furthermore, FinTech promises to cut industrial costs, to improve the quality of financial services and to create a more diverse financial landscape[2], allowing FinTech start-ups to disintermediate traditional financial firms with personalized services. According to PwC (in 2016), 83%[3] of financial institutions are risking various aspects of their business. Indeed, since fintech companies already have a significant impact on this industry, every financial firm needs to achieve the capability to leverage and or invest in fintech; otherwise, they will not be competitive enough.

How it emerged

Starting from early 1990s, financial markets worldwide were affected profoundly by the internet revolution. Technological advances driven by internet changed the face of the financial services industry, leading to the development of electronic finance (e-finance), i.e. all forms of financial services (banking, insurance, stock trading performed through

[1] PHILIPPON T., (2016). *The FinTech Opportunity* (Working Paper No. 22476), Working Paper Series. National Bureau of Economic Research. https://doi.org/10.3386/w22476.
[2] The Economist, (May 2015). *The fintech revolution*, available at https://www.economist.com/leaders/2015/05/09/the-fintech-revolution.
[3] PwC, (March 2016), Blurred lines: *How fintech is shaping Financial Services*, Global FinTech Report pwc.com/fintechreport, available at https://www.pwc.com/il/en/home/assets/pwc_fintech_global_report.pdf.

electronic means). With e-finance, in the 1990s business models emerged, including online and mobile banking and payments or online brokerage services. These changes have led to the downsizing and reduction of number in physical locations for banks and stores, as they pushed also the e-commerce's activities. Potential benefits of online activities (such as online banking) include lower operational costs, smoother communication within the organization and customers, real-time managerial information as well as shorter turnaround time. For online stock trading, operating costs are minimized by processing every stock transaction online, proving furthermore differentiated services with lower feasible transaction fees. In the mid-2000s, as an extension of e-finance, the growth of smartphone user base facilitated the growth of mobile finance, with mobile payment and banking, allowing customers to access bank account information and to make transactions as paying bills and remitting money directly by their mobile devices. FinTech innovation emerged then in 2008, as a combination of e-finance, internet technologies, artificial intelligence, big data analytics and social networking services. Therefore, a new way of thinking about problems and their solution is faced, as FinTech technology provides simplifications to financial services. It became an integral part of the economy through the digitalization of trade and data, generating autonomous transformation pushes and intervening in the value chain of the financial industry.

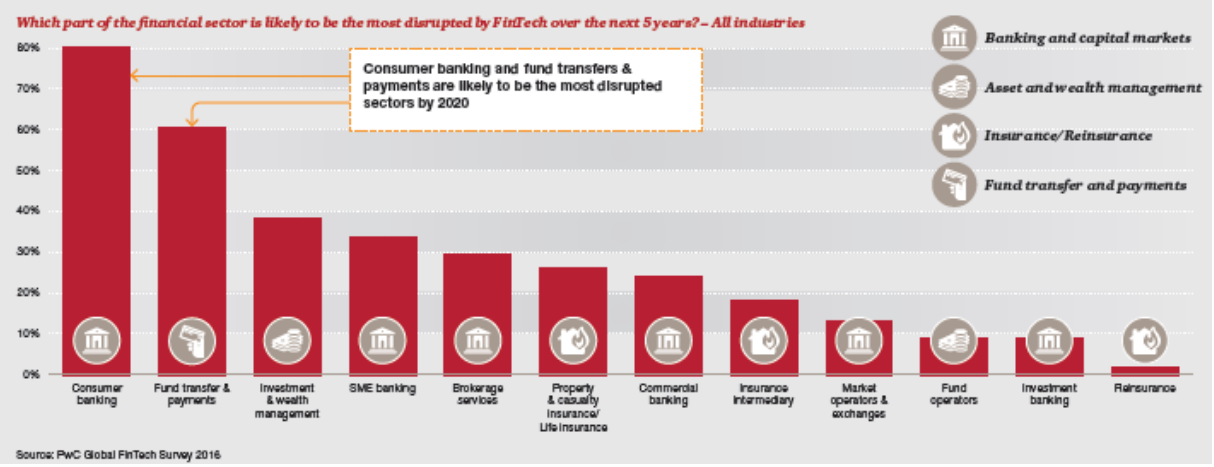


Figure 1: Financial sectors most exposed to Fintech's disruptive impulse by 2020

(Source: https://www.pwc.com/il/en/home/assets/pwc_fintech_global_report.pdf)

1.1 What is blockchain? Basic concepts

Before introducing the role of blockchain and how it actually works, it is necessary to define its basic components:

- Nodes: a node consists of a physical network device (although there are some specific cases where virtual nodes are required) that acts as a redistribution point or communication endpoint, in which a message can be created, received or transmitted. With a network of nodes, digital currencies are traded without intermediaries, regardless of physical distance[4];
- Transaction: a blockchain transaction is the operation generated by the exchanged values. Each transaction must be approved - in order to be validated - and then included in the chain;
- Block: it is a set of merged files (transactions) pertaining to the network and permanently recorded and subsequently stored as a page of a ledger or record book. Each completed block gives way to the next block in the blockchain and cannot be altered or removed;
- Ledger: it is a database that contains all verified transactions - in chronological order – consensually shared and synchronized across multiple sites, institutions or accessible by multiple people. The participant at each node of the network can access the recordings shared and own a copy;
- Hashing/Hash: a hash is a function (non-reversible, i.e. non-decryptable) that converts an input of letters and numbers (with a variable length) into an encrypted output (with a fixed length). It is created using algorithm and provide unique and secure identification for each block.

The definition and explanation of the mechanism, as well as these concepts, will be further explained in the following paragraph.

1.1.1 Defining blockchain and its mechanism

In contemporary society, trust was created through intermediaries. Third party entities were and are used because people and companies trust that they will store and protect assets and sensible data, while sending right amount when request it and to the right person. In this contest, blockchain has replaced the need for intermediaries, by

[4] For further details, *see also*: Binance Academy, (2017), *Cosa sono i Nodi?* (i.e.: *What are Nodes?*). Available at https://academy.binance.com/it/blockchain/what-are-nodes.

redirecting this trust to decentralised systems[5]. Central banks are good examples of such entities and that are therefore primarily affected by this technology, as it changed their business model from "being a charge per hour to a charge per item"[6], as a result of how blockchain itself works. Even if there is no universally agreed-upon definition, blockchain is a subset of so-called distributed ledger technology (DLT), which is a way of recording and sharing data across ledgers – i.e. multiple data stores – that "have the exact same data records and are collectively maintained and controlled by a distributed network of computer servers, which are called nodes"[7]. Furthermore, blockchain's mechanism employs an encryption[8] method known as cryptography, using sets of specific algorithms to create and then verify a continuously growing data structure. In this structure, data can only be added and there is no possibility of removal, leading it to the form of a chain of "transaction blocks"[9], which works as a DT, i.e. a distributed ledger.

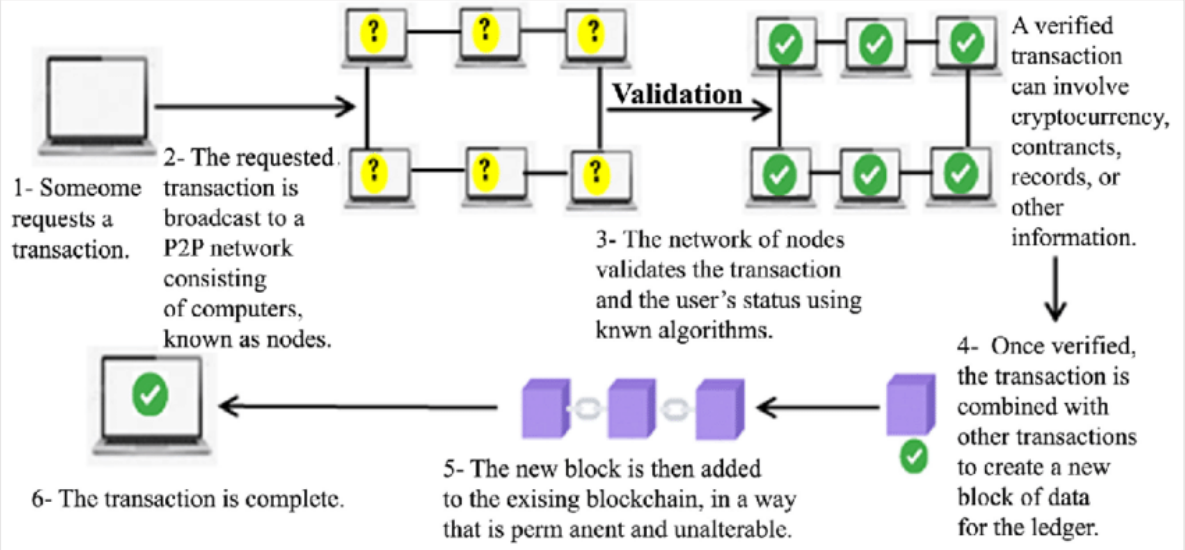


Figure 2: Blockchain mechanism *(Source: https://www.researchgate.net/publication/335176341_Blockchain_in_Smart_Cities_Exploring_Possibilities_in_Terms_of_Opportunities_and_Challenges)*

[5] MACRICINI D., CARTOFEANU C., GAO S., (October 2018), *Smart contract applications within blockchain technology: A systematic mapping study*. Örebro University, Örebro, Sweden.
[6] MACRICINI D., CARTOFEANU C., GAO S., (October 2018), *Smart contract applications within blockchain technology: A systematic mapping study*. Örebro University, Örebro, Sweden.
[7] HOUBEN R., SNYERS A., (July 2018), *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. European Parliament - Policy Department for Economic, Scientific and Quality of Life Policies.
[8] "**Encryption** is the process of converting data to an unrecognizable or "encrypted" form. It is commonly used to protect sensitive information so that only authorized parties can view it. This includes files and storage devices, as well as data transferred over wireless networks and the Internet." (CHRISTENSSON P., (November 2014), Encryption Definition. TechTerms, available at https://techterms.com/definition/encryption).
[9] HOUBEN R., SNYERS A., (July 2018), *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. European Parliament - Policy Department for Economic, Scientific and Quality of Life Policies.

The blockchain then is extended by each additional block, representing a complete ledger of the transaction history. As previously mentioned, a key element is the trust factor. In this structure, trust is monitored by cryptography. By using encryption every block of is securely wrapped in a protective layer and can be validated by the network. Additionally, each of them contains a "timestamp[10]; the hash value of the previous lock ("parent"); and a nonce[11], which is a random number for verifying the hash"[12]. With this process, the integrity of the entire blockchain is ensured and should effectively prevent frauds.

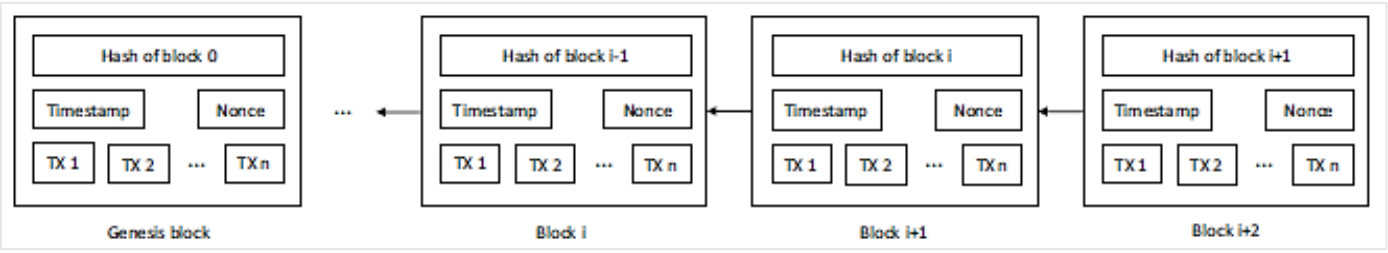


Figure 3: Example of a blockchain *(Source: https://doi.org/10.1007/s12599-017-0467-3)*

Overall, the identifiable key concepts that guarantee the system's functioning are the blocks and hashing, mining and proof of work and consensus.

Finally, by considering a practical point of view, blockchain is a "technology with many faces" [13], since it covers a wide array of systems, ranging from being fully open permissionless to permissioned to a "Consortium Blockchains" [14], which combines elements from both. The majority of the currently cryptocurrencies in circulation is based on an open permissionless blockchain, in which "a person can join or leave the network

[10] "A **timestamp** is temporal information regarding an event that is recorded by the computer and then stored as a log or metadata. Any event or activity could have a timestamp recorded, depending on the needs of the user or the capabilities of the process creating the timestamp." (Technopedia, (December 2016), *What Is a Timestamp?*, available at https://www.techopedia.com/definition/16285/timestamp).

[11] "A **nonce** is an abbreviation for "number only used once," which is a number added to a hashed—or encrypted—block in a blockchain that, when rehashed, meets the difficulty level restrictions. The nonce is the number that blockchain miners are solving for. When the solution is found, the blockchain miners are offered cryptocurrency in exchange." (FRANKENFIELD J., (August 2019), *Nonce Definition*. Investopedia, available at https://www.investopedia.com/terms/n/nonce.asp).

[12] NOFER M., GOMBER P., HINZ O., SCHIERECK D., (March 2017), *Blockchain*. Business & Information Systems Engineering - Bus Inf Syst Eng 59, 183–187 https://doi.org/10.1007/s12599-017-0467-3.

[13] HOUBEN R., SNYERS A., (July 2018), *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. European Parliament - Policy Department for Economic, Scientific and Quality of Life Policies.

[14] Binance Academy, (2017), *Private, Public, and Consortium Blockchains - What's the Difference?.* Available at https://academy.binance.com/blockchain/private-public-and-consortium-blockchains-whats-the-difference.

at will, without having to be (pre-) approved by any (central) entity"[15], needing only a computer with the relevant software. For both network and software, there is no central owner.

In stark contrast to these public blockchains, on privates chains (or on permissioned blockchain), transaction validators (i.e. nodes) have to be selected in advance by a network administrator in order to be able to join the network. In this permissioned environment, the administrator establishes the rules for the ledger who can see and who can write to the chain, also defining and verifying the identity of the network participants. Furthermore, this system can be divided into two subcategories, namely public (or open) and enterprise (or closed) permissioned blockchain. In the first case, anyone can access and view, but can neither generate transactions nor update the state of the ledger, if not authorised. In the "enterprise"[16] case, the same access is restricted and only network administrator can create transactions or update the state of the ledger. Nonetheless, it should be noted that transactions on an open permissioned blockchain could be validated, and then executed, without the intervention of a trusted third party.

Finally, the consortium blockchain is midway between public and private chains, and it combines elements from both, with notable differences at the consensus level. Indeed, it operates as closed, cryptographically secured databases, meaning that the ledger can be accessed by the nodes participating in the network (creating few equally powerful parties function as validators) and from there, different rules apply on who can update the state of the ledger.

[15] HOUBEN R., SNYERS A., (July 2018), *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. European Parliament - Policy Department for Economic, Scientific and Quality of Life Policies.

[16] "Private or closed chains are better suited to **enterprise** settings, where an organization wants to enjoy blockchain properties without making their network externally accessible". (Binance Academy, (2017), *Private, Public, and Consortium Blockchains - What's the Difference?.* Available at https://academy.binance.com/blockchain/private-public-and-consortium-blockchains-whats-the-difference).

			Read	Write	Commit	Example
Blockchain types	Open	Public permissionless	Open to anyone	Anyone	Anyone	Bitcoin, Ethereum
		Public permissioned	Open to anyone	Authorised participants	All or subset of authorized participants	Sovrin
	Closed	Consortium	Restricted to an authorized set of participants	Authorised participants	All or subset of authorized participants	Multiple banks operating a shared ledger
		Private permissioned ('enterprise')	Fully private or restricted to a limited set of authorized nodes	Network operator only	Network operator only	Internal bank ledger shared between parent company and subsidiaries

Table 1: Main types of blockchains segmented by permission model

(Source: https://doi.org/10.2139/ssrn.3040224)

1.1.2 Blockchain's applications

Blockchain technology is associated especially with digital or virtual currencies schemes, financial services and payments, but could be applied in various sectors and has numerous potential applications, for instance identity services, which identity detection for managing passports, birth and wedding certificates etc. or governmental services, which support the provision of public needs to citizens and stakeholders, especially with healthcare management (secure storage and patient data access is a crucial part of the medical industry). Other examples are related to education, since students and faculty records in the education domain (such records are maintained and shared with selected stakeholders), or public elections, as the electoral processes could be managed by distributed registers, which are used to run voting processes and prevent fraud or identity theft and many others. Moreover, it could be applied to pledging of collateral, registration of bonds, shares or other assets.

1.2 Cryptocurrencies

Financial services and information technology allowed the development and the establishment of both Blockchain technology system and cryptocurrencies. The concept of cryptocurrency appears for the first time in a 1998 paper, wrote by computer engineer Wei Dai - perhaps a pseudonym - entitled "B-money, an anonymous, distributed electronic cash system". Current cryptocurrency systems are essentially based on his principles, which defined them as "a scheme for a group of untraceable digital pseudonyms to pay each other with money and to enforce contracts amongst themselves without outside help"[17]. In the same period, other developers tried to create similar concepts to the one developed by Wei Dai, among them Nick Szabo: his project had as protagonist the Bit-gold, a cryptovalue whose functioning was practically the same compared to b-money. In these days, "cryptocurrencies are the first – and therefore most developed – application of blockchain technologies"[18]. These applications represents a digital asset, whose main aim is to be a medium in exchange, using cryptography (i.e., the technique of protecting information by encrypting/transforming it into an unreadable format) in order to secure all the transactions via ingenious system of public and private digital keys. Cryptocurrencies[19] are defined as virtual currencies and a form of unregulated digital money, usually issued and controlled by its developers and accepted and used among the members of a specific virtual community – the network. In the absence of trust between parties and intermediaries (therefore they are not operated by any specific institution), virtual currencies make use of distributed ledgers to allow remote peer-to-peer exchanges of electronic value and can be divided into two basic types: convertible and non – convertible virtual currencies. Convertible ones have an equivalent value in real currency and can be exchanged back and forth for real currency. Non – convertible are specific to a particular virtual domain/world, they are under "inter nos" rules (i.e. under

[17] "B-money, an anonymous, distributed electronic cash system" Wei Dai, 1998.
FRANKENFIELD J., (June 2019), *B-Money*. Investopedia, Cryptocurrency - Cryptocurrency strategy & education, available at https://www.investopedia.com/terms/b/bmoney.asp.
[18] World Bank Group, (May 2018), Cryptocurrencies and Blockchain. (ISBN electronic: 978-1-4648-1299-6) World Bank ECA economic update, available at http://documents.worldbank.org/curated/en/293821525702130886/pdf/Cryptocurrencies-and-blockchain.pdf.
[19] Since cryptocurrency exchanges (or transactions) are made via cryptography, they are called **CRYPTO-currency**.

the rules governing its use) and therefore cannot be exchanged for fiat currency[20] (e.g. World of Warcraft: a massively, multiplayer online role-playing game[21]).

Furthermore, to better understand cryptocurrencies and their functioning, it is necessary to define some other main characteristics. Cryptocurrency can have all, or only some, of the following peculiarities: decentralisation, pseudo – anonymization, reliability and safety, issue limitation, accessibility, affordability and speed.

- Decentralisation: as previously – and implicitly – mentioned, cryptocurrencies arise from the necessity to move (or to "disconnect") from the traditional control system of central authorities and to create a decentralised and completely autonomous one. Under a practical point of view, this currency is an encrypted code computed by a certain algorithm, which establishes its emission. The latter controls a network of interconnect servers, instead of being managed by a single entity, such as the Central Bank. This process of "creating money" is called mining;
- Pseudo - anonymization: it is difficult to become aware and know the identity of the natural person or individual that is making a cryptocurrency transaction. Indeed, transactions do not require the identification by name, address or other individual's information. This means that that person can purchase and enjoy numerous services, without being recognized. Nonetheless, it is important to note that this does not mean that there is no record of it, on the contrary, the blockchain works precisely because transactions are recorded regularly, anyone can see these them and verify the exchanges made so far. The fact that virtual currency and transactions are considered pseudo-anonymous, and not completely anonymous, means that sender and recipients can only be represented by a long code, composed by letters and numbers (the public key). From this, it is understandable that through these public keys, it is

[20] "**Fiat money** is government-issued currency that is not backed by a physical commodity, such as gold or silver, but rather by the government that issued it. The value of fiat money is derived from the relationship between supply and demand and the stability of the issuing government, rather than the worth of a commodity backing it as is the case for commodity money. Most modern paper currencies are fiat currencies, including the U.S. dollar, the euro, and other major global currencies." (Source: CHEN J., (April 2020), Fiat Money. Investopedia, available at https://www.investopedia.com/terms/f/fiatmoney.asp).

[21] **World of Warcraft** (WoW) **Gold** is the virtual currency used in this online role – playing game, designed by Blizzard Entertainment. Players have different options – and subscription fees – for opening an account. This "gold" is needed as a means of exchange in the game in order for players to equip themselves and reach higher levels, for instance. Players have also several opportunities to earn WoW gold but it is strictly forbidden to buy and sell it in the real word, as specified by the terms and conditions established by Blizzard Entertainment. (Source: European Central Bank – ECB, (October 2012), *Virtual currency schemes*. (ISBN: 978-92-899-0862-7), available at https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf).

not possible to trace easily the natural person that is carrying out the operation but, at the same time, it is possible to have access to the balance, for instance, of bitcoin of a certain public key;

- Reliability and safety: the cryptocurrency system works because it does not require trust between parties; anyone can access and view the transactions in progress at any time, also relatively to a specific user. These currencies are transparent, all operations are stored in the ledger system, remaining immutable and irreversible. The structure is safe since there is a shared consensus, it is the network server system that is in charge of validate the integrity of the transactions. Even if it is not possible to trust all participants, it is difficult to "not trust" the network as a whole, because to alter and get full control of the system, a single node should have an extremely high computing capacity;
- Limitation: for some cryptocurrencies, the creation of coin is limited, which means that their issuance will cease when a maximum number set by the creators of the same coin is reached. E.g., the creation of the most famous and used coin, the bitcoin (BTC), will stop when it will reach 21 million units[22], presumably in 2140; this also applies to litecoin: its coin creation will stop when 84 million units[23] will be reached;
- Accessibility: only an internet connection is required to use the cryptocurrency. Through this connection, it is possible to create an electronic wallet, also called web-wallet, containing cryptocurrency available for transactions;
- Affordability: the cryptocurrencies bypass the intermediaries that the traditional system normally uses; they do not require the payment of high commissions, or other charges, for the transactions execution. For these executions, small commissions (or fees) are usually paid to miners[24] (these fees are variable and generally there is a

[22] Bitcoins.net, (2019), *Limits of supply*. Bitcoins.net - Investing, available at http://bitcoins.net/investing/limits-of-supply.
[23] Bitcoins.net, (2019), *Limits of supply*. Bitcoins.net - Investing, available at http://bitcoins.net/investing/limits-of-supply.
[24] For each transaction, a **cryptocurrency miner** – or **cryptominers** – is responsible for ensuring the authenticity of information and updating the blockchain with the transaction. Furthermore, the mining process itself involves competing with other miners, in order to solve complex mathematical problems with cryptographic hash functions, associable to blocks containing the transaction data. The first cryptominer to crack the code is rewarded by being able to authorize the transaction. In return for the service provided, he or she earn small amounts of cryptocurrencies of their own. (Source: FORREST S., (2019), *What Is Cryptocurrency Mining?*. Webopedia Definition, available at https://www.webopedia.com/TERM/C/cryptocurrency-mining.html. The following concept, as it is one of the player involved in the process, will be discussed again at later time.

"market price" executing the trade in a timely manner: the higher the fee, the sooner the trade will be executed[25]) - allowing the validation of transactions as a priority;

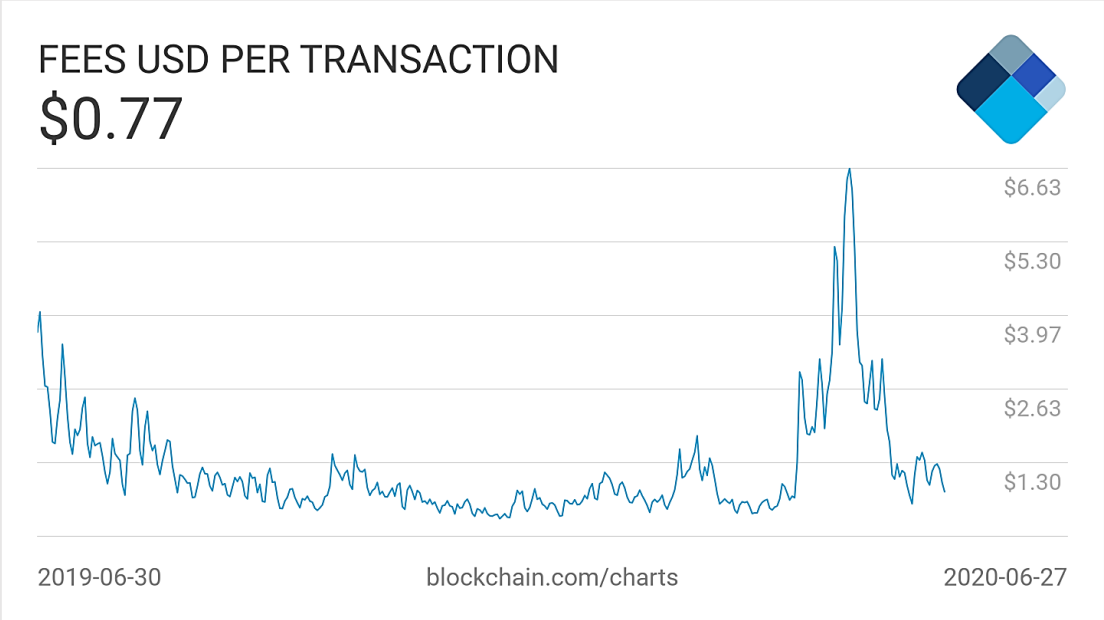


Figure 4: Average transaction fees in USD per transaction

(Source: https://www.blockchain.com/charts/fees-usd-per-transaction)

- And speed: unlike banks - that sometimes take a few days to transfer money – cryptocurrencies take about 10 minutes to verify and validate a transaction.

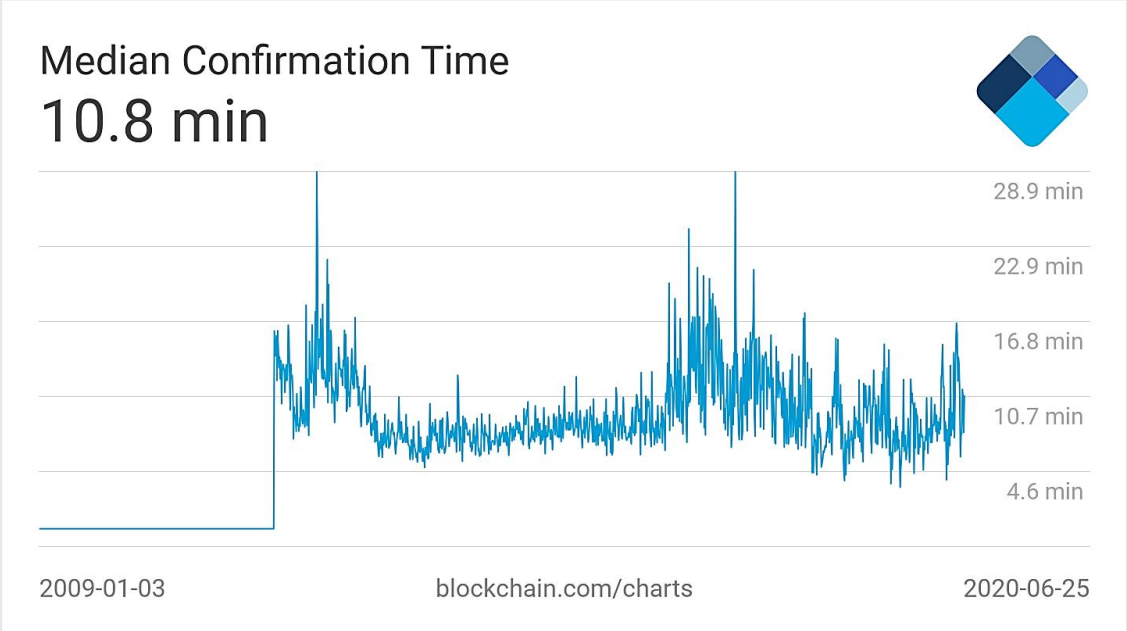


Figure 5: The median time for a transaction with miner fees to be included in a mined block and added to the public ledger *(Source: https://www.blockchain.com/charts/median-confirmation-time)*

[25] Bitcoin.net, (2019), *Transaction fees and the blockchain*. Bitcoins.net – Mining: Bitcoin Fees, available at http://bitcoins.net/mining/bitcoin-fees.

To summarize, as in the case of blockchain technology there is no generally accepted definition of the term "cryptocurrency". Nonetheless, most policy makers (such as the European Central Bank, Financial Action Task Force, International Monetary Fund, the World Bank, etc.) ended up and tried to define it as a subset or a form of virtual or digital currencies, or - as a recap of the previous discussion – as a "digital representation of value that is intended to constitute a peer-to-peer (P2P) alternative to government-issued legal tender, that is used as a general-purpose medium of exchange (independent of any central bank), is secured by a mechanism known as cryptography and can be converted into legal tender and vice versa"[26].

1.3 Classifying cryptocurrencies and the Crypto-Market

Cryptocurrencies are in practice often erroneously used in a very broad sense; hence, another distinction and explanation must be discussed. Cryptocurrencies indeed can be classified into two further main categories, namely altcoin, arising as a "hard fork" (this concept will be shortly analysed) of Bitcoin code, to which modifications have been occurred as Litecoin and Dogecoin, and altcoin based on other blockchain, such as Ethereum. Any software needs constant updates to solve problems or improve performances. In the crypto world, these updates are called "forks". Since cryptocurrencies are decentralized networks, all network participants must follow the same rules in order to work together properly. This set of rules (e.g. block size or miner rewards) is defined as a "protocol". There are two types of forks in the crypto world, soft fork and hard fork. A soft fork is a change in a cryptocurrency protocol, which is backward-compatible: non-updated nodes are still able to process transactions and add or push new blocks to the chain, as long as they do not break the rules of the new protocol. On other hand, a hard fork is a change in a cryptocurrency protocol incompatible to the previous versions. Nodes that do not update to the new version will not be able to process transactions or add/push new blocks to the chain. These forks can be used to modify or improve an existing protocol, or to create a new one and a new independent blockchain[27]. Later, from these previous mentioned "classic" currency, further categories and/or

[26] HOUBEN R., SNYERS A., (July 2018), *Cryptocurrencies and blockchain - Legal context and implications for financial crime, money laundering and tax evasion*. European Parliament - Policy Department for Economic, Scientific and Quality of Life Policies.
[27] Binance Academy, (2017), *Hard Forks and Soft Forks*. Available at https://academy.binance.com/blockchain/hard-forks-and-soft-forks.

subcategories have emerged, both for technological and needs evolution. Among these, tokens come into play, and can be defined as a subset of cryptocurrencies that do not have a specific blockchain of their own, but that use, indirectly, other chains. Their peculiarity is to offer a functionality other than and beyond of a general-purpose medium of exchange. An example of these are the utility tokens, normally launched by ICOs, asset or security tokens and payment tokens (these concepts will be further analysed and explained). Security tokens, since are using the blockchain technology to register, issue and transfer shares or other corporate securities with cryptography, are defined also cryptosecurities. The only connection with this last concept and cryptocurrencies is that they both implement blockchain technology.

1.3.1 Cryptocurrencies with the highest market capitalisation

How many cryptocurrencies are there? Currently, according to CoinMarketCap[28], the number of existing currencies is extremely high and exceeds 5000[29] types, and it is a growing number. Coinlore[30] shows a sensible difference, listing a total of 4390[31] cryptocurrencies, since a lot of them may be attached to projects that were either abandoned, failed or exit scammed. Indeed, not all crypto projects can or will last or have not been created with serious intentions. Many are generated as tests or jokes fading into irrelevance. For these reasons, the study will be focus on the five altcoins that currently have the highest market capitalisation, and exhibit a wide range of different features (e.g. some of them based on Bitcoin's protocol and most are characterised as pseudo-anonymous). The first cryptocurrency, surely the most known and used, is the bitcoin (BTC). This is flanked by other cryptocurrencies, which are based on the same blockchain technology, but designed differently from Bitcoin since they arise for different purposes. To date, the other most traded are Ethereum (ETH), Tether (USDT), Ripple (XRP) and Bitcoin Cash (BCH).

[28] For further details, *see also*: CoinMarketCap (Accessed on May 2020), Available at https://coinmarketcap.com/
[29] CoinMarketCap (July 2020), *All Cryptocurrencies*. Available at https://coinmarketcap.com/currencies/stasis-euro/markets/.
[30] For further details, *see also*: Coinlore (Accessed on May 2020), Available at https://www.coinlore.com/.
[31] CoinLore, (June 2020), *List of All Cryptocurrencies*. Available at https://www.coinlore.com/all_coins.

Rank	Name	Symbol	Market Cap	Price	Circulating Supply	Volume (24h)	% 1h	% 24h	% 7d
1	Bitcoin	BTC	$168,708,183,974	$9,160.88	18,416,162 BTC	$15,769,526,252	-0.13%	-0.10%	-1.41%
2	Ethereum	ETH	$25,666,414,974	$230.14	111,523,215 ETH	$5,879,398,035	-0.14%	-0.34%	0.49%
3	Tether	USDT	$9,186,415,180	$0.999828	9,187,991,663 USDT *	$18,893,357,101	-0.11%	-0.09%	-0.11%
4	XRP	XRP	$8,061,694,845	$0.182153	44,257,803,618 XRP *	$1,003,026,356	-0.14%	-1.15%	-2.67%
5	Bitcoin Cash	BCH	$4,224,140,517	$228.99	18,446,475 BCH	$1,026,177,669	-0.16%	-0.75%	-1.05%

Table 2: Most traded cryptocurrencies (https://coinmarketcap.com/currencies/stasis-euro/markets/)

1.3.2 Bitcoin (BTC), the cryptocurrency where it all began

In 2008 Nakamoto (or more inventors known under this pseudonym) published in a cryptography mailing list a paper entitled "Bitcoin: A Peer-to-Peer Electronic Cash System" in which it explains all the essential features and the method of operation of the new cryptocurrency called bitcoin. The latter, (BTC) arose in 2009 with a practical distinction between "Bitcoin" – with the capital letter - that defines the decentralized consent network that allows the execution of payments, and "bitcoin" - with the lowercase letter - that defines the new type of virtual currency, as a means of payment that can be used in this web system. With the implementation of the project, the network was created and later, the first virtual coins have been extracted, thus creating the first blockchain. After extracting about 1 million cryptocurrency, Nakamoto disappeared, abandoning also the homonymous movement. Gavin Andresen (an American programmer and software developer) became then the next leader of the Bitcoin Foundation and the representative for the revolutionary network.

Firstly, this coin is characterized by a limited offer. Among the parameters set by its creator (and continuously monitored by the network), it is important to highlight, as previously mentioned, that its emission will stop when it will reach 21 million units. This and the fact that its creation and increase is automated by the system itself implies that there is no need for the intervention of central banks, entity or authority to issue Bitcoins. For these reasons, conversions rates are determined by supply and demand, since there is no government body being able to intervene (for instance through the printing of new money). By reminding again its limited quantity and the latter fact, the result is a high volatility in Bitcoin prices. Nonetheless, it can be bought with and converted into fiat

currency on a large array of cryptocurrencies exchanges. Indeed, out of all the other existing digital currencies, Bitcoin is one of the easiest to convert into fiat currency.

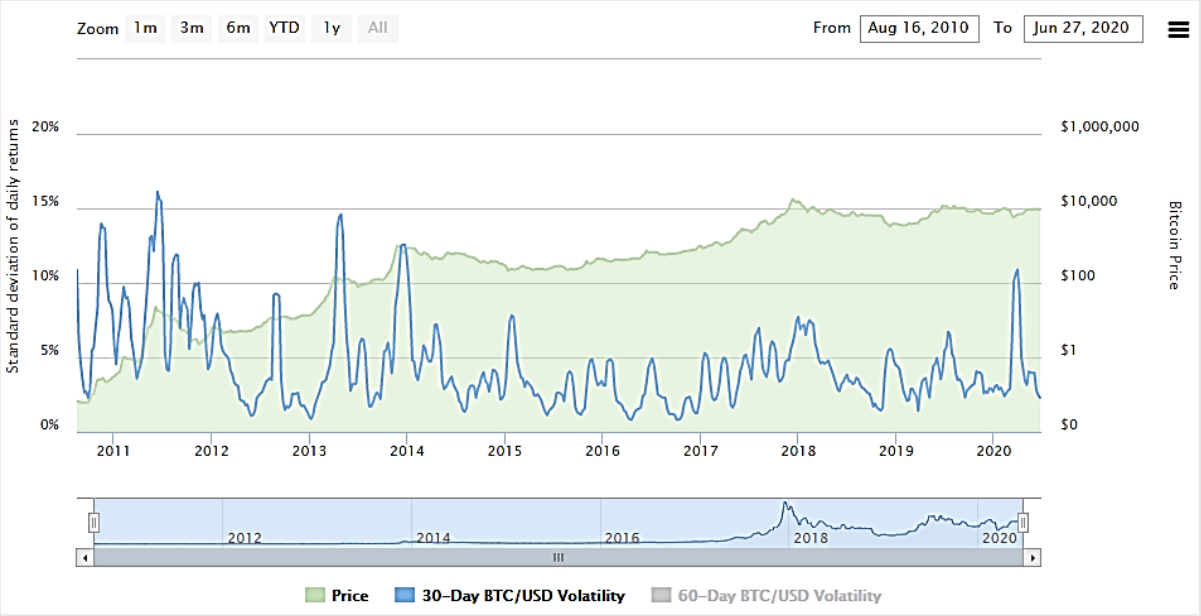
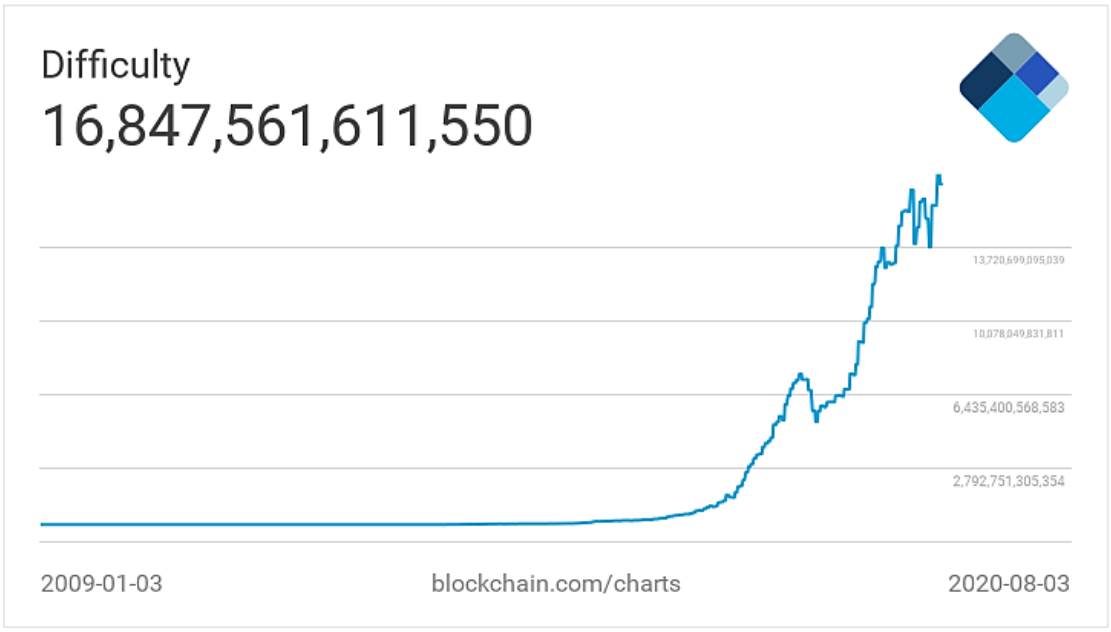


Figure 6: Bitcoin Price and Volatility *(Source: https://www.buybitcoinworldwide.com/volatility-index/)*

Moreover, its emission takes place via the previously mentioned process called mining. Such process entails that persons make their own devices available to the coin network to solve difficult[32] mathematical problems.

[32] The graphs below, represent, respectively, the **Network Difficult**, i.e. a relative measure of how difficult it is to mine a new block for the blockchain, with respect to the time horizon – "**all time**" and - **one year**. In terms most belonging to the sector, it is a measure of how difficult it is to find a hash below a given target. "A high difficulty means that it will take more computing power to mine the same number of blocks, making, theoretically speaking, the network more secure against attacks. The difficulty adjustment is directly related to the total estimated mining power estimated in the Total Hash Rate, or TH/s chart".
Blockchain, (August 2020), *Difficulty*. Available at https://www.blockchain.com/charts/difficulty.
TH/s: it is the "estimated number of terahashes per second the network is performing in the last 24 hours"
Blockchain, (August 2020), *Hash-rate*. Available at https://www.blockchain.com/charts/hash-rate.



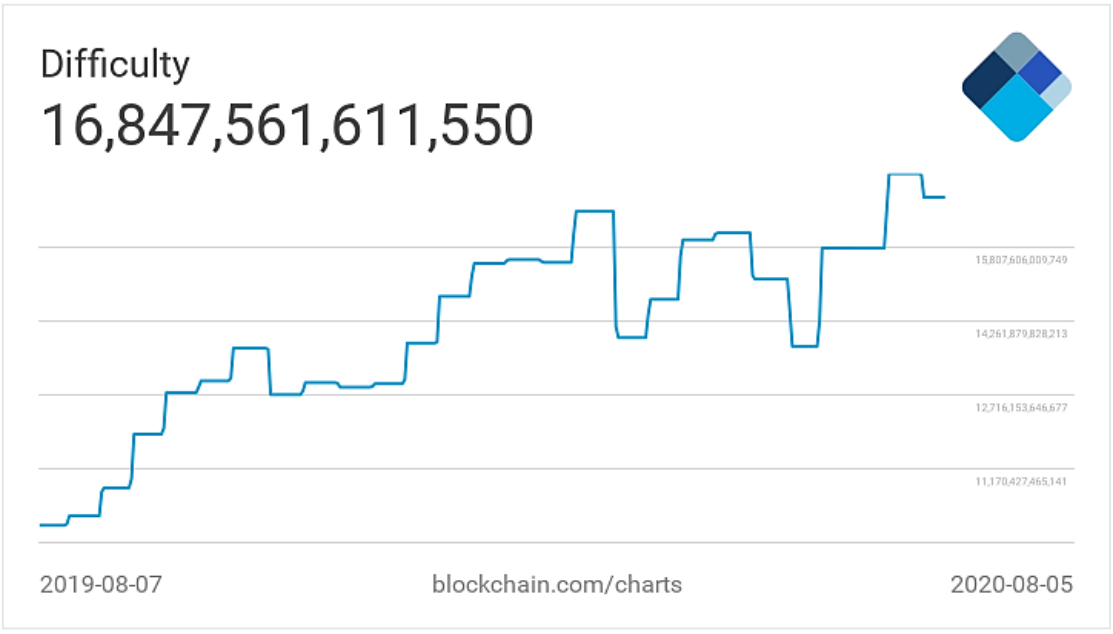


Figure 7a and 7b: Network Difficulty - A relative measure of how difficult it is to mine a new block for the blockchain (Time Horizon: a - All time; b – One year)

(Source: https://www.blockchain.com/charts/difficulty)

These computers, able to create transactions, are rewarded with Bitcoins. The Bitcoin chain is characterized by an open, permissionless blockchain, meaning that any person can join or leave the public network and need only a PC to generate and add transaction to the ledger, if validated. It is quite accepted and can be qualified as a medium of exchange as a result of its recognition as a legitimate source of funds of online merchants, among which it is possible to find various large companies[33], such as:

- Microsoft: the company has been accepting Bitcoin since 2014 for licenses to games, movies or apps, but later and temporarily took a pause due to its volatility. Now they are again accepting it for the Xbox store credits only;
- Overstock: it is the leader in the shopping and cryptocurrency field since it accepts multiple kinds of digital coin, not just bitcoins. This American online retailer, partnered with Coinbase, indeed allow Bitcoin payments for their online orders;
- Wikipedia: the biggest open – source encyclopaedia, accepts donations in Bitcoin and payments are done through BitPay[34];
- Newegg: representing one of the biggest computer hardware and consumer electronics online retailers, the company recognized the popularity in the cryptocurrency and started to accept as one of the first in the world, for its hardware and other restricted range of products;

and many other companies. Finally, Bitcoin is a pseudo – anonymous coin. Everyone can verify the transactions on the basis of the public ledger, however there is no connections between Bitcoins and individuals. It is very costly and complex, but technically feasible, to identify the person or parties behind a Bitcoin operation by merging factors that flank such transaction. For this reason, the coin is not a fully anonymous currency, but, as mentioned, a pseudo-anonymous one.

[33] Paybis Blog, (June 2020), *160 Companies That Accept Bitcoin*. Available at https://paybis.com/blog/companies-that-accept-bitcoin/.
BuyBitcoinwWorldwide, (June 2020), *11 Major Companies Who Accept Bitcoin - Where to Spend Bitcoins*. Available at https://www.buybitcoinworldwide.com/who-accepts-bitcoin/.
99Bitcoins, (April 2020), *Who Accepts Bitcoins in 2020? List of 20+ Major Companies*. Available at https://99bitcoins.com/bitcoin/who-accepts/.
[34] **BitPay** is an automated payment processing system for bitcoin currency, enabling online merchants to accept the currency as easily as payments from credit cards, debit cards, or PayPal. For further details, *see also*: BitPay, (June 2020), *Welcome to the future of payments*. Available at https://bitpay.com/.

1.3.3 Ethereum (ETH), a new mechanism through smart contracts

Following the success of Bitcoin, a Russian programmer named Vitalik Buterin became interested in the new financial technology, creating in 2013 Ethereum and later, in July 2015, the project and its platform became accessible to all. With Ethereum, a second generation of blockchain is created, capable of generating decentralized applications that runs so-called "smart contract". Smart contracts are the operating mechanism of the ETH platform. When an individual wants a certain task performed by someone else in Ethereum, a smart protocol is stipulated. This protocol is "self-executing", indeed it runs exactly as programmed without any possibility of downtime (i.e. the blockchain is never down, it is always running), censorship, fraud or third-party intervention. These types of contracts are created by encoding a series of instructions using the programming language called "solidity", which works on the basis of IF-THIS-THEN-THAT (IFTTT logic). If a series of instructions have been completed, then the next ones can be executed, and once they are completed, it will endlessly run until the contract is finally concluded. Like in a domino effect, each completed step triggers the next one, the consecutive step will not start unless the previous one is completed first. It is possible to notice that, unlike the previous coin, the main purpose of the ETH platform is the peer-to-peer creation of smart contracts, with the solidity programming language. The platform is able to create smart contracts that could be implemented in various fields, including data management systems, auctions, trading platforms, intellectual property protection, etc. and, as it will be seen later, are an important concept in the development of Initial Coin Offerings (ICO). The crypto-coin circulating within the platform is called Ether, and it is used to perform all transactions within the chain. Unlike Bitcoin, there is no maximum limit in terms of emission of Ether units (and its blocks times are at about 14 seconds, compared to Bitcoin's 10 minutes[35]), although it is not excluded that in the future developers may decide to impose a maximum emission limit. The algorithm used is the proof of work, but the goal of the platform is to move to a proof of stake type in the future. The proof of work (PoW) is a distributed consent mechanism whose purpose is to ensure that the rules defined in the protocol are respected. In this situation, the mining activity is exploited and once this happens, the miners validate a block and add it to the blockchain, with the nodes'

[35] HARM J., OBREGON J., STUBBENDICK J., (Accessed on June 2020), *Ethereum vs. Bitcoin*. Creighton University Kraken case study, available at https://www.economist.com/sites/default/files/creighton_university_kraken_case_study.pdf.

consent which verifies that the hash found by this computer is actually correct. The proof of stake (PoS, known also as the Casper Protocol) works in a completely different way. The result is always the same, i.e. to validate the blocks and ensure that they are actually correct, even though the mechanism getting this result has nothing to do with PoW. Firstly, it is not a physical process, there are no super computers that perform very complex calculations using their computational resources, but there are so-called validators. The mechanism that decides which new blocks will be validated is based on the fact that the network participants will put their own cryptocurrency (stake) into play. Generally speaking, the more stakes are made available by a participant and the longer these cryptovalues last, the higher the probability that the participant will become a validator[36]. Ethereum has capabilities that goes far beyond that of a peer-to-peer digital cash equivalent, and technically speaking, the platform itself is not only a cryptocurrency. However, like in the previous case, it is based on an open, permissionless blockchain, requiring a specified form of on-chain (a form of payment) to incentivise transaction validation and therefore execution within the network. In this scenario, Ether comes into play. The currency allows smart contracts and also functions as a medium of exchange, specifically in the context of ITOs (Initial Token Offering, or ICO). In addition, Ether boast the fact that is directly convertible into fiat currency and it is growing in terms of recognition as mean of payment. Just like Bitcoin, Ether can be labelled as pseudo-anonymous coin. Lastly, it is noticeable that ETH could be more volatile than BTC. The latter was launched in 2009, while Ethereum only in 2015, meaning that it is six years "younger" than the other. Furthermore, its volatility is driven in large part by varying perceptions of the intrinsic value of the cryptocurrency as a store of value and method of value transfer.

[36] For further details, *see also*: CAVALLI S., (October 2019), *Proof of Work vs Proof of Stake*. The Cryptonomist, available at https://cryptonomist.ch/2019/10/05/proof-of-work-pow-vs-proof-of-stake-pos-la-guida/.

Figure 8: Ethereum Volatility Time Series *(Source: https://www.buybitcoinworldwide.com/ethereum-volatility/)*

1.3.4 Tether (USDT), from Realcoin to stablecoin

Tether is a stablecoin, which means a digital currency that aims to be a substitute for legal tender (fiat currency). Formally, its definition states "Tether converts cash into digital currency, to anchor or tether the value to the price of national currencies like the US dollar, the Euro, and the offshore Chinese yuan"[37]. From this statement it is noticeable the meaning that the creators of the project wanted for the digital currency, i.e. to tie the value of the cryptocurrency to the price of fiat currencies" (not surprisingly, the word tether means to tie).

Tether was founded in 2014, although the original idea is based on the Mastercoin protocol of J. R. Willett (drafted on January 2012), the inventor of the ICO. Brock Pierce and Craig Sellars, respectively official member and CTO of the Mastercoin Foundation, are the co-founders of Tether. At the beginning, the cryptocurrency Tether was known as Realcoin, almost emphasizing the difference with the other existing cryptocurrencies. Four months after its foundation, Realcoin was replaced by Tether (₮). The first tokens were issued on the Bitcoin blockchain in October 2014, three months after the official rise. When talking about Tether, reference is made to the stablecoin USD₮, the abbreviation that identifies a single tether linked to the price of a dollar. Actually, the Tether project

[37] Tether, (Accessed on June 2020), *Tether – Stable Digital Cash on the Blockchain*. Available at https://tether.to/.

also includes other stablecoins, such as EUR₮, a tether tied to the price of one euro and CNH₮, a tether tied to the price of one Chinese yuan. Tether's transitions are mainly based on the Omni digital resource platform, which in turn is based on the Bitcoin blockchain. However, the stablecoin USDT also works on other blockchains, including the Ethereum blockchain, where the tethers are coined as ERC20 tokens. The total value of outstanding tether is guaranteed by the reserves of Tether Limited, consisting of dollars and other assets, including receivables from loans granted by Tether to third parties. Many traders have considered the USDT a safe asset like gold, with the knowledge that it were and is still a digital currency. Some investors also sold the cryptocurrencies in their e-wallet by exchanging them for USDT in order to have a stable cryptocurrency to be employed in many virtual currency exchange sites. The fluctuation of the value of each USDT may be considered quite minimal.

Figure 9: Tether fluctuations *(https://coinmarketcap.com/it/currencies/tether/)*

Tether can be used in p2p, as a pseudo-anonymous, decentralized cryptographically secure environment and can be exploited with merchants, exchanges, and wallets[38]. Moreover, USDT implements an effective approach for conducting Proof of Reserves (PoR), which significantly reduces the counterparty risk as the custodian of reserve

[38] Tether, (June 2016), *Tether: Fiat currencies on the Bitcoin blockchain*. Tether White Paper, available at https://tether.to/wp-content/uploads/2016/06/TetherWhitePaper.pdf.

assets. Indeed, PoR allows an exchange to test how many tether they could spend, without necessarily having to generate a transaction that actually spends those funds, thus avoiding exposure to the risks of moving digital currency. Using this tool, the exchange builds a single transaction that spends all the UTXO (unspent output) of the exchange on input, and adds in addition an invalid input. With this single invalid input, the entire transaction is invalid and would be rejected by the network if transmitted. Nevertheless, the transaction is constructed in such a way that it can be used as explicit evidence of all the UTXOs expendable by the exchange. An auditor can simply import this transaction data into his Proof of Reserves client to confirm the overall exchange reserves and their addresses. This solution is very simple, and is accessible to anyone who knows how to use a command line application[39].

1.3.5 Ripple (XRP), a bridge currency for cross-border payments

Ripple was founded in 2005 by software developer, consultant and ICO advisor Ryan Fugger. Subsequently, in 2012 Fugger retired from the project, selling the company to Ripple Labs, which was founded by Jed McCaleb and Chris Larsen. Ripple Labs developed the Ripple protocol, which enabled the company to receive a "BitLicense"[40] for an institutional use case of digital assets from New York's Department of Financial Services. The cryptocoin created is called XRP, and operates on a p2p decentralized digital payment platform, which allows for near-instantaneous transfers of currency regardless of their form (e.g. US Dollar, Yen, Bitcoin, etc.). Indeed, the coin was created with the intention of building a "bridge currency" to allow financial institutions to execute cross-border payments faster and cheaper with respect to the existing alternatives. Moreover, under a practical point of view, XRP is able to handle and execute more than 1,500 transactions per second, becoming a coin adopted and spent by a large number of digital currency users, even if was initially intended for enterprises use. Its validation process differs from the previous examples. The coin indeed is not based on a Proof of Work (PoW) or a Proof of Stake (PoS) mechanism, but uses its own consensus protocol (called also consensus network). The first two networks are built so that participants compete by uploading a

[39] For further details, *see also*: ROOSE S., (February 2019), *Lo Standard per Le Proof of Reserve Su Bitcoin*. Blockstream: Bitcoin & digital asset infrastructure. Available at https://blockstream.com/2019/02/04/it-standardizing-bitcoin-proof-of-reserves/.

[40] The **BitLicense** referred to the term used for a business license of virtual currency activities. This license is issued by the New York State Department of Financial Services (NYSDFS) under regulations designed for companies.

transaction on the blockchain in order to get rewards, while, in a consensus network, this competition do not exists, since the key incentive is based on trust and the vested interests of participants[41]. The existing amount of Ripple's coins inside the platform is about 100 billion units, which are directly convertible into fiat currency and therefore is used as a medium of exchange by a growing number of online merchants. In order to transfer legal currency, Ripple uses IOU credits (i. e. "I owe you") which represent the amount in currency (euro, dollar, etc.) that one subject owns to another. IOU credits are then converted into currency via Ripple gateways. All transactions take place between individuals that have established a relationship of mutual trust and are recorded in a register (the ledger). The Ripple network consists of over 200 banks and payment institutions worldwide. It is important to highlight that unlike Bitcoin and Ethereum, Ripple is based on a permissioned blockchain. Indeed, it is the company behind the coin (Ripple Labs Inc.) that decides who may act as a transaction validator. Apart from this, the blockchain can be accessed and viewed by anyone. Hence, it is considered as a public chain and as BTC and ETH, XRP belongs to the pseudo-anonymous coin group. Generally, every coin is prone to quite same volatility as bitcoin but in this case the scenario is a little bit different. Indeed XRP in 2018 went on a bull run, in spite of the bear run of the main coin competitor – BTC. This peak was determined as a result of the news of the coin's mainstream acceptance by institutions such as banks.

[41] Grayscale Investments LLC, (November 2019), *An Introduction to XRP*. Available at https://grayscale.co/wp-content/uploads/2019/11/Grayscale-Building-Blocks-XRP-11_2019.pdf.

Figure 10: Ripple fluctuations *(Source: https://coinmarketcap.com/it/currencies/xrp/)*

1.3.6 Bitcoin Cash (BCH), beyond bitcoin's limitations

Bitcoin Cash arose in 2017 from a hard fork of Bitcoin. Its developers - following Bitcoin's goal - tried to overcome some of its limitations. Indeed, Bitcoin is able to handle a limited number of transactions per block, while with Bitcoin Cash the block size increased from 1MB to 8MB. The coin is still decentralized p2p digital cash. Furthermore, users that owned bitcoins at the time of the fork were allowed, on August 1 2017 (hence at Bitcoin Cash's foundation), to obtain the amount in bitcoin cash. After this event, the two coins followed independent paths. BCH is based on BTC's original SHA-256 Proof of Work (PoW) algorithm, yet with some changes to its code (but it can be mined as BTC). The reason behind the division between the two is related to their developers, some of them wanted to raise block sizes limit (and this is indeed happened) in order to reduce transactions fees and improve confirmations times, while other preferred the original settings. Because a consensus was not reached, the new cryptocurrency was created. Furthermore, on November 2018 BCH was hard forked for a second time and again split into Bitcoin SV and Bitcoin ABC (which became the dominant chain and had more hashpower and nodes in the network).

Nonetheless, in principle, its arising as hard fork does not change the main peculiarities of the coin. Bitcoin Cash indeed works on an open and permissionless chain, is convertible (directly) into fiat currency, is a means of exchange and is a pseudo-anonymous currency. Finally, among the major factors influencing the price of bitcoin cash, it should be noted that if the original bitcoin (BTC) continues to be characterized by a slow processing, due to the increase in transactions, this could have a positive impact (and vice versa, negative) on the price of bitcoin cash.

Figure 11: Bitcoin Cash fluctuations *(Source: https://coinmarketcap.com/it/currencies/bitcoin-cash/)*

1.3.7 Summary of cryptocurrencies

Based on the previous overview and analysis, it is possible conclude that "the" cryptocurrency is non existing. Even if some of them are similar to each other (as the case for BTC and BTH), there are quite differences on which chain they run, the anonymity involved etc. The table below aims to illustrate this diversity, comparing the digital coins on the basis of various parameters, such as, for instance, their decentralized nature or if they are directly convertible into fiat currency or not. However, it is important to remind that these coins are shrouded in scarcity of information available and are a moving target. A coin that is not a means of exchange today can be one tomorrow.

Name	Permissionless / Permissioned	Decentralized	Initial offering by an identifiable person or entity?	Eletronically traded	Directly convertible into fiat currency	Medium of exchange	Pseudo anonymous / Anonymous
bitcoin	Permissionless	V	X	V	V	V	Pseudo anonymous
ethereum	Permissionless	V	V	V	V	V	Pseudo anonymous
tether	Permissioned	Semi decentralized	V	V	V	V	Pseudo anonymous
ripple	Permissioned	V	V	V	V	V	Pseudo anonymous
bitcoincash	Permissionless	V	X	V	V	V	Pseudo anonymous

Table 3: Summary of cryptocurrencies

1.4 The players of blockchain's environment

As it has been anticipated and analysed in previous paragraphs, the blockchain system, as well as the implementation of cryptocurrency, requires and identifies a number of players. At first, it is important to identify the cryptocurrency users, i.e. natural person or legal entity that owns coins and use them to purchase goods or services from specific merchants, as well as to make p2p payments or to invest them. In order to do so, the players can obtain these digital currencies with different methods. They can simply buy them on crypto - exchange (using equivalently fiat money or other cryptocoins) or through trading platforms. In the first case, these persons or entities behind crypto – exchanges, offer exchange services to crypto users, and earns a certain amount of fees or commissions. Usually, crypto - exchange users can choose from a wide array of payment options, such as PayPal transfers, credit cards, wire transfers or other coins, while accessing to some statistics on the crypto market (i.e. volatility or trading volumes of traded coins), as well as conversion services. It is important to highlight that some of them are pure cryptocurrency exchanges, meaning that they only accepts amounts in cryptocoins (frequently bitcoins, as in the case of Binance[42]), while others also admit fiat currencies (Coinbase[43]), or even that users are allowed to buy a determined set of coins. Before choosing in which crypto exchange is better to operate, the player takes (or should take) into account multiple factors, including the exchange security or liquidity. The higher the volume of trades, the greater will be the liquidity, which will generate faster

[42] For further details, *see also*: Binance (Accessed on June 2020), Available at https://www.binance.com/en.
[43] For further details, *see also*: Coinbase (Accessed on June 2020), Available at https://www.coinbase.com/?locale=en.

and easier transactions, avoiding the risk of price volatility. Other factors include the cost of commissions, the history of the operating entity, markets in which it operates, user experience/feedbacks and whether, as mentioned earlier, trades are exclusively crypto-crypto or also crypto-fiat. In the second case, (crypto) trading platforms are market places that bring users together, with the purpose of enable direct trading with each other. They are referred also as p2p or decentralized exchanges, e.g. Bitfinex[44] or Kraken[45]. Users can also mine new coins, if the currency is based on a Proof of Work (PoW) consensus mechanism. By doing so, they become also miners, and participate in transactions' validation, solving the mathematical algorithms and therefore getting newly mined coins as reward. Finally, crypto users can obtain digital currencies directly from coin offerors (which are individuals/organizations that offer coins upon their initial release and that pre-mined or pre-create them in variable portions), receive them as a form of payment, in case he or she sells goods or services (in exchange for digital coins), automatically earn them in case of a creation of a new hard fork of a coin's blockchain, receive them as a gift or donation from another player.

There are also players identifiable as coin developers (known – as in the case of Ripple, or not – as in the case of Bitcoin), which are individuals or organizations who have developed the mathematical algorithms and technical computations in order to generate new coins and their rules (for instance, if the units of this developed digital currency is limited, or not). Lastly, it is important to draw attention to wallet providers, entities that provide crypto users digital wallets (or crypto wallets) in order to hold, store and transfer crypto coins. The existing crypto wallets can be distinguished into three groups, namely software (the majority), hardware and paper wallets. These wallets differ depending on where – for instance on a software, hardware or even on a piece of paper with printed crypto address and with private key in form of QR codes – and how key information are stored and viewed. Examples are Ledger Wallet[46], Jaxx[47] and Coinbase[48].

[44] For further details, *see also*: Bitfinex (Accessed on June 2020), Available at https://www.bitfinex.com/.
[45] For further details, *see also*: Kraken (Accessed on June 2020), Available at https://www.kraken.com/en-us/.
[46] For further details, *see also*: Ledger (Accessed on July 2020), Available at https://www.ledger.com/.
[47] For further details, *see also*: Jaxx (Accessed on July 2020), Available at https://jaxx.io/.
[48] For further details, *see also*: Coinbase (Accessed on July 2020), Available at https://wallet.coinbase.com/.

CHAPTER 2. EXISTING REGULATORY FRAMEWORK AND KEY ISSUES

OVERVIEW: *2.1 Key issues and risks. Acceptability of the coin as a medium of exchange - 2.2 Analysis of the regulatory framework of central banks and international economic institutions - 2.3 Analysis of the international regulation - 2.4 Summary of the existing legal framework. 2020, the year of regulation?*

From the previous chapter, especially from paragraph 1.2 "Cryptocurrencies", where the main features of these currencies are described, it could be inferred that cryptocurrencies operate outside the scope of national regulations. De facto, their quotes, transaction volumes and catchment areas are particularly affected by reports of regulatory interventions. The impact of the news depends on the specific category of regulation to which it refers: news about generic bans on cryptocurrencies or their treatment under securities legislation have the greatest negative effect, followed by news about the fight against money laundering and terrorist financing and news about the restriction of the interoperability of cryptocurrencies with regulated markets. As mentioned earlier, cryptocurrency can be used mainly for two reasons, as a payment instrument and as an investment instrument. As a payment instrument, cryptocurrencies can be used to make purchases or pay for services even though, in most countries, cryptocurrencies are not recognised as legal currencies. Given the high volatility of these coins, the attraction for investors is very high. Especially for those who want to make a high profit in the short term. The graph below compares the volatility of the bitcoin with the price of gold and the S&P 500 index etc. The difference is clear.

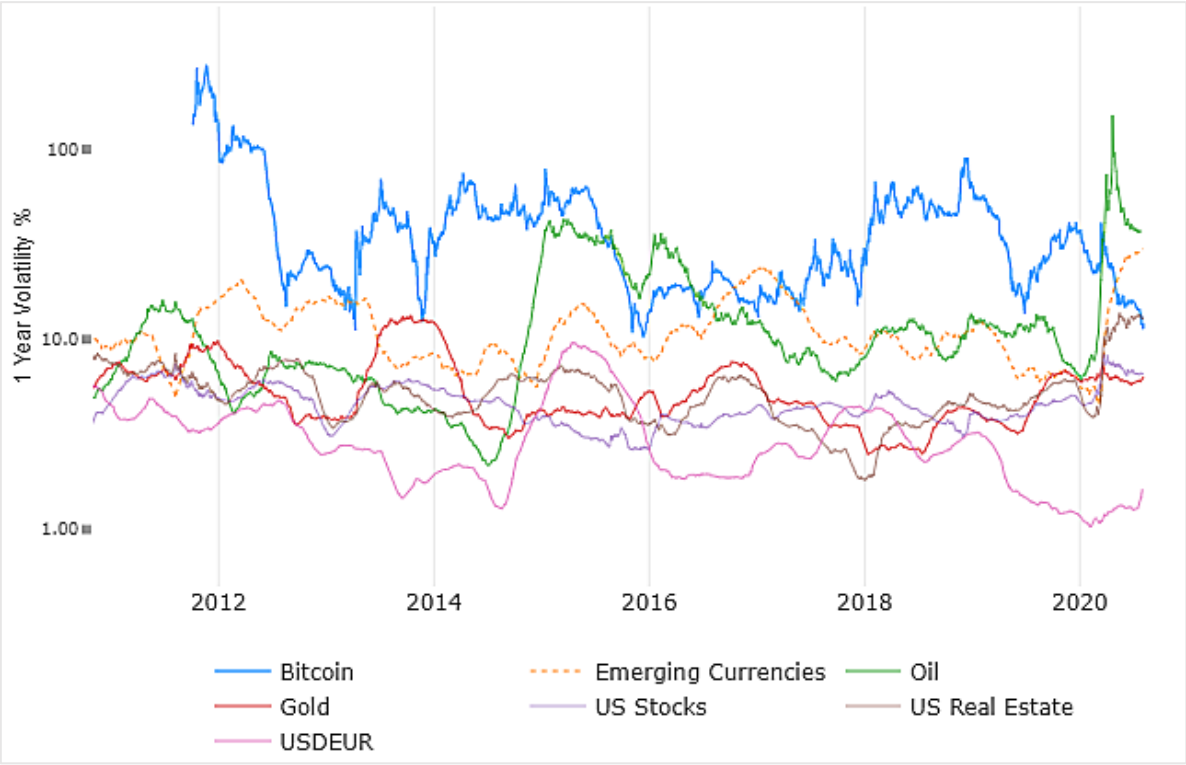


Figure 12: Bitcoin Volatility vs Other Assets *(Source: https://charts.woobull.com/bitcoin-volatility-vs-other-assets/)*

Furthermore, investors, academics, policymakers or blockchain enthusiasts alike are involved in the debate on what is the socially preferable level of cryptocurrency regulation. While some support the idea of a more or less flexible regulatory framework, others call for a complete cryptocurrency ban[49]. It is also argued that digital coins should not be regulated at all[50]. This array of opinions or views on the issue, plus the lack of consensus, are the result of the presence of "technological advantages, sources of consumer value and concerns and challenges. Indeed, as mentioned above, digital coins are tools used for tax evasion, money laundering and illegal activity financing. Bitcoin transactions occurring in the informal or grey sector[51] of the economy are estimated to

[49] Nobel Prize-winning economist Joseph Stiglitz said that "Bitcoin is successful only because of its potential for circumvention, lack of oversight." BloombergQuint.com (Accessed on August 2020), *Bitcoin 'Ought To Be Outlawed,' Nobel Winner Stiglitz Says*. Available at https://www.bloombergquint.com/business/bitcoin-ought-to-be-outlawed-nobel-prize-winner-stiglitz-says-jal10hxd.

[50] For further details, *see also*: SWAN M., (February 2015), *Blockchain, Blueprint for a new economy*. First edition. Beijing : Sebastopol, CA: O'Reilly, available at http://book.itep.ru/depository/blockchain/blockchain-by-melanie-swan.pdf.

[51] The **informal economy/sector or grey economy** is a side of the economy that is neither controlled nor taxed by the government and its activities are never included in gross domestic product (GDP). Initially, the idea of an informal sector applied to self-employment in many unregistered companies, but then expanded to salaried jobs in this unmonitored sector (therefore it is not limited to organised crime's activities).

be 46%[52]. Finally, it is necessary to consider the volatility of the markets and the bubble-like behaviour[53] of cryptocurrency. These two characteristics represent high risks for individual investors and pose a systematic threat to the financial system as a whole. Moreover, the environmental impact of the proof-of-work process as well as the coin mining process (both essential for the functioning of the network), require a high amount of energy, thus representing a potential source of negative externalities.

2.1 Key issues and risks. Acceptability of the coin as a medium of exchange

After carrying out an analysis of the cryptocurrencies with the highest market capitalisations and verifying their actual acceptability as a means of payment, it should be possible to conclude this discussion quickly. Nonetheless, as actually observed in the previous chapter, their dissemination and acceptance are limited and in most cases only the most experienced users know how and where use them. Merchants[54] that accept payments in cryptocurrencies (especially and mainly Bitcoin) have increased over the years, but are not sufficient to include these currencies into the daily life of the economic system in general. Consequently, it is possible to conclude that they are still far from being fully interchangeable with traditional coins.

Name	Permissionless/ Permissioned	Decentralized	Initial offering by an identifiable person or entity?	Eletronically traded	Directly convertible into fiat currency	Medium of exchange	Pseudo anonymous/ Anonymous
bitcoin	Permissionless	V	X	V	V	V	Pseudo anonymous
ethereum	Permissionless	V	V	V	V	V	Pseudo anonymous
tether	Permissioned	Semi decentralized	V	V	V	V	Pseudo anonymous
ripple	Permissioned	V	V	V	V	V	Pseudo anonymous
bitcoincash	Permissionless	V	X	V	V	V	Pseudo anonymous

Table 4: Summary of cryptocurrencies, focus on their acceptability

[52] SHANAEVA S., SHARMAA S., GHIMIREA B., SHURAEVAB A., (January 2020), *Taming the Blockchain Beast? Regulatory Implications for the Cryptocurrency Market*. Research in International Business and Finance Volume 51, 101080. https://doi.org/10.1016/j.ribaf.2019.101080.

[53] ENOKSEN F. A., Landsnes Ch. J. , LUCIVJANSKÁB K., MOLNÁR P., (August 2020), *Understanding Risk of Bubbles in Cryptocurrencies.* Journal of Economic Behaviour and Organization 176 (2020) 129–144. https://doi.org/10.1016/j.jebo.2020.05.005.

[54] On the following website, called "Coinmap" is possible to see and find all the cryptocurrency merchants and ATMs of the world. However, its use should be done with caution since it is based on community feedback.

Coinmap (Accessed on August 2020), *Crypto ATMs & Merchants of the World - Coinmap.Org*. Available at https://coinmap.org/.

2.1.1 Volatility

It is in many economists' opinion that cryptocurrencies cannot be considered as a fiat currencies since their value is too volatile. If compared to fiat currencies, digital coin's price may increase or decrease by 30% (precisely 29. 74%[55]), looking at a short-term time horizon, i. e. 12 months or 52 weeks.

Data $ and €	Period	bitcoin		Period	ethereum	
Price	Aug-20	$11.863,58	€ 9.984,03	Aug-20	$398,27	€ 337,71
52 Week Low	Jan-19	$4.106,98	€ 3.466,55	Jan-19	$95,18	€ 80,34
52 Week High	Jan-19	$12.034,14	€ 10.157,58	Jan-19	$411,23	€ 347,08
Δ 52 week		**34,13%**			**23,15%**	
All Time Low	Jul-13	$65,53	€ 55,31	Oct-15	$0,42	€ 0,36
All Time High	Dec-17	$20.089,00	€ 16.956,38	Jan-18	$1.432,88	€ 1.209,38

Table 5a: Cryptocurrencies prices, historical data and mean price change

(Data source: https://coinmarketcap.com/)

Data $ and €	Period	tether		Period	ripple	
Price	Aug-20	$1,00	€ 0,85	Aug-20	$0,30	€ 0,26
52 Week Low	Jan-19	$0,90	€ 0,76	Jan-19	$0,12	€ 0,10
52 Week High	Jan-19	$1,08	€ 0,92	Jan-19	$0,34	€ 0,29
Δ 52 week		**83,29%**			**33,46%**	
All Time Low	Sep-19	$0,00	€ 0,00	Jul-14	$0,00	€ 0,00
All Time High	May-17	$1,21	€ 1,02	Jan-18	$3,84	€ 3,24

Table 5b: Cryptocurrencies prices, historical data and mean price change

(Data source: https://coinmarketcap.com/)

[55] This **mean** (**29,74% ≈ 30%**), illustrated particularly in Table 5c, was computed as the average of the quotient of the individual currencies shift (given simply by the formula):

$$\left[\left(\frac{52\ Week\ Low}{52\ Week\ High}\right)*100\right]$$

However, **Tether's quotient was not taken into account** since it would otherwise misrepresented the overall price change of the digital currencies over the time horizon equal to 12 months or 52 weeks.
CoinMarketCap (Accessed on August 2020), Available at https://coinmarketcap.com/
For further details, *see also*:
Attachment 1a – 1b: Cryptocurrencies prices, market capitalization and other metrics in **USD $**. (Source: CoinMarketCap (Accessed on August 2020), Available at https://coinmarketcap.com/) and
Attachment 2a – 2b: Cryptocurrencies prices, market capitalization and other metrics in **EUR €**. (Source: CoinMarketCap (Accessed on August 2020), Available at https://coinmarketcap.com/).

Data $ and €	Period	bitcoincash		Mean (not considering Tether)
Price	Aug-20	$304,87	€ 257,75	
52 Week Low	Jan-19	$139,22	€ 117,70	
52 Week High	Jan-19	$493,03	€ 416,84	
Δ 52 week		**28,24%**		**29,74%**
All Time Low	Dec-18	$75,03	€ 63,43	
All Time High	Dec-17	$4.355,62	€ 3.682,50	

Table 5c: Cryptocurrencies prices, historical data and mean price change

(Data source: https://coinmarketcap.com/)

As a result, the high volatility they present could entail great risks, especially for less experienced investors. The latter, who are looking for high gains in the short term, may have to face major losses due to a lack of knowledge about the subject. Furthermore, this oscillating behaviour may lead to the conclusion that cryptocoins could not represent means of value reserve due to their instability over the time. This creates insecurity for those who would like to keep their capital in digital coins.

2.1.2 Legislation

As it will be described and expanded in the following paragraphs, not all countries have already regulated and clarified their position regarding the coin's legislation. Operating in a market or respectively using a payment instrument, which is leaving out the legislative basis, creates also a lack of protection. Moreover, the lack of regulation may push even the least experienced to operate in a market in which they do not have enough knowledge.

2.1.3 Corruption

Regardless of the currency or payment instrument used, there is always a risk of corruption. Corruption can be defined as the abuse of a position of trust for obtaining an undue advantage expecting in return the payment of a large sum of money[56]. The possibility of making a payment, or rather a transfer of cryptocurrencies, in order to obtain a future advantage position, combined with the fact that blockchain is a distributed

[56] For further details, *see also*: Altalex, (October 2018), *Corruzione*. Quotidiano di informazione giuridica, available at https://www.altalex.com/documents/altalexpedia/2013/06/03/corruzione.

technology accessible to anyone with the minimum necessary "equipment", means that there is no authority controlling the flows within it. In this way, those who intend to bribe an official or a person, thereby obtaining advantages, could deposit economic compensation simply by transferring the agreed sums between the various existing wallets[57]. Funds transferring through digital currencies could take place from one wallet to another, without anyone knowing who is actually transferring these funds. This is because the real identity of the individual operators is not declared, indeed one of the major characteristic of the coins is the pseudo – anonymization. Transactions do not require the identification by name, address or other individual's information. This means that individuals can purchase and enjoy numerous services, without being recognized. Hence, the anonymity of the wallets could cause problems and legal risks.

2.1.4 Money laundering

The criminal act of money laundering, which is defined as an act capable of nullifying the detection of origin, the discovery or the confiscation of assets, arising from a crime or a qualified tax crime[58], has always been a global problem. The main problem related to recycling is particularly the possibility of anonymously financing the cryptocurrency system. This is done by selling cryptocurrencies privately, or by posting simple online advertisements or on blogs. Since authorities do not regulate exchanges, no one has any real, effective control over these transactions. For those interested in buying cryptocurrencies, so that they can "clean up" money from criminal activity or tax evasion, it is sufficient to contact one of these sellers. When the seller and the buyer meet, the latter will pay the agreed amount in cash and within a few minutes, the seller will transfer the cryptocurrencies to the buyer's address. Of this transition will not remain any trace, and recyclers now have a cryptocurrency amount that they can freely spend at all retailers of goods or services that accept payment in digital currencies. However, the main problem is not only related to the possibility of using digital currencies derived from an illicit monetary sum. Bitcoins and other cryptocurrencies can be transferred internationally, especially to countries that do not pay particular attention to anti-money laundering laws.

[57] As previously mentioned, a **cryptocurrency wallet** is a secure digital wallet used by users in order to store, send, and receive digital currency (most of the existing digital coins have an official wallet of their own).

[58] For further details, *see also*: Brocardi, (June 2020), *Art. 648 bis codice penale – Riciclaggio*. Raccolta di testi della costituzione e dei quattro codici principali dell'ordinamento giuridico italiano, available at https://www.brocardi.it/codice-penale/libro-secondo/titolo-xiii/capo-ii/art648bis.html.

The most significant factor is precisely the possibility of making transitions in total freedom and with guaranteed anonymity.

2.1.5 Digital extortion and Ransomware

Blackmail in order to gain illicit profit is also possible through payment in cryptocurrencies. As with other risks, this is due - again - to the anonymity of the wallets. Whoever asks for compensation, by blackmailing or misleading a person, commits a digital extortion without being physically discovered. The impossibility of seeing who is behind each wallet makes it impossible to detect any attacker. The cases can be multiple, e.g. a company that has suffered a data theft, or the deletion of such data, may be forced to pay a sum imposed by the perpetrators to retrieve its data.

Ransomware, which is a malicious software that infects computers and devices, attacks the latter by displaying messages demanding fees to be paid in order to reobtain the functionality of the system[59]. This type of malware is a criminal money making scheme that can attack PCs through deceptive links in email messages or websites. Starting from 2016, cybersecurity experts have noted an increase in this type of cyber-attacks. A recent attack occurred on the city of Riviera Beach (Florida - June 2019), in which the city official paid hackers 65 Bitcoin, i.e. $592,000[60], as a result of public and private computer systems (and their data) withheld hostage. As in the other cases, the peer-to-peer architecture of the cryptocurrency enables payment of ransom remotely and anonymously.

2.1.6 Fraud

No one can know, or at least a few can, whether a cryptocurrency will continue to prevail in the future, whether its value will fluctuate minimally or, as seen above, strong peaks both rising and falling will occur, or whether it will end in bankruptcy. The risk of frauds appears and relates mainly to the ICOs (which will be discussed and described later), especially since the business projects presented on the dedicated platforms are not always real and true. In the past, there have been cases where a project, although presenting good initiative, smart planning, and success for the future, went bankrupt and

[59] Kaspersky, (June 2020), *What is Ransomware?*. Available at https://www.kaspersky.com/resource-center/definitions/what-is-ransomware.
[60] DOUGLAS J. C., JOHAN S., PANT A. (July 2019), *Regulation of the Crypto-Economy: Managing Risks, Challenges, and Regulatory Uncertainty*. Journal of Risk and Financial Management 12, n. 3, 126. https://doi.org/10.3390/jrfm12030126.

all the operators who had bought the tokens or otherwise contributed to the financing, found themselves worthless. Among the most striking cases, Confido was one of the most impressive examples. Confido should have been an innovative crypto currency, which served as a guarantee deposit in a transition. The project raised $375,000 during its ICO launch[61]. However, at the end of the capital raising, the website was blacked out and its social networks (Facebook, Twitter and LinkedIn) were removed. Shortly afterwards the CEO, Joost van Doorn, published a letter explaining that there were legal problems. Actually, it turned out it was all a fraud. The capital raised vanished and all the investors found themselves with a loss despite the fact that the project seemed interesting.

A possible next step should be the regulation of the investment funds and their advisors. For example, in the U.S, the Investment Company Act of 1940[62] regulates the organization of companies, including mutual funds, which engage primarily in the investing, reinvesting, and trading securities. The Act requires these companies to disclose information about the fund, and its investment objectives, as well as the investment company structure and operations, to the investing public"[63]. It also regulates investment advisors, requiring firms to register with the SEC, and conform to regulations designed to protect investors. To the extent that ICOs are weakly regulated, their investment funds and advisors are following the same path. The SEC would may ensure the regulation of these funds, in accordance with the rules and regulations of the two acts regulating the non-digital securities[64].

2.1.7 Financing of illicit activities

As in the cases of corruption and money laundering, the anonymity of the portfolios and the absence of a central control body "facilitates" the possibility of capital being transferred for the purpose of financing terrorist activities or illicit trafficking. The possibility of transferring digital coins between wallets is an opportunity for those who

[61] KHARPAL A., (November 2017), *Cryptocurrency Start-up Confido Disappears with $375,000 from an ICO, and Nobody Can Find the Founders*. CNBC, available at https://www.cnbc.com/2017/11/21/confido-ico-exit-scam-founders-run-away-with-375k.html.
[62] For further details, *see also*: **Investment Company Act of 1940,** (Accessed on August 2020), *Investment companies*. Available at https://www.govinfo.gov/content/pkg/COMPS-1879/pdf/COMPS-1879.pdf.
[63] SEC.gov – US Securities and Exchange Commission, (May 2020), *Laws and Rules*. Available at https://www.sec.gov/investment/laws-and-rules.
[64] DOUGLAS J. C., JOHAN S., PANT A. (July 2019), *Regulation of the Crypto-Economy: Managing Risks, Challenges, and Regulatory Uncertainty*. Journal of Risk and Financial Management 12, n. 3, 126. https://doi.org/10.3390/jrfm12030126.

want to finance terrorist activities. In addition, those who work in the dark web[65] can easily buy weapons or similar items by paying in cryptocurrency. Funding can also be provided for activities other than terrorism, such as illicit drug trafficking, toxic waste, or animals and other illegal activities. Illegal activity covers a substantial proportion of the users and trading activity in bitcoin. Approximately, nearly 26% of all users and close to one-half of bitcoin transactions (46%) are associated with illegal activity. It has been estimated that 27 million bitcoin market participants, using BTC for illegal purposes, annually generate almost 37 million transactions, which were worth about $76 billion, and collectively hold around $7 billion worth of bitcoin[66]. Indeed, through the payment in cryptocurrency, a secure channel is obtained and it does not endanger those who finance these activities, overcoming then the problem and complications associated with a payment with fiat currencies. In this way, criminals have fewer problems in transferring funds and above all, they know that even in the event of interception of suspicious transitions their identities will be concealed.

2.1.8 Embezzlement

In the world of traditional currencies, when bank details and credentials are stolen in order to access e-banking and empty the account, the reference bank can block the latter and then re-establish it. Even with theft of credit cards or withdrawals from an ATM, it could be possible to trace the responsible and to block the card avoiding further losses. However, all these measures are implemented precisely by a bank, which provides assistance in the event of misappropriation. The same logic does not occur in the cryptocurrency world. The lack of a central authority - in this case, the bank - creates an "empty space in the assistance and control system". If someone misappropriates or discovers the access keys to a wallet, he or she is free to steal its contents. Additionally, if access keys are lost, the owner is no longer able to access to the wallet, making difficult to

[65] The **Dark Web** is the "dark side of the Internet", representing over 90% of the entire Internet and in which hackers and cybersecurity operate. On the Dark Web is possible to find, sell and buy everything, especially illegal goods or services such as drugs, weapons, counterfeit money, fake degrees, stolen identities, fictitious bank accounts etc. It is also a component of the **Deep Web**, which describes the widest range of content that does not appear through normal Internet browsing activities and requires specific browsers such as Tor (an anonymous network able to mask the real IP from which you connect) for navigation.
BAGGIO A., (July 2019), *Dark Web: cos'è, come accedere e pericoli*. Available at https://baggioandrea.com/dark-web.

[66] PUTNINS T., (January 2019), *Sex, Drugs, and Bitcoin: How Much Illegal Activity Is Financed through Cryptocurrencies?*. University of Technology Sydney, SSE Riga, BICEPS. Available at https://freepolicybriefs.org/wp-content/uploads/2019/02/freepolicybrief_jan212019.pdf.

recover the money or to find someone to repay them. Moreover, embezzlement can occur not only between two actors, or for the theft of passwords and access data, but can come directly from a hacker[67]. Many attacks carried out at exchanges happened, and the figures subtracted are near to millions. In June 2018, one of South Korea's largest exchanges, Coinrail, experienced a cyber-attack. The news was immediately confirmed by the same platform through its Twitter profile. To the platform contents has been subtracted $40 million in cryptocurrencies, causing the price of several digital currencies to collapse by more than 15%[68]. This computer attack turns out to be one of the most significant attacks ever carried out. There have been many other attacks that have taken large sums of money or cryptocurrencies. To protect from this risk, it is important not keeping funds on the exchange platforms and move the cryptocurrencies on special wallets. When deciding to buy digital currencies, individuals must choose carefully which platform to trade on. This is because certain sites provide better protection, although no one guarantees for its investors.

2.1.9 Crypto-Jacking

Cryptojacking[69] (also called malicious cryptomining) is an emerging online threat, which hides on a computer or mobile device and uses machine resources to "generate" types of virtual money, indeed cryptocurrencies. It is an expanding threat, able to seep web browsers and compromise any type of device, from desktop PCs to laptops to smartphones and even network servers. As with most cyber-attacks, the main aim is achieving profit but, unlike other threats, this system is designed to remain completely hidden. Hence, it is a method used by hackers to mine digital coins without owners' awareness, while other sites encourage this activity by sharing information and profits of the mining.

2.1.10 Taxation Fraud, tomorrow's tax havens?

Tax havens enable taxpayers to hide earnings from home - country tax authorities, by offering an environment with little taxation. Worldwide, revenues loss, as consequence of

[67] The term **hacking** refers to an illegal activity carried out by hackers, which consists of penetration into a computer system by exploiting their own technical programming skills.
[68] CoinDesk – ZHAO W., (June 2018), *Coinrail Exchange Hacked, Loses Possibly $40 Million in Cryptos*. Available at https://www.coindesk.com/coinrail-exchange-hacked-loses-possibly-40-million-in-cryptos.
[69] Malwarebytes, (Accessed on August 2020), *Cryptojacking – What Is It, and How Does It Work?.* Available at https://www.malwarebytes.com/cryptojacking/.

this havens, amount to $255 billion, with $40 billion to $70 billion for the U.S alone. In the case of digital coins, although having no jurisdiction per se, coins are characterised by two essential elements of traditional tax havens, which are the absence of jurisdiction of operation and anonymity. Therefore, they would not be subject to taxation at source[70]. In addition to this framework, another way to extend this concealment is the usage of tax-exempt buying agents to exchange financial contract obligations. When dealing with swap instrument, the agent receives BTC, ETH, USDT, XRP, BCH etc., and then buys a security with legal currency value. Any earned dividends would be distributed in BTC or other coins value to the swap holder. Gains (or losses) would be paid following same process. During all these operations, the BTC holder would be impossible to trace and the agent would have no tax liability as results of his or her tax - exempt status.

2.2 Analysis of the regulatory framework of central banks and international economic institutions

Central banks and other international economic institutions play a crucial role in the financial sector. The following paragraph will describe the work of these important entities in this context, in order to identify how and why States should decide and regulate cryptocurrencies, whether as means of payment or means of investment. The European Central Bank (ECB), the Federal Reserve (FED), the Bank for International Settlements (BIS) and the European Securities and Markets Authority (ESMA) will be analysed hereinafter.

2.2.1 European Central Bank – ECB: "Nobody backs the Bitcoin"

Earlier in 2012, with the imminent spread of cryptocurrencies, the ECB[71] published a report entitled "Virtual Currency Schemes", which defined and classified the characteristics of cryptocurrencies. However, at the time, it was specified also that cryptocurrencies did not represent a danger to price stability[72] due to their lower volume and complex use. Yet, the lack of regulation in this filed is recognised, even though it was partially covered by the Directive 2009/110/EC "Electronic Money Directive", which

[70] EscapeArtist – International Strategies, (September 2017), *Cryptocurrency Is the New Tax Haven*. Available at https://www.escapeartist.com/blog/cryptocurrency-new-tax-haven/.
[71] For further details, *see also*: European Central Bank (Accessed on August 2020), Available at https://www.ecb.europa.eu/home/html/index.en.html.
[72] The ECB main objective is to maintain price stability in order to ensure the strength of the euro

applied three criteria in order to define electronic money, saying that it should be stored electronically, be issued on receipt of funds of an amount not less in value than the monetary value issued and be accepted as a means of payment by undertakings other than the issuer[73]. Nonetheless, the implicit question "can Bitcoin be considered an electronic money institution?" raised doubts regarding the fact that BTC (or other digital coins) may comply with the first and third criteria, but not with the second, regardless of the fact that the conversion into other currencies and the mining activity (which leads to money creation without the receipt of funds) were not still contemplated. As of 2015, due to the sharp increase in these currencies, the bank issued another report[74], which specified, more forcefully, the danger of payment systems, in particular for users who were exposed to the risk of exchange rate, volatility and to the danger of anonymity and frauds. In the light of these issues, the ECB has begun to recommend to national authorities, in particular to the central banks of European countries, that they issue and publish the necessary documentation in order to protect their financial and monetary markets. In 2018, the then-President of the Central Bank, Mario Draghi, declared that

"A euro today, is a euro tomorrow. Its value is stable. The value of Bitcoin oscillates wildly".[75]

This is why the ECB does not consider the cryptocurrency a currency. Also for this second reason:

"The euro is backed by the European Central Bank, the dollar by the Federal Reserve; currencies are backed by the central banks or their governments. Nobody backs the Bitcoin".[76]

Summarising its opinion, bitcoin would not represent a currency because of its volatility and the absence of a central authority. Additionally, he further told that it is not ECB's task to regulate or even ban Bitcoin and simultaneously defined blockchain technology as "very interesting" and capable, probably, of strengthening an economy and creating many benefits. Although it is not yet completely safe and, in any case, need to be analysed

[73] European Central Bank – ECB, (October 2012), *Virtual currency schemes*. (ISBN: 978-92-899-0862-7), available at https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf.
[74] European Central Bank, (February 2015), *Virtual Currency Schemes: A Further Analysis*. Available at https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemesen.pdf.
[75] La Repubblica, (February 2018), *Draghi sul Bitcoin: "Attenzione, ma non spetta alla Bce bloccarlo*. Available at https://www.repubblica.it/economia/2018/02/13/news/bce_askdraghi_bitcoin_crisi-188765722/.
[76] La Repubblica, (February 2018), *Draghi sul Bitcoin: "Attenzione, ma non spetta alla Bce bloccarlo*. Available at https://www.repubblica.it/economia/2018/02/13/news/bce_askdraghi_bitcoin_crisi-188765722/.

carefully. Although the statements made by the European Bank have caused a stir, it can be underlined that the ECB will presumably not make specific regulations for cryptocurrency, but will nevertheless continue its efforts to inform, document and maintain a high level of attention and information regarding digital currencies, as carried out and reported in Directive 2018/843[77] concerning the prevention of the financial system against purposes of money laundering or terrorism financing.

2.2.2 Federal Reserve – FED, an open debate on digital developments

The Federal Reserve System[78] is the central bank of the United States. It performs general functions to promote the effective operation of the U.S. economy and, more generally, the public interest. The U.S. regulatory landscape for digital currencies has been discussed especially in December 2019, by Governor Lael Brainard on the debate on digital developments in the world of monetary policy and central banking[79]. American regulators and policy makers, to date, have not yet developed a framework for regulating private digital currencies. By recognising the potential of global stablecoins, US revisit questions over what form this money can take and who and how should issue it (while also define how payments should be recorded and settled). It is in FED opinion they stablecoins aspire to achieve functions or traditional money, without relying on confidence in an issuer - i.e. a central authority – to "stand behind" these coins. As previously mentioned and also reported by Leal Brainard

"In the United States, the regulatory framework for cryptocurrencies is not straightforward".[80]

The current regulation is based largely on whether a digital coin represent and therefore is deemed to be a security or has, instead, associated derivative financial products and

[77] Official Journal of the European Union, (May 2020), Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the *Prevention of the use of the financial system for the purposes of money laundering or terrorist financing*, and amending Directives 2009/138/EC and 2013/36/EU. European Parliament and the Council of the European Union, Pub. L. No. 32018L0843, OJ L 156 (2018), available at http://data.europa.eu/eli/dir/2018/843/oj/eng.
[78] For further details, *see also*: Federal Reserve (Accessed on August 2020), Available at https://www.federalreserve.gov/.
[79] Board of Governors of the Federal Reserve System, (December 2019), *Update on Digital Currencies, Stablecoins, and the Challenges Ahead*. Available at https://www.federalreserve.gov/newsevents/speech/brainard20191218a.htm.
[80] Board of Governors of the Federal Reserve System, (December 2019), *Update on Digital Currencies, Stablecoins, and the Challenges Ahead*. Available at https://www.federalreserve.gov/newsevents/speech/brainard20191218a.htm.

whether a supervisory agency overseeing these activities is existing or not. Furthermore, the legal basis challenges are likely to be inherently cross-border in nature, since physical borders do not bound cryptocurrencies. Some proponents argue that digital currencies issued by central banks would be a safer alternative with respect to privately issued stablecoins, because they would de facto be a direct liability of FED/ECB etc. Considering the American robust and diverse banking system, which provides services with a wide array of digital payment options, the country may consider whether it could provide safer and more efficient payments, taking into consideration the raise of profound legal, policy and operational concerns. In this regard, the Federal Reserve is actively working to introduce faster payment system that reduce frictions and delays, while preserving consumer and data protections, but not introducing actually cryptocurrencies yet.

2.2.3 Bank for International Settlements – BIS, an analysis of cryptocurrencies' impacting factors

The purpose of the Bank for International Settlements (BIS) is to promote cooperation between central banks while maintaining stability in financial markets. It acts as the "Bank of central banks". The BIS's publications and documentation on cryptocurrencies are numerous. The first report was published in 2015 under the title "Digital Currencies"[81]. The paper examines two main aspects, namely factors influencing the development of cryptocurrencies and its implications as a decentralised payment instrument for central banks. The factors identified as influencing future development are divided on the supply and demand side.

Supply	Demand
Fragmentation	Security
Scalability and effiency	Cost
Pseudonumity	Usability
Tecnical and security concers	Volatility and risk of loss
Business model stainability	Irrevocability
	Processing speed
	Cross-border reach
	Data privacy/pseudonymity
	Marketing and reputational effects

Table 6: Impacting factors in cryptocurrencies' future *(Source: http://www.bis.org/cpmi/publ/d137.htm)*

[81] Bank für Internationalen Zahlungsausgleich, (November 2015), *Digital Currencies*. Available at http://www.bis.org/cpmi/publ/d137.htm.

On the supply side, BIS identified that the development of digital currencies has been driven mostly by private sector non – banks. Banks tended not to engage directly with these means, as a consequence of risk and uncertainty over legal or compliance issues. Only recently, they are exploring this business, for instance by investing in companies that specialise in providing digital currency services. The influencing supply side factors based on future development on digital currencies (DCs) are numerous. A first factor could be the fragmentation. This means that to date, many DCs are in circulation, each of them with different transaction processes and approaches for their use and acceptance as means of payment. This could represent an obstacle to achieve the "mass" necessary to realise a great users' network. Digital coins' scale and acceptance are limited, so are the number of transactions currently being processed. Although an increase in number of transactions and efficiency could be the direct answer, these increments cannot be taken for granted. Some currency schemes need high and intensive resources in terms of energy, computing power and speed. Once again, pseudonymity peculiarity may discourage financial system participants from direct use, since anti-money laundering and combating the financing of terrorism requirements (AML/CFT) could be difficult to satisfy in relation to DCs transactions. Technical and security concerns also emerge. Consensus among network participants is necessary for ensuring the uniqueness of the ledger. However, malicious actors may introduce fraudulent transactions, altering this equilibrium. Lastly, in the long term, building a sustainable business model for some DCs schemes may represent the main challenge. Incentives to support schemes are related directly to the issuance of the currency, which often oscillates widely. Costs incurred might be significant and open questions whether these incentives or raised fees compensating loss of revenues are sufficient. Moreover, not all schemes follow the same pattern, as well as operation costs and transactions fees vary across initiatives.

After the discussion on the supply side, BIS described the potential factors that could influenced the future demand for digital currencies and related payment mechanism. The first analysed factor is security, intended as the DCs usage on ledgers and connected risk of loss. Indeed, security breaches may undermine "participants' confidence" and cause the loss of specific information, which provide him or her the "ownership" of currencies stored in the distributed ledger. On the other side, lower transaction fees, with respect to traditional means of payments, may be offered. Some schemes reward processes of payments with newly issued units, which could have the potential for earning "capital

gains". For this reason, DCs may seem an attractive alternative to fiat currencies, especially when dealing with cross-border payments that usually involve high fees. Nonetheless, the downside is non-transparency of transaction costs and / or hiddenness of other costs, e.g. conversion fees. Payment processes are not so easy and intuitive. Many providers are therefore trying to facilitate and improve the network participants' experienced. Volatility and risk of loss are mentioned too, since by choosing to hold DC asset, users could may face costs and losses associated with price and liquidity risks. Furthermore, distributed ledger schemes often lack dispute resolution facilities, offering simultaneously the irrevocability of payments. This represents a double-edged sword, as merchants will surely be paid, but consumers may be discouraged and deter the coins adoption. Among factors that positively influence the future development of cryptocurrencies, it is recognized that DCs have the potential to settle transactions faster (and with large-value payments) with respect to fiat currencies, although speed can varies according to each schemes technicality. Besides, distributed ledgers schemes are open networks with a global scope. They do not distinguish between participants based on certain locations. Therefore, values can be transferred freely and given the decentralised nature, it is difficult to impose restrictions. Although pseudonymity attractiveness may be driven by the will to circumvent regulations, consumers' preferences may be driven by the will to protect personal information, like the address, credit card numbers, bank credentials etc. Lastly, it can be concluded that these coins surely represent an innovative and interesting payment method. Users may be attracted simply to the newness and uniqueness of the technology, merchants may receive benefits thanks to the boost in the demand goods or services sold.

The document describes also the possible fields of action within which regulation can operate, finding possible applications with a long-term view:

Main options	Type of actions / Country examples
Information/moral suasion	• Public warnings • Investor/buyer information • Research papers *Most countries have issued these types of warnings, research or information notes.*
Specific stakeholder regulation	• Regulation of digital currency administrators (record-keeping, reporting, AML/TF). Example: United States. • Regulation of digital currency exchangers (record-keeping, reporting, prudential measures, AML/TF). Examples: United States, France, Canada, Singapore, Sweden. • Consumer protection measures (payment guarantee, redeemability etc).

Table 7a: Broad classification of the main types of regulatory action

(Source: http://www.bis.org/cpmi/publ/d137.htm)

Main options	Type of actions / Country examples
Interpretation of existing regulations	• Application of regulation based on "interpretation" of how existing framework (eg tax law treatment) may be applied to digital currencies or digital currency intermediaries. Example: United States.
Overall regulation	• Dedicated regulation, covering all three aspects (consumer protection, prudential/organisational rules for stakeholders, and specific operating rules as payment systems).
Prohibition	• Ban (or amount cap) on retail Bitcoin transactions. • Ban on digital currency acceptance by retailers. • Ban on digital currency-based financial instruments. Examples: China, Belgium. • Ban on digital currency exchangers. • Ban on Bitcoin transactions between banks. Examples: China, Mexico.

Table 7b: Broad classification of the main types of regulatory action

(Source: http://www.bis.org/cpmi/publ/d137.htm)

As such, a possible regulation is not introduced or specified. Digital coins' risks and concerns are listed and analysed, reporting that

> *"Because of their anonymity, it is difficult to quantify the extent to which cryptocurrencies are used to escape controls on capital movements or taxes or, more generally, to carry out illegal transactions".*[82]

A final discussion includes investor protection's subject, the lack of standards for ICOs and the need of targeted laws against the misuse of blockchain technology.

2.2.4 European Securities and Markets Authority - ESMA

The main purpose of the European Securities and Markets Authority[83] is maintaining and guarantee investors protection while promoting financial market stability. In 2015 (and subsequently expanded in 2019), ESMA published a first study called "Call for Evidence"[84] - [85]. The Authority has mainly focused on three issues: investment products that have cryptocurrency as their underlying, investments and transfers of securities-based cryptocurrencies and other implementation of blockchain technology regarding investments. As an independent authority, ESMA , together with the European Banking Authority (EBA)[86] and the European Insurance and Occupational Pensions Authority (EIOPA)[87], published a report (March 2018) aiming to make consumers aware of the risks arising from the use of virtual currencies[88]. Among these, mainly mentioned "dangers" (as well as already seen for previous mentioned entities) are the extreme volatility and bubble risk, since most virtual currency (so called "VCs" in the document) are subject to

[82] Bank für Internationalen Zahlungsausgleich, (November 2015), *Digital Currencies*. Available at http://www.bis.org/cpmi/publ/d137.htm.
[83] For further details, *see also*: European Securities and Markets Authority (Accessed on August 2020), Available at https://www.esma.europa.eu/.
[84] European Securities and Markets Authority, (April 2015), *Call for evidence - Investment using virtual currency or distributed ledger technology*. Available at https://www.esma.europa.eu/sites/default/files/library/2015/11/2015532_call_for_evidence_on_virtual_currency_investment.pdf.
[85] European Securities and Markets Authority, (September 2019*), Call for evidence Effects of product intervention measures regarding CFDs and binary options on market participants and clients*. Available at https://www.esma.europa.eu/sites/default/files/library/esma-35-432090_call_for_evidence_on_mifid_ii_product_intervention_powers.pdf.
[86] For further details, *see also*: European Banking Authority (Accessed on August 2020), Available at https://eba.europa.eu/.
[87] For further details, *see also*: European Insurance and Occupational Pensions Authority (Accessed on August 2020), Available at https://www.eiopa.europa.eu/.
[88] European Securities and Markets Authority, European Banking Authority, European Insurance and Occupational Pensions Authority, (March 2018), *ESMA, EBA and EIOPA warn consumers on the risks of Virtual Currencies*. Available at https://www.esma.europa.eu/sites/default/files/library/esma50-164-1284_joint_esas_warning_on_virtual_currenciesl.pdf.

price volatility and showed pricing bubble behaviour, the absence of protection since VCs remain unregulated under EU law, the lack of exit options, which means that by deciding to buy virtual currencies, the consumer is at the risk of not being able to trade coins or to exchange them for traditional ones, for a long period of time. The lack of price transparency emerges too. De facto, the price formation is often not transparent and consequently, the risk of unfair exchange when buying or selling the digital coins is high. Additionally, some coins suffered severe operational problems, trading disruption - for instance. The result was the inability of to buy and sell at the desired time or to have suffered losses caused by prices fluctuations. Lastly, in most cases provided information are incomplete and/or difficult to understand by general users which leads to the unsuitability of virtual currency for investment or retirement planning, induced indeed by the uncertainty of their future trends and possible unreliability of related exchange platforms and wallet providers.

The identification and publication of these risks and the possibility of investing in cryptocurrencies through contracts for difference[89] (CFDs) and in particular, the promise of high returns as well as the ease of trading through digital platforms, at a time of historically very low interest rates, have created attractive earning opportunities for investors. However, this resulted in significant losses as the products were very complex and the leverage effect was excessive. This is reason behind ESMA introduction of new rules aiming to strengthen these crypto-currency contracts. Although these measures do not only concern cryptocurrencies, but also other underlyings, the authority's will was to reduce or restrict the leverage effect. New rules mainly consist of two limits, namely new leverage criteria for position's opening, and automatic position's closure when the account margin is reached. The European Securities and Markets Authority has focused on several aspects of cryptocurrency, implying that there digital currencies should be

[89] **Contract for Difference** is a derivative instrument and can be defined as a contract between two parties in which the buyer, against payment of an interest rate, receives the return on an underlying financial asset while the seller of the contract, against payment of interest, commits to pay the return on the underlying asset. The two parties then agree to exchange the cash flow arising from the differential between the price of an underlying financial asset at the opening time and at the closing time of the contract. Through CFDs, parties operate on contracts price differences, gaining or losing depending on the difference between the purchase price and the selling price of the underlying asset, multiplied by the number of traded CFDs. It is possible to buy (long) or sell (short) the latter.
For further details, *see also*: Borsa Italiana, (Accessed on August 2020), *CFD: Contract for Difference*. Available at https://www.borsaitaliana.it/notizie/sotto-la-lente/cfd-contracts-for-difference.htm.

considered not only as means of payment, but can interconnect to a wide array of investments.

2.3 Analysis of the international regulation

After analysing the regulatory framework of central authorities, it is necessary to investigate and examine the international legislative measures, particularly regarding the most developed countries such as United States, China and the general framework of European States.

Some countries are "global advocates" (dark green), pioneers whose governments are enabled to promote digital coins and their parity, while others have taken the opposite path ("banned" – red) and actively banned these coins and/or even threaten punitive sanctions to users. In Bangladesh for instance, passed a law [90] (2014) stating that individuals caught using cryptocurrencies could be jailed under the strict anti-money laundering laws. From one end to another, there are three various shades. Light green countries represent nations that are moving to the equal status of cryptocurrencies but are still facing some barriers ("developing" countries). "Fence – sitters" / yellow countries did not question about individual trading. They just provide shortly some legal or regulatory protection to users. Finally, orange countries ("hostile") represent governments that limit the virtual currencies usage but do not completely banned their exchanges.

[90] Bangladesh Bank - Bangladesh Financial Intelligence Unit, (September 2012), *Guidance notes on prevention of money laundering and terrorist financing*. Available at https://www.bangladesh-bank.org/aboutus/regulationguideline/aml/16sep2012guideline.pdf.

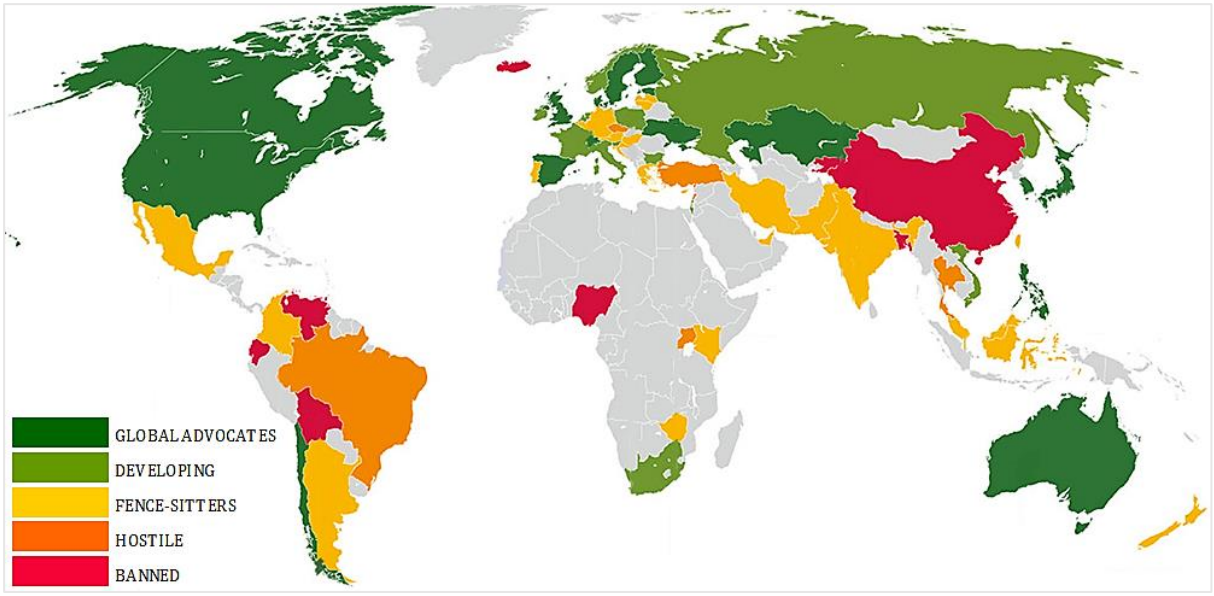


Figure 13: Governmental attitudes toward cryptocurrencies *(Source: https://blogs.thomsonreuters.com/answerson/world-cryptocurrencies-country/)*

It is important to specify that each country has its own legislation (or should have) and the law is imposed according to the regulatory structure of each. There are many actors involved in a legislative system. On one hand, there are the nations, which, through the authorities responsible for drafting and implementing laws, are auto monitoring their territory. On the other hand, there are international organizations, such as the Financial Action Task Force (FATF)[91], which act and influence all the member countries of these organizations. In this way, the legislative system does not only derive from the will of each state government, but also from other bodies which aim for supervising and contributing to the proper functioning of the markets. Lastly, another interesting aspect of this international framework is the fluidity of the terms used to describe the product falling within this ambit. De facto, various forms of what is known as cryptocurrency are similar and differ only as a consequence of the jurisdiction of which they are subjected. Some of these forms used by countries are listed in the following table.

[91] **Financial Action Task Force** (FATF) is an intergovernmental entity whose objective is to develop strategies to fight money laundering, prevent terrorist financing and proliferation of weapons of mass destruction financing. Thirty-five members compose the group: states and regional organisations representing the major international financial centres, as well as the most relevant international financial institutions (including the IMF, the World Bank, ECB, the United Nations, Europol and Egmont).
For further details, *see also*: Financial Action Task Force (Accessed on August 2020), Available at http://www.fatf-gafi.org/.

Term	Country
Digital currency	Argentina, Thailand, and Australia
Virtual commodity	Canada, China, Taiwan
Crypto-token	Germany
Payment token	Switzerland
Cyber currency	Italy and Lebanon
Electronic currency	Colombia and Lebanon
Virtual asset	Honduras and Mexico

Table 8: International terminology for cryptocurrencies

2.3.1 United States of America, a differing picture per State

Currently in U.S., cryptocurrencies are not considered a legal tender and their legislation, unlike other nations, varies or may vary from state to state. Indeed, even if the country has one of the highest number of crypto users, the highest number of BTC ATMs and trading volumes, there is a differing picture per State. Montana, South Carolina, Tennessee, Kansas and Texas appear to be more "friendly" based on state regulation. New York[92], New Hampshire, North Carolina, Georgia, Hawaii, Connecticut, Washington and New Mexico are not as favourable as the others are, while the remaining 37 territories have not yet taken a position. In order to carry out a comprehensive legislative analysis, the main rules in force, at national level, will be described. In 2013[93], the Financial Crime Fighting Network (FinCEN) declared that cryptocurrencies are not yet a legal tender. This does not mean that it is prohibited to use them, but that the parties involved in the transaction must agree on the same method of payment and companies operating which such currencies must comply with the laws against money laundering. In addition, the Securities Exchange Commission (SEC)[94], which is the authority responsible for

[92] New York officially wrote the **BitLincense Act** in 2015, giving BTC businesses and start-ups the possibility to operate within the State and later on (2017), Washington passed a bill which applied money transmitting laws to cryptocurrency exchanges (this **Act** was also mentioned in the paragraph 1.3.5 "*Ripple (XRP): a bridge currency for cross-border payments*").

[93] Financial Crimes Enforcement Network, (March 2013), *Application of FinCEN's Regulations to Persons Administering, Exchanging, or Using Virtual Currencies*. Available at https://www.fincen.gov/sites/default/files/shared/FIN-2013-G001.pdf.

[94] For further details, *see also*: U.S. Securities and Exchange Commission (Accessed on August 2020), Available at https://www.sec.gov/about.shtml.

protecting investors and maintaining an efficient market, stated that digital coins are digital assets that need an ongoing attention and review, or more precisely

"OCIE[95] will continue to monitor the offer and sale, trading, and management of digital assets, and where the products are securities, examine for regulatory compliance."[96]

OCIE's 2020 priorities seem more interested in the positive potential of financial technologies, with respect to the previous year. The office will continue to identify and examine SEC-registered firms engaged in the digital asset space, aiming to make sure that these coins will not be used for illegal purposes, while making sure that they meet the requirements for legal operations, i.e. KYC[97] (Know Your Customer) and AML (Anti Money Laundering).

2.3.2 China, from the bitcoin's prohibition to the country's own sovereign digital currency

China is one of the major countries that has embarked, at least initially, on a road of prohibition towards cryptocurrencies. It is in fact one of the few countries in the world to have declared that these currencies are not a legal currency and as a result exchanges are declared to be illegal. The People's Bank of China[98] (PBOC or "中國人民銀行") has been conducting a study on digital coins for over three years, and has established a special institute to study these currencies. Zhou Xiaochuan, the bank's governor, expressed his opinion in March 2018 stating that the Chinese authorities do not recognise virtual coins, such as bitcoins, as a tool for retail payments (e.g. bills, coins, or credit cards). Zhou also added that the banking system does not accept any existing virtual currency or will not provide any relevant service[99]. Previously, in September 2017, the seven moderators of the government, i.e. the most important authorities in the country (the PBOC; the

[95] The **OCIE** is the SEC's Office of Compliance Inspections and Examinations.
[96] Cointelegraph, (January 2020), *US SEC Prioritizes Crypto Compliance in 2020, But Hints at Kinder Gentler Approach*. Available at https://cointelegraph.com/news/us-sec-prioritizes-crypto-compliance-in-2020-but-hints-at-kinder-gentler-approach.
[97] The term **know your customer** refers to a recognition process used by companies to verify the identity of their customers and then assess potential risks or illegal intentions in their relationship. **KYC** often refers to banking regulations and anti-money laundering regulations that regulate these activities. Customer recognition processes also cover companies of other types and sizes, with the aim of ensuring their agents, advisors and distributors anti-corruption compliance.
[98] For further details, *see* also: People's Bank of China (Accessed on August 2020), Available at http://www.pbc.gov.cn/en/3688006/index.html.
[99] The Law Library of Congress - Global Legal Research Center, (June 2018), *Regulation of cryptocurrency around the world*. Available at https://www.loc.gov/law/help/cryptocurrency/cryptocurrency-world-survey.pdf.

Cyberspace Administration of China (CAC); the Ministry of Industry and Information Technology (MIIT); the State Administration for Industry and Commerce (SAIC); the China Banking Regulatory Commission (CBRC); the China Securities Regulatory Commission (CSRC) and the China Insurance Regulatory Commission (CIRC)), jointly published an announcement in which attention was drawn to the prevention of financial risks due to ICOs, prohibiting them within the country. According to the announcement, the financing of ICOs that generally takes place with cryptocurrency, such as Bitcoin and Ethereum, generates the irregular sale and circulation of tokens, which in turn essentially represent public funding without approval, hence defined as illegal. The announcement had indicated that tokens or virtual coins involved in the financing of the ICO were not issued by monetary authorities. For this reason, they did not represent acceptable money since they did not have the same legal status as legal currencies. As early as December 2013, PBOC, MIIT, CBRC, CSRC and CIRC have issued a notice on the risks associated to bitcoin. The circular defined bitcoin as

> *"By nature a special virtual commodity, which does not have equal legal status as currencies and cannot and should not be circulated in the market as a currency."*[100]

According to the notice, banks and payment institutions in China cannot deal in BTC. Financial institutions are prohibited to use BTC pricing for products or services or from buying or selling bitcoins. Moreover, they may not provide directly or indirectly services related to them, including registering, settling, trading, clearing or other services; accept or use bitcoins as a clearing tool; or exchange bitcoins with Chinese Yuan[101] or foreign currencies. Recently, on the other hand, China's central bank stated that it is almost ready[102] to issue the country's own sovereign digital currency. The bank set up a research team in 2014, assigning to it the responsibility to explore the possibility of launching its own digital currency, with the purpose of cutting the costs of circulating traditional paper money while boosting policymakers' control of money supply. To date however, just few details of the plan were revealed. Firstly, the issuance of this "customized" digital currency will rely on a two-tier system, in which both the central bank and financial

[100] Ministry of Industry and Information Technology of the People's Republic of China, PBOC, CBRC, CSRC, and CIRC, (December 2013), *Notice on Precautions Against the Risks of Bitcoins*. Available at http://www.miit.gov.cn/n1146295/n1652858/n1652930/n3757016/c3762245/content.html.
[101] **Chinese Yuan** is the currency unit of the People's Republic of China, currently known as **Renminbi**.
[102] Reuters, (August 2019), *China's Sovereign Digital Currency Is "Almost Ready": PBOC Official*. Available at https://www.reuters.com/article/us-china-cryptocurrency-cenbank-idUSKCN1V20RD.

institutions will be legitimate issuers. Secondly, it was declared that this new coin would not solely rely on blockchain technology, as current blockchain technology would not be able to handle transaction volumes in China. Finally, it is noticed that if this new hypothetical virtual currency will actually materialize, it will be very interesting to observe and study its effects in terms of market's usage (both Chinese and global markets), its price fluctuations over the years and, above all, its impacts towards other cryptocurrencies, especially Bitcoin and Ethereum (or even fiat currencies like US Dollar)[103].

2.3.3 General framework of European States

The European Union mainly concerned and focused on money laundering and terrorist financing risk. It should be stressed that Member States must submit to and align with the standards dictated by the EU. It should also be recalled that each Member State has the euro as its reference currency and that the creation of a European crypto-currency, which could accompany the current one, is not currently planned[104]. Hereinafter, the existing legislative frameworks of Germany, France and Italy, as the main contributors to the EU in terms of both cryptocurrencies' regulation and monetary contributions[105] - [106], will be explained. Exception is made for UK, following its exit from the European Union (Brexit).

2.3.3.1 Germany

Germany, as the driving Member State of Europe, has always been willing to take a stand in order to regulate digital currencies and was one of the first to study the matter while accepting the coin without strong bans. According to Bundesbank expert[107] in the area of payments, Mr Dirk Schrade, BTC is neither a virtual currency nor a digital money since it is not part of the German monetary system and does not operate as fiat currencies do[108].

[103] For further details, *see also*: Bloomberg, (June 2020), *China's Digital Currency Could Challenge Bitcoin and Even the Dollar*. Available at https://www.bloomberg.com/news/articles/2020-06-01/china-is-making-cryptocurrency-to-challenge-bitcoin-and-dollar.

[104] Il Sole 24 ORE, (November 2019), *L'Ecofin: no alle criptovalute prima che ci siano regole della Ue*. Available at https://www.ilsole24ore.com/art/l-ecofin-no-criptovalute-prima-che-ci-siano-regole-ue-AC4gD6w.

[105] Statista, (January 2020), *Which Countries are EU Contributors and Beneficiaries*? Available at https://www.statista.com/chart/18794/net-contributors-to-eu-budget/.

[106] BBC News, KOVACEVIC T., (May 2019), *EU budget: Who pays most in and who gets most back?* Available at https://www.bbc.com/news/uk-politics-48256318.

[107] For further details, *see also:* Deutsche Bundes Bank (Accessed on August 2020), Available at https://www.bundesbank.de/en.

[108] Deutsche Bundesbank, (February 2018), *Bitcoin is not a virtual currency*. Available at https://www.bundesbank.de/en/tasks/topics/-bitcoin-is-not-a-virtual-currency—667600.

He identified it as crypto token, while previously the Bundesbank board member Carl-Ludwig Thiele warned investors in cryptocurrencies or in bitcoins that these tools

"Remain highly speculative, as they are as volatile as ever"[109]

highlighting then their riskiness, fluctuations in terms of value, high energy-need for mining and costliness. Nonetheless, he also recognized the blockchain technology potential and mentioned a joint project with the German stock exchange group (Deutsche Börse Group[110]) that will test the application and performance this technology in the settlement of securities transactions between banks. The Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin[111]), whose aim is the stability of the national financial market, stated even earlier, in 2013 (and then update in 2017[112] - [113]), when the main authorities began to realise the importance of these currencies, that BTC should be treated as a trading activity and be subject to capital gains taxes unless they were held for a year or more. Persons and undertakings that buy or sell tokens on a commercial basis or carry out broking services by online trading platforms are generally required to obtain previously the authorization from BaFin, thus causing additional costs or at least complicating the intermediation path between users and transactions. Subsequently, the German Federal Ministry of Finance added that BTC represent a unit of account and private money, and should or could be subject to sales taxes as well as VAT. The entity published later a guidance on value added – tax (VAT) treatment of bitcoin and other virtual currencies. This document determined that virtual currencies transactions constitute the taxable supply of other services for consideration, but fall under the exemption from VAT. If these coins are used simply as means of payment, they are directly treated as the traditional ones. Virtual gaming money is not exempt, since it does not fulfil the functionality of the euro or other legal tender. This

[109] Handelsblatt - 24/7 Vorsprung durch Wissen, (July 2014), *Internetwährung: Bundesbank warnt vor Bitcoins* (i.e: *Internet currency: Bundesbank warns against Bitcoins*). Available at https://www.handelsblatt.com/finanzen/maerkte/devisen-rohstoffe/internetwaehrung-bundesbank-warnt-vor-bitcoins/9294940.html.

[110] For further details, *see also*: Deutsche Börse Group (Accessed on August 2020), Available at https://www.deutsche-boerse.com/dbg-en/.

[111] For further details, *see also*: Federal Financial Supervisory Authority (Accessed on August 2020), Available at https://www.bafin.de/EN/Homepage/homepage_node.html.

[112] Federal Financial Supervisory Authority, February 2014), *Bitcoins: Supervisory Assessment and Risks to Users*. Available at https://www.bafin.de/SharedDocs/Veroeffentlichungen/EN/Fachartikel/2014/fa_bj_1401_bitcoins_en.html.

[113] Federal Financial Supervisory Authority, (December 2017), *Virtual Currency (VC)*. Available at https://www.bafin.de/EN/Aufsicht/FinTech/VirtualCurrency/virtual_currency_node_en.html.

guidance is in line with the European Court of Justice (ECI) decision "Hedqvist" from October 22, 2015[114].

2.3.3.2 France

Compared to the German case, cryptocurrencies remain largely unregulated in France. The government however is actively moving towards establishing a legal regime and already in 2014, the Ministry of Finance and Public Accounts[115] (Ministère Des Finances Et Des Comptes Publics) published a report entitled "L'encadrement des monnaies virtuelles"[116], a set of recommendations aimed at preventing the use of cryptocoins for fraudulent or money laundering purposes. The paper described mainly four topics, distinguishable in risky characteristics of virtual currencies, major risks associated with their use, usage risks with illegal acts purposes and recommendations to limit their use for fraudulent or money laundering purposes. These recommendations as well as the identified risks are consistent with other countries. Later, a 2016 ordinance included two provisions that allowed the use of blockchain technology for a zero-coupon bond called "mini-bond"[117] (in French: "minibon") and provided the first definition of this technology, which is shared electronic recording system allowing for authentication. Related to this, BNP Paribas revealed that its securities services division is working on a blockchain platform that would allow retail investors to lend money to businesses or record transactions through this tool. Another ordinance, from December 2017[118], went further and made possible to use the technology for a wide array of financial instruments while in 2018 the French Financial Market Authority[119] (Autorité des marchés financiers, AMF)

[114] Europe Curia Documents - Judgment Of The Court (Fifth Chamber), (October 2015), Reference for a preliminary ruling, Common system of value added tax (VAT), Directive 2006/112/EC, Articles 2(1)(c) and 135(1)(d) to (f), Services for consideration*, Transactions to exchange the 'bitcoin' virtual currency for traditional currencies, Exemption*. Available at http://curia.europa.eu/juris/document/document.jsf?docid=170305&doclang=EN.

[115] Ministry for the Economy and Finance (Accessed on August 2020), Available at https://www.economie.gouv.fr/welcome-to-the-french-ministry-for-the-economy-and-finance.

[116] Ministère Des Finances Et Des Comptes Publics, (June 2014), *L'encadrement des monnaies virtuelles: Recommandations visant à prévenir leurs usages à des fins frauduleuses ou de blanchiment* (i.e.: *Guidance for virtual currencies: Recommendations to prevent their use for fraudulent or money laundering purposes*). Available at https://www.economie.gouv.fr/files/rapport_monnaies-virtuelles2014.pdf.

[117] Bitcoin News, (September 2016), *BNP Paribas Announces New Mini-Bond Blockchain Platform*. Available at https://news.bitcoin.com/bnp-paribas-mini-bond-blockchain/.

[118] Légifrance, (December 2017), *Ordonnance n° 2017-1674 du 8 décembre 2017 relative à l'utilisation d'un dispositif d'enregistrement électronique partagé pour la représentation et la transmission de titres financiers* (s.d.) (i.e.: *Order no. 2017-1674 of 8 December 2017 relating to the use of a shared electronic recording device for the representation and transmission of financial securities*). Available at https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000036171908.

[119] For further details, *see also*: French Financial Market Authority (Accessed on August 2020), Available at

together with the Prudential Supervisory Authority[120] (Autorité de contrôle prudentiel et de resolution, ACPR) issued a notice to investors in order to make them aware of the unregulated nature of digital coins. Even if these authorities recognized the potential benefits of blockchain for companies, they criticized its means of payment as a vehicle for speculation comparable to an instrument for money laundering or other illegal activities. They also suggested that the conversion between BTC/other VCs and "real currencies" should be considered a payment service, which could and should be performed by authorized payment service providers, supervised by the ACPR. Moreover, the National Assembly[121] (Assemblée Nationale, one of the two houses of the French Parliament) started a fact-finding mission on digital coins plus a separate one on blockchain and the other possible technologies for the certification of ledgers[122]. Additionally, a former deputy of the Banque de France was tasked by the Minister of the Economy on researching how to best regulate these currencies. The purpose was to control their development and, overall, prevent their use for tax evasion, financing or criminal & terrorist activities and money laundering[123]. Furthermore, France and Germany have jointly requested to discuss about cryptocoins in the G-20[124], aiming to coordinate and harmonize the regulation at the international level.

2.3.3.3 Italy

Italy has not yet officially recognized cryptocurrencies as legal currencies and as stated for the other countries, the only one that is circulating is the euro. The Bank of Italy was the first government authority in the country to present a statement concerning cryptocurrencies. In 2015, some directives were published for the purposes of inform and present the subject, with particular emphasis on the risks of these currencies and

https://www.amf-france.org/fr.

[120] For further details, *see also*: Prudential Supervisory Authority (Accessed on August 2020), Available at https://acpr.banque-france.fr/en.

[121] For further details, *see also*: National Assembly (Accessed on August 2020), Available at http://www.assemblee-nationale.fr/.

[122] National Assembly, (January 2019), *Mission d'information sur les monnaies virtuelles* (i.e.: *Information Mission over Virtual Currency*). Available at http://www.assemblee-nationale.fr/dyn/15/rapports/cion_fin/l15b1624_rapport-information.

[123] Le Point Économie, (January 2018), *Un ancien de la Banque de France chargé d'une mission sur le bitcoin* (i.e.: *A former Banque de France official in charge of a mission on bitcoin*). Available at https://www.lepoint.fr/economie/un-ancien-de-la-banque-de-france-charge-d-une-mission-sur-le-bitcoin-15-01-2018-2186834_28.php.

[124] Reuters, (February 2018), *France, Germany Call for Joint G20 Action on Cryptocurrencies*. Available at https://www.reuters.com/article/us-germany-france-g20-crypto-idUSKBN1FT176.

their characteristics, in order also to clarify the difference between them and traditional electronic payment tools, such as credit and debit and cards, bank transfers, prepaid cards, other electronic money instruments, etc. In January 2015, the document entitled "Avvertenza sull'utilizzo delle cosiddette 'valute virtuali'"[125] (i.e.: Warning on the use of so-called 'virtual currencies') was published, which summarises the guidelines previously proposed by the European Central Bank, European Banking Authority and Financial Action Task Force. In particular, it is specified that

"In Italy, the purchase, use and acceptance of payment with virtual currencies must be deemed to be lawful activities; the parties are free to oblige themselves to pay sums not expressed in legal tender currencies."[126]

adding also the following remark

"The purchase, possession or exchange [of virtual currencies] could involve significant risks, especially for those who do not have the adequate knowledge and awareness of the risks involved"[127].

One year later, a Ministerial Resolution issued by the Revenue Agency[128] (Agenzia delle Entrate) addressed aspects of BTC and other virtual coins' tax treatment[129] - [130], which implemented the decision taken by the European Court of Justice (ECJ) in the case of Skatteverket v. David Hedqvist[131] that has, as already seen in the German framework, defined how and when the value added tax (VAT) is applied [132]. Additionally, the

[125] Banca D'Italia, (January 2015), *Avvertenza sull'utilizzo delle cosiddette "valute virtuali"*. Available at https://www.bancaditalia.it/compiti/vigilanza/avvisi-pub/avvertenza-valute-virtuali/AVVERTENZA_VALUTE_VIRTUALI.pdf.

[126] Banca D'Italia, (January 2015), *Avvertenza sull'utilizzo delle cosiddette "valute virtuali"*. Available at https://www.bancaditalia.it/compiti/vigilanza/avvisi-pub/avvertenza-valute-virtuali/AVVERTENZA_VALUTE_VIRTUALI.pdf.

[127] Banca D'Italia, (January 2015), *Avvertenza sull'utilizzo delle cosiddette "valute virtuali"*. Available at https://www.bancaditalia.it/compiti/vigilanza/avvisi-pub/avvertenza-valute-virtuali/AVVERTENZA_VALUTE_VIRTUALI.pdf.

[128] For further details, *see also*: Revenue Agency (Accessed on August 2020), Available at https://www.agenziaentrate.gov.it/portale/web/English.

[129] Agenzia delle Entrate, (September 2016), Interpello ai sensi dell'art. 11, legge 27 luglio 2000, n. 212. *Trattamento fiscale applicabile alle società che svolgono attività di servizi relativi a monete virtuali*. Available at https://www.finaria.it/pdf/bitcoin-tasse-agenzia-entrate.pdf.

[130] Coinlex, BURLONE P.L., (April 2016), *Dichiarazione dei redditi e bitcoin*. Available at https://www.coinlex.it/2016/04/26/dichiarazione-dei-redditi-e-bitcoin/?cn-reloaded=1.

[131] Europe Curia Documents - Judgment Of The Court (Fifth Chamber), (October 2015), Reference for a preliminary ruling, Common system of value added tax (VAT), Directive 2006/112/EC, Articles 2(1)(c) and 135(1)(d) to (f), Services for consideration*, Transactions to exchange the 'bitcoin' virtual currency for traditional currencies, Exemption*. Available at http://curia.europa.eu/juris/document/document.jsf?docid=170305&doclang=EN.

[132] I.e.: For transactions in which digital currencies are exchanged for traditional ones (or vice versa), the **VAT** is not applied.

Resolution states that profits and losses on cryptocurrencies transactions constitute corporate income (or losses) subject to taxation of the Corporate Income Tax (CIT - Imposta sul Reddito sulle Società, IRES) plus the Italian Regional Production Tax (Imposta Regionale sulle Attività Produttive, IRAP). Specific requirements for recording the crypto operations (e.g. amounts or dates of the transactions), are required too. Instead, transactions performed by individuals which hold BTC for other than corporate or commercial aims (hence, outside of the scope of speculative activities), do not "create the basis" for taxable income establishment (or are not required to pay income taxes). The Legislative Decree No. 90 of 2017 subjected digital coins providers to the regulations established for traditional money exchange operators[133]. In particular, the legislator recognised among "other non-financial operators"[134] the category of operators of virtual currencies defined as "natural or legal persons who provide third parties, on a professional basis, with services functional to the use, exchange, storage of virtual currency and their conversion from or into legal tender currencies"[135]. Once the implementing decrees have been approved, these operators will be obliged to notify the Ministry of Economic and Finance[136] (MEF), register with the Agents and Mediators Organism[137] (AMO) and supervised by the Italian Finance Police[138] (Guardia di Finanza). The Decree states that providers of services related to the use of virtual currency, limited to the performance of the activity of converting virtual currencies from or into legal

[133] Gazzetta Ufficiale, (July 2017), Decreto Legislativo 25 maggio 2017, n. 90 Attuazione della Direttiva (UE) 2015/849 Relativa alla *Prevenzionedell'Uso del Sistema Finanziario a Scopo di Riciclaggio dei Proventi di Attivita Criminose e di Finanziamento del Terrorismo* (Legislative Decree No. 90 of May 25, 2017, Implementing Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the *Prevention of the Use of the Financial System for the Purposes of Money Laundering or Terrorist Financing*). L.D. No. 90, art. 8, ¶ 1, G.U. June 19, 2017, n. 140. Available at https://www.gazzettaufficiale.it/eli/id/2017/06/19/17G00104/sg.

[134] Banca D'Italia, CAPONERA A., GOLA C., (March 2019), *Questione di Economia e Finanza: Aspetti economici e regolamenti delle "cripto-attività"*. ISSN 1972-6643. Occasional Papers n. 484. Available at https://www.bancaditalia.it/pubblicazioni/qef/2019-0484/QEF_484_19.pdf.

[135] Gazzetta Ufficiale, (July 2017), Decreto Legislativo 25 maggio 2017, n. 90 Attuazione della Direttiva (UE) 2015/849 Relativa alla *Prevenzionedell'Uso del Sistema Finanziario a Scopo di Riciclaggio dei Proventi di Attivita Criminose e di Finanziamento del Terrorismo* (Legislative Decree No. 90 of May 25, 2017, Implementing Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the *Prevention of the Use of the Financial System for the Purposes of Money Laundering or Terrorist Financing*). L.D. No. 90, art. 8, ¶ 1, G.U. June 19, 2017, n. 140. Available at https://www.gazzettaufficiale.it/eli/id/2017/06/19/17G00104/sg.

[136] For further details, *see also:* Ministry of Economic and Finance (Accessed on August 2020), Available at https://www.mef.gov.it/en/index.html.

[137] For further details, *see also*: Agents and Mediators Organism (Accessed on August 2020), Available at https://www.organismo-am.it/.

[138] For further details, *see also*: Guardia di Finanza (Accessed on August 2020), Available at http://www.gdf.gov.it/home#null.

tender, must comply with anti-money laundering obligations (e.g., obligations of proper verification, document retention, reporting to the Financial Intelligence Unit[139] (FIU) of suspected money laundering and terrorist financing). To this end, the Decree assigns to the Ministry of Economy and Finance the responsibility of issuing a ministerial decree outlining the modalities and timelines for the legal execution of these activities.

2.4 Summary of the existing legal framework: 2020, the year of regulation?

After this analysis, the overall conclusion is that one of the most common actions identified across jurisdictions is the government-issued warnings about the pitfalls of trading and investing in the crypto-market. These notices, issued by both individual countries and central authorities or banks, aim to make users and companies aware of the difference between legal tender, traditional electronic payment tools and finally cryptocurrencies, while warning about risks or concerns associated (e.g.: the acceptability of the coin as a medium of exchange, digital extortion and ransomware risk) to virtual coins. Many warnings issued by various countries also highlight the possibility that digital coins may create opportunities for illegal activities - such as money laundering and terrorism - financing. Nonetheless, not all countries or central institutions consider the advent of blockchain technology and of cryptocurrencies as a threat. Although digital coins are not yet recognised as legal tender, the actors involved acknowledge the potential in the technology behind them. Therefore, they are moving towards a cryptocurrency-friendly regulatory framework, aiming to attract investments for companies that excel in this sector, protect users or take advantage of blockchain system for public applications (e.g.: governmental services that support the healthcare management like recording and protecting patients data access). Financial technology is rapidly affecting markets, contributing to their well-functioning and investor protection, for instance through more transparency, reduction of distribution costs or automated advice. In this regard, European Securities and Markets Authority (ESMA) is actively examining this new opportunity and, together with the national authorities, it will requires EU market participants to acknowledge the risks deriving from digitalisation by ensuring up-to-date

[139] For further details, *see also*: Financial Intelligence Unit (Accessed on August 2020), Available at https://uif.bancaditalia.it/homepage/index.html?com.dotmarketing.htmlpage.language=1.

technology as well as adequate protection against cyber-threats[140]. To conclude, in this year, 2020, it could be possible to achieve a "legal framework for crypto-assets", since ESMA, together with ECB and other central institutions are finally focusing on this area.

[140] European Securities and Markets Authority, (January 2020), *ESMA Strategic Orientation 2020-22*. Available at https://www.esma.europa.eu/sites/default/files/library/esma22-106-1942_strategic_orientation_2020-22.pdf.

CHAPTER 3. RAISING CAPITAL, COMPARISON OF METHODS

OVERVIEW: *3.1 Initial Coin Offering (ICO) - 3.2 Initial Public Offering (IPO) - 3.3 Initial Coin Offering (ICO) and Initial Public Offering (IPO) - 3.4 Crowdfunding - 3.5 ICO and Crowdfunding – 3.6 What is the best method of fundraising. An open question*

Businesses, from small – medium ones, to billion-dollar multinationals need capital to grow, even to exist. Many companies look to banks for capital but they are not always are the most cost effective or reliable source of funds. The objective of the next paragraph is to provide an understanding of how entrepreneurs (hence established businesses or start-ups) can find funding, what are the existing alternatives and the possible costs in terms of cash payments, equity and loss of control. Hereinafter we will analyse the initial coin offering, the initial public offering and crowdfunding[141].

3.1 Initial Coin Offering (ICO)

The Initial Coin Offerings (ICO) are a new form of fundraising by start-ups and or established businesses, which intend to create a new project that involves third parties in order to contribute in both economic and innovative terms. ICOs represent an innovation in the business finance's field, wherein blockchain-related ventures raise public capital (in the form of either cryptocurrencies or fiat currencies) in exchange for newly issued digital tokens[142]. By way of the ICOs (also called Initial Token Offering, ITO or Token Sale) companies, through a blockchain platform and the will of raising capital, offer digital tokens to investors, paying in return a certain amount of digital coins (e.g. ether, bitcoin) or fiat currencies. Project information shall be included in a document called white paper, created by the offeree company but not approved by any specific authority. The white paper presents information for potential investors to properly evaluate and examine the project. The document describes the proposal that the issuer aims to achieve, the characteristics of the service that will be offered, the skills of the team and the peculiarities (the rights or benefits) of the tokens. Moreover, as mentioned above, these

[141] VANCE D. E., (2005), *Raising Capital*. Springer Science & Business Media. Rutgers University School of Business, Camden, NJ, USA. (ISBN-10:0-387-25319-X) Available at https://www.springer.com/gp/book/9780387253190.

[142] OFIR M., SADEH I., (August 2019), *ICO vs IPO: Empirical Findings, Information Asymmetry and the Appropriate Regulatory Framework*. SSRN Scholarly Paper. Rochester, NY: Social Science Research Network, https://doi.org/10.2139/ssrn.3338067.

initial coin offerings operate through blockchain and cryptocurrencies' technology. With this financing instrument, blockchain's application does not require the presence of an intermediary authority. Either a customise blockchain protocol or an existing one (e.g. Ethereum) can be employed in order to conduct the token offering.

Tokens may assign to their holders certain rights or benefits. Some of them guarantee the opportunity to be part of the project community without any economic benefit, others give the possibility to receive the services that will be offered by the issuing company, and others can guarantee rights, such as the right to participate to the profits' distribution or the right to vote. In the public opinion additionally, tokens are often compared to shares, although in some aspects/characteristics they have a very different nature. Shares are bought on the stock market, giving the holder a certain set of economic and administrative rights (such as the right to vote or the right to receive profits from the company) as they form part of the business's equity. At the same time, they are considered a funding source for the whole business. Tokens, on the other hand, contribute to finance either the entrepreneurial activity or a specific project, which the company or the start-up plans to carry out, by granting privileges – and not necessarily rights – to the owners. Moreover, tokens, by being based on blockchain technology, allow their owner to enjoy the advantages (as well as the risks) described in the previous chapters. Since shares and tokens have the same purpose (fundraising), an average user may confuse these two concepts. ICOs could apparently be assimilated to IPOs (Initial Public Offerings) and crowdfunding, but again, there are many elements that differentiate ICOs from these financing instruments. Finally, ICOs, as they are a new tool for raising capital, show an "offering structure" not yet predefined and evolving constantly.

3.2 Initial Public Offering (IPO)

An initial public offering (IPO) refers to the process of offering private corporation's shares to the public. Share issuance allows a business to raise capital from public investors and creates the so-called floating, a necessary requirement to obtain the listing of its securities on a regulated market. Shares offered (for the first time) to the market, confer part of the ownership of the firm to the purchaser, and in general to a wider public of investors, in exchange for an amount aimed at financing the company’s activity. Shares provide investors with administrative and asset rights. The IPO has to follow a particular procedure, providing a series of documents to protect investors and therefore, it is a

strictly regulated and supervised operation (examples of supervising authorities are the SEC in the United States and the CONSOB in Italy). The transition from private to public company could represent an important event for private investors. Their investment can indeed realize extra gains, as this transition includes typically share premiums. Meanwhile, it also allows public investors to participate in the offering. The company promoting an IPO can raise liquidity from the primary market through various means, such as the issuance of new shares offered for underwriting (defined as *OPS*, "*Offerta Pubblica di Sottoscrizione*", i.e.: Public Underwriting Offer), which generally corresponds to the case in which the company issues new shares on the market when going public, the issuance of shares offered in the possession of current shareholders - i. e. the case in which the issuing company sells part of its shares to the market - without necessarily altering the share capital (defined as Public Offering or *OPV*, "*Offerta Pubblica di Vendita*), or through both means (defined as Public Underwriting and Offering, or *OPVS*, "O*fferta Pubblica di Sottoscrizione e Vendita*"), albeit it occurs more rarely than the other two cases. The difference between OPS and OPV lies essentially in the collected capital. In OPS's case, the placement corresponds to share capital increase, thus generating cash flows for the company that is going to be listed on the stock exchange. In the case of the OPV, on the other hand, the collected capital is not for the company, but is only available to the owner(s) as it corresponds to a sales deed. The involved parties in the transaction are the issuing company, the global coordinator, the sponsor, the specialist, the financial advisor, the law firms and the members of the placement consortium. The procedure for admission to the Stock Exchange takes place over a period of time ranging from 4 to 6 months, during which the planning, due diligence, preparation of the prospectus and the documentation required for listing, admission to listing, constitution of the placement consortium, marketing activities, road shows, book building, actual placement and subsequent negotiation[143].

[143] Corporate Finance Institute, (Accessed on August 2020), I*PO Process - A Guide to the Steps in Initial Public Offerings (IPOs)*. Available at https://corporatefinanceinstitute.com/resources/knowledge/finance/ipo-process/.

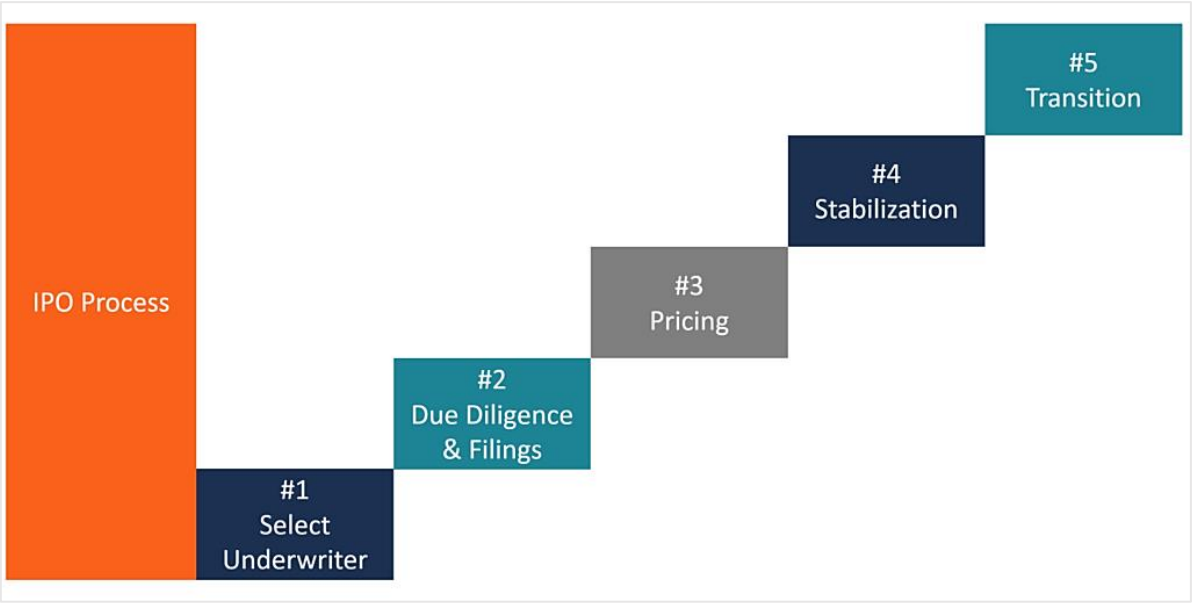


Figure 14: Overview of IPO Process *(Source: https://corporatefinanceinstitute.com/resources/knowledge/finance/ipo-process/)*

Among the last stages, one of the most widely used methodologies stands out, namely book building[144], which involves the formation of the price range (so-called "*forchetta di prezzo*", the price range of the IPO within which the company and the underwriter are expected to set the final public subscription price) through the use of the demand expressed by institutional investors. The other methodologies are auction and fixed price.

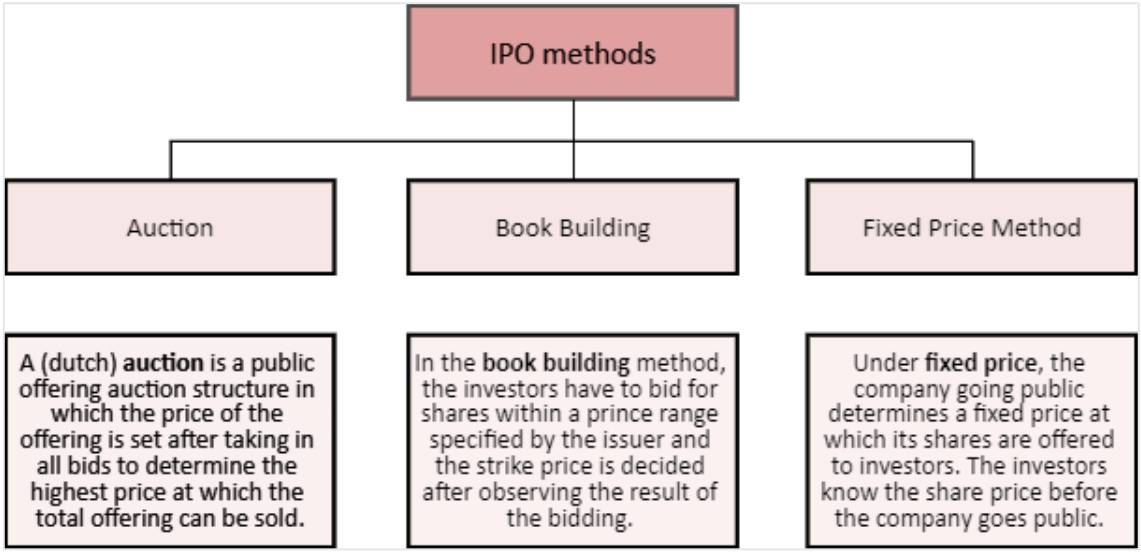


Figure 15: IPO methods / mechanisms

[144] PUKTHUANTHONG K., VARAIYA N., WALKER T., (October 2007), B*ook building versus auction selling methods: A study of US IPOs*. Venture Capital: An International Journal of Entrepreneurial Finance. https://doi.org/10.1080/13691060701605439.

Firstly, it is necessary to choose how many and what kind of shares to place (i.e. if existing or newly issued shares). Then, it is required to choose the global coordinator, who coordinates the transactions and manages the relations between issuer and institutional investors. Additionally, the global coordinator must promote the IPO and ensure that the company has the necessary requirements to carry it out, then the IPO will be managed by a pool of banks, which will form the underwriting syndicate. The syndicate will underwrite the shares on the market, meanwhile the company must finalize the information prospectus, which contains all the indications on the IPO and financial data, estimates, risks and opportunity of the investment, etc. The price of the securities is decided based on different economic and financial valuations, and by comparison with other already listed companies in the same sector. The most complex phase of the IPO is indeed the valuation of the company, aiming to establish the price range to be proposed to the market. During this phase, different evaluation methodologies can be adopted, the most widely used is the discounted cash flow (DCF) method, which estimates future cash flows and operating income by discounting them to present value[145]. The market valuation approach or the multiples method may also be used. The first one is used in cases where the company is easy to evaluate and it is based on the price estimate that should be paid to acquire the individual elements of the company's capital. The second one instead is used to compare companies existing multiples that are similar to the interested firm, allowing a comparative assessment. Another important aspect of an IPO is the road show, phase in which the company has to meet the financial community for the purpose of presenting the offer and collecting the first participations/adhesions. The maximum bid price is derived from these bids. The final price is settled at the closing of the bids, shortly before the stock exchange listing. On the opening day of the stock trading, the price may rise because the market considers the price to be low compared to the company's actual valuation, or the price may contract despite the large demand, until the market has defined the company's actual, real value.

[145] Borsa Italiana, (Accessed on August 2020), *I principali metodi di valutazione aziendale* (i.e.: *Main methods of business evaluation*). Available at https://www.borsaitaliana.it/notizie/sotto-la-lente/valutazione-aziendale-134.htm.

3.3 Initial Coin Offering (ICO) and Initial Public Offering (IPO)

In this section major differences between ICO and IPOs will be discussed and illustrated, describing also the case of equity token offering (ETO) and its subtle difference compared to IPOs.

The IPO is the process by which a company decides to offer its shares to the market for the first time. Shares are sold to an audience of investors in order to obtain an amount to finance the business, giving to holders certain set of economic and administrative rights, as they form part of the business's equity. Token's sale can be defined too as a process by which a company finances itself, nonetheless, those who buy them do not participate in the share capital of the company. Moreover, individuals acquiring tokens do not obtain economic or administrative right, but the possibility to use some services or products offered by the company itself. It should be noted and highlighted, however, that during 2018 an evolution of the concept of Initial Coin Offering emerged, the ETOs or Equity Token Offerings. This is a new method, currently used mainly by start-ups, which offers the purchase of tokens representing a share in the underlying company. As with any stock purchase, holders own their given percent of the total enterprise, and are entitled to vote on its future activities, as well as being entitled to a portion of its profits. A significant difference between an equity token and a traditional stock is the recording ownership method. In the first case, an equity token records business ownership on a blockchain, while in the second case, the stock is logged into a database and is accompanied by a paper certification. What is holding back their adoption is the applied regulation, unsustainable for small-unstructured companies and, in any case, still incomplete. Large authorities such as the SEC have not yet decided exactly how to treat these instruments, and have not completely settled corporate rights and responsibilities.

While investors in an IPO can keep track of past trends, data and base investments on existing and accomplished projects, in the other case their evaluations are most of the time based on not yet realized activities, especially in start-ups cases. On the other hand, ICOs are not subject to IPO's strict regulation and are conducted on decentralised platforms. It is not mandatory to submit specific documents and the operation itself can be fulfilled within a few weeks. Consequently, the process will be leaner and quicker, without undergoing to a bureaucracy that lengthen the time taken to implement the project. The documentation requirements are indeed different, while a company that

launches an IPO faces disclosure and registration requirements imposed by securities regulators, ICOS' requirements are unclear and/or depend on governing jurisdiction. Most Initial Token Offering (ITO) generally publish a white paper which describe and delineates the business model of the project, however, unlike IPO's required documentation, ITO's documentation format, to date, is not standard. Therefore, this lack of regulation leads to poor protection for investors and an ICO could prove to be a fraud to the detriment of the project's supporters. Moreover, investors could lose everything they have invested if the projects end up to be a failure. This happens especially in the ICOs because the target audience of the operations in question is represented by unqualified investors with little preparation and knowledge in the field, who may not have the capacity to understand and evaluate whether a project can be considered economically worthy. Only few investors have sufficient knowledge and information to make informed decisions, understand the uniqueness of the technology and analyse the token underlying the project. Many of them are attracted by the popularity that has been created around blockchain system and cryptocurrency, investing carelessly in any project that is linked in one way or another to this technology. As there is no regulation, at least not yet specific and or not in all countries, it is difficult to protect weaker parties from frauds or from failures. Therefore, investors must gather as much information about the project as possible, follow the activities of the start-up, and carefully study its team, as well as the reference market, making their own risk analysis, which identifies key issues of the industry. A further difference is the qualification attributable to the share and tokens purchasers. Whereas in IPOs stock acquirers could be defined as "real investors" since they are exclusively interested in the subsequent potential gain, in the case of the ICO the acquirers of the tokens are sometimes more identifiable as supporters of the project or the cause. For this reason, they could resemble another form of fundraising, crowdfunding, it should be stressed however, that in addition to the "sentimental" component, there is usually the expectation of an economic return from the purchase of the token.

The project's degree of maturity is typically higher in IPOs. In order to initiate it, the company – the potential issuer – has to "demonstrate a certain level, and stability, of revenues, which can only be achieved through a certain maturity in the issuer's

operations"[146]. This is partially the result of the listing requirements of exchanges and investment banks propensity to select only IPOs that could guarantee "good" performances after their launch. ICOs are normally launched at a very early stage, when most of them are in the "idea stage", and their services as well as their platform will be introduced to the public in a year or more after the ICOs. This particular difference may suggest that ITOs could be riskier and are characterized by a higher degree of information asymmetry. Finally, the token sale's marketing process is again significantly different from IPO's process, with the latter being an underwriter conduct a book-building[147] procedure. With token sale, the marketing activity is managed primarily through social media channels, ICOs indeed use social networks to publish essential information such as launch announcements, the trading start and to communicate directly with potential investors in order to reduce the "ex-ante uncertainty" associated with platform[148]. IPOs use social networks to raise awareness for the project.

[146] COLLOMB A., DE FILIPPO P., SOK K., (January 2020), *Blockchain Technology and Financial Regulation: A Risk-Based Approach to the Regulation of ICOs*. European Journal of Risk Regulation, https://doi.org/10.1017/err.2019.41.

[147] **Book building** is the process by which an underwriter seek to determine the price at which the IPO will be offered. The underwriter, normally constituted by an investment bank, builds a book by inviting institutional investors (e.g. fund managers) to propose bids for the number of shares and the price(s) they would be willing to pay for them. This process surpassed the "fixed pricing" method, where the price is established prior to investor participation. De facto, it became the mechanism by which companies define the price of their IPO. The price discovery process involves generating and then recording investor demand for shares before achieving a finale issue price, able to satisfy both the company offering the IPO and the market.

[148] OFIR M., SADEH I., (August 2019), *ICO vs IPO: Empirical Findings, Information Asymmetry and the Appropriate Regulatory Framework*. Interdisciplinary Center (IDC) Herzliyah, Radzyner School of Law, Students. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3338067.

Feature	ICO	IPO
What the investor obtains	Token	Share
How	Through the distributed ledger of the blockchain technology	Through investment banks or underwriters
Investor's rights to the company	The token's purchaser do not always become shareholders, sometimes they get privileges on the project or simply can access to the services and products offered by the issuer.	The share's purchaser become always a shareholder and therefore the owner of a part of the company. He or she is the holder the business administrative and property rights.
Investor's identification	Token purchaser is sometimes a simple (often unqualified) supporter of the project or cause.	(Qualified) share purchaser is always comparable to a real investor.
Which businesses are authorised to do so	Anyone; mostly done by start-ups.	Well-established private companies.
Investment's return	Possible (but not easily achievable) increase in the value of distributed tokens.	Dividends from business profits.
Trends/data tracking	Lack of past records.	Availability of past records or data on already existing and accomplished projects.
Ideal type of environment	Open-source; without a central authority.	Centralized and fully controlled by a company.
Duration	6 - 12 months.	18 - 24 months and more.
Legal framework	Unclear or incomplete regulation, sometimes absent as decentralised platforms operate outside national borders.	Extremely regulated; companies need authorisations from the competent authorities.
Project’s degree of maturity	Normally launched at a very early stage, when most of them are in the “idea stage”.	High. The company has to demonstrate a certain level, and stability, of revenues.
Marketing process	Social networks cover an essential role since they communicate directly with potential investors and report fundamental information.	Conduct via book-building procedure; social networks are used only to raise awareness for the project.

Table 9: Differences between Initial Coin Offering and Initial Public Offering

3.4 Crowdfunding

As we have seen, ICO and IPO both act as a means of access to the capital market, but actually differ in many aspects and the same conclusion could be reached by comparing ICOs with crowdfunding (i.e a direct access to the retail investor market facilitated by the use of new technologies such as digital platforms). Starting with the definition of crowdfunding, similarities and differences to ICOs will be outlined.

Crowdfunding, called also crowd financing or crowd investing, is generally defined as the collective cooperation by people who join forces and pool their funds via the internet, with the purpose of supporting efforts initiated by other or by organizations. It is important not to confuse it with crowdsourcing and outsourcing, indeed, unlike crowdfunding, crowdsourcing is an economic approach or model that aims to develop business projects based on knowledge sharing, which means that a large number of individuals (the crowd) can actively participate in a company's innovation processes, allowing it to access information and knowledge spread among the various users. Outsourcing pinpoints the practice for companies to outsource some internal activities to external companies, joining to the collaborative web.

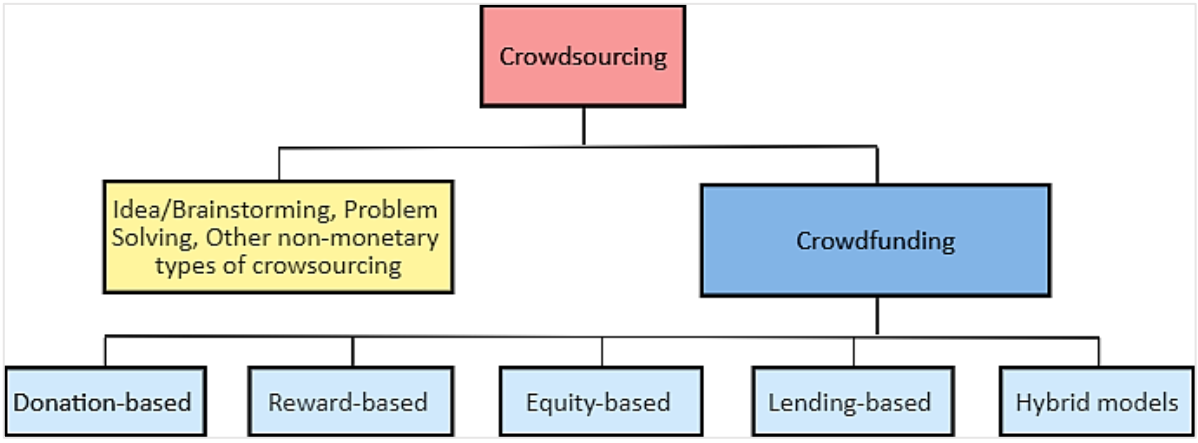


Figure 16: Crowdfunding and crowdsourcing

Firms can use this form of fundraising when proposing an innovative project or idea, and it is achieved by exposing it on online platforms, dedicated specifically to crowdfunding (an example is Kickstarter[149], a platform heavily focused on creative projects like art, music, film, technology, etc.). In this way, a start-up that needs funding to develop its business idea, instead of turning to banks or a few large investors can look into the general

[149] For further details, *see also*: Kickstarter, (Accessed on August 2020), Available at https://www.kickstarter.com/about?ref=global-footer.

public. Crowd investing can sustain a wide array of purposes, from disaster relief to publishing books, to funding a start-up or small businesses [150]. Historically, crowd financing is known for helping to raise charitable donations, however now it supports much more than just non-profits entities. Indeed, since now social media, online communities, and micropayment technology has made it straightforward for sourcing donations from a group of supporters and at lower costs, crowdfunding is collecting the attention of numerous entrepreneurs. Whether it is directed at profit-oriented investment opportunities, at artistic efforts or at charitable purposes, it is a core pooling of resources at grassroots level, aiming to initiating an investment and eventually obtaining a rewards, and where common desire and trust are the essential driving forces for participation. The main advantage of this financing method is the possibility of reaching a very wide audience of investors, without undergoing to the bureaucratic restrictions or "heavy" documentation required by an initial public offering. Moreover, many forms of crowdfunding (CF) exist and can be distinguished between donation-based CF, reward-based CF, equity-based CF, lending-based CF and hybrid models.

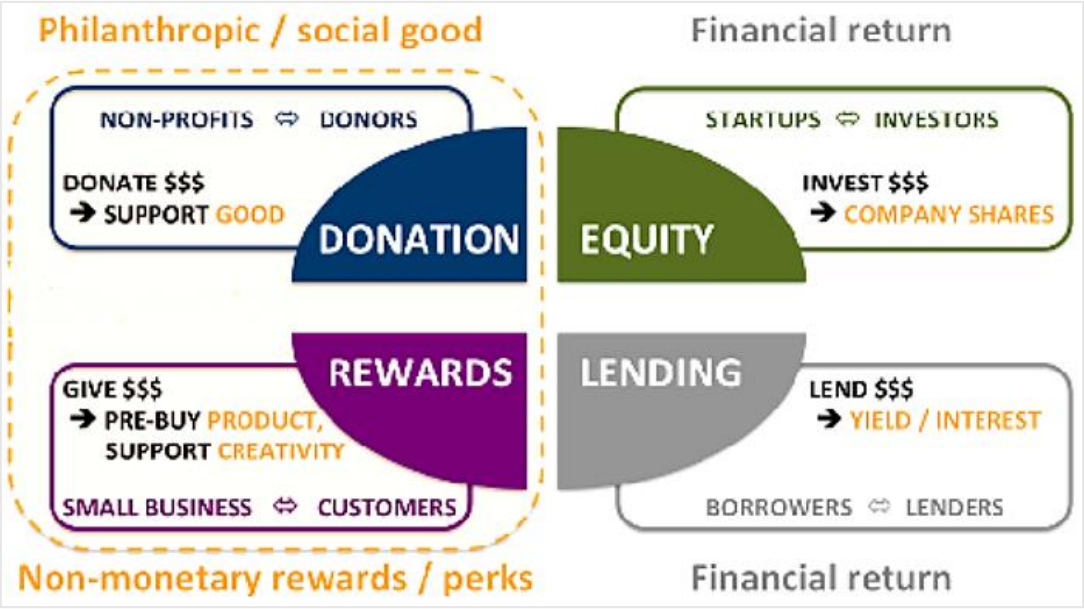


Figure 17: Main types of crowdfunding, besides hybrid models

(Source: https://www.sparkraise.com/pages/about-crowdfunding)

The first model is the donation-based crowdfunding, often referred to as the original form of crowdfunding, this is the type of funding in which individuals (or investors) allocate

[150] DRESNER S., (April 2014), *Crowdfunding: A Guide to Raising Capital on the Internet*. Wiley, Bloomberg Press, ISBN: 978-1-118-49297-0.

relatively small amounts of money to a cause of their choice. These amounts can range from 1 euro to one thousand or two thousand euro etc. Examples could be a charity fundraiser or a payment to a web page, such as GofundMe[151], for a private fundraising campaign for new projects or, as previously mentioned, shared causes. In this form, lenders donate money without expecting any reward or economic incentive (sometimes a symbolic gadget is given in exchange). The second one is the reward-based crowdfunding, in which private individuals (or financiers/supporters) donate money to a project with the idea of being rewarded at its conclusion. Donations are similar to donation-based crowdfunding, indeed they can start from 1 euro too. Usually, different rewards for donors exist, and they depend on the amount donated, on an increasing scale. The more is given, the bigger is the reward. Supporters can expect to receive (in advance) products, services or discounts and usually projects are basically products that have not been accepted by commercial investors. Hence, their creator goes in search of private funding to collect the needed amount. One example is Beeline, the company that launched a crowdfunding campaign on Kickstarter to raise money for its new motorcycle navigation device. In the case, equity-based crowdfunding individuals (or investors) allocate an amount to a certain company, receiving its shares back (the equivalent of purchasing it). The donations usually start from 500 or 1,000 euros. This model is often adopted by small start-ups to find funds for the launch or development of their companies and it is also used by many real estate crowdfunding platforms. Given the nature of the operation (i. e., taking ownership of shares in a company and therefore participating in the share capital), this form of crowdfunding is relatively new and is very strictly regulated, in order to protect investors. This way of raising capital was validated following the Title III – Crowdfunding, of the Jobs Act in 2013[152] (in the United States), while in Italy, the first crowdfunding equity website went online in December 2013 [153] . Examples are

[151] For other details, *see also*: GofundMe, (Accessed on August 2020), Available at https://www.gofundme.com/.

[152] U.S. Securities and Exchange Commission, (2013), *Spotlight on Jumpstart Our Business Start-ups (JOBS) Act*. Available at https://www.sec.gov/spotlight/jobs-act.shtml.
and
U.S. Securities and Exchange Commission, (May 2016), *Regulation Crowdfunding: A Small Entity Compliance Guide for Issuers*. Available at https://www.sec.gov/info/smallbus/secg/rccomplianceguide-051316.htm.

[153] Reuters - O'Leary N., (April 2014), Start-up completes first equity crowdfunding drive in Italy. Available at
https://www.reuters.com/article/us-italy-crowdfunding/startup-completes-first-equity-crowdfunding-drive-in-italy-idUSBREA301NB20140401.

Crowdfunder [154], CircleUp [155], OurCrowd [156], and Walliance [157]. Lending-based Crowdfunding represents the third model, in which individuals (or creditors) lend money for a certain project. However, instead of getting a reward, or company shares, lenders expect to receive the money they lent, plus interest, the amount of money lent depends on the creditor and on the platform used. Usually, this type of crowdfunding is implemented by companies that do not want to sell their shares at that specific time. Alternatively, it is implemented by individuals who do not want (or cannot) ask for a bank loan. This peer-to-peer loan has seen a hike in terms of popularity in recent years as many people prefer to borrow small amounts of money from many different sources rather than get a larger loan from the bank, as interest rates are often lower. Examples are Lending Club[158], Prosper[159], and Kiva[160]. Finally, hybrid models have emerged, after crowdfunding concept gains professional investors' attention. These funding forms blend elements of traditional crowd financing with a model that is led by a smaller group of people or institutions, which have large sums to commit and wide experience in equity investment. A first case of hybrid model was launched in 2013 and is called Syndicate Room[161], a platform on which all funding rounds are led by professional investors, software developers and marketers aiming to structure and fund the world of start-ups. Another example is Growthdeck[162], which offers "private equity quality" investments. Since the premise behind is that many businesses are raising cash and offering investors little chance of returns, the platform, led by founders who have a background in the private equity marketplace, promises to deliver only the highest quality opportunities. Finally, there are also sector specialist platforms like Cogress[163], which turn specifically to HNW

[154] For further details, *see also*: Crowdfunder, (Accessed on August 2020), Available at http://blog.crowdfunder.com/about-crowdfunder/.
[155] For further details, *see also*: CircleUp, (Accessed on August 2020), Available at https://circleup.com/about-us/.
[156] For further details, *see also*: OurCrowd, (Accessed on August 2020), Available at https://www.ourcrowd.com/about.
[157] For further details, *see also*: Walliance, (Accessed on August 2020), Available at https://www.walliance.eu/about.
[158] For further details, *see also*: Lending Club, (Accessed on August 2020), Available at https://www.lendingclub.com/company/about-us.
[159] For further details, *see also*: Prosper, (Accessed on August 2020), Available at https://www.prosper.com/about.
[160] For further details, *see also*: Kiva, (Accessed on August 2020), Available at https://www.kiva.org/about.
[161] For further details, *see also*: Syndicate Room, (Accessed on August 2020), Available at https://www.syndicateroom.com/about.
[162] For further details, *see also*: Growthdeck, (Accessed on August 2020), Available at https://www.growthdeck.com/about-us/approach.
[163] **HNW investor** or **high net worth individual** (**HNWI**) refers to an individual with a net worth of a minimum of $1,000,000 ($1 mln is the most commonly reported figure) in highly liquid assets, i.e. cash and

individuals [164], allowing them to choose the projects that best fit their investment requirements and build a diverse property investment portfolio, across multiple asset classes, for instance student accommodation or hotels.

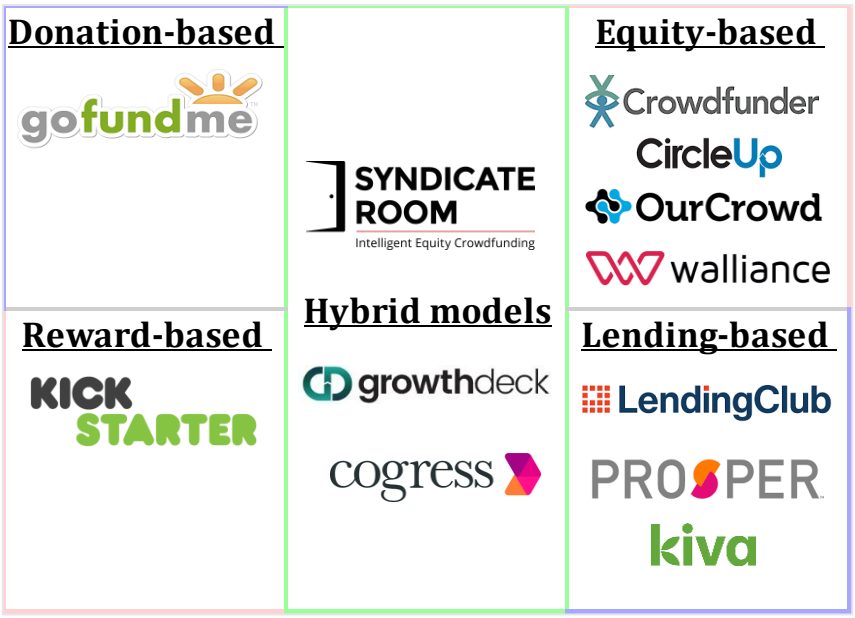


Figure 18: Crowdfunding platforms examples based on type

Crowdfunding occurs through the usage of these dedicated online platforms. The start-up looking for fundraising will register on the platform that best meets its needs, providing the required documents. Attention must be paid to legal issues, permits and certificates to be issued in order to be fully compliant with the regulation (-s) and legislation (-s) involved. Being able to create a community around the project is also crucial, through for example an introductive video, the start-up presents its own product or service and/or explains the entrepreneurial idea. Activities aimed at attracting the public, including the involvement of journalists and an active advertising campaign on social media, are important too. Investors in turn choose the ideas that they consider most interesting, useful and successful, and then may contribute financially during the fundraising period. In this regard, the recent agreement[165] on European Crowdfunding Service Providers[166]

cash equivalents. This term is extensively used in the world of private wealth management and often used by financial services industry. Depending on the financial institution and region analysed, the exact minimum amount could range, from people with a net wealth of 6 to 7 or more figures.

[164] For further details, *see also*: Cogress, (Accessed on August 2020), Available at https://www.cogress.co.uk/who-we-are/the-vision.

[165] European Commission, (March 2018), *Proposal for a Regulation of the European Parliament and of the Council on European Crowdfunding Service Providers (ECSP) for Business* - COM/2018/0113 final - 2018/048 (COD). Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52018PC0113.

[166] For further details, *see also*: European Crowdfunding Stakeholders Forum, (Accessed on August 2020), Available at

(ECSP) introduced a regulation on crowd-lending (or lending-based CF) and crowd-equity (or equity-based CF), valid for all EU Member States[167]. The reached agreement by the EU institutions on the new regulation on providers of crowdfunding services for businesses will provide further impetus to the spread of cross-border crowdfunding, facilitating the raising of capital and offering new investment opportunities to savers. This was possible as a result of the collaboration between the European Commission, the European Parliament, the European Council, the ECN (European Crowdfunding Network) and the industry.

3.5 ICO and Crowdfunding

Token sales are often defined as the "crowdfunding of cryptocurrencies", although they differ in some aspects. Initial Coin Offering investors normally do not donate or lend money to the company that promotes it, they expect financial returns from the tokens' ownership, or expect to access to products or services offered by the platforms, similarly to the case of reward-based crowdfunding. However, while in the latter case, CF investors acquire the possibility of purchasing goods or services in advance, in an ICO a token represents a real key to access to services offered by the platform. In addition, in the crowd financing case, products present a wide array, mostly tangible goods. In the case of ICO, products are mostly technological items or products based on blockchain technology.

https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=3130&Lang=EN.

[167] In the **Italian framework**, **equity-based crowdfunding** was introduced by the Decree Law no. 179/2012 ("Decreto Sviluppo bis" or Decreto Crescita, i.e.: Development Decree bis or Growth Decree) converted into Law no. 221/2012. The policy's intention was clearly to introduce the raising of venture capital through Internet, aiming to encourage the emergence and development of innovative start-ups and strengthen the enterprises' competitiveness. The same Decree introduced other significant changes, such as the recognition of the status "innovative start-up" and simplifications that has provided a kick-start to the minibond industry.
For further detail, *see also*: Gazzetta Ufficiale, (October 2012), Testo del decreto-legge 18 ottobre 2012, n. 179 (pubblicato nel supplemento ordinario n. 194/L alla Gazzetta Ufficiale 19 ottobre 2012, n. 245), coordinato con la legge di conversione 17 dicembre 2012, n. 221 (in questo stesso supplemento ordinario alla pag. 1), recante *Ulteriori misure urgenti per la crescita del Paese* (i.e.: Decree-Law Text no. 179 of 18 October 2012 (published in Ordinary Supplement no. 194/L to the Official Gazette of 19 October 2012, no. 245), coordinated with Conversion Law no. 221 of 17 December 2012 (in the same Ordinary Supplement to page 1). 1), on *Further urgent measures for the growth of the* country). Available at https://www.gazzettaufficiale.it/atto/serie_generale/caricaDettaglioAtto/originario?atto.dataPubblicazioneGazzetta=2012-12-18&atto.codiceRedazionale=12A13277.
and *also*: Politecnico di Milano - Osservatori Entrepreneurship & Finance, (July 2020), *5° Report italiano sul CrowdInvesting* (i.e.: *5th Italian Report on CrowdInvesting*). Available at http://www.osservatoriocrowdinvesting.it/.

The regulation of crowdfunding is already sufficiently comprehensive (as a result of European Commission actions) while in the case of the ICOs, to date there is not a completely clear and precise one. Moreover, on one side, CF funds are raised via centralised platforms, on the other ICOs funds are added into one or more digital wallets belonging to the start-up. Digital wallets are usually displayed on the website of the business or dedicated section of it, with a guided procedure. A "connecting element" between the two philosophies is the similarity between equity-based CF and Equity Token Offering (ETOs), both characterized by the opportunity for the investor to participate in the share capital. What substantially differentiates the two financing operations is the fact that the ICO is implemented and conducted on decentralised platforms, without the intervention of intermediaries, whereas crowdfunding operations are based on platforms that require the presence of third parties, who usually charge substantial fees to carry out the operation. It could therefore be said that ICOs are a combination of crowdfunding and Initial Public Offering. Indeed, ICO participants bet on a project that has not yet received market approval, and at the same, similarly to IPOs, they hope for an increase in the value of the company and of tokens, with the purpose of gain profits.

Those who promote the ICO issue digital tokens on public blockchains, such as Bitcoin or Ethereum, purchase and pay for them with the cryptocurrency of the chosen blockchain system. Later, tokens may be sold, traded or converted into fiat currency, in the same way as exchanges or conversions with BTC or ETH. This is not the case of CF. It can be noted that in both systems capital is raised by means of internet, aiming to reach a large number of subjects (and therefore both require powerful advertising campaigns). The "event" seeks not only to raise investments but also creating a network around the project. Finally, both ICO and CF investors could face quite high risks given their (semi) decentralized nature.

3.6 What is the best method of fundraising. An open question

With the sunrise of the internet age, each time period or era has been defined by the emergence of innovation in the digital field. During the 90' the ".com" trend's rise and fall, together with the rise of emails. The 2000's represented the "flight deck" of the e-commerce, e-learning and many other innovations, which are still growing and developing, followed by the advent of mobile phones and smart phones. Along the timeline, the start of 2010 saw the official appearance of the cryptocurrencies and the

undergoing technology, and with more investors' attention turning towards them, the coming years may suggest endless possibilities. However, there are also many questions to answer in order to identify the advantages and disadvantages associated with each alternative, with the purpose of understanding which will actually be the best choice and direction to take as a company or start-up. For instance, companies will have to or will be able to choose between an initial coin offering (ICO) and an equity-based crowdfunding, or even wait and hope for a simplification of the process related to the initial public offering (IPO). Yet again, they will have to decide on how much faith they should place in these new technological tools and systems, therefore a crucial question could be the understanding whether the company is risk lover or a risk averse. Moreover, in a market characterized by multiple products or services, corporate legal forms, regulations and technological advances, entrepreneurs should ask themselves what criteria answer the question “what is the best method of fundraising?".

CHAPTER 4. HOW INITIAL COIN OFFERING ROSE

OVERVIEW: *4.1 Tokens – 4.2 Stages of ICO launch and development process – 4.3 White Papers. Their common characteristics and elements of (non)success for ICOs – 4.4 Regulation – 4.5 The ICO's advantages, risks and the final balance*

Initial coin offering grown exponentially especially starting from 2017 and continued to be widely used, however, its arise can be dated back to 2013. The design of the token sale was attributed to J. R. Willett, an engineer from Seattle, who in early 2012 published a paper entitled "The second Bitcoin White Paper", in which he stated that the protocol used for bitcoin could have great potential and therefore could also be implemented for a new operation, meaning that it "can be used as a protocol layer, on top of which new currency layers with new rules can be built without changing the foundation"[168] , that is the Initial Coin Offering. The idea was then achieved in July 2013, with the launch of the digital token called Mastercoin (MSC)[169]. Users could buy MSC by paying in bitcoin at the Mastercoin Exodus address[170], at that time, one BTC was equivalent to 100 MSC. Mastercoin gained that much attention as a result of its sheer number and depth of brought features[171] and

[168] VITALIK B., (November 2013), *Mastercoin: A Second-Generation Protocol on the Bitcoin Blockchain*. Bitcoin Magazine, available at https://music.youtube.com/watch?v=VY1eFxgRR-k&list=RDAMVMOSTF6fDOSe0.

[169] CoinDesk, (Accessed on September 2020), *Mastercoin*. Available at https://www.coindesk.com/crypto/mastercoin.

[170] The **addresses** are identifiers that individuals use in order to send or receive BTC/cryptocurrencies. The concerned **address** is the following 1EXoDusjGwvnjZUyKkxZ4UHEf77z6A5S4P. It indicates the total number of transactions this address has participated in (e.g. 50,456); the total amount received from this address over time and the total amount sent from it (respectively, 6673.85394969 BTC or $68,973,012.54 and 6671.69009358 BTC or $68,934,971.02; the final - current balance (e.g. 2.16385611 BTC or $22,359.77) and information related to its transactions, such as the hash code and fees.
Blockchain.Com, (Accessed on September 2020), *Blockchain.com Explorer: BTC – ETH - BCH, The easiest and most trusted transaction search engine and block explorer*. Available at https://www.blockchain.com/btc/address/1EXoDusjGwvnjZUyKkxZ4UHEf77z6A5S4P.

[171] In particular, **Mastercoin specifications** are multiples and can be distinguished in user - defined currencies; decentralization; on – blockchain price feeds and on – blockchain bets; saving address. With **user - defined currencies** each individual can create its own currency on the MCS network. **Decentralized exchange** feature allows the network to act as a fully - functional exchange between any two currencies, therefore anyone can place an order on the chain in order to trade certain quantity of currency, and anyone can match that order, without the further involvement. **On - blockchain price feeds** means that reliable organizations can publish prices' data that be used in MSC scripts, such as the value of one ounce of gold in USD, while **on - blockchain bets** allows individuals to bet with others that a given price feed, at a particular future time, will be below or a above a certain value. This allows leveraged speculation on coins pairs and also hedging trading, making therefore possible to expose MSC users less from BTC or Mastercoin volatility. Lastly, **savings addresses** transactions can be reversed within "N" days by a "guardian address" (N set for each address), providing an additional level of security for high-value savings accounts.

in order to encourage people to buy before others, an extra 10% was offered for each week of token ownership, computed from the date the individual bought the token until the end of the money collection period. A total of BTC 5,120 was raised, at that point it was the equivalent of about $500,000. The project aimed to finance the development of Willet's idea, as well as the provision of incentives for projects developed in the Mastercoin ecosystem, the fundamental concept was to increment the value of the token for the purpose of gain investors' attention and enable them to make a profit. This token is now recognized under the name of Omni (OMNI) and is worth 0.00061117 BTC equivalent to $6.32[172] (€5.34).

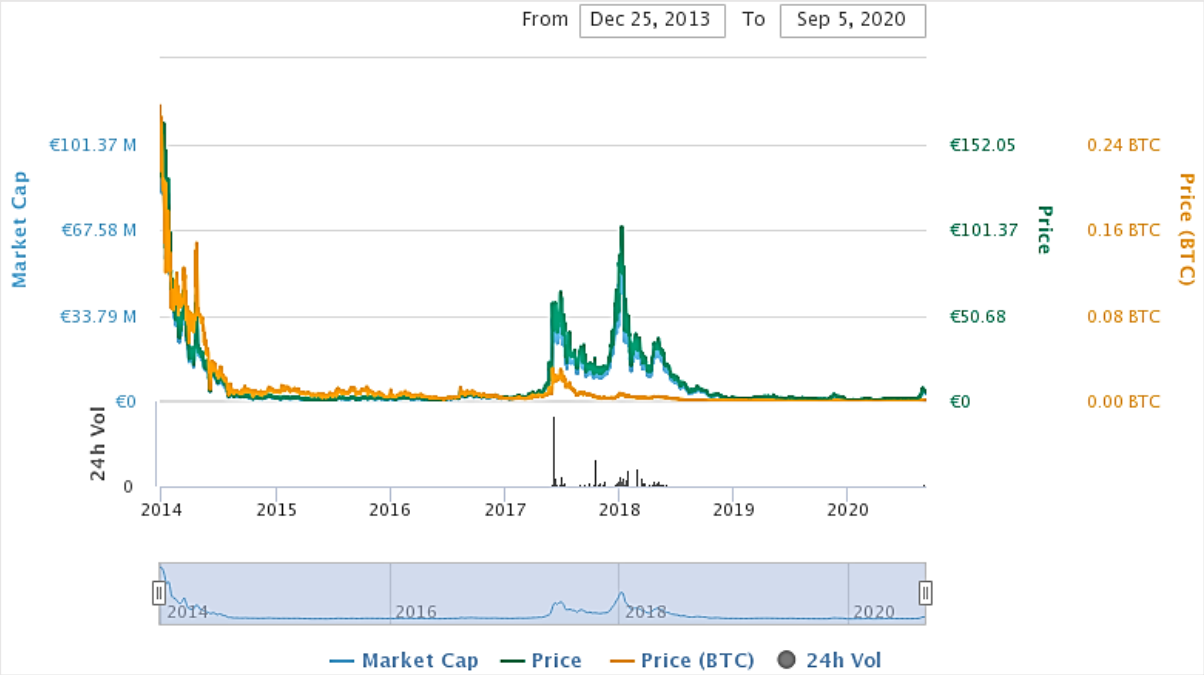


Figure 19: Omni fluctuations *(https://coinmarketcap.com/currencies/omni/)*

After the first ICO, many more have taken place in the following years, including Ethereum in 2014[173], which collected 3,700 BTCs in only 12 hours, equivalent to approximately $2.3 million. To date, Ethereum[174] is the most important platform for ICOs launching, its creation leads to a significant transformation of the crypto-market since it facilitates

VITALIK B., (November 2013), *Mastercoin: A Second-Generation Protocol on the Bitcoin Blockchain*. Bitcoin Magazine, available at https://music.youtube.com/watch?v=VY1eFxgRR-k&list=RDAMVMOSTF6fDOSe0.

[172] CoinMarketCap, (Accessed on September 2020), *Omni (OMNI) Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/currencies/omni/.

[173] ICO Drops, (August 2014), *Ethereum (ETH) - All Information about Ethereum ICO (Token Sale)*. Available at https://icodrops.com/ethereum/.

[174] For further details, *see also*: Ethereum, (Accessed on September 2020), Available at https://ethereum.org/en/.

Ethereum blockchain to launch the coin offering, as a result of the Turing complete programming language called Solidity[175]. The latter indeed allows each individual to create smart contracts and decentralized applications. On the other side, a slight problem is that the programming language is recent and relatively unknown[176]. However, once it is mastered, the "designer's imagination" is the only limit to the token's customization potential and currently, about 83.09%[177] of ICOs are launched through the Ethereum platform.

Platform	Market share
Ethereum	83.09%
Custom Platform	7.97%
Other	3.90%
Waves	2.28%
Bitcoin Fork	0.81%
Stratis	0.49%
Graphene	0.33%
Hyperledger	0.33%
NEO	0.16%
Rootstock	0.16%
Ethereum Classic	0.16%
Maidsafe	0.16%
Litecoin Fork	0.16%

Table 10: Market share per ICO Platform *(Source: https://icowatchlist.com/blockchain-2/)*

4.1 The tokens

By way of the Initial Coin Offering (ICO), or Initial Token Offering (ITO), companies offer digital tokens to investors who find the project financially worthy, receiving in return digital tokens that may assign to their holders certain rights or benefits. Therefore, it is necessary to illustrate what is meant by the term token, how they are issued and

[175] Icodrops - Read the Docs (Accessed on September 2020), *Solidity - Solidity 0.7.1 documentation*. Available at https://solidity.readthedocs.io/en/v0.7.1/.
[176] Cointelegraph, (Accessed on September 2020), *Where To Issue ICO Tokens: Platforms Review*. Available at https://cointelegraph.com/ico-101/where-to-issue-ico-tokens-platforms-review.
[177] ICOWatchList.com, (Accessed on September 2020), *ICO Statistics – By Blockchain Platform*. Available at https://icowatchlist.com/blockchain-2/.

classified.

By the term cryptocurrency, everything that has value and that can be exchanged fall into the category, consequently cryptocoins and tokens fall under this definition, identifying therefore two main types of cryptocurrency. Coins, in most cases, act as a decentralised digital means of payment and are often used interchangeably, they are also called altcoins and can be created using the original Bitcoin protocol by applying modifications to the underlying codes and assigning different functions (e.g. Namecoin[178], Peercoin[179], Litecoin[180], Dogecoin[181], Auroracoin[182], and Bitcoin Cash[183]). As it was discussed in the first chapter – "Financial technology (Fintech): The general framework", this protocol change is called fork. There are also altcoins that do not derive from the open source protocol of Bitcoin, indeed they have been created by a new blockchain with its own protocol that supports its "native" currency (e.g. Ethereum[184], Ripple[185], Omni[186], Nxt[187], Waves[188] and Counterparty[189]).

[178] For further details, *see also*: Namecoin, (Accessed on September 2020), Available at https://www.namecoin.org/.
[179] For further details, *see also*: Peercoin, (Accessed on September 2020), Available at https://university.peercoin.net/#/9-peercoin-proof-of-stake-consensus.
[180] For further details, *see also*: Litecoin, (Accessed on September 2020), Available at https://litecoin.org/.
[181] For further details, *see also*: Dogecoin, (Accessed on September 2020), Available at https://dogecoin.com/.
[182] For further details, *see also*: Auroracoin, (Accessed on September 2020), Available at http://en.auroracoin.is/.
[183] For further details, *see also*: Bitcoin Cash, (Accessed on September 2020), Available at https://www.bitcoincash.org/.
[184] For further details, *see also*: Ethereum, (Accessed on September 2020), Available at https://ethereum.org/en/.
[185] For further details, *see also*: Ripple, (Accessed on September 2020), Available at https://ripple.com/.
[186] For further details, *see also*: Omni, (Accessed on September 2020), Available at https://www.omnilayer.org/.
[187] For further details, *see also*: Nxt, (Accessed on September 2020), Available at https://www.jelurida.com/nxt.
[188] For further details, *see also*: Waves, (Accessed on September 2020), Available at https://github.com/wavesplatform.
[189] For further details, *see also*: Counterparty, (Accessed on September 2020), Available at https://counterparty.io/.

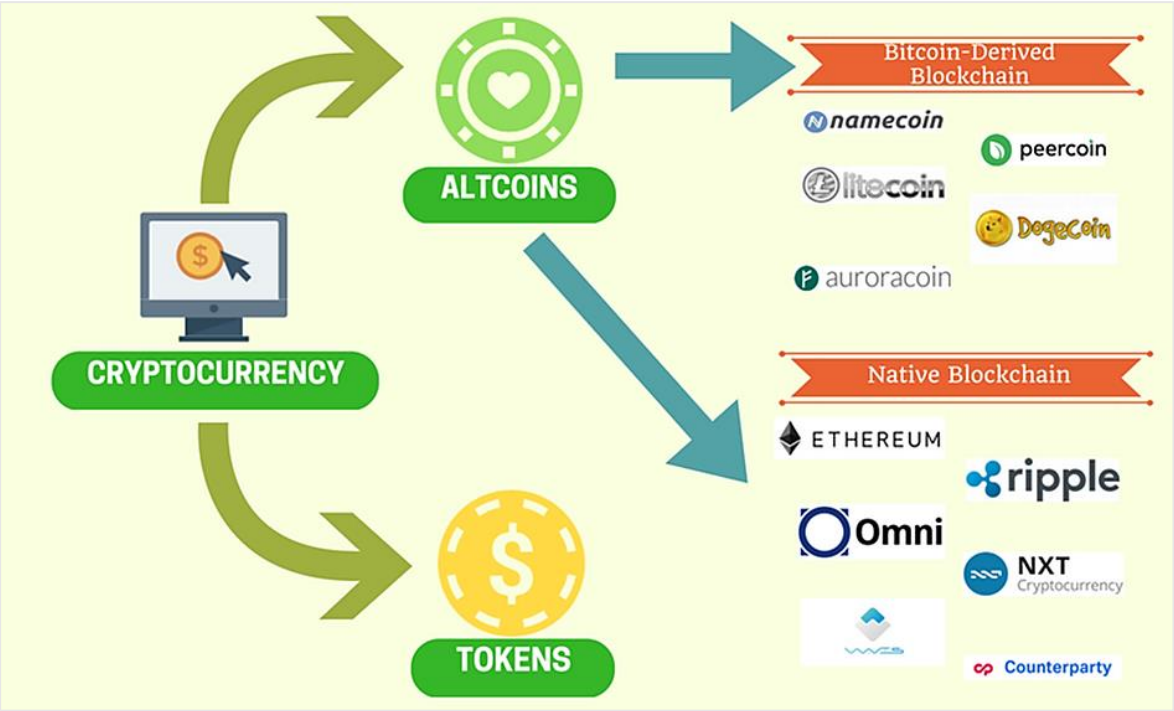


Figure 20: Cryptocurrencies, altcoins and tokens *(Source: https://www.fintastico.com/it/blog/criptovalute-tokens-e-coins-sono-la-stessa-cosa/)*

Tokens in turn embody a particular function, resource or utility in digital form, anything valuable can be represented in the form of a token. This value may be intrinsic or derived /connected to other sources, e.g. the right to receive a dividend, voting rights, licensing, ownership rights, and the right to participate in future performance or to use future services. For this reason, tokens could represent all goods that are fungible and marketable, from raw materials, to loyalty points, to others and they are issued/released by a Decentralized Application (dApp) normally built on another blockchain. Unlike digital coins or altcoins, there is no need to create a new chain, indeed, users can use templates provided by a main blockchain (i. e. the Ethereum protocol). This way, tokens are released more easily and quickly. Once again, it is important to pinpoint that to date, more than 83% of the existing tokens are generated by the Ethereum (ERC20) platform.

4.1.1 What is a dApp?

After describing the difference between coins and tokens, it is advisable to understand the dApp instrument and its role within the ICO. The term dApp is an acronym for a Decentralized Application, a software created through smart contracts that connect

suitable blockchain platforms (such as Ethereum) to the back-end[190] of an app. The dApps developers write sets of smart contracts that determine the overall functionality of each decentralized application, the special feature of these unconventional applications is that they are open-source, which means that the public code with which they are programmed can be taken up by others to be improved or adapted to the needs of a particular purpose. The dApps allow individuals to launch an ICO, while taking advantage of the benefits of the blockchain system, that are guaranteeing users' anonymity, the absence of a central authority and the possibility of creating new smart contracts. An interesting example relates to one of the most important social networks, namely Facebook. If its founder decides to develop a Facebook dApp, based on blockchain, users could register without sharing their personal data and then decide, through a distributed consensus, to implement smart contracts that returns revenues generated by the sale of big data. An existing business case is Steemit[191], a social platform that offers rewards to users who publish news and those who comment on it, the person's profit depends on the level of involvement he/she gets from his/her post; the more comments and likes you get, the higher the reward. Earnings are not that high, however this is an extra income from recreational activity. Another peculiarity of Steemit is that users are rewarded in Steem, a cryptocurrency that uses exchange technology and that can be traded with other virtual currencies or real money (unlike Facebook that collects data and sells advertising space to "survive", Steemit takes advantage of the incentive of users, rewarding them in Steem token). Thanks to the blockchain system, dApps are growing exponentially.

[190] **Back End** is a term used to describe interfaces that have a program as their recipient. A back end application is a program with which the user interacts indirectly, generally through the use of a front-end application (direct interaction). In a client/server structure, the back-end is the server.
[191] For further details, *see also*: Steemit, (Accessed on September 2020), Available at https://steemit.com/.

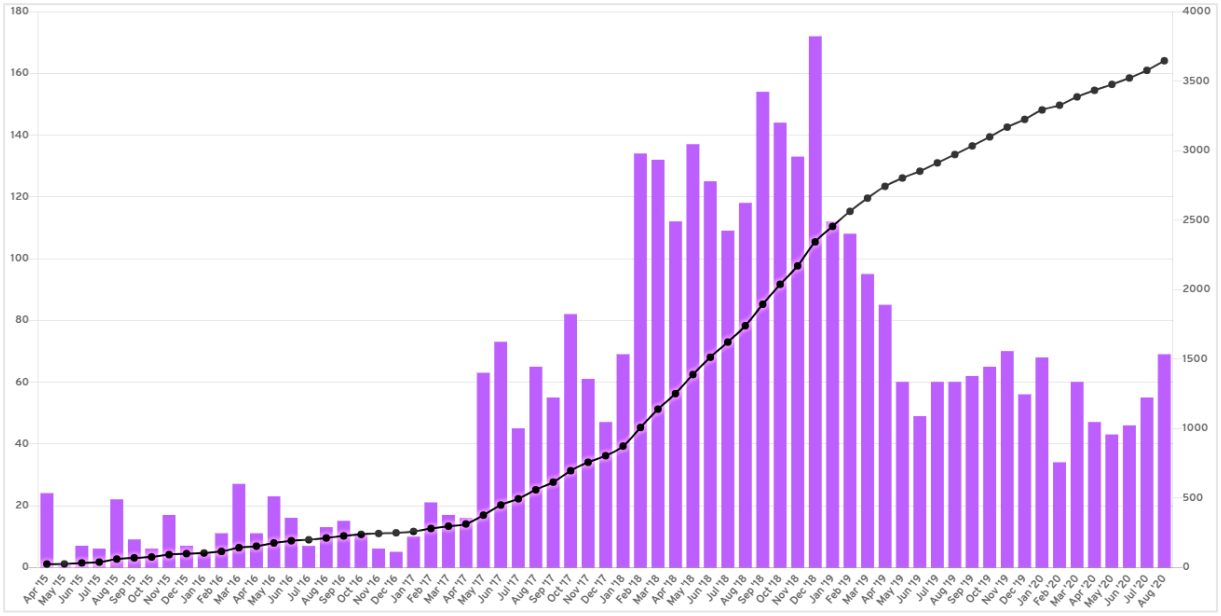


Figure 21: New DApps per Month *(Source: https://www.stateofthedapps.com/stats)*

4.1.2 Type–token distinction

Tokens, as mentioned earlier, are given to investors in return for their investment, and may assign, depending on the type, some rights or benefits. In different countries, supervisory authorities have tried to classify the tokens issued by the various ICOs, nonetheless there is no univocal classification, but it is possible to distinguish some of the most relevant types of token, i.e. payment tokens, utility tokens, security tokens and hybrids tokens. Payment tokens are considered full-fledged cryptocoins and can be used as a means of payment for purchasing goods, services or traded on the market with other digital coins or with legal currencies. These tokens do not confer rights on investors vis-à-vis the issuer and in this case, the word "coin" is more appropriate than the word "token." Examples of this type are bitcoins or ether. They are in practice real currencies, a generic payment instrument for goods and services purchasing. Utility tokens instead give the holder the opportunity to purchase goods or services that will be offered by the issuing company, unlike payment tokens that are used as a means of payment for any good, this tokens can only be used for purchases that will be provided by the issuing company, excluding any speculative, monetary and participatory activities. Whoever buys it intends to use it within the system in which the same token operates. The token in this case is an access key to be part of the network and to take advantage of the tools it offers,

an example is Golem (GNT)[192], a peer-to-peer decentralized marketplace for computing power, aiming to be an alternative to centralized cloud service providers[193]. Security tokens can be equated to financial instruments and guarantee certain rights (voting rights, right to receive future capital flows, etc.), they may represent, depending on their economic function, shares, bonds or derivative financial instruments. This type of token may be subject to regulation because since it is the equivalent of financial instruments and in most cases the legislation in force for traditional financial instruments is applied. Those who decide to buy this type make therefore an investment and believe that the value of the token may increase in the future, an example is Bankera's token (BNK)[194], very similar to a share, since it would give its holders a percentage of Bankera's profits and the additional possibility of reselling it[195]. Finally, hybrid token. In addition to the previously listed, there is also this fourth type, an instrument that have characteristics of two or more types of tokens, and for this reason called "hybrid token". For example, an investment (security) token that can be used as a means of payment. These instruments are very frequent and it often happens that a token arise having a certain nature, but later transforms becoming a hybrid token, as a consequence, it becomes extremely difficult to apply precise regulations. An interesting example of a hybrid token is the Binance Coin (BNB), used to pay transaction fees on BNB Exchange. When paying these transaction fees using BNB, the token holder gets a discount on the transaction fees on the exchange, additionally the latter redistributes 20% of its profits to token holders by “burning” BNB tokens, thereby reducing the total supply of tokens. In this way, the exchange platform distributes the value of these burned tokens across all other BNB token holders[196].

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[192] For further details, *see also*: Golem, (Accessed on September 2020), Available at https://golem.network/.
[193] CoinMarketCap, (Accessed on September 2020), *Golem (GNT) Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/it/currencies/golem-network-tokens/.
[194] For further details, *see also*: Bankera, (Accessed on September 2020), Available at https://bankera.com/.
[195] CoinMarketCap, (Accessed on September 2020), *Bankera (BNK) Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/it/currencies/bankera/.
and
EtherEvolution, (March 2018), *Le 3 categorie di token secondo le linee guide della FINMA* (i.e.: *The 3 token categories according to FINMA guidelines*). Available at https://etherevolution.eu/le-tre-categorie-di-token-secondo-le-linee-guida-della-finma/.
[196] MAAS T., (June 2019), *What Are Hybrid Tokens? A Comparison between Token Models*. Law & Blockchain Consultancy, available at https://www.lawandblockchain.eu/the-case-for-hybrid-tokens/#:~:text=Hybrid%20tokens%20borrow%20elements%20of%20utility%20tokens%20(or%20even%20cryptocurrencies).&text=At%20the%20same%20time%20however,rights%20in%20the%20issuer's%20business.

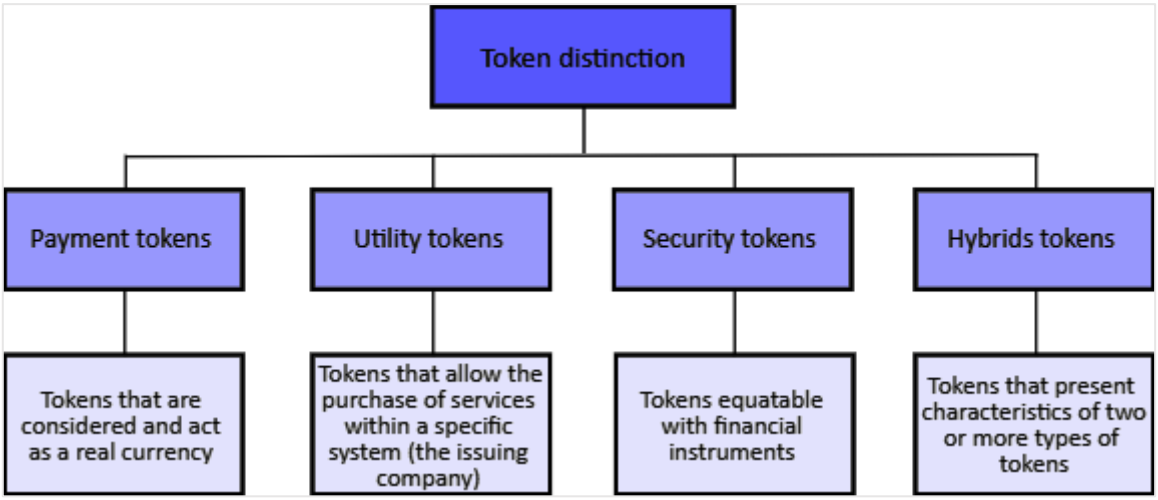

Figure 22: Type - token distinction

Both FINMA (Swiss Financial Market Supervisory Authority) and SEC (US Securities and Exchange Commission) have defined a classification of tokens, dividing them into two broad categories, security tokens and utility tokens. The other identified category, payment tokens, are also recognized and defined often as "real cryptocurrencies". By comparing the terminologies used by the two authorities[197], it is possible to notice a big difference between SEC and FINMA, while SEC focuses on comparing tokens with securities, FINMA is focused on their economic functions.

SEC	FINMA
Cryptocurrencies	Payment tokens
Utility token	Utility token
Security token	Asset token

Table 11: FINMA and SEC type – token distinction: how they are called

In closing, depending on the type chosen, each token can perform one or more functions, from financing a particular start-up, to act as an accounting tool (e.g. compute upload volumes), to embody a digital representation of ownership reserves on land or items from inventory, to represent a way to prevent hacker attacks and to act as a means of payment between participants or as a fee for the use of the system or platform. Nonetheless, on a

[197] ICOscoring, (March 2018), *Types of Tokens. The Four Mistakes Beginner Crypto-Investors Make*. Available at https://medium.com/swlh/types-of-tokens-the-four-mistakes-beginner-crypto-investors-make-a76b53be5406.

technical level, to create tokens individuals do not need to change the codes of a particular protocol or create a new blockchain. There are indeed standard templates on the blockchain (e.g. Ethereum, the most exploited, has the ERC-20[198]) allowing users to create these diverse tokens' types.

Rank	Name	Platform	Market Cap	Price	Volume (24h)	Circulating Supply	Change (24h)
1	Tether	Ethereum	€12,509,065,428	€0.827823	€45,603,309,272	15,110,798,985 USDT *	-0.11%
2	Chainlink	Ethereum	€2,948,048,153	€8.42	€960,281,254	350,000,000 LINK *	-6.25%
3	Crypto.com Coin	Ethereum	€2,752,845,427	€0.136917	€39,945,259	20,105,936,073 CRO *	-0.33%
4	USD Coin	Ethereum	€1,760,454,366	€0.827899	€421,347,592	2,126,413,231 USDC *	-0.14%
5	UNUS SED LEO	Ethereum	€990,079,639	€0.990576	€8,632,439	999,498,893 LEO *	0.40%

Figure 23: Top five Tokens by market capitalization *(Source: https://coinmarketcap.com/tokens/)*

4.1.3 Preponderance of utility tokens

Utility token model dominates the top 100 tokens market capitalization, as previously mentioned, the category includes primarily tokens intended to be used within a specific system. Tokens are tied to the development of a network, provide access to a digital service, confer consumptive rights, etc. A study performed by the European Corporate Governance Institute (ECGI) in 2019 indicated that 53%[199] of ICOs sell tokens with the utility feature, this type typically do not entitle holders to the future cash flows of the platform or of the issuer, except to the degree the token's value is intrinsically tied to the network's value. For this reason, the most common right for holders remains the right to use tokens to access project's services.

[198] Why the need for an **ERC-20 standard**?
Prior to the creation of the ERC-20, several "compatibility problems" had arisen among different forms of Ethereum tokens. Indeed, each token had a completely unique smart contract. In other words, to be able to host a new token, individuals had to write a completely new code for each portfolio or exchange. Supporting the growing variety of tokens was becoming overly problematic and time-consuming. As a solution, the industry created a standard protocol that all tokens must follow, which is now known as ERC-20. The **ERC-20 token standard** has six mandatory parameters for each smart contract, plus three optional. Users may set the maximum number of decimals that a token supports. For comparison, Bitcoin allows eight digits after the decimal point, along with its symbol (usually a 3-digit or 4-digit code) and its name. The six mandatory functions deal with the number and transfer of tokens. All these things allowed portfolio and exchange providers to create a single codebase, which can interact with any ERC-20 smart contract.
NIZZA C., (September 2020), *Token ERC-20: cosa sono e come funzionano* (i.e.: *Token ERC-20: what they are and how they work*). Available at https://it.ihodl.com/tutorials/2018-03-26/token-erc-20-guida-ico-ethereum-tutorial/.

[199] HOWELL S., NIESSNER M., YERMACK D., (September 2019), *Initial Coin Offerings: Financing Growth with Cryptocurrency Token Sales*. European Corporate Governance Institute (ECGI) - Finance Working Paper No. 564/2018, Available at SSRN:
https://ssrn.com/abstract=3201259 or http://dx.doi.org/10.2139/ssrn.3201259.

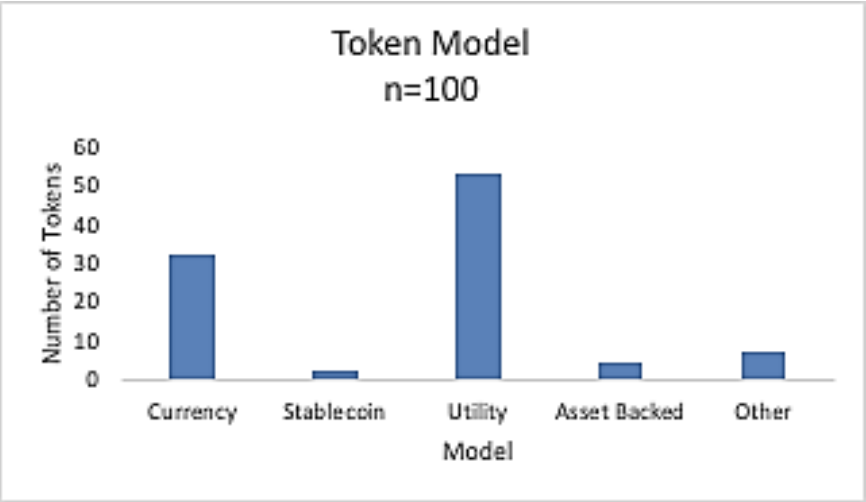

Figure 24: Prevalence of tokens models *(Source: https://wulfkaal.com/2019/01/11/top-100-token-models-compared/)*

4.2 Stages of ICO launch and development process

After the analysis of the different types of tokens, it is necessary to define also the general and specific steps that an issuer should follow in order to launch an Initial Coin Offering. ICOs remain relatively new financing instruments, therefore there is yet no pre-defined structure for such capital raising. Nevertheless, it is possible to identify the emergence of a structural model, in fact it can be said that an ICO generally consists of three main steps that are the presentation of the project or the business idea, the offer's issuing and finally the purchase by the public of those tokens.

Figure 25: ICO's general steps

By going into the specifics of the ICO procedure, six distinct phases can be identified, the first step is the development of the design idea, blockchain protocol's choice and first interaction with the community. Firstly, the issuer announces its intention to develop a particular innovative project, in order to promote it and spark interest among different parties. This step is extremely important since it aims to make a good impression to potential investors, when designing the project, the issuer will have to choose whether to create a customized blockchain protocol, where the issued tokens will be the traded coin within the platform, or whether to exploit existing platforms such as the Ethereum one.

By exploiting existing platforms, individuals can take the advantage of the inherent capabilities of these. On one hand, a business may decide to launch its own ICO through Ethereum and use the platform's capabilities to create Smart contracts[200], on the other launching an ICO through an existing platform may be easier. However, the process is closely linked to the underlying infrastructure, hence the choice will depend on the type of project to be developed.

The second step involves the announcement and description of the white paper. In this phase the issuer provides interested parties with information about the project, usually the announcement is made within a forum (e.g. Cryptocointalk[201] or Bitcoin Talk[202]). This stage is essential to attract potential investors, the issuing company will, after the notice, receive (or hopefully will receive) feedback that could be useful to improve the proposal. Subsequently, the issuer provides interested parties with a white paper[203] aiming to provide more detailed information on the project and to support potential investors in their assessments, the given information includes a description of the tokens, the creation process and how to purchase them.

The publication of the white paper and first feedback from users then follow. The white paper is published on the business website. In this phase, it will be very important to obtain the approval or the support of people who hold an influent position within the chosen network community and in this way, the project will be perceived as promising and achievable/feasible by other people who are not yet convinced. It is also important to point out that these white papers are not supervised by any authority, this means that preliminary steps are crucial to build some credibility in the market and to obtain investor confidence in the soundness of the project.

The fourth stage consist in tokens' creation (which will later be exchanged with other cryptocurrencies), typically they are ether or bitcoin. In order to create them, designers can turn to specially made sites (Token Factory[204] or decentralized applications), or

[200] Smart contracts have been defined within chapter no. 1 "Financial technology (Fintech): The general framework", paragraph no. 1.3.3 "Ethereum (ETH: a new mechanism through smart contracts".
[201] For further details, *see also*: Cryptocointank, (Accessed on September 2020), Available at https://cryptocurrencytalk.com.
[202] For further details, *see also*: Bitcoin Talk, (Accessed on September 2020), Available at https://bitcointalk.org/.
[203] **White papers** were mentioned in Chapter no. 3 "Raising capital: comparison of methods", paragraph no. 3.1 "Initial Coin Offering – ICO" and will be further described.
[204] For further details, *see also*: Token Factory, (Accessed on September 2020), Available at http://thetokenfactory.com/.

follow the instructions dictated by specific platforms, as is the case with Ethereum (or more specifically, the standard ERC-20). Generally, this phase is quite simple, firstly, the total offer must be established, i. e. the number of tokens that can be purchased (called also hard cap[205]). Setting this limit is essential since this limited number may increases demand, as the law of supply and demand requires, consequently, it will have to be decided how much, for each token, the investor will have to pay in terms of cryptocurrencies and, if considered necessary for a fair distribution of the tokens, establish a maximum limit that can be purchased by the same person. Finally, the issuer must give a name and a symbol to its token, so that it is easily recognizable.

The second-to-last stage is the ICO planning. At this point, it is necessary to settle the period of time during which the tokens will be offered, a decision that is the sole responsibility of the issuer, determining the offering time is extremely important for the success of the ICO which may depend on the ranking of sites discussing existing token offers or on community support for the project or on pre-sales phase. Tokens indeed are offered for a limited period and generally in two tranches, the first called presale plus a second one, which represents the real token sale. Thanks to pre-sales, the issuer segments the market before the public ICO, resembling how IPO issuers have often sold private equity to venture capitals or other stakeholders before going public. Furthermore, this stage serves multiple functions, from funding promoting costs, to certifying the issuer, to determining demand and the right price, this is analogous to the book-building part of the Initial Public Offer process. Those who join the offer in the pre-sale phase usually have the right to buy tokens with a cheaper conversion ratio than those who buy directly in the sale phase (which means that they receive discounts), the whole mechanism mirrors the traditional "network effect"[206], in that the value of being an investor (or a user) depends on there being a sufficient number of other investors/users on the ICO platform[207].

[205] In the Initial Coin Offering context, the term **hard cap** refers to the upper limit on the number of tokens that can be sold. It concerns the fund's maximum amount that the design team/the development issuer is willing to collect, in exchange for their/its tokens during the initial phase of the fundraising. If, during this phase, the upper limit is reached, the projects' tokens are considered as sold out for that particular round, which means that developers will no longer accept investors' financing.
Binance Academy, (September 2020), *Hard Cap – Definition*. Available at https://academy.binance.com/glossary/hard-cap.

[206] The **network effect** is a phenomenon whereby increased numbers of users, people or participants will subsequently improve the value of a good or service, in this case, ICOs and tokens value.

[207] HOWELL S., NIESSNER M., YERMACK D., (September 2019), *Initial Coin Offerings: Financing Growth with Cryptocurrency Token Sales*. European Corporate Governance Institute (ECGI) - Finance Working Paper No. 564/2018, Available at SSRN: https://ssrn.com/abstract=3201259 or http://dx.doi.org/10.2139/ssrn.3201259.

Purchasing discounted tokens could help the issuer to attract the critical mass of participants. Additionally, it will be advisable to align the timing of the ICO with the "rhythms of life of the target audience", e.g. avoiding holiday periods or days when those who are crucial to the success of the operation are unavailable. Together with the duration, issuers must also decide the minimum amount (called also soft cap[208]) that must be reached in order for the offer to be considered successful and therefore valid, if the minimum required is not met, then the ICO will be deemed to be failed and the issuer will have to return the amounts already received to the sponsors. Vice versa, if the minimum is exceeded, the offer ends successfully, and the resources collected will be used to carry out the project described in the white paper as well as to support future expenses, such as costs related to the promotion or development of the software. Moreover, if this phase has raised a substantial amount of capital, then it can positively influence the offering, creating expectations in potential investors while increasing and strengthening confidence and credibility in the project.

Finally, the disclosure of the offering through major advertising channels occurs (it can be defined also as ICO's marketing campaign). Once the fifth phase (the ICO planning) has been completed, the issuer must take care of the advertising side of its offer, in order to promote and persuade as many people as possible. In recent years, some emerged platforms became widely used to disseminate ICO information, among the main ones, users can find Icowatchlist[209] and Icorating[210] that often offer special options such as premium positioning and advertising. Prior to the emergence of these dedicated platforms, an own ICO issuance was actually more complex, as the potential investor had to log into the project web site in order to find out more details. Finally, at the end of the marketing campaign, the beginning of tokens sale is definitely announced, supporters and investors can purchase tokens by paying for them with the required cryptocurrency.

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[208] In the Initial Coin Offering context, the term **soft cap** refers to the capital amount gathered at which the Initial Coin Offering will be then considered successful. In other words, it is the minimal amount of required financing which, theoretically speaking, will enable the project to proceed as planned the development team. At the present time, the soft cap represent one of the main goal to kick-start a project and therefore to raise money.
CoinStaker - Bitcoin News (February 2018), *ICO Hard Cap vs. Soft Cap - Easily Understand the Difference*. Available at https://www.coinstaker.com/difference-ico-hard-cap-soft-cap/.

[209] For further details, *see also*: Icowatchlist, (Accessed on September 2020), Available at https://icowatchlist.com/.

[210] For further details, *see also*: Icorating, (Accessed on September 2020), Available at https://icorating.com/.

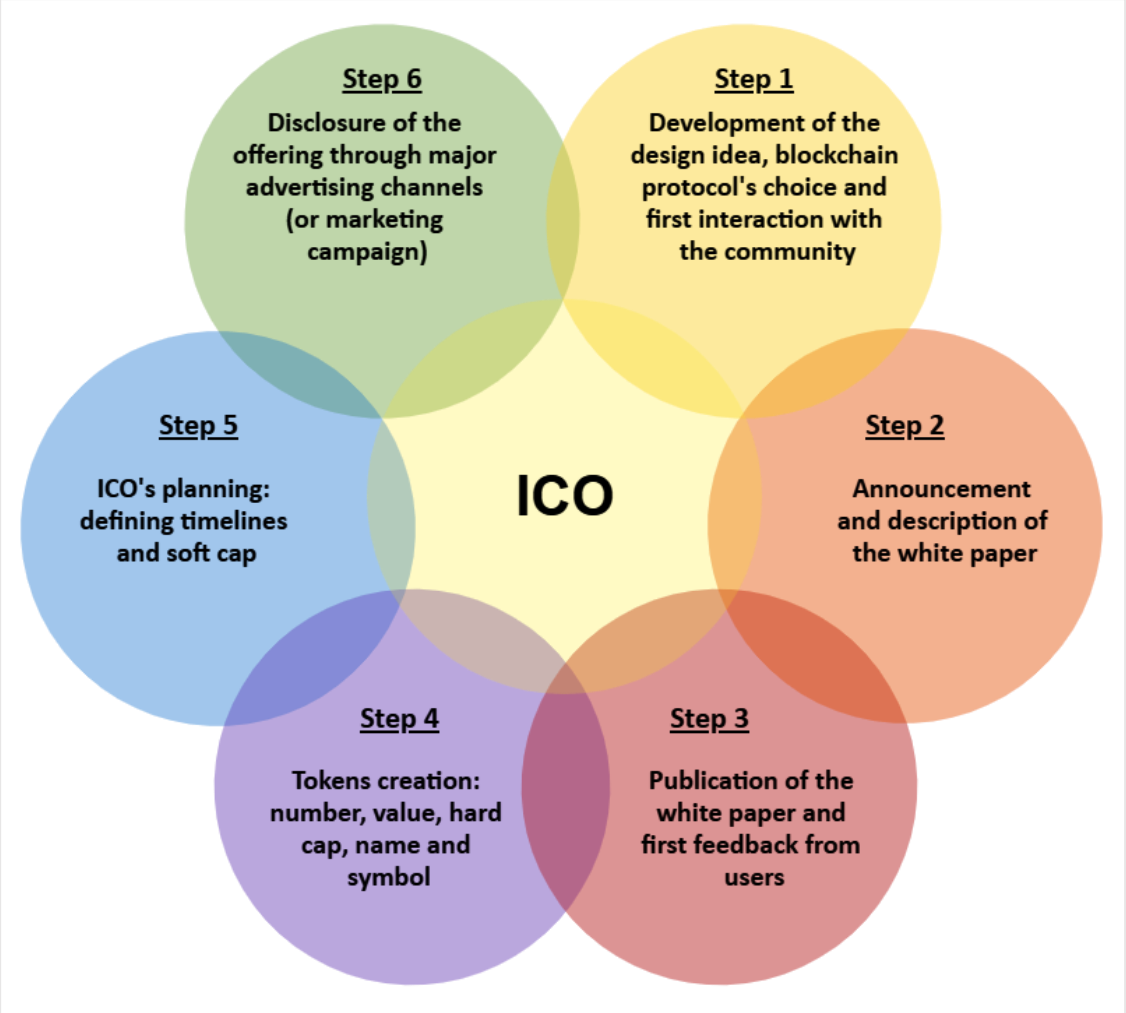

Figure 26: Specific steps of the ICO procedure

4.3 White Papers. Their common characteristics and elements of (non)success for ICOs

As we have seen in the previous paragraphs, the white paper (sometimes also referred to as a "yellow paper") is the most important document of ICOs, it provides potential investors detailed information on the offering, which significantly influence their choices. Its structure and degree of completeness are further indicators of the seriousness and safety of the project as there are no drafting guidelines to follow and authorities do not supervise it. Although the document is important, people who draft it often make mistakes or do not explain clearly why the ICO (an innovative method) is chosen over other traditional tools, such as IPO or crowdfunding, according to a study conducted by EY (Ernst and Young Global Limited) published in 2017[211], most white papers fail to provide

[211] Ernst and Young, (December 2017), *EY research: Initial Coin Offerings*. Available at

a clear entrepreneurial motivation to justify the use of ICO and in addition, many of them use frequently clichés to attract inexperienced investors and at the same time, they do not justify the use of blockchain technology. Some of these common phrases (or clichés) have been identified, for example "Next-generation platform", "First project to unlock multibillion market of < … >", "Decentralized network that puts users in control/the driver's seat" or "No corrupted central authority"[212] etc. In this way, both the credibility of the project and the authenticity of the initiative are damaged and the lack of an adequate explanation could convey the idea of an unrealistic project or a scam, for these reasons, many projects fail to move from the design phase to the implementation phase. To overcome the problem, the person who drafts the document must set out clearly and decisively the objectives that the company intends to achieve and how it intends to do so, also providing the detailed technical aspects[213], in order to give to investors the idea of having carefully studied the applied strategy. Providing a working prototype of the good or service for example could effectively engage investors, if something tangible[214] already exists and a development plan is provided, the project will be perceived even more credible. As mentioned above, there is no guideline to follow, consequently no legal safeguards prevent the issuer from absconding with the collected funds, nor is there accountability via audits or control and oversight through company's governance of promoter's use of the funds[215]. Furthermore, the published white papers can vary a lot, the models or styles used turns out to be different, some of them are written with a structure and linguistic style similar to those of the scientific articles, others are less formal but have graphics that are more appealing. Nevertheless, it is possible to identify some common elements, i. e. the objectives of the project, the characteristics of the service and the offer, the road map and the team composition. Goals are described at the beginning of the document, together with a brief introduction of the project and the promoter company. Afterwards, the paper moves on to the characteristics of the service,

https://www.ey.com/Publication/vwLUAssets/ey-research-initial-coin-offerings-icos/$File/ey-research-initial-coin-offerings-icos.pdf.

[212] Ernst and Young, (December 2017), *EY research: Initial Coin Offerings*. Available at https://www.ey.com/Publication/vwLUAssets/ey-research-initial-coin-offerings-icos/$File/ey-research-initial-coin-offerings-icos.pdf.

[213] This peculiarity will be further deepen in the next paragraph.

[214] In this case reference is made to utility tokens.

[215] HOWELL S., NIESSNER M., YERMACK D., (September 2019), Initial Coin Offerings: Financing Growth with Cryptocurrency Token Sales. European Corporate Governance Institute (ECGI) - Finance Working Paper No. 564/2018, Available at SSRN: https://ssrn.com/abstract=3201259 or http://dx.doi.org/10.2139/ssrn.3201259.

highlighting its functionalities and technology used. It also explains why this instrument (ICO) was chosen in comparison with traditional methods, including the description of the tokens' offer too, together with their creation and purchase process, symbol, soft cap etc. The company explains how it intends to allocate these tokens, which means splitting them between the public and other subjects, for example team members (a detailed plan describing the allocation of the funds raised may be included in the document). Another common feature is the road map, which shows potential investors at what stage the project is and which direction the company intends to go for. Finally, the composition of the team is another relevant data, potential financiers will be able to understand who actually orchestrates the proposal (thus removing the suspicion of fraud) and the skills and abilities involved, especially those related to the cryptocurrency and blockchain technology sector. Often, members of the team briefly describe themselves and add a photo and/or report their own social links, e.g. LinkedIn, this is crucial because it should ensure active communication between members and investors. If the communication is effective and direct, the issuing company can create a community where users exchange opinions and ideas about the project, avoiding misunderstandings, for example, many firms create shared chats on Telegram in order to disclose essential information such as price or number of tokens. Additionally, websites are created and used with a dedicated section to Frequently Asked Questions (FAQ), the premise is that the site should be clear, easily accessible and able to intrigue the user. As described in the second-to-last step of the ICO launch (phase no. five, ICO planning), the business should try to appear on major cryptocurrency websites and forums, such as Bitcointalk[216] and Reddit[217], along with a strong presence on social networks (Facebook, Twitter, LinkedIn etc.), these websites and social platforms are the immediate way to reach the target. However recently many of them have begun to ban advertisements related to ICOs or cryptocurrencies, the first example happened in 2018 on Facebook, AdWords and Twitter followed[218]. These prohibitions were necessary to protect users from frauds, advertisements were often

[216] For further details, *see also*: Bitcointalk, (Accessed on September 2020), Available at https://bitcointalk.org/.
[217] For further details, *see also*: Reddit, (Accessed on September 2020), Available at https://www.reddit.com/r/ico/.
[218] Cointelegraph, (March 2018), *Facebook, Google and Twitter Ban Ads, But Do Their Founders Really Dislike Crypt?*. Available at https://cointelegraph.com/news/facebook-google-and-twitter-ban-ads-but-do-their-founders-really-dislike-crypto.

misleading, attracting inexperienced investors with promises of easy and risk-free returns.

4.3.1 Technical white paper

The technical description should not be taken for granted, because it is an "ICO de facto standard"[219] that investors highly recognize. The issuing company should consider the significant costs in producing a technical white paper, they vary depending on venture technological capabilities. Explaining the complex technological background of distributed ledgers as well as illustrating how the company is going to build on and implement this technology require a high amount of knowledge, time and effort, this is especially the case of ICOs, since many businesses are in their early stages of development and frequently they do not have an operating project at the time of their Initial Coin Offering. Some analysts argue that lower quality ventures, which means ventures with lower technological capabilities, will suffer major costs to produce their technical white paper, since they could outsource its production. Alternatively, they will end up producing a nontechnical document that focuses on their team or business model, establishing additional differences between papers and pinpointing another signal for investors: companies with little technical knowledge will draft a poor white paper and may not produce goods and services as good as higher ventures, i.e. with high technological capabilities.

4.4 Regulation

After analysing the characteristics of the ICO, its process and tokens, it is advisable to carry out an analysis of its existing regulation, indeed ICO legislation represents a crucial aspect, aiming especially at protecting investors. The fundraising method is a completely different way of financing compared to existing ones described in the previous chapter (IPO and crowdfunding). Because of their innovative nature, they do not yet have clear regulation that can frame them under a legislative point of view, nor can "traditional" jurisdiction be applied. Some international authorities overseeing the financial markets in different countries have begun to issue warnings or guidelines in this regard, warnings in particular introduced an approach that assesses the ICOs on a case-by-case basis,

[219] Fisch C., (January 2019), *Initial Coin Offerings (ICOs) to Finance New Ventures*. Journal of Business Venturing 34, n. 1: pages 1–22, https://doi.org/10.1016/j.jbusvent.2018.09.007.

distinguishing the structure of the offer and the rights embedded in the tokens. Some countries have tried to address the problem by associating tokens to existing financial instruments, others have not yet enacted laws on the subject, and others have banned their use, such as China and South Korea. One of the main problems however is represented by the multitude of existing tokens categories (such as hybrids tokens, payment tokens, utility tokens and security tokens) and their individual features and functions. The lack of legislation exposes both issuing companies and investors to various risks. Hereinafter, we move on to the analysis of the position taken by the main countries involved, namely the European Union, United States and China.

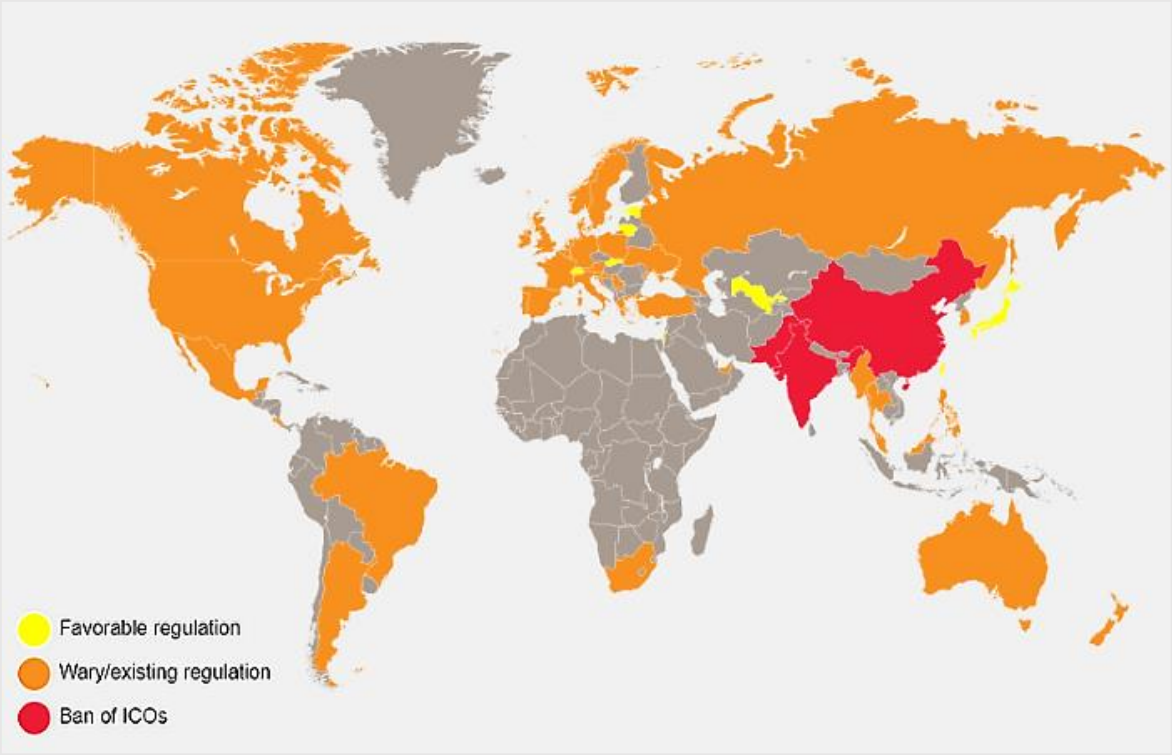

Figure 27: Treatment of ICOs worldwide *(Source: https://www.pwc.ch/en/industry-sectors/financial-services/fs-regulations/ico.html)*

4.4.1 European Union, nine directives for investors' protection

In Europe ICOs are allowed in all countries, with different regulatory approaches depending on the individual cases. At EU level there is no "real" regulation, however with a circular of November 2019 the European Securities and Markets Authority (ESMA) called "Advice: Initial Coin Offerings and Crypto-Assets" [220], consistently with its

[220] European Securities and Markets Authority, (January 2019), *Advice: Initial Coin Offerings and Crypto-Assets*. Available at

institutional mission, the authority has focused its analysis on analogies between crypto-assets and traditional financial instruments. ESMA analysed also the possibility to apply the main regulations concerning financial markets to crypto-assets, in particular, the authority observed that many crypto-asset investors lack the necessary knowledge to assess the high degree of risk inherent in the investment and that these instruments are characterized by low liquidity. In addition, ESMA reveals that the percentage of ICOs found to be fraudulent would be equal to 80% on total issues, and that the absence of organisational rules for trading platforms increments risks related to the lack of guarantees in terms of accuracy and regular transactions' execution. This could increase conflicts of interest between platform operators and investors too. Moreover, the document reports that national supervisory authorities have not considered crypto-assets as securities and/or financial instruments, because the rights they grant would be too different from the typical structure of traditional ones. Despite this, these entities agreed on regulate them, applying especially anti-money laundering laws. In this regard, section no. VII of the ESMA's advice lists nine potentially directives.

The first one is the Prospectus Directive, which would apply in the case of crypto-assets offered to the public through ICOs that exceed certain thresholds. This directive requires that offers should publicize detailed information about the issuing company, the characteristics and rights attached to the crypto-assets, the terms, conditions and deadlines of the offer, the use of proceeds and the specific risks associated with the underlying technology. The main purpose is to ensure that potential investors are aware of all necessary information in order to invest consciously.

The second Transparency Directive would require issuers to comply with the periodic and ongoing disclosure of annual financial reports, half-yearly reports, interim management statements, acquisition or disposal of major holdings and any changes in the rights of holders of securities, while the regulatory framework of the third MiFID II Directive (Market in Financial Instruments Directive framework) together with the MiFIR Regulation (Market in Financial Instruments Directive Regulation) qualify crypto-assets' activities, such as MTF management (Multilateral Trading Facility[221]) or investment

https://www.esma.europa.eu/sites/default/files/library/esma50-157-1391_crypto_advice.pdf.

[221] A **multilateral trading facility** (MTF) is a European term describing a trading system that offers the possibility of trading financial instruments listed on a stock exchange, without regulatory admission and disclosure tasks.

consulting. Moreover, ESMA oversees trading platforms, highlighting problems related to the inadequacy of data recording and storage systems, as they are designed for traditional instruments and not for crypto-assets.

The Market Abuse Regulation (MAR, fourth directive) describes the need to set up, within trading platforms, systems and procedures aimed at preventing, detecting and reporting market abuse. It reports additionally the obligation for issuers to disclose inside information, to keep a list of persons in possession of such information and the obligation of professionals providing investment advice to ensure an objective and disinterested presentation of information. After that, the Short Selling Regulation follows, applicable in the event that a position in the crypto-assets market confers a financial advantage in case of a decrease in the price or value of a share or sovereign debt.

The fifth Settlement Finality Directive and the Central Securities Depositories Regulation refer especially to the "safekeeping and record-keeping of ownership of securities and rights attached to securities" [222] (no. six). The SFD aims at reducing systemic risk associated with participation in payment, clearing and securities settlement systems, especially the risks linked to insolvency of a participant in such a system. The purpose of the CSDR is to harmonize certain aspects of the settlement discipline and cycle, providing a set of common requirements for CSDs operating securities settlement systems in order to enhance cross border settlement in the EU.

The advice reports then the Directive on Alternative Investment Fund Managers (AIFMD), which lays down requirements for the authorisation and supervision of managers of alternative investment funds within the European Union. If an ICO is structured as an alternative investment fund, then the provisions in question should apply. The Directive on investor-compensation schemes provides instead access to compensation up to a specified amount for investors where the investment firm is no longer financially able to meet its obligations.

The legal framework is completed by the Anti-Money Laundering and Terrorist Financing Directive (AMLD5), in which ESMA and the European Banking Authority agree on monitoring the exchange of legal tender currency with crypto-assets and the virtual

[222] European Securities and Markets Authority, (January 2019), A*dvice: Initial Coin Offerings and Crypto-Assets*. Available at https://www.esma.europa.eu/sites/default/files/library/esma50-157-1391_crypto_advice.pdf.

currency custodian wallet services, in order to reduce the risk of money laundering and the financing of terrorist activities.

European Securities and Markets Authority's directives	
1	The Prospectus Directive
2	The Transparency Directive
3	The Markets in Financial Instruments Directive framework
4	The Market Abuse and Short-Selling Regulation
5	The Settlement Finality Directive and the Central Securities Depositories Regulation
6	Safekeeping and record-keeping of ownership of securities and rights attached to securities
7	Alternative Investment Fund Managers Directive
8	Directive on investor-compensation schemes
9	The fifth AMLD on money laundering and terrorist financing

Table 12: ESMA directives on ICO crypto-assets

4.4.2 United States of America, investment contracts' identification through the Howey Test

The U. S. allows ICOs and issued tokens are considered securities and therefore subjected to SEC (Securities and Exchange Commission) regulations. It is important to point out that, as in the case of cryptocurrencies[223], the regulation could differ depending on the State concerned. In July 2017, the American authority published a survey report on the "The DAO[224]" case, indicating that the tokens it issued were comparable to real securities and therefore subject to the Securities Act. This report also concluded the investigation highlighting the need to assess individual offering cases in order to understand where to apply the Securities Act. Subsequently, President J. Clayton, elected in 2017 and to date still in office, published a warning in order to alert investors to the potential risks associated with these investments, making considerations that were addressed to market professionals (such as lawyers, consultants, broker-dealers, etc.) urging them to act in the

[223] The **U. S. legislative framework** related to **cryptocurrencies** has been mentioned and discussed earlier in the chapter no. 2 "Existing regulatory framework and key issues", paragraph 2.2.2 "Federal Reserve – FED, an open debate on digital developments" and paragraph 2.3.1 "United States of America, a differing picture per State".

[224] Securities and Exchange Commission, (July 2017), *SEC Issues Investigative Report Concluding DAO Tokens, a Digital Asset, Were Securities*. Available at https://www.sec.gov/news/press-release/2017-131.

interest of investors' protection. The Securities and Exchange Commission has also published guidelines to provide a legal framework for the analysis of ICO assets.

In April 2019, FinHub[225], the Strategic Hub for Innovation and Financial Technology, published a framework for the analysis of digital assets, in particular, those assets that are offered and sold as securities, defined in the "Securities Act" (1933), "Securities Exchange Act" (1934), "Investment Company Act" (1940), and "Investment Advisers Act" (1940)[226], which lists a number of instruments, such as shares or security-based swaps, that fall into this category. The document aims to identify those digital assets falling under the concept of "investment contract[227]" and subjected, consequently, to the so-called "federal securities laws[228]".

Generally, the instrument used to establish whether or not a digital asset represents a security is the so-called Howey Test, which takes its name from the case "Securities and Exchange Commission v. W. J. Howey Co. , 328 U. S. 293 (1946)[229]", known for having identified the necessary requirements for the integration of an investment contract. In particular, you have an investment contract (and therefore securities laws is applied) in all cases where there is an investment of money in a "common enterprise[230]" and from which individuals can reasonably expect to make profits mainly from the efforts of others. The document further specifies the above characteristics and identifies the factors to be considered in the event that a digital asset ceases to be a security. In the final part of the paper, related to the "other relevant considerations", reference is made to those which are, in substance, "utility tokens", distinguishing them from the hypotheses previously examined and highlighting the cases in which the assets are apparently of the "utility" type, but in concrete terms endowed with the securities' features. Therefore, they must

[225] For further details, *see also*: FinHub, (Accessed on September 2020), Available at https://www.sec.gov/finhub.
[226] SEC, (Accessed on September 2020), *The Laws That Govern the Securities Industry*. Available at https://www.sec.gov/answers/about-lawsshtml.html.
[227] **Investment contracts** are agreements wherein one party invests a certain amount of money with the expectation of receiving a return on investment.
[228] SEC, (Accessed on September 2020), *Federal Securities Laws*. Available at https://www.sec.gov/page/federal-securities-laws?auHash=B8gdTzu6DrpJNvsGlS1-JY1LnXDZQqS-IgJAgaSXimg.
[229] Cornell Law School – Legal Information Institute, (Accessed on September 2020*), Securities And Exchange Commission V. W. J. Howey Co. et al*. Available at https://www.law.cornell.edu/supremecourt/text/328/293.
[230] Regarding the second requirement, it is argued that investments in digital assets generally constitute financing in a **common enterprise** as the fate of the various purchasers/investors' capital is linked to each other or to the success of the promoter's efforts.

be subjected to the Securities Act. Moreover, the Act provides that the securities, or in this case the tokens, must be registered with the SEC and the issuing company must issue a description of the company and the business, the characteristics of the tokens to be issued, information on the management of the firm and a certified financial statement.

As it is evident from the guidelines, the attention of the SEC and its FinHub to the innovations introduced in the financial world by Blockchain technology continues to be high. Although they do not constitute rules or statements, the above-mentioned U. S. Securities Laws guidelines are easy tools made available to buyers/investors to assess whether or not the Securities Laws are applicable to the practical cases.

4.4.3 China, Initial Coin Offering prohibition for better future prospects

Compared to the European and American situation, the People's Bank of China's decision (PBOC) is completely the opposite, since in September 2017 it banned all ICOs conducted in the territory, as they were considered as illegal fundraising methods and extremely risky for investors. After banning the offerings, the issued Notice ("Notice regarding Prevention of Risks of Token Offering and Financing" or simply "The Notice") [231] announced that they would be nullified and that the ICOs already concluded would have to return the capital raised to investors, incurring very high penalties if they did not comply with the order[232]. As stated in the document, the country noticed that a large number of domestic financing activities through the issuance of tokens, including initial coin offerings (ICOs), have emerged and speculation has prevailed. PBO investigation suspected that these activities were engaged in illegal financial activities, which have seriously disrupted the economic and financial order. The relevant matters announced (for a total of six) were related to an accurate understanding of the essential attributes of token issuance financing activities, the fact that no organization or individual can illegally engage in token issuance financing activities, the strengthening of the supervision of token financing trading platforms, the ban for financial institutions and non-bank

[231] CoinDesk, (September 2017), *China's ICO Ban: A Full Translation of Regulator Remarks*. Available at https://www.coindesk.com/chinas-ico-ban-a-full-translation-of-regulator-remarks.
The original statement is reported in China Banking and Insurance Regulatory Commission's website, available at
http://www.cbirc.gov.cn/en/view/pages/index/index.html.

[232] The **announcement's content** of the People's Bank of China was also the work of the Central Cyberspace Administration, the Ministry of Industry and Information Technology, the State Administration for Industry and Commerce, China Banking Regulatory Commission, China Securities Regulatory Commission, and China Insurance Regulatory Commission on Preventing Token Issuance Financing Risks.

payment institutions to conduct business related to token issuance financing transactions, the public alert on being highly vigilant about the hidden dangers of token issuance financing and transactions and finally the self-discipline role of industry organizations. In addition, the bank subsequently decided in January 2018 to prohibit also mining activity, establishing a national ban on internet access to cryptocurrency trading sites, blocking the associated services and cancelling the financial benefits on the use of electricity (given the high consumptions of computers used for mining processes). The aim of this position is probably to eliminate all cases of harmful ICOs, and then in the future possibly revoke the ban and allow projects to evolve through tokens sale, once a regulation able to protect investors is in place.

Statements by China's financial regulators on ICOs	
1	An accurate acknowledgement of the nature of ICOs
2	Any organization or individual is prohibited from starting illegal token fundraising activity
3	Reinforce the supervision on platforms that provide exchange services for tokens issued during the fund raising
4	No financial institutions or non-banking payment institutions shall operate businesses that deal with token fundraising
5	The public should be highly vigilant about the hidden dangers of token issuance financing and transactions
6	Industry Organizations Should be Self-disciplined

Table 13: Statements by China's financial regulators on ICOs

4.5 The ICO's advantages, risks and the final balance

A proper understanding of the Initial Coin Offering systems allows companies looking for funding to approach an efficient channel to obtain resources for growth and investment in their projects. An opportunity certainly less onerous with respect to other types of venture capital funding. ICOs are therefore an innovative tool, although they do not have yet a predefined structure. Nonetheless, it is possible to analyse their benefits and risks.

ICOs allow to support and finance innovative projects that otherwise would not be able to move from the conception phase to the development phase and are a more accessible alternative to other funding instruments. They offer an opportunity for promising

projects as they are proposed to a large number of investors, a striking example is Ethereum, which has led to the launch of the second most used cryptocurrency in the world (ether), and which has provided the creators of Decentralized Applications with platforms to develop and propose various ideas. As a funding method embodying the concept of innovation, it has been particularly exploited (especially in 2017) by entrepreneurs who wanted to implement projects that also represent the concept of innovation. ICOs can be implemented faster and are less expensive than other traditional tools, the speed of execution is partly due to the technology involved and partly to the absence of regulatory constraints. Many projects fail to "take off" because of the formalities and strict rules imposed by traditional methods, such as IPOs or crowdfunding. The launch of an ICO, as highlighted in the previous paragraphs, does not require specific documentation, the only document that companies issue is the white paper. Furthermore, conducting an ICO does not require the intermediation of a central body establishing the legitimacy to submit the offering. Raising capital by means of this tool allows the company to present its project to a very large number of investors, creating also a community that can communicate directly with users and that, if used correctly, can promote the company and the project's credibility. Finally, it is an investment within the reach of many, most tokens in the offer phase can be purchased at a relatively low cost, which makes the investment attractive and accessible to the public, because they do not require too high initial disbursements and at the same time can lead to positive returns.

However, this method presents many risks that hinder its use, which will have to be remedied if the aim is to make ICOs totally safe and reliable.

The lack of regulation, as mentioned, may lighten the process and thus facilitate its implementation, but because of the legislative absence, investors are not protected against possible fraud, nor can receive guarantees that the team that intends to carry out the project is committed constantly and professionally, considering also that the responsible persons or the single individual may disappear after raising the capital. On the other hand, given the growth of the ICOs market, some governments and supervisory authorities have begun to formulate regulations to protect investors. The type of information that is released on white papers is another risk factor since users are often misled or data are illustrated inadequately. Within the white papers, the reported information can be manipulated in order to highlight the benefits of the investment,

without sufficiently explaining the risks involved (or they can be omitted). In this case, there is a real lack of transparency (or information asymmetry), which can lead inexperienced investors not to understand the possible dangers, nor to have all the information necessary to make an informed investment. It should be noted that the majority of the promoting companies, at the time of the offer, are at an early stage of development, also known as the "idea stage", hence the outcome of the project is very uncertain, there is no guarantee that it will be successful or that even if results are positive, the total benefit could be too low in relation to the capital invested. ICOs are in fact based on speculation, when a subject invests in an ICO, he or she bets on the proposal based on the credibility that it has managed to create itself. If a large proportion of "traditionally funded" start-ups fail, you might expect a similar trend for “cryptocurrency funded” companies. For this reason, often the value attributed to the tokens issued can be driven simply by speculation and not by the intrinsic value of the project and by the actual capabilities of the executive team members. The tokens’ value can oscillates widely, exchanges can be subject to fraudulent activities and prices can be manipulated by the market, moreover investors may not be able to trade these assets again. Finally, blockchain technology may have some bugs, for instance there could be problems with the use of the platform during activities peaks, which in turn could cause transaction blocking (so-called “platform saturation”). A further problem is related to the chain technology and to the absence or lack of regulation at the same time, i.e. the exposure of both investors and businesses to cyber-attacks, such as digital extortion, ransomware, embezzlement and crypto-jacking.

Advantages	Risks
1. Creation of opportunities for innovative projects and community involvement	1. Lack of investor protection against fraud and of control on the capital raised
2. Possibility of proposing to a large number of investors	2. Manipulation of information contained in white papers and/or omissions of important data (information asymmetry)
3. Implementation speed and low launch costs	3. Uncertainty about the success of the project and of sufficiently high economic returns
4. Absence of regulatory constraints and of central authorities' intermediation	4. Discrepancy between the attributed value and the real value of tokens
5. Reduced initial disbursements and possibility of potential gains	5. Oscillation in the tokens value and risk of illicit transactions
	6. Technical problems and transaction blocking (platform saturation)
	7. Exposure of both investors and promoting companies to cyber-attacks

Table 14: ICO's advantages and risks

CHAPTER 5. ICOs' EMPIRICAL ANALYSIS

OVERVIEW: *5.1 Market trend and the introduction of Security Token Offering - 5.2 The five biggest token offerings since 2016 – 5.3 Frauds and cyber-attacks – 5.4 Empirical Analysis*

In the previous chapters and paragraphs it was possible to examine the ICOs, comparing them with IPOs and existing crowdfunding types. Afterwards, an in-depth analysis was carried out, reporting its main features, the description of the tokens, the regulatory level and a final reflection on the advantages and risks of this method. Hereinafter, the market and its further developments of the last period will be studied, subsequently analysing successes and failures, as well as the sectors and geographical areas most affected.

5.1 Market trend and the introduction of Security Token Offering

A report[233] produced by PwC in collaboration with Crypto Valley Association shows that Initial Coin Offering (ICO) and Security Token Offering (STO) have benefited from a general improvement in terms of attitude towards blockchain and legislation. The latter, in countries like Switzerland and its Financial Market Supervisory Authority (FINMA), is evolving and creating clearer frameworks with greater protection for investors. Initial Coin Offering however raised many objections and concerns, often they have been used as a vehicle for financial speculation and in many cases the industrial project did not live up to expectations, or did not exist at all. The Security Token Offering (STOs), an evolution of the ICOs, are now part of this general framework.

STO refers to the offering of representative financial instruments of traditional asset classes, such as shares, bonds, rights, obligations and their derivatives, or alternative asset classes (encrypted assets) as real, financial and virtual assets, capable of generating wealth by revaluing or distributing income. They concern not only the world of "blockchain-based companies" but also all firms that can have "token-based assets" [234] of value. "Tokenisation"[235] refers to the issuance and management of so-called uniquely

[233] PwC and Crypto Valley Strategy, (2020), *6th ICO / STO Report, A strategic perspective*. Available at https://www.pwc.ch/en/publications/2020/Strategy&_ICO_STO_Study_Version_Spring_2020.pdf.
[234] Deloitte, (Accessed on September 2020), *The Tokenization of Assets Is Disrupting the Financial Industry*. Available at https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/financial-services/lu-tokenization-of-assets-disrupting-financial-industry.pdf.
[235] Blockchain4innovation, PIERUCCI G., (April 2018), *Cosa è Tokenizzazione+ e quali sono i suoi ambiti applicativi nell'economia reale* (i.e.: *What is Tokenisation+ and what are its application fields in real economy*).

Labelled Tokens (LB), defined also as Token+. LB or Tokens+ in fact are those that contain metadata[236], for which exchange is currently conducted on a secondary market, via Smart Contracts on Blockchain Ethereum Mainnet.

IPO	ICO	STO
Initial Public Offering	Initial Coin Offering	Security Token Offering
Shares	Utility tokens	Token backed by real-life assets
Strict regulations imposed by governments	No regulatory framework or legal protocol is required	Regulated via KYC/AML verifications
Bank account is required to buy stock	Crypto wallet is required to buy and store tokens	Start-ups do not need to forfeit control and ownership in the company
Start-ups forfeit control and ownership in the compnay	Not backed by anything, predisposed to scams	Investors right such as voting and revenue distribution
Expensive process that can take up to 6 months	Complete anonymity for investors via Blockchain	Transparent fundraising solutions for both entrepreneurs and investors
Exclusive for accredited investors only	No MVP/prototype is required	Fractional ownership
MVP/prototype/working product is mandatory		
CENTRALIZED	**DECENTRALIZED**	**CENTRALIZED + DECENTRALIZED**

Table 15: Main differences between IPO, ICO and STO *(Source: https://stoscope.com/blog/whats-the-difference-between-ipo-ico-and-sto)*

Available at https://www.blockchain4innovation.it/esperti/cosa-tokenizzazione-quali-suoi-ambiti-applicativi-nelleconomia-reale/.

[236] The term **metadata** defines a set of data information, often referred as "data on data". In the digital archives' context, metadata is the information that must be provided by the IT/electronic document in order to correctly form, manage and preserve it over time. The document is in fact devoid of the material component consisting of paper and is stored in systems that contain many digital objects. In order to be accessible over time, and to be properly placed in its context, it must be related to a set of information that describe it at various levels.

Unlike STOs, ICOs have the specific purpose of allowing companies to implement a sort of crowdfunding by selling tokens representative of a trading asset for transactions aimed at buying or selling the company's services, and not as an asset created as an exclusive form of investment. Utility tokens provide the access to a service or asset within a specific environment or ecosystem, security tokens are the real asset that can be considered a form of investment for all purposes, which benefits can be realized in various forms, from the traditional right of dividend or expected interests, to the possibility of participating in the company's governance. For these reasons, they are subject to regulation.

Nonetheless, this market is very recent and continues to develop. Its beginning can be traced back to 2016 and the first concrete projects to 2017 (the "boom year", in which ICOs began to be widely used by companies as a new method of financing). It can be said that the tokenisation of business assets aiming to create new forms of investment in start-ups (or consolidated companies) has already had phases characterized by crises and "restarts", and in turn by new and important forms of innovation. In 2018 this market, which combines the two main phenomena of the ICOs and the STOs, demonstrated further positive signals, doubling the results of the previous year. In the second half of 2019, instead, trends did not show a particularly significant growth (in terms of funding volumes and number of completed offerings), but they continued to strengthen their general scope and relevance in the global crypto token supply. The high number of companies implementing the tokenisation implies a strong consolidation of the new system. It is important to stress that, looking ahead, the existing underlying infrastructure will require further and complete upgrading[237].

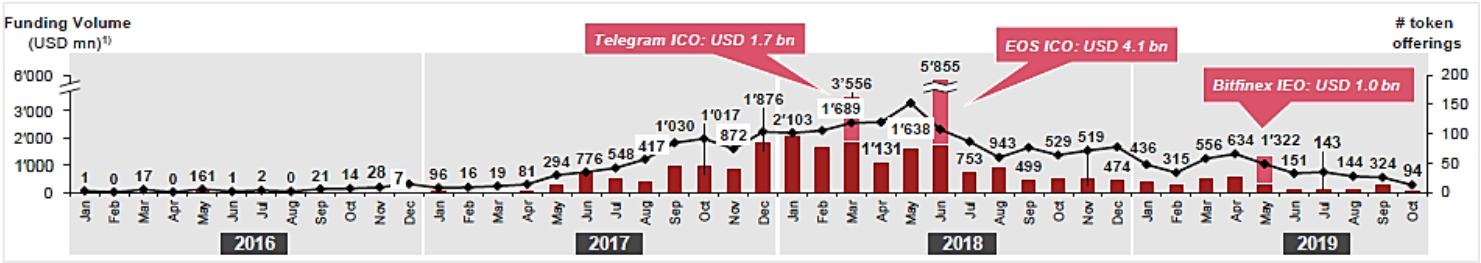

Figure 25: Tokens offerings *(Source: https://www.pwc.ch/en/publications/2020/Strategy&_ICO_STO_Study_Version_Spring_2020.pdf)*

[237] PwC and Crypto Valley Strategy, (2020), *6th ICO / STO Report, A strategic perspective*. Available at https://www.pwc.ch/en/publications/2020/Strategy&_ICO_STO_Study_Version_Spring_2020.pdf.

Year	Duration (d)	USD mln	Total #	Total volume
2013	41	0.4	2	0.8
2014	68	3.8	8	30.5
2015	32	1.0	10	9.9
2016	39	5.1	49	252
2017	29	12.8	552	7043.3
2018	58	12.3	1132	19689.3
2019	81	10.8	380	4118.5
All	49.7	6.6	2113	31144.3

Table 16: Token Offering Development *(Source: https://www.pwc.ch/en/publications/2020/Strategy&_ICO_STO_Study_Version_Spring_2020.pdf)*

5.2 The five biggest token offerings since 2016

The trends and characteristics of the ICOs market are constantly evolving as a result of their innovative mechanism as well as particular background. Main examples in terms of capital raised, launched from 2016 onwards, can be analysed and will be discussed below. Among these, five cases stand out, namely EOS, Telegram, Bitfinex, TaTaTu and Dragon, which raised from $320 million to $4,1 billion[238], involving individuals and investors in a wide variety of sectors, such as social blockchain infrastructures for dApp, to gambling in virtual casinos. As will be seen in the following paragraphs, it is interesting to note that despite the high sums of money collected, each case have had to deal with relevant problems, such as scandals or heavy cyber-attacks.

#	Name	Total raised amount (USD mln)	End of offering (month)	Focus	Industry	Country
1	EOS	4.100	June 2018	Blockchain infrastructure for decentralized apps	BC infrastructure	Cayman Islands
2	Telegram	1.700	March 2018	Tokens to enhance messenger ecosystem	Social media	British Virgin Islands
3	BitFinex	1.000	May 2019	Tokens for fee discounts in the iFinex ecosystem	FinTech	Hong Kong
4	TaTaTu	575	June 2018	Social entertainment on the Blockchain	Entertainment	Cayman Islands
5	Dragon	320	March 2018	Decentralized currency for casinos	Gambling	British Virgin Islands

Table 17: Five biggest token offerings overall since 2016 *(Source: https://www.pwc.ch/en/publications/2020/Strategy&_ICO_STO_Study_Version_Spring_2020.pdf)*

[238] PwC and Crypto Valley Strategy, (2020), *6th ICO / STO Report, A strategic perspective*. Available at https://www.pwc.ch/en/publications/2020/Strategy&_ICO_STO_Study_Version_Spring_2020.pdf.

5.2.1 EOS, a powerful infrastructure for decentralized applications

EOS [239] was founded in mid-2017, aiming to offer services such as database, authentication, and simplification of new dApps development[240]. The project is therefore not about a simple digital currency for the transferring of value, as bitcoin can be, but goes much further. The head of development is the engineer Dan Larimer, former founder of Bitshares and co-founder of Steemit. It should be specified that "EOS" correspond to the cryptocurrency's name, while Eos.io is the name of the platform released as open source software by the private company block.one, which launched the ICO in June 2017 and completed it the following year. To date, it represents the offer that has raised the highest amount of money, equal to 4.1 billion dollars. The blockchain EOS, unlike Ethereum and Bitcoin, uses a public permissioned structure and a proof of stake's algorithm. The project purpose is to bring on a single platform all the best existing features concerning the development of smart contracts. In April 2019 the EOS blockchain exceeded one million accounts and among the main peculiarities there is a security function, which can block transactions in case of theft. Scalability, flexibility and usability[241] are three features also highlighted on the EOS homepage. Scalability refers to the amount of transactions that the platform can support, flexibility consists in the possibility of being able to block the transaction if an error occurs (for example, if the recipient's address is wrong, the digital money sent would not be lost, but return to the sender, who will be able to carry out the transaction without further issues). Usability coincides with the possibility for everyone, even those who do not have advanced IT knowledge, to understand how this platform works, that indeed it is considered easier to use with respect to Ethereum platform. The system has 21 block producers who are responsible for validating each block, however their quantity is quite reduced and additionally, in October 2018 the developer of the "block-block protocol" (the company's protocol) was accused of data manipulation and further controversy arose when one of the "network arbitrators" reversed some of the transactions already confirmed by the system. For these events, the company recently registered a new patent for a digital identity recognition (DI) system, while the developer Larimer is working on a solution to the problem of blockchain scalability. Nevertheless, it

[239] For further details, *see also*: EOS, (Accessed on September 2020), Available at https://eos.io/.
[240] CoinMarketCap, (Accessed on September 2020), *EOS (ESO) Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/it/currencies/eos/.
[241] Reddit, (2018), *EOS features*. Available at https://www.reddit.com/r/eos/comments/80o9ts/eos_features/.

has very limited fees and an offer of all major cryptocurrencies, such as BTC, ETH and EOS, exchangeable with a version of Tether based on EOS.

5.2.2 Telegram, a scalable blockchain with integrated payments and communication channels

The origin of Telegram[242] dates back to 2013 from an idea of the Russian brothers Durov, Nikolai and Pavel. In order to expand the platform, the founders have leveraged on the security's feature, ensuring the inviolability of messages exchanged by users. This factor has led it to some troubles in Russia, where the company refused to cooperate with the security services asking for access keys for the decryption of messages. This rejection cost to the company a request by the Communications Control Authority to block the service on Russian territory[243]. Despite this, the ICO was launched, with the purpose of developing a blockchain platform called TON (Telegram Open Network) that includes the Gram cryptocoin[244]. In this way, the Telegram network allowed users to not only exchange messages, but also transactions of money and contracts. The designed platform could allow faster transactions than those of Bitcoin and Ethereum. The pre-sale of the TON tokens[245] was conducted at the end of February 2018, and after a month, the capital collection closed with more than $1,700 million. The ICO has been characterized by a pre-sale reserved for private individuals, hence it was not a "regular" ICO. In addition, the huge demand for participation has contributed to the proliferation of frauds that have exploited the "emotional wave" created by the messenger service, which today represents one of the most used worldwide. For this reason and in order not to create further chaos, in May 2018 the Telegram executives officially cancelled the public fundraising via ICO. The capital raised aimed to expand the company's messaging services and functionality, using

[242] For further details, *see also*: Telegram, (Accessed on September 2020), Available at https://telegram.org/.
[243] Nevertheless, **Russia** has decided to **remove the ban** on the messaging service, placed in April 2018. Therefore, users can use Telegram freely, as the software house has reached an agreement with Roskomnadzor, the Federal Agency that monitors communications and establishes any censorship. Reuters, (June 2020), *Russia Lifts Ban on Telegram Messaging App after Failing to Block*. Available at https://www.reuters.com/article/us-russia-telegram-ban-idUSKBN23P2FT.
[244] CoinMarketCap, (Accessed on September 2020), *Telegram Open Network [IOU] (GRAM) Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/it/currencies/telegram-open-network-iou/.
[245] CoinMarketCap, (Accessed on September 2020), *TONToken (TON) Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/it/currencies/tontoken/.

blockchain technology. Boasting over 21 million daily users, it is possible to conclude that Telegram can be defined as one of the first mainstream cryptocurrencies.

5.2.3 BitFinex and the issues raised by cyber-attacks

Bitfinex[246] is considered as an exchange for online trading and for cryptocurrency purchases (including Bitcoin, Ethereum, EOS, Litecoin, Ripple, NEO, Monero and many others), it is currently managed (but not owned) by iFinex Inc.[247]. Since 2014, BitFinex has always been the largest Bitcoin exchange, with the 10% of global trading[248]. In 2016, however, the Bitfinex platform was hacked, and at that time, 72 million Bitcoins[249] were stolen from the platform's customers. There have been many criticisms about the relationship between Bitfinex and Tether, which was then the official BitFinex digital coin and whose value was correlated with that of the US dollar. Subsequently, the firm created the BFX token[250], used to represent the stolen equity from customers, with a value equal to $1. In April 2017, BitFinex announced that it repurchased all BFX tokens, and thus repaid substantially customers' lost funds[251]. In the same year, however, it was no longer able to allow users to withdraw dollars after Wells Fargo (a US financial services multinational based in San Francisco, California, and operating around the world) have interrupted their bank transfers. BitFinex and Tether then sued Wells Fargo for the decision[252], withdrawing the charge after a few days[253]. Since then, Bitfinex decided to move the banks transfers to different banks located in other countries, without revealing to the customers where the money was actually stored. On that occasion, analysts accused Bitfinex of creating tokens from nowhere[254]. Only in September 2017, Bitfinex and Tether

[246] For further details, *see also*: BitFinex, (Accessed on September 2020), Available at https://www.bitfinex.com/.
[247] BitFinex, (May 2019), *iFinex Inc. - The Present and the Future Current and Forthcoming Platforms, Products, and Services*. Available at https://www.bitfinex.com/rm-2019-05.pdf.
[248] CoinMarketCap, (Accessed on September 2020), *Bitfinex trade volume and market quotations*. Available at https://coinmarketcap.com/it/currencies/telegram-open-network-iou/.
[249] Reuters, (August 2016), *Bitcoin worth $72 million stolen from Bitfinex exchange in Hong Kong*. Available at https://www.reuters.com/article/us-bitfinex-hacked-hongkong-idUSKCN10E0KP.
[250] CoinMarketCap, (Accessed on September 2020), *Bitfex (BFX) Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/it/currencies/bitfex/.
[251] CoinDesk, (April 2017), *Bitcoin Exchange Bitfinex Buys Back All Remaining "Hack Credit" Tokens*. Available at https://www.coindesk.com/bitfinex-pledges-buy-back-remaining-hack-credit-tokens.
[252] CoinDesk, (11 April 2017), *Bitfinex Sues Wells Fargo Over Bank Transfer Freeze*. Available at https://www.coindesk.com/bitcoin-exchange-bitfinex-sues-wells-fargo-over-bank-transfer-freeze.
[253] CoinDesk, (12 April 2017), *Bitfinex Withdraws Lawsuit Against Wells Fargo*. Available at https://www.coindesk.com/bitcoin-exchange-bitfinex-withdraws-lawsuit-wells-fargo.
[254] CoinDesk, (September 2020). *NYAG Lays Out 3-Phase Production Plan for Bitfinex*. Available at https://www.coindesk.com/nyag-bfx-letter-hearing.

published an accounting paper to convince critics that Tether was actually funded with real money. Nevertheless, the document was not considered sufficiently reliable, moreover, in November 2017 further $31 million[255] in cryptocurrencies were stolen. Later in 2019, Bitfinex announced LEO[256], the new utility token that aimed at raising 1 billion dollars. In just 9 days, the company was able to achieve that goal, and thanks to this new token, users were able to take advantage of new benefits, such as discounts on trading fees.

5.2.4 TaTaTu, from social entertainment platform to an innovative system of rewards and incentives

TaTaTu[257] is a social entertainment platform that has been licensed to distribute 50 films and TV programmes, as a result of the agreements with Lakeshore Entertainment, Kew Media Group and Film4. TaTaTu was launched in early 2018 and is managed by film producer Andrea Iervolino, who recently collaborated with the actor Johnny Depp[258] to develop and produce additional movies and digital content. The platform has also signed major industry agreements with the world's leading film financier BondIt Media Capital, and with the global rights and financial services company TV Fintage House, to recognise and accept its TTU tokens[259], issued with the purpose of financing new films, and paying rights relating to industry (such as television rights). The platform also deals with video-on-demand advertising (AVOD) which combines the functionality of major platforms and social networks, with an innovative system of rewards and incentives. In fact, TTU tokens are distributed to both creators and spectators, including those from users that become clients through a referral program (namely an agreement whereby the referral, i. e. the person who enters into a profit program on the indication of another already subscribed individual, recognises to the latter a commission on sales generated). By means of the ICO, TaTaTu raised $575 million, with the purpose of creating original contents, acquiring new

[255] Europar2010, (December 2017), *BITFINEX opinioni: cos'è e come funziona l'exchange di criptovalute* (i.e.: *BITFINEX opinions: what is this cryptocurrencies exchange and how it works*). Available at https://www.europar2010.org/news/bitfinex-opinioni-cose-funziona-lexchange-criptovalute.
[256] BitFinex, (Accessed on September 2020), *IFinex's Unus Sed LEO Transparency Report*. Available at https://leo.bitfinex.com/.
[257] For further details, *see also*: TaTaTu, (Accessed on September 2020), Available at https://www.tatatu.com/.
[258] Cointelegraph, (October 2018), *Johnny Depp to Produce Film Within Crypto-Powered Content Distribution Platform TaTaTu*. Available at https://cointelegraph.com/news/johnny-depp-to-produce-film-within-crypto-powered-content-distribution-platform-tatatu.
[259] CoinMarketCap, (Accessed on September 2020), *TaTaTu (TTU) Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/it/currencies/tatatu/.

users, marketing the platform and developing the software. Nevertheless, the project today seems to be stalled since it is competing with Netflix, Hulu, Amazon Video and Disney Plus, which have hindered TaTaTu growth in terms of market share[260]. In this particular industry, "the product is king" and young crypto start-ups like TaTaTu struggle a lot in order to provide popular movies on their platform (and therefore survive within the sector). Additionally, reports have surfaced claiming that TaTaTu has replaced almost half of its original team[261], leading to a lack of stability that could denoted a larger business failings.

5.2.5 Dragon and Cambridge Analytica's scandal

Dragon Platform[262] is the blockchain-based digital system dedicated to Real Casinos, where customers play using the Dragon Token with transparency and security, taking advantage of encryption that makes each transaction immutable within the distributed ledger. The Dragon Platform (founded in 2017) is based on the Ethereum network, the dApp created by Dragon Inc. aims at reducing the casinos' costs related to money managing, which affect 5%-7% on customers' pockets. Within the platform, players use virtual currencies named Dragon Global Chips (DGC) that can be converted into Dragon Token at any time. The Dragon Token (DRG)[263] is an ERC20 token representing one of the existing altcoins that can be purchased through the dApp or through Dragon Token ATMs. In addition, it is traded with fiat currencies such as USD, EUR and the Hong Kong dollar (the cryptocurrency funded start-up is specifically targeting the South East Asian market). Dragon global chips, on the other hand, is a group of digital chips that can be only purchased if users already own dragon tokens (the chips also cannot be converted into other cryptocurrency or fiat coins, but only in DRG). This type of activity (i. e. gambling) does not use real money but indeed chips, their value is linked to the legal currency in which the casino is located. At the moment, the chips are called DGC-HK, because they are linked to the value of 1 Hong Kong dollar. The relation between fiat and digital coin tries to reduce the high volatility of cryptocurrencies, and thus prevent customers from

[260] The Coin Offering, (April 2019), *The 10 Biggest ICOs and Where They Are Today*. Available at https://thecoinoffering.com/learn/the-10-biggest-icos/.
[261] Crypto Briefing, (February 2019), *TaTaTu: A $500M Startup Has Replaced Half Its Original Team*. Available at https://cryptobriefing.com/tatatu-core-team-members/.
[262] For further details, *see also*: Dragon, (Accessed on September 2020), Available at https://drgtoken.io/.
[263] CoinMarketCap, (Accessed on September 2020), *Dragon Coins (DRG) Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/it/currencies/dragon-coins/.

suffering damages due to the fluctuation of prices. In March 2018, each Dragon member was able to buy tokens (allowing the company to raise $320 million) simply connecting to a network of Global Cash Machines and requesting to convert a certain amount of fiat currencies into DRG cryptocurrency. Unfortunately, that is where the good news end for investors. During the ICO Dragon worked with the Cambridge Analytica (CA), a British consulting firm involved in the data scandal "Facebook – CA"[264], which occurred in the same year. The company had collected personal data from millions of Facebook accounts without their consent, using them for political propaganda purposes. Moreover, at that time the start-up seemed to be backed by organized crime as well[265], ruining therefore its reputation and credibility.

5.3 Frauds and cyber-attacks

Cybercriminals are becoming more and more attentive to the field of cryptocurrency and ICOs, and thanks to social engineering and proven phishing[266] techniques, they have managed to extract more than ten million dollars[267] through the conducted frauds of the last years. These data are reported in the latest publication of Kasersky Lab[268], a Russian company founded in 1997 and specialized in computer security software's production. According to the company, among the favourite hackers' targets it is possible to find mainly Initial Coin Offerings and digital coins, where the targeted users can be those who already have a crypto wallet and/or users that are more inexperienced. Cybercriminals usually develop fake websites that "faithfully" reproduce the official ICO's online pages, or try to get access to their contacts so that they can send phishing emails with the digital portfolio number in which investors could mistakenly send their virtual coins. Alternatively, a "crypto-swindler" aims to persuade unwitting investors to buy counterfeit coins by transferring fake fiat coins or crypto-currencies. A project could turn out to be a

[264] The Coin Offering, (April 2019), *The 10 Biggest ICOs and Where They Are Today*. Available at https://thecoinoffering.com/learn/the-10-biggest-icos/.
[265] Europol, (December 2017), *Operation DRAGON Delivers Major Blow to Organised Crime*. Available at https://www.europol.europa.eu/newsroom/news/operation-dragon-delivers-major-blow-to-organised-crime.
[266] IT fraud carried out by sending an e-mail with the counterfeit logo of a credit institution or e-commerce company, and inviting the recipient to provide confidential data (credit card number, password for access to the home banking service, etc.), justifying this request for technical reasons.
[267] Kaspersky – Press Releases & News, (July 2018), *Cryptocurrency Social Engineering Schemes Helped Criminals Net Nearly $10 Million Last Year*. Available at https://usa.kaspersky.com/about/press-releases/2018_cryptocurrency-phishing.
[268] For further details, *see also*: Kaspersky Lab, (Accessed on September 2020), Available at https://usa.kaspersky.com/.

scam then when the money collected during a pre-ICO or ICO are stolen and the development team has disappeared right after that (so-called ICO exit[269]). This means that the fraud was planned and the theft of investors' funds was premeditated. Among the most striking cases of fraud are Pincoin and iFan, Plexcoin, Opair and Ebitz, Benebit and Bitconnect.

Name	Total stolen amount (USD)
Pincoin and iFan	660,000,000
PlexCoin	15,000,000
Opair and Ebitz	2,900,000
Benebit	2,700,000
Bitconnect	700,000

Table 18: the five biggest ICO scams *(source: https://www.finance-monthly.com/2018/10/the-10-biggest-ico-scams-swindled-687-4-million/)*

5.3.1 Pincoin and iFan (660 million dollars)

To date, Pincoin and iFan represent the largest fraud realized. They occurred in April 2018 and were led by a single Vietnamese company that launched two projects, iFan and Pincoin, involving around 32000 investors[270]. The scam amounted to more than $658 million, achieved as a result of the implementation of the Ponzi scheme[271], inevitably leading to the disappearance of the investors' capital, to whom were promised

[269] For further details, *see also*: SHOBIT S. – Investopedia, (March 2018), *What's a Cryptocurrency Exit Scam? How Do You Spot One?*. Available at https://www.investopedia.com/tech/whats-cryptocurrency-exit-scam-how-spot-one/.

[270] Cointelegraph, (April 2018), *Vietnam: Pincoin, IFan ICOs Exposed As Scams That Allegedly Stole $660 Million*. Available at https://cointelegraph.com/news/vietnam-pincoin-ifan-icos-exposed-as-scams-that-allegedly-stole-660-million.

[271] The **Ponzi scheme** is an economic model of fraudulent sales devised by Charles Ponzi, which promises large profits to the victims, if they recruit new "investors", who are themselves victims of the scam. The potential investor is attracted to the network thanks to the promise of huge profits in a relatively short time. Percentages can often reach as much as 100% of the capital invested. Shortly afterwards, part of the amount invested in the scheme is returned to the investor. In doing so, the customer starts to trust the system and is therefore convinced that the method is really working. At that point, the client, now the victim of the scam, will begin to advertise widely the profit's opportunity. In doing so, innumerable other investors are attracted to the network. In reality, the company has zero capital, but the customers do not know that. The first-comer's returns are paid for with the last-comer's money. As the demand for withdrawals exceeds the deposits, the system stops and, in general, the companies using the Ponzi's system disappears, leaving thousands of investors without their investment.

unreasonable returns, i. e. up to 40%[272] of gains on the initial investment and on a monthly basis. The figure varied depending on how much individuals decided to invest and on how many people have been persuaded to participate in the company's ICO, since for each convinced person, the persuader earned a commission (it was clearly an application of the Ponzi scheme). After the first misleading earnings (made with the sole purpose of reassuring investors and making them believe that the system worked), the business partners or team members stopped paying the monthly interest with real money but with the tokens of the two ICOs. An event that then led to the collapse of the value of these two cryptocurrencies, causing the value of iFan, for example, to decrease hastily to almost zero (about $0.01). In addition, the homepage began to send error messages or impede transactions, furthermore its logos / links on the platform also did not refer to any other page. The scammers had simply created a fake website that could seemed credible and that attracted investors' attention by means of images of luxury goods (e.g. Lamborghini's cars or mansions). After this episode, in Vietnam the issue of Initial Coin Offering was taken seriously, the Prime Minister issued statements on this subject, prohibiting financial institutions from processing transactions related to cryptocurrencies and then prohibiting their use for purchases on e-commerce[273]. Ironically, the slogan launched by the company was "Sharing is Caring".

5.3.2 PlexCoin (15 million dollars)

The episode related to the PlexCoin company is even more impressive. The United States Securities and Exchange Commission (SEC)[274] suspended the company's ICO in 2018, in response to an official complaint against founder Dominic Lacroix, accused of scamming American and Canadian investors. The sue "stated" that Lacroix was advertising a return of 1354%[275] (which the SEC determined impossible to achieve) within 29 days, led by a

[272] CoinDesk, (April 2018), *Vietnam Investigates ICO Fraud After $660 Million in Losses Reported*. Available at https://www.coindesk.com/vietnam-investigates-ico-fraud-660-million-losses-reported.
[273] OECD, (December 2019), *Cryptoassets in Asia*. Available at https://www.oecd.org/countries/vietnam/2019-cryptoassets-in-asia.pdf.
[274] SEC, (March 2018), *SEC Emergency Action Halts ICO Scam*. Available at https://www.sec.gov/litigation/litreleases/2018/lr24079.htm.
and
SEC, (April 2017), *SEC Emergency Action Halts ICO Scam*. Available at https://www.sec.gov/news/press-release/2017-219.
[275] Cointelegraph, (July 2020), *Three Individuals Behind Alleged PlexCoin ICO Scam Charged With Fraud*. Available at https://cointelegraph.com/news/three-individuals-behind-alleged-plexcoin-ico-scam-charged-with-fraud.

group of fake experts who legitimized his project, trying also to hide his past financial crimes, which included scams at the expenses of investors in micro-credit agencies. The SEC has frozen all funds raised during the ICO since its launch in August 2017. Lacroix was arrested and the parent company of PlexCoin received a $100,000 fine. About $810,000 was still held by the Stripe payment[276] processing company and have been returned, while the rest of the funds has been dispersed in various cryptocurrency portfolios belonging to Lacroix. As in the case of Pincoin and iFan, PlexCoin has been one of the greatest attempts at ICO exit scams in history.

5.3.3 Opair and Ebitz (2,9 million dollars)

The Opair ICO was one of the earliest noted frauds in ICO history, happened in 2016[277]. The offering collected 190 Bitcoins, promising investors that the money would have been used to create a decentralized system of debit cards in which they would have deposited and spent their own cryptocurrencies. The company issued the XPO token in order to collect the capital. However, the first warning signs came immediately, the LinkedIn profiles of the company's team members were in fact fake, even though tons of images/photos and personal information were provided. The founders refused to participate in each proposed events or to show in video calls, for "privacy reasons". When people figured out that it was a swindle, it was too late and the scammers had already closed the website, disappearing until November 2016, when they launched the second ICO called Ebitz. The developers said they were a group of white hat hackers[278], i.e. "ethical" hackers intending to design a currency similar to Zcash [279], namely a decentralized and open-source privacy-focused cryptocurrency that enables selective transparency of transactions. Fortunately, just two days after the launch, it was

[276] Stripe payment is an American company that handles online payments.
[277] Cointelegraph, (February 2018), *Do not Believe the Hype. Five Largest ICO "Exit Scams": Expert Take*. Available at https://cointelegraph.com/news/dont-believe-the-hype-the-five-largest-ico-exit-scams-expert-take?_ga=2.141509106.1784007676.1601483582-513128421.1599077761.
[278] A **white hat** is an expert **hacker** in programming, systems and IT security who can break into computer networks in order to help their owners to become aware of a security problem while respecting ethics and countering those who illegally violate IT systems, even without personal benefit, calling themselves "**black hat hackers**." Both profiles fall within the more general profile of so-called security hackers. In this context, the white hat hacker can carry out a range of legitimate and useful hacking activities such as testing computers' systems to assess and prove their security and reliability or searching for potential flaws/weaknesses in order to increase its personal capabilities as well as make the system safer.
[279] CoinMarketCap, (Accessed on September 2020), *Zcash* (ZEC) *Price, Charts, Market Cap, and Other Metrics*. Available at https://coinmarketcap.com/it/currencies/zcash/.

discovered that it was a scam orchestrated by the same person behind Opair. Thanks to the Bitcointalk forum[280], users noticed that the servers managing Ebitz's e-mails were connected to the Opair domain (whose site had been removed for some time), hence sensing the link. Shortly after, the site of Ebitz disappeared and so its owner, but not before having collected about 200 Bitcoins (for a total of 390 BTC). However, many users hypothesized that the totalized BTCs came mostly from the developers, which intended to generate a "false volume", i.e. to give the impression that many people had invested in the project and consequently increase its credibility in order to promote the purchase of the issued tokens.

5.3.4 Benebit (2,7 million dollars)

Benebit ICO's purpose was to exploit a token and Blockchain system to unify customer loyalty programs, such as frequent flyer projects[281]. This offering seemed to all intents legitimate, and included a Telegram channel with over 9,000 members with a marketing budget of over $500,000 and token pre-sale promotions, promising to help "group-buy ICOs with private presale bonuses of up to 100%"[282]. With a new idea, an apparently serious white paper, and some well spent marketing dollars, the Benebit team was able to generate a good dose of hype and investors started buying. However, things started to fall apart when someone noticed that the team photos seemed to be stolen from a school in the UK. Furthermore, the passport details provided by the "founders" were all fake. After this revelation, the team behind the scam started to delete everything related to Benebit, including the website, the white paper and social media accounts. The scammers escaped with figures ranging from $2,7 to $4 million[283].

[280] Bitcoin Forum, (May 2017), *Victims of the Opair and Ebitz scams, unite!*. Available at https://bitcointalk.org/index.php?topic=1921711.0.
[281] The **frequent flyer programme** is a service provided by airlines to travellers who make frequent flights in order to provide better services and benefits during travel. In most cases, registered travellers earn as many points as the miles travelled.
[282] Bitcoin News, (January 2018), *Benebit ICO Does a Runner with $2.7 Million of Investor Funds*. Available at https://news.bitcoin.com/benebit-ico-runner-2-7-million-investor-funds/.
[283] Cointelegraph, (February 2018), *Don't Believe the Hype. Five Largest ICO "Exit Scams": Expert Take*. Available at https://cointelegraph.com/news/dont-believe-the-hype-the-five-largest-ico-exit-scams-expert-take?_ga=2.141509106.1784007676.1601483582-513128421.1599077761.

5.3.5 Bitconnect (700,000 dollars)

In addition to the cases described in the previous paragraphs, another famous example was Bitconnect[284], which was also relaunched/advertised with great enthusiasm by several celebrities. The project concerned a platform converting Bitcoins into BCCs, namely the company's tokens, which were then lent to other users in exchange for high interests. Therefore, it was not difficult to realize that it was a fraud, given the disproportionate returns and the sale of BCCs based on a clear application of the Ponzi scheme[285]. Bitconnect's project was shut down after only one year in business and after receiving two closing orders from the US financial authorities. The government bodies estimated that the fraud amounted to $700,000, that later led to a class action lawsuit from a number of affected investors.

5.4 Empirical Analysis

Choosing where to invest the money (especially when it comes to savings) is never a simple choice, even less if the concerned project or company intends to raise the necessary capital through the sale of tokens and through cryptocurrencies, as in the case of ICOs. The lack or the inadequacy of regulation and supervision by institutions or central banks that can guarantee the legitimacy of the offerings are additional factors influencing the choice of individuals. In the course of the various chapters and paragraphs it has been possible to identify variables or aspects that may persuade in some way an investor when facing an investment choice. Among these variables, the marketing channels used for the publication of the offer, the project presentation video, the description of the executive team and their respective roles, the achievement of the necessary soft cap and finally the white paper were identified and examined. In particular, the "financial" document should theoretically be easily and always available to anyone, whether expert or not, within the launch platforms or the corporate websites. Moreover, the predominant sectors, the year of issuance, the duration of the token sale, the platform used, the amount collected and the State in which the ICO was promoted, were examined. The collected and analysed sample is composed by 360 projects/offers, in the period from January 2016 to September

[284] Cointelegraph, (January 2019), *From Bitconnect to SIM-Swap Swindling: 2018's Biggest Scams*. Available at https://cointelegraph.com/news/from-bitconnect-to-sim-swap-swindling-2018s-biggest-scams.
[285] SEC, (Accessed on September 2020), *Investor Alert: Ponzi schemes Using virtual Currencies*. Available at https://www.sec.gov/files/ia_virtualcurrencies.pdf.

2020. The platforms used for data search and database construction are Icowatchlist[286] and Icodrops[287]. Icowatchlist is an ICO listing platform that helps a growing number of entrepreneurs to show, announce and provide information about Initial Coin Offering, also supplying cryptocurrencies' investors a network to find new opportunities in the "digital economy". Icodrops is also an independent database that publishes and highlights token sales. The examples were examined on a case-by-case basis, at first analysing the content directly available from the platforms, then from each corporate website and its corresponding white paper (whether published). The data were reported within an Excel file in order to carry out a statistical survey and a probit regression.

5.4.1 Analysis of conducted ICOs over time

In the last four years the companies that launched an ICO to raise capital and finance their projects were and are part of different sectors, come from different countries in the world, use (or not) social platforms in order to promote their business idea, describing it more or less technically with a video or with the publication of their white paper. In order to understand how, in these terms, the market is structured, 360 ICOs were analysed, examining their success (or failure) in raising capital through the tokens sales.

#	Project	Source	Sector	Year	Token Sale Duration (1,00=30 days)	Platform
1	Primalbase	Icowatchlist	Real Estate	2017	1,00	Ethereum
. . .						
360	Spectiv	Icodrops	Security/Identity/Verification	2018	1,00	Ethereum

Table 19a: ICOs Database

[286] Icowatchlist.com, (Accessed on September 2020), Available at https://icowatchlist.com/.
[287] Icodrops (Accessed on September 2020), Available at https://icodrops.com/.

#	Country	Marketing Channels (0 - 11)	Presence of an introductory video of the business idea	Team members' list	Direct proof of Soft Cap's achievement	Total raised ($)	White Paper direct availability
1	Singapore	7	no	no	yes	8.000.000	yes
. . .							
360	United States	6	yes	yes	yes	7.610.000	yes

Table 19b: ICOs Database

First, we can underline that the companies that resort the most to this method are related to the blockchain industry, which offers services closely concerned to the technological system itself, such as platforms that allow to create smart contracts, protocols, and tokens or to manage decentralized exchanges of information. This sector has stood out even in the last year, 2019[288]. A further sector widely involved is the financial one, implemented mainly to facilitate and accelerate the investments in start-ups.

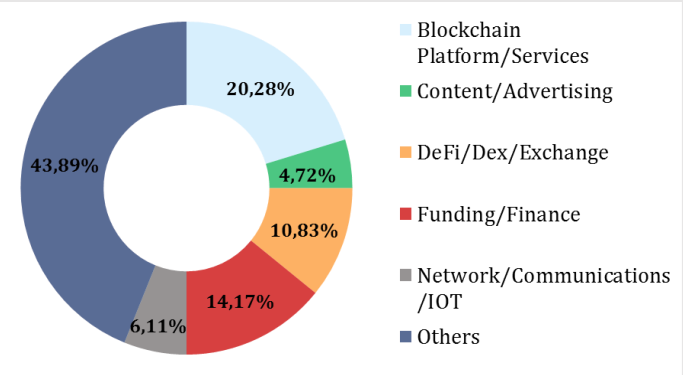

Figure 26: ICOs by industry

Another characteristic analysed is the geographical distribution, and thus the distribution of token offers. The geographical areas where ICOs have raised the most capitals are the United States, Russia, Singapore and United Kingdom. Switzerland and China (despite Chinese restrictive policies) are also among the main countries using this method. The "offers' concentration" is dictated particularly by the legislative approach taken by the concerned country, in the United States, Switzerland or (surprisingly) Singapore, it is quite likely that these percentages will continue to increase, albeit only slightly, in the coming years. The same cannot be said of Russia and especially China, where the government's position may vary year by year and tends not to favour the

[288] *Attachment 3*: ICOs by industry

cryptocurrencies' circulation, since the digital coins are considered harmful to the national economy or are suspected of financing illegal activities, hence not for purposes related to the development of ICO's business idea (as it should be)[289].

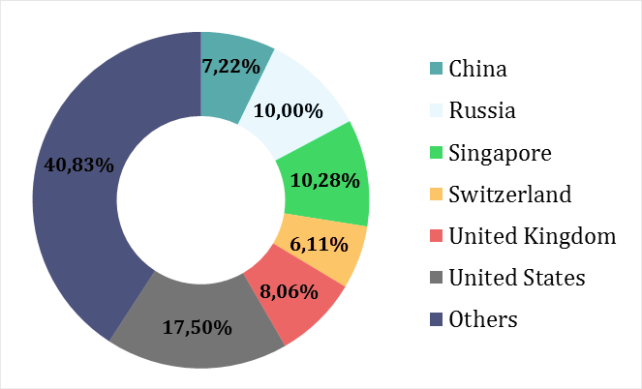

Figure 30: Token sales by country

An interesting aspect of Initial Coin Offering is the speed with which large amounts of capital can be raised. In fact, the sample analysed shows that on average it takes about 24 days to collect the necessary funding from the interested investors[290]. In general, most companies take from one to thirty days (80,28%) to do so. 16,67% instead from 31 to 60 days and finally from 61 to 90 for the remaining ones (3,06%).

From 1 to 30 days	80,28%
From 31 to 60 days	16,67%
From 61 to 90 days	3,06%
Mean	24,42
Min	1,00
Max	90,00

Table 20: Token sale duration (days)

On average, companies have managed to collect almost 14,5 million dollars (up to a maximum of 257 mln), although obviously not all of them were able to convince investors, the failures indeed (i.e. the inability of reaching the soft cap) are equal to 38,61%. For the fundraising, companies carried out a marketing campaign, presenting (or not) an introductory video, the executive team and the white paper within the specific platforms or on their website or through multiple social channels. 78% of companies present the

[289] *Attachment 4*: Token sales by country
[290] *Attachment 5*: Token sale duration (days)

team members and the role they played, the individual photo and a brief description of their professional profile. Less than half (namely 43,61%) includes also a video presentation of the business idea.

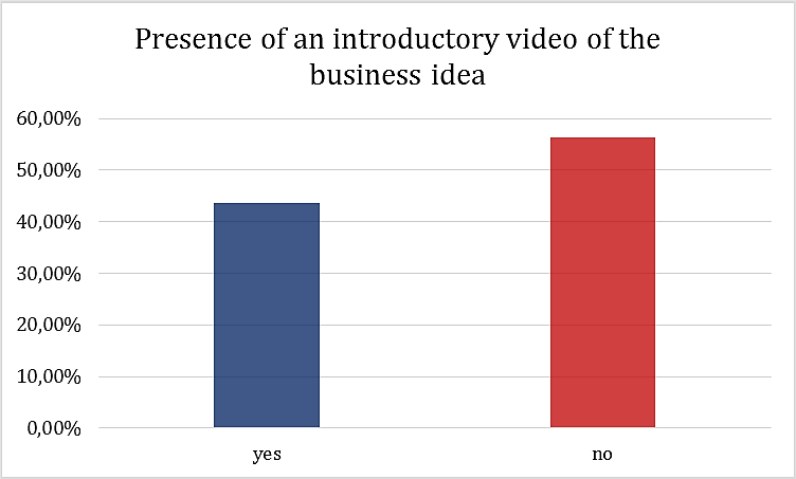

Figure 31a: Common elements of the ICO's marketing campaign

Figure 31b: Common elements of the ICO's marketing campaign

The most relevant factor remains the presence of the company in the main social networks, among them it was possible to find Twitter (the most used), Medio, GitHub, YouTube, LinkedIn, Reddit, Facebook, Telegram, Gioco, Instagram and Bitcointalk. Furthermore, more than 40% of the offers do not submit the white paper or do not make the document easily visible to the public, even though it is the only one required.

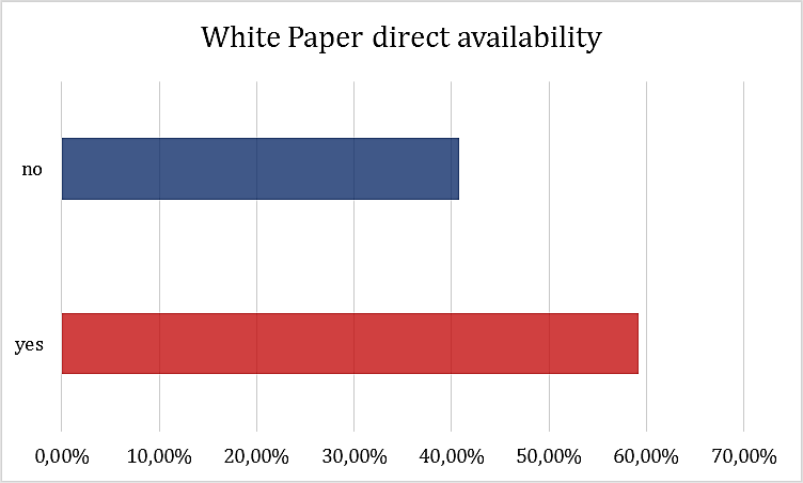

Figure 31c: Common elements of the ICO's marketing campaign

5.4.2 The Probit Model

After this first analysis, it is advisable to study also the impact that the main characteristics and elements of the tokens offers have with respect to the minimum capital achievement, namely what it is financially necessary in order to start the business/produce the good or service. This study will be conducted by means of a probit regression.

In statistics and econometrics, the probit is a nonlinear regression model used when the dependent variable is represented by the dichotomous type and in this field (namely the economic one) is based on a normal distribution hypothesis. Its purpose is to establish the probability with which an observation can generate one or another value of the dependent variable. It assumes a value of "1" if the event occurs, "0" otherwise. The regressors of the model will be socio-economic variables.

The probit regression model with a single X regressor is the following.

$$\Pr(y = 1|x) = \Phi\,(\beta_0 + \beta_1 x)$$

where Φ is the standard normal distribution function.

In the multivariate case (our example) the formulation changes.

$$\Pr(y = 1|x_1, \ldots, x_n) = \Phi(\beta_0 + \beta_1 x_1 + \cdots + \beta_p x_p)$$

The probit coefficients do not have an immediate interpretation, the computation of the predicted probabilities and the effect of a regressor's variation allows a better interpretation of the model. The values of $\Phi(\beta_0 + \beta_1 x_1 + \cdots + \beta_p x_p)$ are obtained by

looking at the standard normal distribution table. The model that will be used is therefore the following.

$$Y_i = \beta_0 + \beta_1 x_1 + \cdots + \beta_p x_p + \varepsilon_i \qquad i = 1, \ldots, n$$

More specifically, in our case four variables and a sample equivalent to 360 will be examined.

$$Y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \varepsilon_i \qquad i = 1,\ldots,360$$

Y is the dependent (or explained) variable, in our case it coincides with the achievement of the soft cap, called also "*Dummy Success*", *X* are the independent variables (explanatory variable or regressors) of a dichotomous qualitative type. As mentioned above, these variables assume a value equal to "1" if the qualitative characteristic is obtained and a value equal to "0" if not, they are represented by the marketing channels used for publishing the offer ("*MarketingChannels*" β_1 by the project introductory video of the business idea ("*DummyVideo*" β_2), by the description of the executive team and their respective roles ("*DummyTeam*" β_3) and finally by the availability of the white paper ("*DummyWhitePape*r" β_4).

β_0 is the so-called constant, $\beta_1 x_1 + \cdots + \beta_p x_p$ instead are the coefficients that will be estimated thanks to the regressions on the sample data, ε is the error which contains all the factors omitted by the model, n is the number of observations present in the sample, and finally p is the number of variables used in the model to explain the dependent variable Y, in this case equal to four.

The regression was ran through the Gretl, a statistical software. As mentioned above, before entering the data and then analysing the results, the independent variables were transformed into dummy variables, where the description "yes" or "no" became "1" or "0". The data for the independent variable "MarketingChannels" were already expressed numerically, with a range of 0 to 11.

#	Marketing Channels (0 - 11)	Presence of an introductory video of the business idea	Team members' list	Direct proof of Soft Cap's achievement	Total raised ($)	White Paper direct availability
1	7	no	yes	yes	8.000.000	yes
2	6	no	no	yes	5.500.000	yes
3	4	no	yes	yes	12.000.000	no
...						
358	8	no	no	yes	25.660.000	yes
359	8	no	yes	yes	17.700.000	yes
360	6	no	yes	yes	2.000.000	yes

Table 21: Model's independent variables

#	Dummy Video	Dummy Team	Dummy success	Dummy White Paper
1	0	1	1	1
2	0	0	1	1
3	0	1	1	0
...				
358	0	0	1	1
359	0	1	1	1
360	0	1	1	1

Table 22: Conversion of independent variables into dummy variables

```
Model 1: Probit, using observations 1-360
Dependent variable: DummySuccess
Standard errors based on Hessian

                    coefficient  std. error     z       slope
  ---------------------------------------------------------------
  const              -0.486634    0.188449    -2.582
  MarketingChannels   0.0877008   0.0234076    3.747    0.0334625
  DummyVideo         -0.108515    0.142446    -0.7618  -0.0414703
  DummyTeam           0.335243    0.170510     1.966    0.130414
  DummyWhitePaper     0.209740    0.139832     1.500    0.0803368
```

Table 23: The probit regression and the significance level of the independent variables

From these results, it can be seen that only the variables "MarketingChannels" and "DummyTeam" are significant (especially the first one) with a level of confidence of 95%. To assess if a variable is significant, it is necessary to look at the z – column. If this value

is lower than |1,96|, the variable is meaningless. In particular, the presence of one or more marketing channels increases the probability of success (i. e. being able to collect the soft cap) by roughly 3% for each channel used, while the description of the executive team increases this probability by 13% (however, it should be kept in mind that its significance level is hardly sufficient, |1,96| ≈ |1,966|). On the other hand, the availability of the White Paper, whether direct or not, would appear to be irrelevant to the investor, although it is the only mandatory document for the ICOs. Evidently, the financiers, more or less inexperienced, base their choice therefore on the presence of the company in the social networks and on the identification of the personnel who develops and manages the project. In fact, as explained in the third chapter[291], it is important to remember and emphasize that during the tokens sale, marketing activities are mainly managed through such social platforms and that, unlike IPOs, they are exploit to publish essential information related for example to the launch's announcement (or even the pre-sale) or to communicate directly with potential investors. The probit regression is not straightforward when it comes to assess the reliability/validity of the model, nonetheless, the number of correctly predicted cases is equal to 68,9%.

```
Number of cases 'correctly predicted' = 248 (68.9%)
f(beta'x) at mean of independent vars = 0.382
Likelihood ratio test: Chi-square(4) = 24.413 [0.0001]

            Predicted
               0     1
  Actual 0    49    90
         1    22   199
```

Table 24: The number of correctly predicted cases

[291] Chapter 3. Raising capital, comparison of methods, paragraphs no. 3.1 Initial Coin Offering (ICO) and 3.3 Initial Coin Offering (ICO) and Initial Public Offering (IPO).

CONCLUSION

The thesis work focuses on the Initial Coin Offering (ICO), describing the factors that allowed its development, namely the growth of the FinTech sector and arise of blockchain technology, an instrument that removes banks or central entities' intermediation through an innovative decentralized system. The underlying transactions take place by means of cryptocurrencies, also defined in the study and outlined under a legislative point of view.

Companies, from small-to-medium sized or established ones and finally to start-ups, need capital to grow, or even to exist. For this reason, an overview of existing financing methods is provided, including the ICOs, the Initial Public Offerings (IPOs) and crowdfunding. The ICOs (otherwise known as Initial Token Offerings or Tokens sales) are distinguished especially by the willingness to carry out innovative and cutting-edge projects, thanks to third parties who contribute financially by purchasing the tokens issued by the business, paying them with virtual coins. The results show that this tool enabled many projects to move from the idea phase to the implementation phase. The method grows exponentially in 2017 (called the "boom year"), but its emergence occurred previously, in 2013. This market differs from the traditional one as it is very recent, constantly evolving and for being characterized by phases of crisis and "restarts" even for periods of less than 12 months. Furthermore, starting from 2018, it has been noted that the combination of Initial Coin Offerings and Security Token Offerings expanded this industry, doubling the previous year's results. In the following year (2019) on the other hand, trends did not show any particular sign of growth (in terms of funding's volumes and number of completed offers) although ICO continued to strengthen the role-played and its significance with respect to the global supply of crypto tokens. The analysis of tokens sales' advantages demonstrates that the method creates opportunities for innovative projects, involving a large community of individuals and potential investors, with low costs and in short time, compared to traditional ways (ICOs take on average one month, an IPO from four to six months), because of the absence of intermediaries and legislative limits. The lack of a precise and complete regulation, however, turns out to be a double-edged sword, in fact the study reveals various risks for both parties, namely enterprises and financiers. The risks of

cyber-attacks and technical problems related to the underlying platforms and transactions are the main common issues. Individuals intending to invest represent the weaker side, given the high number of frauds in circulation, the difficulty in recognizing them, the high degree of risk of project's failure, the fluctuation in the tokens' value and the information asymmetries caused by the manipulation of project's data, indicated within the white paper. The latter is the most important document, as it should provide detailed information on the offer. However, to date there is no guideline to follow when drafting it, this means that it has not a standard structure, it is poorly exhaustive and untechnical, or often it does not explain why the company chose the ICO over other methods.

Even though this last year would seem to be "the year of regulation" and despite the fact that central authorities are starting to protect investors, the issued directives are mostly anti-money laundering laws or warnings on the risks of such investments. Overall, the countries analysed under the legal point of view are divided into countries for and against the ICOs or States that have not yet taken a position and therefore have not produced any guidelines.

The undertaken analysis aimed also to identify the variables or aspects that can somehow persuade investors when facing an investment opportunity and thus allow companies to obtain the necessary capital to start the business. The analysis was conducted by building a database composed by 360 offers, collected from the main launch platforms, studying afterwards their success (i.e. whether the company was able to raise capitals) or failure. For each offer, the data relating to the marketing channels used for the publication of the offer, the project presentation video, the description of the executive team and their respective roles, the achievement of the necessary soft cap and finally the white paper were examined. Additionally, the predominant sectors, the year of issuance, the duration of the token sale, the platform used, the amount collected and the State in which the ICO was promoted, were observed too. The analytical framework demonstrates that the market is particularly concentrated in the United States (to date the country has the highest number of completed offerings), and that the main interested sectors are those offering services related to the blockchain technology or financial ones. The probit regression conducted on this sample reveals that the minimum capital's achievement is influenced especially by the company's presence in

existing marketing channels (i. e. social platforms) and the publication of information related the executive team. The direct or indirect availability of white paper, on the other hand, would not seem to be a decisive factor. Clear at this point therefore is that those who invest in an ICO do not focus on the presence of economic and financial information (which should be identified in the white paper), even though such indications would help them not only to assess whether the project is financially worthy, but also whether it is de facto a planned fraud.

Finally, it should be acknowledged that ICOs are undoubtedly an innovation that can be very successful, however at the same time they show many criticalities. This is a recent phenomenon, characterised by inexperienced investors and a lack of a clear regulation, in terms of both the digital coins' use and the method of financing per se. That is why, to date, ICOs are still very risky. Therefore, a regulation capable of protecting investors and setting standards for the necessary information is required, without however adopting extremely restrictive measures that could distort the instrument, as its main feature is the decentralization. It is an equilibrium not easily achievable, but the underlying idea and technology are worthy, considering their capability of creating opportunities, transforming and possibly improving the current system.

ATTACHMENTS

- *Attachment 1a*: Cryptocurrencies prices, market capitalization and other metrics in **USD $.** (Source: CoinMarketCap (Accessed on August 2020), Available at https://coinmarketcap.com/)

Statistics	Bitcoin	Ethereum	Tether
Price	$11,867.16 USD	$398.27 USD	$1.00 USD
ROI	8,670.99%	> 9000%	0.30%
Market Rank	#1	#2	#4
Market Cap	$218,984,909,246 USD	$44,633,358,766 USD	$10,026,041,158 USD
24 Hour Volume	$24,147,316,183 USD	$12,224,528,965 USD	$32,430,151,384 USD
Circulating Supply	18,453,025 BTC	112,068,171 ETH	9,998,221,723 USDT
Total Supply	18,453,025 BTC	112,068,171 ETH	10,281,372,504 USDT
Max Supply	21,000,000 BTC	No Data	No Data
All Time High	$20,089.00 USD (Dec 17, 2017)	$1,432.88 USD (Jan 13, 2018)	$1.21 USD (May 27, 2017)
All Time Low	$65.53 USD (Jul 05, 2013)	$0.420897 USD (Oct 21, 2015)	$0 USD (Sep 18, 2019)
52 Week High / Low	$12,034.14 USD / $4,106.98 USD	$411.23 USD / $95.18 USD	$1.08 USD / $0.899490 USD
90 Day High / Low	$12,034.14 USD / $8,374.32 USD	$411.23 USD / $180.72 USD	$1.06 USD / $0.971167 USD
30 Day High / Low	$12,034.14 USD / $9,088.95 USD	$411.23 USD / $231.62 USD	$1.06 USD / $0.990811 USD
7 Day High / Low	$12,034.14 USD / $10,962.93 USD	$411.23 USD / $317.38 USD	$1.06 USD / $0.991539 USD
24 Hour High / Low	$11,876.98 USD / $11,592.87 USD	$406.30 USD / $393.97 USD	$1.01 USD / $1.00 USD
Yesterday's High / Low	$11,786.62 USD / $11,158.29 USD	$406.30 USD / $386.22 USD	$1.01 USD / $0.999533 USD
Yesterday's Open / Close	$11,203.82 USD / $11,747.02 USD	$389.71 USD / $401.59 USD	$1.00 USD / $1.00 USD
Yesterday's Change	$543.20 USD (4.85%)	$11.88 USD (3.05%)	$0.002893 USD (0.29%)
Yesterday's Volume	$24,411,254,471 USD	$12,875,466,638 USD	$33,191,883,907 USD

- *Attachment 1b*: Cryptocurrencies prices, market capitalization and other metrics in **USD $.** (Source: CoinMarketCap (Accessed on August 2020), Available at https://coinmarketcap.com/)

Statistics	Ripple/XRP	Bitcoin Cash
Price	$0.301561 USD	$304.87 USD
ROI	5,033.97%	-45.16%
Market Rank	#3	#5
Market Cap	$13,528,833,085 USD	$5,634,732,858 USD
24 Hour Volume	$1,729,097,546 USD	$1,946,672,963 USD
Circulating Supply	44,862,646,997 XRP	18,482,444 BCH
Total Supply	99,990,908,537 XRP	18,482,444 BCH
Max Supply	100,000,000,000 XRP	21,000,000 BCH
All Time High	$3.84 USD (Jan 04, 2018)	$4,355.62 USD (Dec 20, 2017)
All Time Low	$0.002802 USD (Jul 07, 2014)	$75.03 USD (Dec 15, 2018)
52 Week High / Low	$0.343972 USD / $0.115093 USD	$493.03 USD / $139.22 USD
90 Day High / Low	$0.322561 USD / $0.174234 USD	$334.78 USD / $214.19 USD
30 Day High / Low	$0.322561 USD / $0.184200 USD	$334.78 USD / $220.23 USD
7 Day High / Low	$0.322561 USD / $0.241475 USD	$334.78 USD / $278.13 USD
24 Hour High / Low	$0.306645 USD / $0.298339 USD	$305.57 USD / $289.17 USD
Yesterday's High / Low	$0.307874 USD / $0.292720 USD	$298.37 USD / $285.80 USD
Yesterday's Open / Close	$0.300783 USD / $0.303311 USD	$288.38 USD / $294.49 USD
Yesterday's Change	$0.002528 USD (0.84%)	$6.10 USD (2.12%)
Yesterday's Volume	$2,048,410,252 USD	$1,871,748,593 USD

- *Attachment 2a*: Cryptocurrencies prices, market capitalization and other metrics in **EUR €.** (Source: CoinMarketCap (Accessed on August 2020), Available at https://coinmarketcap.com/)

Statistics	Bitcoin	Ethereum	Tether
Price	€9,984.03 EUR	€337.71 EUR	€0.846519 EUR
ROI	8,642.45%	> 9000%	0.23%
Market Rank	#1	#2	#4
Market Cap	€184,235,725,126 EUR	€37,847,062,691 EUR	€8,463,688,867 EUR
24 Hour Volume	€20,362,441,531 EUR	€10,238,061,710 EUR	€27,781,378,155 EUR
Circulating Supply	18,453,050 BTC	112,068,575 ETH	9,998,221,723 USDT
Total Supply	18,453,050 BTC	112,068,575 ETH	10,281,372,504 USDT
Max Supply	21,000,000 BTC	No Data	No Data
All Time High	€16,956.38 EUR (Dec 17, 2017)	€1,209.38 EUR (Jan 13, 2018)	€1.02 EUR (May 27, 2017)
All Time Low	€55.31 EUR (Jul 05, 2013)	€0.355244 EUR (Oct 21, 2015)	€0 EUR (Sep 18, 2019)
52 Week High / Low	€10,157.58 EUR / €3,466.55 EUR	€347.08 EUR / €80.34 EUR	€0.915753 EUR / €0.759319 EUR
90 Day High / Low	€10,157.58 EUR / €7,068.46 EUR	€347.08 EUR / €152.53 EUR	€0.895225 EUR / €0.819827 EUR
30 Day High / Low	€10,157.58 EUR / €7,671.64 EUR	€347.08 EUR / €195.49 EUR	€0.891754 EUR / €0.836409 EUR
7 Day High / Low	€10,157.58 EUR / €9,268.03 EUR	€347.08 EUR / €268.55 EUR	€0.891754 EUR / €0.837024 EUR
24 Hour High / Low	€10,024.92 EUR / €9,790.05 EUR	€342.93 EUR / €332.52 EUR	€0.851347 EUR / €0.844402 EUR
Yesterday's High / Low	€9,948.65 EUR / €9,418.30 EUR	€342.93 EUR / €325.97 EUR	€0.851347 EUR / €0.843771 EUR
Yesterday's Open / Clos	€9,456.73 EUR / €9,915.23 EUR	€328.92 EUR / €338.95 EUR	€0.844331 EUR / €0.846774 EUR
Yesterday's Change	€458.49 EUR (4.85%)	€10.03 EUR (3.05%)	€0.002442 EUR (0.29%)
Yesterday's Volume	€20,604,636,683 EUR	€10,867,112,726 EUR	€28,019,459,870 EUR

- *Attachment 2b*: Cryptocurrencies prices, market capitalization and other metrics in **EUR €.** (Source: CoinMarketCap (Accessed on August 2020), Available at https://coinmarketcap.com/)

Statistics	Ripple/XRP	Bitcoin Cash
Price	€0.260921 EUR	€257.75 EUR
ROI	5,163.76%	-45.16%
Market Rank	#3	#5
Market Cap	€11,705,604,695 EUR	€4,763,941,242 EUR
24 Hour Volume	€1,578,412,454 EUR	€1,645,834,123 EUR
Circulating Supply	44,862,646,997 XRP	18,482,444 BCH
Total Supply	99,990,908,537 XRP	18,482,444 BCH
Max Supply	100,000,000,000 XRP	21,000,000 BCH
All Time High	€3.24 EUR (Jan 04, 2018)	€3,682.50 EUR (Dec 20, 2017)
All Time Low	€0.002365 EUR (Jul 07, 2014)	€63.43 EUR (Dec 15, 2018)
52 Week High / Low	€0.290278 EUR / €0.097127 EUR	€416.84 EUR / €117.70 EUR
90 Day High / Low	€0.272209 EUR / €0.147036 EUR	€283.05 EUR / €181.09 EUR
30 Day High / Low	€0.272209 EUR / €0.155446 EUR	€283.05 EUR / €186.19 EUR
7 Day High / Low	€0.272209 EUR / €0.203781 EUR	€283.05 EUR / €235.15 EUR
24 Hour High / Low	€0.261627 EUR / €0.251769 EUR	€258.35 EUR / €244.48 EUR
Yesterday's High / Low	€0.259814 EUR / €0.247027 EUR	€252.26 EUR / €241.63 EUR
Yesterday's Open / Clos	€0.253831 EUR / €0.255964 EUR	€243.82 EUR / €248.98 EUR
Yesterday's Change	€0.002133 EUR (0.84%)	€5.16 EUR (2.12%)
Yesterday's Volume	€1,728,653,412 EUR	€1,582,488,565 EUR

- *Attachment 3*: ICOs by industry

#	Sector	Observation	%	2019	%
1	Asset Management	14	3,89%	0	0,00%
2	Banking	2	0,56%	0	0,00%
3	Betting/Gambling	11	3,06%	0	0,00%
4	Blockchain Platform/Services	73	20,28%	6	26,09%
5	Cloud Storage	2	0,56%	0	0,00%
6	Commerce/Retail	9	2,50%	0	0,00%
7	Content/Advertising	17	4,72%	1	4,35%
8	Crypto Mining	4	1,11%	0	0,00%
9	Data/Computing	13	3,61%	1	4,35%
10	DeFi/Dex/Exchange	39	10,83%	3	13,04%
11	Drug/Health	6	1,67%	0	0,00%
12	Education	4	1,11%	0	0,00%
13	Energy/Utilities	5	1,39%	0	0,00%
14	Entertainment	5	1,39%	0	0,00%
15	Funding/Finance	51	14,17%	4	17,39%
16	Gaming/AR/VR	8	2,22%	1	4,35%
17	Industry/Logistics	1	0,28%	0	0,00%
18	Insurance	3	0,83%	0	0,00%
19	Job/Market Place	11	3,06%	0	0,00%
20	Lending	1	0,28%	0	0,00%
21	Marketing	1	0,28%	0	0,00%
22	Music/Art	1	0,28%	0	0,00%
23	Network/Communications/IOT	22	6,11%	4	17,39%
24	Payment/Wallet	15	4,17%	0	0,00%
25	Prediction Market	6	1,67%	0	0,00%
26	Protocol/Smart contract	13	3,61%	3	13,04%
27	Real Estate	3	0,83%	0	0,00%
28	Security/Identity/Verification	12	3,33%	0	0,00%
29	Social Network	7	1,94%	0	0,00%
30	Transportation	1	0,28%	0	0,00%
	TOTAL	360	100,00%		

- *Attachment 4*: Token sales by country

#	Country	Observation	%	2019	%
1	Africa	1	0,28%	0	0,00%
2	Argentina	1	0,28%	0	0,00%
3	Australia	5	1,39%	0	0,00%
4	Austria	1	0,28%	0	0,00%
5	Belgium	2	0,56%	0	0,00%
6	British Virgin Islands	3	0,83%	1	4,35%
7	Canada	6	1,67%	0	0,00%
8	Cayman Islands	5	1,39%	1	4,35%
9	China	19	5,28%	2	8,70%
10	China - Hong Kong	7	1,94%	1	4,35%
11	Costa Rica	1	0,28%	0	0,00%
12	Czech Republic	1	0,28%	0	0,00%
13	Denmark	1	0,28%	0	0,00%
14	Estonia	2	0,56%	0	0,00%
15	France	3	0,83%	0	0,00%
16	Germany	7	1,94%	0	0,00%
17	India	4	1,11%	0	0,00%
18	Indonesia	1	0,28%	1	4,35%
19	Ireland	1	0,28%	0	0,00%
20	Israel	5	1,39%	0	0,00%
21	Italy	1	0,28%	0	0,00%
22	Lithuania	5	1,39%	0	0,00%
23	Luxembourg	2	0,56%	0	0,00%
24	N/A	62	17,22%	5	21,74%
25	Netherlands	1	0,28%	0	0,00%
26	New Zealand	1	0,28%	0	0,00%
27	Panama	1	0,28%	0	0,00%
28	Poland	3	0,83%	0	0,00%
29	Romania	2	0,56%	0	0,00%
30	Russia	36	10,00%	0	0,00%
31	Singapore	37	10,28%	3	13,04%
32	Slovakia	1	0,28%	0	0,00%
33	Slovenia	2	0,56%	0	0,00%
34	South Korea	3	0,83%	0	0,00%
35	Spain	7	1,94%	1	4,35%
36	Sweden	1	0,28%	0	0,00%
37	Switzerland	22	6,11%	0	0,00%
38	Taiwan	2	0,56%	1	4,35%
39	Thailand	1	0,28%	1	4,35%
40	Ukraine	2	0,56%	0	0,00%
41	United Kingdom	29	8,06%	6	26,09%
42	United States	63	17,50%	0	0,00%
	TOTAL	360	100,00%		

- *Attachment 5*: Token sale duration (days)

Days	Days /30	Obs.	%	Days	Days /30	Obs.	%	Days	Days /30	Obs.	%
1	0,03	46	####	31	1,03	4	1,11%	61	2,03	2	0,56%
2	0,07	22	6,11%	32	1,07	1	0,28%	62	2,07	0	0,00%
3	0,10	4	1,11%	33	1,10	4	1,11%	63	2,10	0	0,00%
4	0,13	4	1,11%	34	1,13	0	0,00%	64	2,13	0	0,00%
5	0,17	7	1,94%	35	1,17	2	0,56%	65	2,17	0	0,00%
6	0,20	2	0,56%	36	1,20	3	0,83%	66	2,20	0	0,00%
7	0,23	6	1,67%	37	1,23	5	1,39%	67	2,23	0	0,00%
8	0,27	3	0,83%	38	1,27	0	0,00%	68	2,27	0	0,00%
9	0,30	3	0,83%	39	1,30	1	0,28%	69	2,30	2	0,56%
10	0,33	2	0,56%	40	1,33	2	0,56%	70	2,33	1	0,28%
11	0,37	1	0,28%	41	1,37	2	0,56%	71	2,37	0	0,00%
12	0,40	4	1,11%	42	1,40	4	1,11%	72	2,40	2	0,56%
13	0,43	7	1,94%	43	1,43	1	0,28%	73	2,43	0	0,00%
14	0,47	4	1,11%	44	1,47	1	0,28%	74	2,47	0	0,00%
15	0,50	3	0,83%	45	1,50	5	1,39%	75	2,50	1	0,28%
16	0,53	2	0,56%	46	1,53	0	0,00%	76	2,53	1	0,28%
17	0,57	0	0,00%	47	1,57	2	0,56%	77	2,57	0	0,00%
18	0,60	5	1,39%	48	1,60	2	0,56%	78	2,60	0	0,00%
19	0,63	6	1,67%	49	1,63	2	0,56%	79	2,63	0	0,00%
20	0,67	1	0,28%	50	1,67	0	0,00%	80	2,67	0	0,00%
21	0,70	7	1,94%	51	1,70	1	0,28%	81	2,70	0	0,00%
22	0,73	1	0,28%	52	1,73	0	0,00%	82	2,73	0	0,00%
23	0,77	4	1,11%	53	1,77	1	0,28%	83	2,77	1	0,28%
24	0,80	6	1,67%	54	1,80	0	0,00%	84	2,80	0	0,00%
25	0,83	4	1,11%	55	1,83	2	0,56%	85	2,83	0	0,00%
26	0,87	1	0,28%	56	1,87	3	0,83%	86	2,87	0	0,00%
27	0,90	7	1,94%	57	1,90	1	0,28%	87	2,90	0	0,00%
28	0,93	8	2,22%	58	1,93	1	0,28%	88	2,93	0	0,00%
29	0,97	17	4,72%	59	1,97	2	0,56%	89	2,97	0	0,00%
30	1,00	102	####	60	2,00	8	2,22%	90	3,00	1	0,28%

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