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**Blockchain and cryptocurrencies:  
industry analysis from an M&A  
perspective**

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## **Introduction**

Blockchain technology, and its natural development, cryptocurrencies, is becoming more and more part of the daily talk among the public. From retailers to companies and institutions, everyone has become interested in cryptocurrencies and the blockchain.

The blockchain, a distributed ledger technology, set the foundation for the new Web revolution, promising data security, more efficiency, and data transparency. The interest quickly become public, and billions of dollars were poured into the market; a market that went from zero in 2008, with the creation of Bitcoin, the first ever cryptocurrency, to the incredible highs of 2021, when it touched \$3 billion in capitalization.

This exceptional growth brought not only companies' interest, but also the interest of funds, venture capitalists, private equity, and other institutional investors. They focused both on the speculative part, acquiring crypto and blockchain related companies, just to follow the market momentum, and on the synergies and value creation part, with many M&A deals done to increase these two very important characteristics.

With this thesis we try to answer to the questions: how can value be created in the blockchain industry? Is the market profitable, attractive? What drives M&A deals? Are private equity investors already in or it is a little too early for them?

In Chapter 1 we discuss about the basics of blockchain technology and cryptocurrencies, covering how the technology works, its main characteristics and why it is so innovative. Then, we talk about the first ten cryptocurrencies by market capitalization, explaining how they works and what are the differences between each other. We also discuss about new trends of the industry like Decentralized Finance.

In Chapter 2 we do the industry analysis, first by doing a recap of the last two years on the crypto market, then by analyzing the industry utilizing the Porter's 5 Forces model, which helps us understand if the industry is profitable or not, assessing the root causes of profitability.

In Chapter 3, we dig into the recent M&A deals, the various financing rounds, and how private equity works. We then proceed to analyze two different deals, a classic strategic M&A deal and a decentralized M&A deal, a new and very interesting way of making a merger or an acquisition in this industry.



# CHAPTER 1 – Blockchain and cryptocurrencies

## 1.1 Mastering the basics: the blockchain

The first thing to do when discussing about a particular topic like cryptocurrencies, is to have a full understanding of the technology behind them, the blockchain. It is fundamental not only to understand the functioning of the technology, but also to master all the terms and the jargon utilized, which is composed by a variety of words that the reader may be not yet aware of.

Cryptocurrencies are based on the blockchain. Often wrongly treated like two separated entities, the two can be acknowledged like the different sides of the same coin.

A blockchain is a particular type or subset of so-called *distributed ledger technology* (“DLT”). DLT is a way of recording and sharing data across multiple data stores (also known as ledgers), which each have the exact same data records and are collectively maintained and controlled by a distributed network of computer servers, which are called nodes (Cryptocurrencies and blockchain report, EU Tax3 Committee, July 2018).

It uses cryptography to secure the information stored and uses a set of specific mathematical algorithms to create and verify a continuously growing data structure: this is because data can only be added and never be removed from the blockchain, making it one of the most secure means of cloud data storage.

When new information is added to the chain, we say it is added a new *transaction block* to the blockchain, and therefore it is so called. The main idea is that new piece of information is like a brand-new block added to an already existing chain of similar blocks.

In simple terms, the blockchain can be thought of as a distributed database. Additions to this database are initiated by one of the members (i.e., the network nodes), who adds a new block of data, which can contain all sorts of information. This new block is then broadcasted to every party in the network in an encrypted form so that the transaction details are not made public. Those in the network (i.e., the other network nodes) collectively determine the block's validity in accordance with a pre-defined algorithmic validation method, commonly referred to as a "consensus mechanism". Once validated, the new "block" is added to the blockchain, which essentially results in an update of the transaction ledger that is distributed across the network (Cryptocurrencies and blockchain report, EU Tax3 Committee, July 2018).

It is now important to explain how the cryptographic system works behind the chain, talking about the private and the public key.

Every user on a blockchain network has a set of two keys. A private key, which is used to create a digital signature for a transaction, and a public key, which is known to everyone on the network.

The public key is very important to understand because it has a double use: it serves as an address on the blockchain network, and it is used to verify a digital signature and to validate the identity of the sender.

This two keys system could be disruptive in a wide range of networks, especially the ones requiring a third party to proper function, an arbiter who needs to judge, supervise and connect the entire network. The main advantage is the no need of a third party to intermediate between users and to validate transactions (think of a bank, a broker, a dealer). In essence, blockchain is all about decentralizing trust and enabling decentralized authentication of transactions. Simply put, it allows to cut out the "middleman" (Investopedia.com).

In many cases this kind of system will likely lead to efficiency gains. However, it can have some downsides as well, and it is important to underscore that it may also expose interacting parties to certain risks that were previously managed by these intermediaries. In other words, not all things can be summed up and transformed into a blockchain (Cryptocurrencies and blockchain report, EU Tax3 Committee, July 2018).

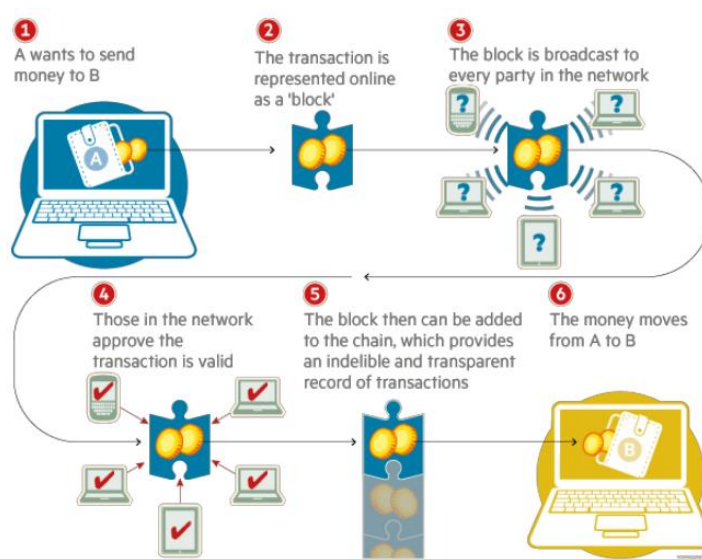


FIGURE 1, BLOCKCHAIN FUNCTIONING MECHANISM, FINANCIAL TIMES, 2021

## 1.2 The consensus mechanism

After the definitions and introductions, it is needed to define the underlying process that allows the correctly addition of a new block to the chain, which we call "consensus mechanism".

In theory, any node of the network can add new information to it, but it needs to be approved by the other nodes, namely the others network participants.

In practice, however, new blocks must be validated by most of the nodes, that have to come in some form of agreement; and it is here that the consensus mechanism comes into play.

In short, a consensus mechanism is a predefined specific cryptographic validation method that ensures a correct sequencing of transactions on the blockchain. In the case of cryptocurrencies, such sequencing is required to address the issue of “double-spending”, one of the biggest issues of this kind of technology: it is when an address doubles a transaction, spending two times the same amount in two different transactions. In other words, spending money it does not have anymore. In order to avoid this error, the consensus mechanism plays a vital role. (Cryptocurrencies and blockchain report, EU Tax3 Committee, July 2018).

This system can be implemented in a wide range of ways, but the two most known and used are without any doubt the Proof of Work (PoW) and the Proof of Stake (PoS).

In PoW, the networks participants must solve a “cryptographic puzzle” to add a new block to the blockchain. The node who first solve the puzzle is rewarded with digital form of value (in case of a cryptocurrency, the emission of one or more coins) and this process is known also as *mining*. This also serves as an incentive to uphold the network. Bitcoin, the most famous cryptocurrency, was the first to successfully implement this process. (Bitcoin Whitepaper, Satoshi Nakamoto, 2008)

Because the input of each puzzle becomes larger over time (resulting in a more complex calculation), the PoW mechanism requires a vast amount of computing resources and electricity. This is one of the most common critics done to this system.

To give an example, the University of Cambridge estimates an annual energy consumption of the Bitcoin network of more than 100 TWh of electricity, which is a third of Italy's annual total energy consumption (302,7 TWh) (Wikipedia.com).

On the other hand, there is the PoS consensus mechanism. This works slightly different. Here, a transaction validator (i.e., a network node) must prove ownership of a certain asset (or in the case of cryptocurrencies, a certain number of coins) in order to participate in the validation of transactions. This act of validating transactions is called "forging" instead of "mining". From here we have the name *staking*, because the validator has to prove his share of coins in order to be allowed to validate a transaction. And depending on how much coins he holds, this will affect the chances of being chosen to validate a transaction and obtain the rewards. The rewards are not granted as the PoW method, which is with the giving of freshly mined coins to the validator but are given by a fee on the validated transaction. The network participant is also disincentivized to approve fraudulent transactions with the penalty of taking away his stake if this should happen.

This consensus mechanism is much less energy consuming than the PoW because of the lesser resources dedicated to the network.

The natural question we should ask after the explanation of these features is: which one is better?

To answer that question, we must examine in depth the matter, what the insiders call the "blockchain trilemma".

Every blockchain tries to offer to its users three fundamental properties: decentralization, security and scalability. Together with transparency and immutability, these are the most important characteristics of a blockchain (Ledger.com, October 2022).

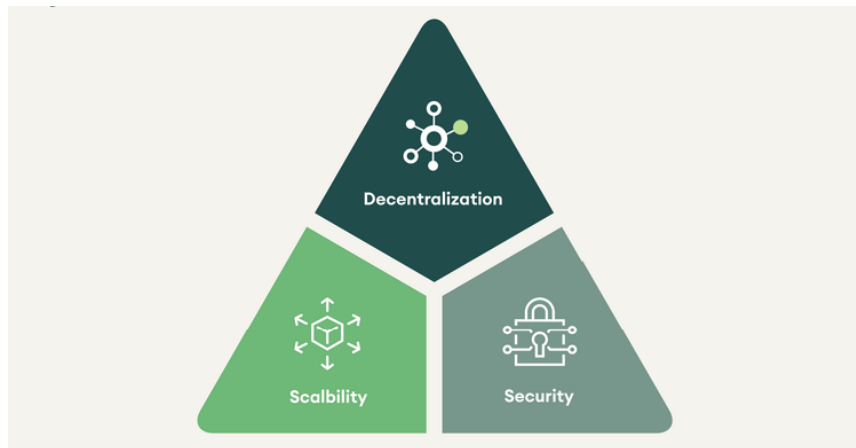


FIGURE 2, THE BLOCKCHAIN TRILEMMA, TUTTOCRYPTO.IT, 2021

Decentralization is the very core of this technology, one of the main motives to create a blockchain: no central entity has the power to modify at his will the data and the information contained in it. Every connected user is at the same hierarchy level, or to say it with the proper jargon, it is a peer-to-peer network.

Decentralization gives power to people across the networks to govern using their computers (nodes) rather than having a central control of the network live with one person or party. It can be said that it is a form of internet democracy, with equal rights to all users and participants.

Security is the second staple of the blockchain technology, a network that uses advanced cryptography to protect its users and the transactions. Having the all the information shared between all the nodes, and not stored in a single centralized member, it is very, very difficult for a potential hacker to get into the network and manipulating the data in his favor. The chances are close to zero, but it can happen: if a member acquires the control of more than the 50% of the nodes in the network, in theory it could govern the entire blockchain and rewriting past information and data. In practice, this threat is remote, because there are hundreds of thousands of nodes in a single

blockchain network and to gain the control of more than half of the computers it would be absurdly expensive. In summary, the more nodes in a network, the better for its security (101blockchains.com).

Scalability is the third fundamental characteristic, and it refers to how much a network can grow in the future while maintaining the same sort of transaction speed and output.

The fourth staple of the blockchain is the transparency. This concept could be a little tricky to grasp, because it would be normal to think: "How can a blockchain be transparent if all nodes are represented by a sequence of numbers and letters?". And this objection is not entirely false. Every node in a blockchain network have its unique alphanumeric name (the public key), which cannot change. But what transparency really means is that in a blockchain every user can see every transaction ever done, with amounts exchanged, timestamps and between what nodes. This process brings trust to the system. Obviously, you would only see the two public keys and to find out who effectively are the users behind, it would be needed the private key, which is very personal and to be kept hidden. If the private key is lost, anyone who finds it can access to the funds stored in that specific network (101blockchains.com).

Immutability is the last important characteristic. It means something that can't be changed or altered. This is one of the top blockchain features that help to ensure that the technology will remain as it is – a permanent, unalterable network. Every node on the system has a copy of the digital ledger. To add a transaction every node needs to check its validity. If the majority thinks it's valid, then it's added to the ledger. This promotes transparency and makes it corruption-proof. So, without the consent from the majority of nodes, no one can add any transaction blocks to the ledger (Investopedia.com).

After this rapid examination of the most important characteristics of the blockchain, we are now ready to tackle the above-mentioned trilemma.

It refers to the fact that is very difficult to pursue together security, scalability and decentralization, because going into one of these three directions it undermines one or even both the other two.

Usually, decentralization is the one characteristic that can never be touched or the entire premises of a blockchain network simply does not work, therefore it is rarely modified and compromises are never made. Pursuing security slows down the entire network, making transactions really time inefficient and not user-friendly; a good metaphor is thinking about each bit of information as something with weight. As more information is added, the data becomes heavier, and it is slower to move around.

On the other hand, aiming for scalability and the network speed does not favors security at all. Faster transactions, a faster and lighter network may be seen as a gain by users but, in reality, those improvements in speed are a downgrade in security (101blockchains.com).

The scaling trilemma is a loose concept which implies that blockchain networks could have only two out of the three crucial traits of decentralization, security, and scalability.

And so, with decentralization being constant, there is a directly proportional relation between security and scalability. Therefore, the blockchain scalability trilemma basically implies that a blockchain network could not optimize decentralization, scalability, and security simultaneously. As a result, trade-offs must be made (Ledger.com).



## 1.3 Cryptocurrencies

Until now the theme of cryptocurrencies has lain below the surface, but the time has come to reveal it and lift it up above the water.

Establishing a definition is no easy task. Much like blockchain, cryptocurrencies have become a “buzzword” to refer to a wide array of technological developments that utilize cryptography techniques.

The European Central Bank has classified cryptocurrencies as a subset of *virtual currencies* (Cryptocurrencies and blockchain report, EU Tax3 Committee, July 2018).

Virtual currencies are defined as a form of unregulated digital money usually issued and controlled by its developers and used and accepted among the members of a specific virtual community.

Virtual currencies are further classified into three more categories.

- 1) Virtual currencies that can only be used in a closed virtual system, like online games.
- 2) Virtual currencies that are unilaterally linked to the real economy, in a one-way channel. It is possible to buy these virtual currencies with traditional ones, to after use them to buy virtual goods or services.
- 3) Virtual currencies that are bilaterally linked to the real economy: there are conversion rates both for purchasing virtual currency as for selling such currency; the purchased currency can be used to buy both virtual as real goods and services.

Cryptocurrencies, such as Bitcoin and Ethereum, are virtual currencies of the third type. Other institutions like the IMF and the EBA have given their definition and classification, which are very similar to the one given by the ECB (Cryptocurrencies and blockchain report, EU Tax3 Committee, July 2018).

Another important difference that must be made is the cryptocurrency – tokens one. Now we shift our focus from the more legal and institutional definitions to the more practical and technological ones (Gemini.com).

A cryptocurrency is the native asset of a blockchain network that can be traded, utilized as a medium of exchange, and used as a store of value. A cryptocurrency is issued directly by the blockchain protocol on which it runs, which is why it is often referred to as a blockchain's native currency. In many cases, cryptocurrencies are not only used to pay transaction fees on the network but are also used to incentivize users to keep the cryptocurrency's network secure.

On the other hand, we have tokens - which can also be referred to as crypto tokens - are units of value that blockchain-based organizations or projects develop on top of existing blockchain networks. While they often share deep compatibility with the cryptocurrencies of that network, they are a wholly different digital asset class (Gemini.com).

Cryptocurrencies are the native asset of a specific blockchain protocol, whereas tokens are created by platforms that build on top of those blockchains. For instance, the Ethereum blockchain's native token is ether (ETH). While ether is the cryptocurrency native to the Ethereum blockchain, there are many other different tokens that also utilize the Ethereum blockchain. These tokens can serve a multitude of functions on the platforms for which they are built, including participating in *decentralized finance (DeFi)* mechanisms, accessing platform-specific services, and even playing games.

Crypto tokens have 4 crucial characteristics. They are transparent, permissionless, programmable and trustless (Gemini.com).

Transparent means that the rules of the protocol and its transactions are viewable and verifiable by all.

Permissionless refers to the fact that anyone can participate in the system without the need for special credentials.

Programmable simply means that they run on software protocols, which are composed of *smart contracts* that outline the features and functions of the token and the network's rules of engagement.

And trustless recalls the blockchain's characteristic of being decentralized and not controlled by any central authority; it runs instead on the rules established by the network.

Understanding tokens is very important because they are at the base of new trends like *NTFs (Non-Fungible Token)*, recently surged in the front pages of newspapers for the millions of dollars poured into this market and the extreme hype and enthusiasm around them (Investopedia.com).

Tokens, like cryptocurrencies, can hold value and be exchanged, but they can also be designed to represent physical assets or more traditional digital assets, or a certain utility or service. For instance, there are crypto tokens that represent tangible assets such as real estate and art, as well as intangible assets such as processing power or data storage space.

They are also commonly used as governance mechanisms for voting on specific parameters like protocol upgrades and other decisions that dictate the future direction of various blockchain projects (Gemini.com).

In this paragraph we have introduced various words that are part of the ever-increasing jargon of cryptocurrencies.

A *smart contract* is a self-executing contract with the terms of the agreement between buyer and seller being directly written into lines of

code. The code and the agreements contained in there exist across a distributed, decentralized blockchain network. The code controls the execution, and transactions are trackable and irreversible (Investopedia.com).

An *NFT* or Non-Fungible Tokens are unique cryptographic tokens that exist on a blockchain and cannot be replicated. They represent real-world items like real estate properties and artworks; they faced a public surge of interest in the late months of 2021 and at the beginning of 2022, with a staggering weekly trading volume of 146.3 billion of dollars in April 2021. These volumes didn't last long, as the entire crypto market faced a steep decline in the following months due to the general economy conditions as we will see very soon (Investopedia.com).

Last, *decentralized finance*, or DeFi, is a new paradigm in finance. It is based on distributed ledger technology, similar to those used by cryptocurrencies. The principle is to use the trustless system, the transparency, the security, and the decentralization offered by blockchain tech to remove third parties and centralized institutions in financial transactions. A newborn technology, still in development by multiple groups, with each major blockchain having its project going (Investopedia.com). More on this later on.

#### 1.4 Bitcoin: where it all began

Bitcoin was the first cryptocurrency ever created, invented by the nearly legendary Satoshi Nakamoto, a mysterious figure whose identity still remains obscure to this day.

Without Bitcoin, we wouldn't have had anything of what we have today regarding cryptocurrencies, blockchains, metaverse and lots of the new trends in computer technology.

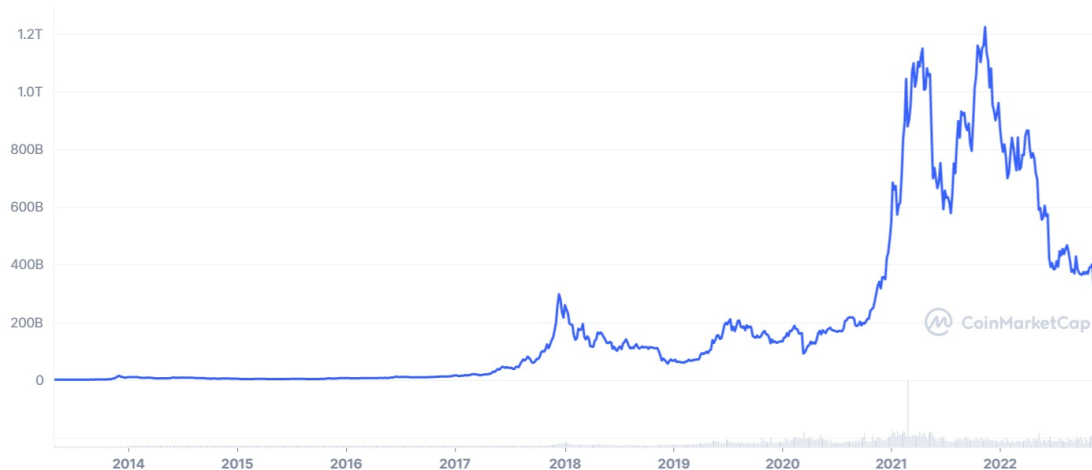


FIGURE 3, BITCOIN CAPITALIZATION ALL TIME CHART, COINMARKETCAP.COM, NOVEMBER 2022

With a current price of \$16100 on November 21, 2022, it is the most capitalized cryptocurrency on the market, with a market capitalization of \$300 billion; it maintains the number one position from the very beginning of the crypto market, being Bitcoin the first crypto ever created (CoinMarketCap.com).

From Figure 3 we can see how Bitcoin market cap has changed over time, remaining low, just a few billions, for over 4 years, and then the first bull run of late 2017; to the enormous growth of the past 2 years, when we touched absurdly high values of over 1.2 trillion of dollars, followed by the spectacular downfall of 2022. More of these quantitative analysis in the following chapter.

To give an idea of the strong grasp Bitcoin has on the market, it's measured the "Bitcoin dominance", a ratio that measures the coin's market cap relative to the overall crypto market - effectively showing

how strong Bitcoin compared to all the other cryptocurrencies that are not BTC, called "altcoins".



FIGURE 4, BITCOIN AND OTHER COINS DOMINANCE, COINMARKETCAP.COM, NOVEMBER 2022

We can clearly see in Figure 4 how the market conditions changed over time: we went from a Bitcoin dominance of more than 75% before 2017 to the fall of 2017/2018, simultaneously at the Ethereum and altcoins rise; we assisted then at the next recovery of the dominance from 2018 to 2021, and the new downfall of the past two years. But even when it has struggled, Bitcoin dominance has never fallen below 30%, indicating the power it has on the entire market.

Now a bit of history. First theorized in late 2008 with the publication of the Bitcoin Whitepaper by Satoshi Nakamoto, the network was launched in January 2009 with the mining of the genesis block, the first block ever created of the Bitcoin blockchain. The identity of Nakamoto was never discovered, even though it is not clear if there is a single

man or a group of people behind this identity. One thing is certain: his bitcoin address is one of the world's biggest, containing from 750000 to 1125000 Bitcoins, which if converted into US dollars, would be worth over 73 billion dollars, making him the 15<sup>th</sup> richest man in the world at that time (Indipendent.co.uk).

The period in which Bitcoin was created is not casual. The seeds that brought its development were spread by the disastrous precedent years, 2007-2008, when the world had suffered one of the most harsh and deep financial crises of all times.

The crisis was caused by the irresponsible risk-taking and lending practices of banks around the world. Despite their reckless behavior, many banks received government bailouts, which led to widespread protests and overall lack of confidence in the global financial system.

It was in that period, when the distrust was at its peak, that someone thought about a mean to overcome all of that and to be sure it would never happen again. Bitcoin emerged as an alternative to the "inherent weaknesses of the trust-based model", as written on the Bitcoin Whitepaper.

It was more than just a dream: it was possible and feasible. It became famous what Satoshi Nakamoto inscribed on the Genesis Block: "*The Times 03/Jan/2009 Chancellor on brink of second bailout for banks*", a message that is widely regarded as not only a timestamp but a true call to arms.

Bitcoin is trustless, fully decentralized, transparent, secure, and *scarce*. This was the breakthrough intuition that established Bitcoin's path and made it possible to see it as a reserve of value.

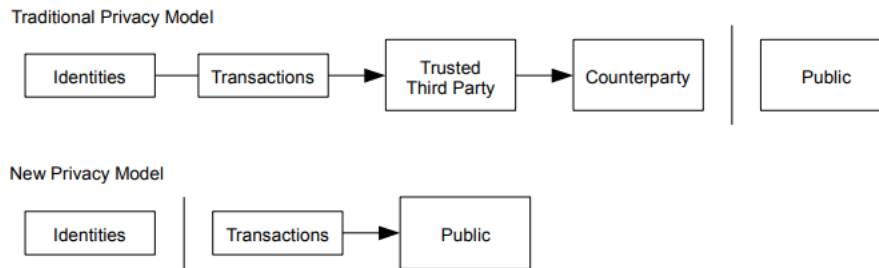


FIGURE 5, BITCOIN PRIVACY MODEL, BITCOIN WHITEPAPER, 2008

Bitcoins are not infinite. They cannot be printed like traditional money (of course, since it is all digital); the Bitcoin algorithm assures that the number of Bitcoins will not be infinite, but instead it is finite and already decided: 21 million. After that number is reached, with the last Bitcoin mined, no other Bitcoins will ever be mined (Bitcoin Whitepaper, Satoshi Nakamoto, 2008).

It is a deflationary currency, something the world has never seen before; possessed by no central bank, no institution, just pure code and mathematics, ran by countless computers (nodes) attached to the Bitcoin network, practically unattackable, programmed to be finite. It sounds like a miracle of modern technology.

When will the last Bitcoin be mined? Estimations were made and a particular year was found, the year 2140. But why this particular year? In order to answer the question, we must introduce the *halving* process and dig a bit deeper into Bitcoin algorithm.

We have already explained how the Proof of Work functions (which needs to be said, this type of consensus mechanism was born with Bitcoin) and how it is implemented in a blockchain, but it is not sufficient to fully understand how the Bitcoin network works.

Just to give a brief recap, new Bitcoins are minted through the proof of work mechanism, where miners compete to solve a computationally



intensive, proof of work puzzle. The one who “wins” is rewarded with a predetermined number of bitcoins plus network transaction fees. One miner wins the block reward roughly every 10 minutes, regardless of the amount of processing power that miners collectively bring to bear on the network. More processing power only increases a miner's chances of winning; it does not speed up the competition.

The halving is when the mining reward are halved, from the word “halve”, to decrease by half. This happens every 210000 blocks, or approximately 4 years. The halving schedule is as follows:

- 2009 to 2012: block reward of 50 BTC
- 2012 to 2016: block reward of 25 BTC
- 2016 to 2020: block reward of 12.5 BTC
- 2020 to 2024: block reward of 6.25 BTC
- 2024 to 2028: block reward of 3.125 BTC

And so on, until it eventually reaches zero BTC, approximately in the year 2140; after that the only rewards for miners will be transaction fees.

This is the characteristic that made Bitcoin be seen as a store of value by many people and which created the aura around it of “digital gold” or “gold 2.0” (Gemini.com).

## 1.5 Altcoins

In the crypto world, the term “altcoins” it’s used to refer to all other cryptocurrencies other than Bitcoin and of course launched after Bitcoin. This is a clear sign of Bitcoin’s dominance in the industry, from the very beginning to the present day.

The most famous altcoin of all it is for sure Ethereum, followed by early years coins like Litecoin, Dogecoin, Cardano and Ripple. In a market where cryptocurrencies appear and disappear in a moment, those coins were among the most resilient of the first crypto wave, surged from 2010 to 2015.

There are then recent years altcoins like Solana, Binance Coin, Avalanche, and all the stablecoins like USDC, BUSD, USDT and many others.

It is good practice to write and analyze the first 10 to 20 most capitalized cryptocurrencies, to give an idea how different projects and cryptos works, how they try to solve and assess different types of problems and what use cases they have or could have in the future.

### 1.5.1 Ethereum

We will start with the analysis of Ethereum, the first competitor of Bitcoin and the second largest cryptocurrency by market share at the moment, with a market capitalization of over 150 billion dollars and a market share of 18.3% at November 2022, this cryptocurrency is by far one of the most important of the entire crypto landscape, for several reasons (CoinMarketCap.com).

Conceived in 2013 primarily by Russian-born Canadian programmer Vitalik Buterin, launched in 2015, Ethereum is a decentralized, open source blockchain with smart contracts functionality (Wikipedia.com). It laid the foundations of blockchain-based decentralized apps, or *dApps*, powered by token economies and smart contracts. The network is fueled by its native cryptocurrency ether (ETH), which is used to pay network transaction fees. In the minds of Buterin and the other founders Ethereum was the first step towards a fully decentralized internet, open source, censorship resistant and

innovation-centered, where new trends like stablecoins, ICOs and dApps could prosper and bolster growth.



FIGURE 6, ETHEREUM ECOSYSTEM, MEDIUM.COM, 2021

As we can see in Figure 6, there are plenty of projects being built upon the Ethereum ecosystem, offering a wide array of services from exchanges and derivatives services to asset management tools and custody wallets. This shows how good the foundation of the project is and how many developers and companies are building on it.

After its creation, the first major event happened in 2016 when was raised more than \$150 million with crowdfunding through a decentralized anonymous organization (or *DAO*) called "The DAO" (Ethereum.org).

But in the June of the same year an accident occurred: The DAO was exploited and \$50 million were stolen by an unknown hacker. This tragic event (unfortunately, we will see that is not so uncommon) sparked debate and discussions though all the crypto community to decide whether Ethereum should perform a contentious "hard fork" to

reappropriate the affected funds. It was decided to proceed with a fork and the blockchain was split in two: the one with the stolen funds reintroduced, which is the Ethereum we all know this day, and the one that did not reverse the theft and continued on the original chain, which is known as “Ethereum Classic” (Wikipedia.com).

The development of the chain did not stop after the hard fork and multiple upgrades were done in the following years. One of them, the London upgrade, introduced a mechanism for reducing transaction fee volatility, a long-term issue of Ethereum. The new method causes a portion of the ether paid in transaction fees for each block to be destroyed rather than given to the miner, reducing the inflation rate, and potentially resulting in periods of deflation (Wikipedia.com).

In 2022 Ethereum had the biggest development by far, the Paris upgrade, which had the entire blockchain switch from Proof of Work to Proof of Stake. This is an enormous development, also called “The Merge”, because it refers to the original Ethereum Mainnet merging with a separate proof-of-stake blockchain called the Beacon Chain, now existing as one chain. This upgrade reduced Ethereum's energy consumption by ~99.95%, eliminating the need for energy-intensive mining and instead enabled the network to be secured using staked ETH (Ethereum.com).

Figure 7 represents the moment of the merge with the 3 key moments: the previous launch of the beacon chain, the merge with the main chain and subsequent sharding, which means, as the word may suggest, to divide into shards the information, making it less heavy and more handily. It is a solution needed if the purpose is to improve the scalability of a network (Sequoiacap.com).

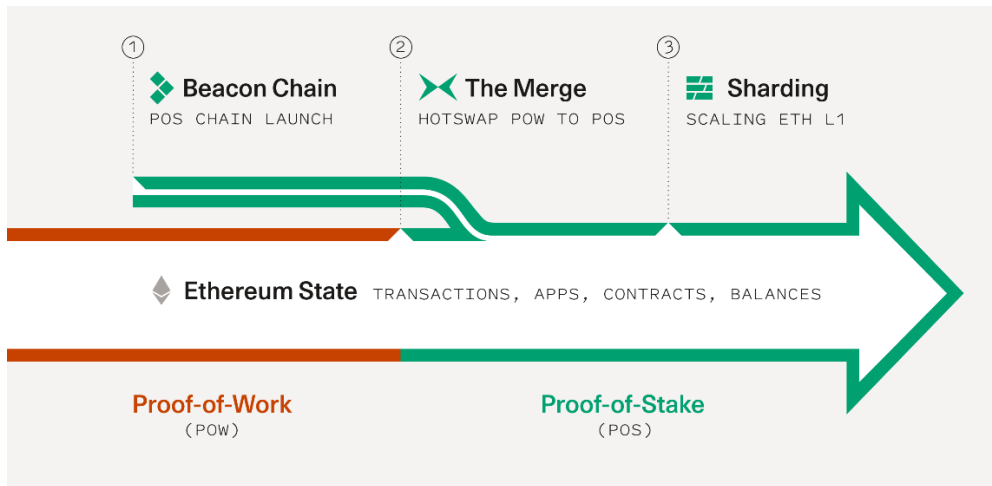


FIGURE 7, ETHEREUM'S MERGE, SEQUOIA CAPITAL, 2022

### 1.5.2 Binance Coin

Binance coin, or BNB in abbreviated form, is the native cryptocurrency of the Binance blockchain ecosystem and currently the fifth largest cryptocurrency by market capitalization.

But what is Binance? It is simply the biggest centralized exchange with more than 30 million users worldwide and \$10 plus billion in daily trading volume. And it is more than just an exchange or a blockchain, it is an entire new ecosystem with multiple specializations and projects based on its architecture (Wikipedia.com).

Founded in 2017 by crypto business executive Changpeng Zhao, also known as "CZ", it rose very rapidly as the biggest centralized exchange by trading volume (CoinGecko.com). The exchange offers lots of features and services for crypto investors, from fast fiat deposits via bank transfer or credit card to advanced trading like spot trading, margin trading and derivative trading. The native blockchain offers an advanced ecosystem which has smart contracts and it's compatible with the Ethereum blockchain through the Ethereum Virtual Machine.

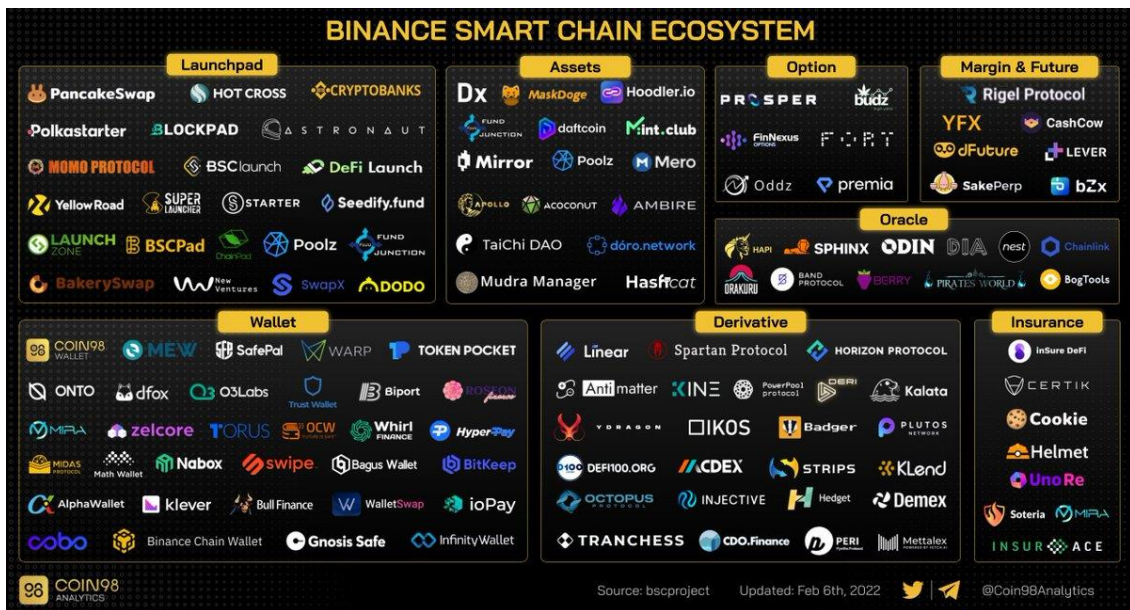


FIGURE 8, BSC ECOSYSTEM, COIN98 ANALYTICS, FEBRUARY 2022

We can clearly see in Figure 8 the Binance ecosystem in all its might: it is about the same size of Ethereum’s one, a clear sign of users and developers’ appreciation. There are multiple projects in each of the key areas listed above, from derivatives and insurance services to lending and asset management (Coin98 Analytics).

As we already said, it is the biggest exchange on the market, with more than 5 times the daily trading volume of the second exchange, Coinbase; Binance alone has a bigger trading volume than the other top 10 exchanges summed together.

This is so true especially after the FTX bankruptcy of November 2022: FTX was the second biggest player in the exchanges market and with him gone Binance position can only grow stronger (CoinMarketCap.com).

The token of the blockchain, BNB, uses a combination of the Proof of Stake and the Proof of Authority (another type of consensus mechanism, less famous) called the “Proof of Staked Authority.” BNBs can be used in the Binance ecosystem as payment for transaction fees

or staked to reap validator's rewards, and many other use cases. In summary, Binance is the leading centralized exchange, and it is there to stay, if managed correctly: FTX's case is a clear warning sign and other exchanges should be taking notes on how not to behave in this industry. We will talk about the FTX case and consequent bankruptcy on Chapter 2.

### 1.5.3 Cardano

One of the early days crypto, Cardano is a Proof of Stake based cryptocurrency with numerous uses cases and applications. It currently has 10.49 billion of dollars of capitalization, making it the eighth most capitalized cryptocurrency, with a price per token equal to \$0.30 as November 2022 (CoinMarketCap.com).

Founded in 2017 by Charles Hoskinson, a co-founder of Ethereum who departed the project to focus on Cardano with the intention of delivering a more complete network for decentralized programs. This blockchain is known to be fully open source, decentralized, and it uses the token ADA as internal currency.

Supervised by the Cardano Foundation and the IOHK, Hoskinson's company, the crypto offers the possibility to program decentralized apps, NFTs, smart contracts and more. The entire project is known for its research-driven focus: the organization has published numerous peer-reviewed papers and partnered with several universities to facilitate blockchain research and education. These peer-reviewed research are used to identify opportunities to change and improve the network. Evidence is reviewed to confirm how well Cardano can change and move forward on the market (Cardano.org).

The goals of the Cardano Foundation are noble and true to the founder's vision, as said on the Cardano website, "Cardano is a fork in the road. It takes us from where we've been to where we're destined to go: a global society that is secure, transparent, and fair, and which serves the many as well as the few."

Even though the high market capitalization and the audacious goals, the project has faced some critics for arriving late to all the blockchain innovations that the industry has seen in the past years: for example, Cardano implemented the possibility to use smart contracts and decentralized apps in September 2021, with the last major upgrade of the chain. A bit late, considering that the Ethereum blockchain can execute smart contracts from its very beginning on July 30, 2015 (Wikipedia.com).

But although the blockchain seemed to not be paced fast enough, the roadmap is clear as we can see from the Cardano ecosystem in Figure 9 down below; the number of projects built upon the chain has risen greatly in the past years and more developments are going to come in the following years.





FIGURE 9, CARDANO ECOSYSTEM, COIN98 ANALYTICS, SEPTEMBER 2022

We can also see from Figure 9 that Cardano is really aiming to the gaming and NTF industry, with more than thirty projects focused in this area, differentiating from other blockchains like Ethereum and the Binance Smart Chain. Ethereum chain is more exchange-centric, allowing developers a wider range of alternatives for the development of diverse types of *decentralized exchanges* (also known as “DEXs”); the BSC is more focused on financial services instead, or better said, decentralized financial services and applications.

#### 1.5.4 Ripple

Ripple, or the XRP Ledger, as they said on their website, is a “decentralized, public blockchain led by a global developer community.” It functions with the XRP token, designed to be a medium of exchange and value transfer, and is intended to be used as a low-cost bridge between fiat currencies for a broad range of global transactions (Xrpl.org).

Here is important to notice that Ripple is often used to refer both to the XRP token and the blockchain: but in fact, the two are to be treated separately, where XRP is a cryptocurrency while Ripple is a for-profit company that helps promote and develops XRP, the software behind it (the XRP Ledger) and numerous other transaction-focused projects.

This cryptocurrency is another one of the earliest, being founded in 2011 from three engineers who were fascinated from Bitcoin and wanted to create something similar but improved. In 2012 was launched the blockchain and the XRP token. From the very beginning it has awakened a significant interest from banks and financial institutions due to the payment-system oriented, fast, and promising blockchain.

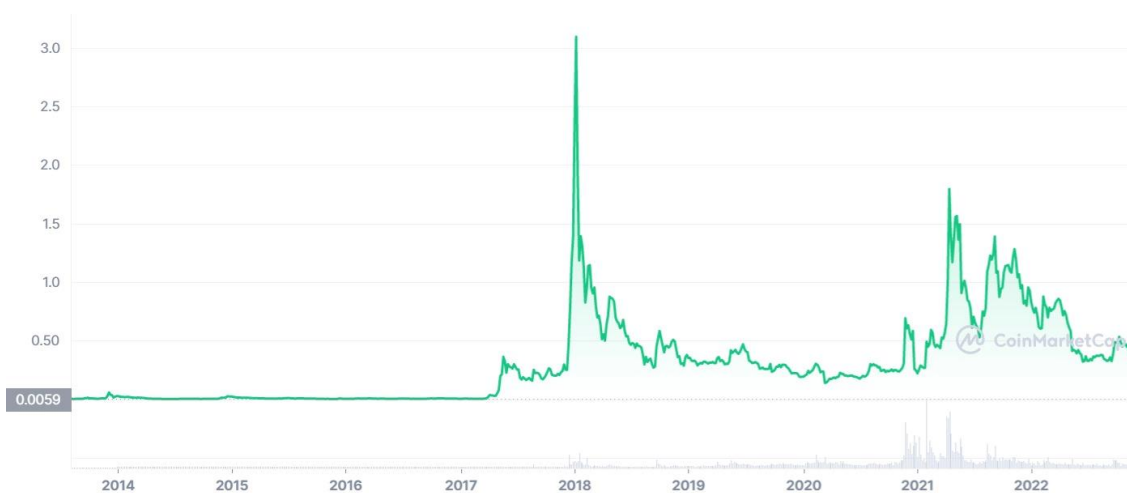


FIGURE 10, XRP ALL-TIME PRICE, COINMARKETCAP.COM, 2022

It gained a lot of attention during the 2017 bull run, where its price skyrocketed to 3 dollars per coin, as we can see from Figure 10, with a dominance of almost 20% of the total market (for reference see Figure 4, page 14); numbers that were never repeated after, since the price has never recovered to those levels nor the dominance, eroded

by other new promising currencies. The price now lingers below the 1-dollar barrier, and as November 2022 is at \$0.36.

### 1.5.5 Dogecoin

We conclude the examination of the first ten cryptocurrencies by market capitalization with one that is almost a hoax, or at least it was born with a playful and not serious intent: Dogecoin, the *meme* coin. Just to bring clarity, the Collins Dictionary defines a meme: “something such as a video, picture, or phrase that a lot of people send to each other on the internet.” And Doge, as written on Wikipedia, is an Internet meme that became popular in 2013. The meme typically consists of a picture of a Shiba Inu dog accompanied by multicolored text in Comic Sans font in the foreground (Gemini.com).

To give a visual representation of what we are discussing about, in Figure 11 there is a picture of Dogecoin, with the Shiba Inu dog and the famous Comic Sans font utilized to do such memes.



FIGURE 11, DOGECOIN, DOGECOIN.COM, 2020

In 2013, software engineers Billy Markus and Jackson Palmer decided to use the popularity of this meme to create a new cryptocurrency, making fun of the wild speculation in cryptocurrencies at the time.

Despite being born with the intent of a parody of the proliferation of altcoins that came into existence in the years following the original launch of Bitcoin, the DOGE crypto network has defied expectations in terms of its growth, fostered an active ecosystem, and proven the market value of internet culture in the digital economy (Wikipedia.com).

This can be seen also looking at the market capitalization and the daily volume of the coin, being respectively at \$10 billion and \$600 million on November 22, 2022; during the last bull-run of 2021, these two metrics went to extreme high values, with a market cap above \$20 billion for much of the year, and peaks of \$70 billion in July; the daily volume was very high as well, with peaks of \$25 billion exchanged (CoinMarketCap.com)

There are some negatives sides as well. One of the major criticisms done to meme coins and Dogecoin in particular, is that cryptos like these are Ponzi schemes, or frauds, promoted by the first who entered the network and whose already have large bags of coins. Those people then try to attract more and more users, so the market price will go up, just to sell afterwards at peak value, scamming the latecomers and leaving them empty-handed (Gemini.com).

All these metrics and considerations are being done to highlight that cryptocurrency industry is still very young, with only 12 years of life, and sometimes can be silly, like someone who doesn't take himself seriously. Meme coins are a part of the crypto world and even if we don't like them, investors and companies must take them into account, or something that can be very important would be missed.

## 1.6 Stablecoins

Stablecoins are digital currencies which value is tied directly to a predetermined fiat currency or tangible commodity. So, for example, 1 USDC is worth 1 US Dollar. This kind of cryptocurrency is relatively new to the crypto landscape, but they rapidly emerged as one of the most used method to store and send digital funds. It is a mean to overcome crypto's extreme volatility, allowing users to operate more easily in the market.

As November 2022, 3 of the first most capitalized cryptocurrencies are stablecoins, which are, in order, Tether, USD Coin and Binance USD, with more than \$133 billion if taken together; given that the total market capitalization is \$830 billion, 16% of this number is represented as stablecoins (CoinMarketCap.com)

There are four primary stablecoin types, identifiable by their underlying collateral structure: fiat-backed, crypto-backed, commodity-backed, and algorithmic. While underlying collateral structures can vary, stablecoins always aim for the same goal: stability.

Fiat-backed collateral is the most common (and secure) type of stablecoin: 1 coin is backed by the same unit of a fiat currency. Fiat collateral remains in reserve with a central issuer or financial institution and must remain proportionate to the number of stablecoin tokens in circulation.

Crypto backed stablecoins, like DAI, are backed with another cryptocurrency as collateral. This process involves on-chain operation and a smart contract instead of relying on a central issuer. While purchasing the coins, cryptocurrency is locked into a smart contract to obtain tokens of equal representative value.

The third type, as the name suggests, are stablecoins backed on some kind of commodity collateral, like gold, real estate, or oil.

And finally, we have algorithmic stablecoins, a very fascinating kind of digital currency. Here the stability is achieved through using specialized algorithms and smart contracts that manage the supply of tokens in circulation (Gemini.com).

## 1.7 DAOs

DAOs, or Decentralized Autonomous Organization, are a new paradigm of governance born together blockchain technology and cryptocurrencies.

The Gemini encyclopedia defines a DAO as a blockchain-specific organizational model that addresses a perennial challenge present in almost every industry and organization: the principal-agent dilemma.

In short, the principal-agent dilemma occurs whenever a system is structured in a way in which an individual or entity (the “agent”) has the ability to make decisions or take actions on behalf of another individual or entity (the “principal”), there is inherent risk in the divergent goals, priorities, or access to crucial information of the respective parties. The agent may be motivated to act by its own principles or self-interest, as opposed to represent the principal’s interests (CoinTelegraph.com).

DAOs assess this issue by being a trustless system, where information is shared, transparent and immutable: every principal or agent (every network user or stakeholder could be agent or principal) can consult that information and as a result we have an alignment of incentives. This key feature is a defining concept of blockchain protocols, and DAOs apply similar logic to organizations and governance. A properly executed DAO aligns the incentives of stakeholders — from founders

to token holders, to users, and the general community — in governing an organization or decentralized platform.

The implications for a greater scale use of these kind of organizations are massive. But how do DAOs work, and what challenges would they face before implementation?

Three major phases have to occur. First, the underlying rules must be defined and encoded in a series of smart contracts. This first step is crucial since an error in the code can create fatal errors later, destabilizing the entire project from the start.

Second, a funding phase must happen, since The DAO's smart contracts must entail the creation and distribution of some form of internal property, such as a native token that can be spent by the DAO, utilized in voting mechanisms, or used to incentivize certain activities within the ecosystem.

And third, there is the deployment phase. After receiving the funding, all the decisions are made through a consensus vote. This imply that all token holders become stakeholders who can make proposals regarding the DAO's future and how its funds are spent (Gemini.com).

At this point, if the design of the organization is good, a DAO can operate independently of its creators or any other central authority.

We can summarize by saying that a DAO's stakeholders are bound together by a common goal, which they will vote to advance through the pursuit of specific network incentives defined by the DAO's underlying consensus policies.

Figure 12 can help visualizing the DAO and its ecosystem with a graphical representation of the various stakeholders and systems used to govern the organization.

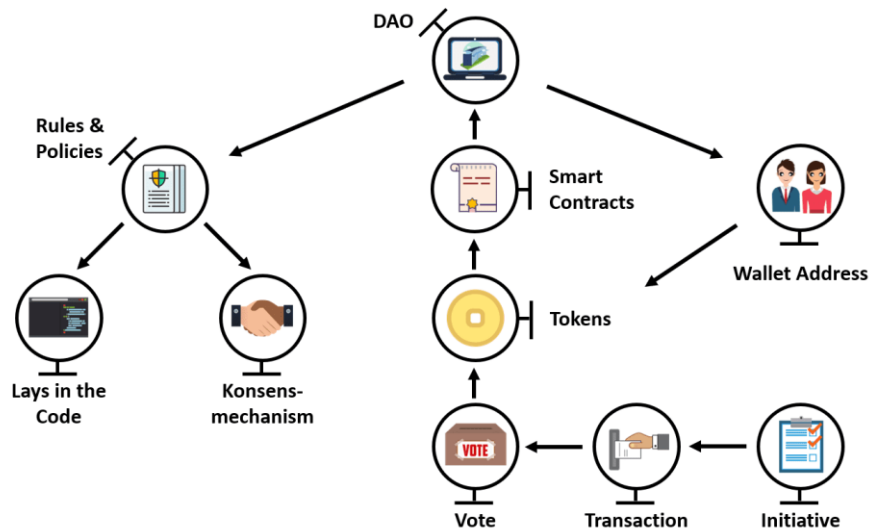


FIGURE 12, A DAO AND ITS ECOSYSTEM, NIROLUTION.COM, 2018

## 1.8 Decentralized applications

Also called dApps, decentralized applications are digital applications or programs that exist and run on a blockchain or peer-to-peer (P2P) network of computers.

As the name said, these applications are decentralized, which means that no central or single authority have the control over them (Nirolution.com).

Usually ran through smart contracts, these applications operate autonomously and can be managed through tokens that represent ownership.

Usually open source, they share the key characteristics of the blockchain technology: transparency, trustless nature and immutability.

They are divided into various categories such as exchanges, games, finance, gambling, development, data storage and many more.



Basically, every program or application built on a public blockchain is a dApp.

DApps have a key role especially in Decentralized Finance applications, DEXs (decentralized exchanges) or financial services apps, with the underline goal of every developer being to disrupt traditional finance and bring more capital into this industry.

## 1.9 Decentralized Finance

Decentralized finance (DeFi) is an emerging financial technology based on secure distributed ledgers similar to those used by cryptocurrencies (Investopedia.com). The key characteristic of DeFi is that it is decentralized, meaning that it is not controlled by any single entity or organization. Instead, DeFi operates on a network of computers that run on open-source software, creating a transparent, secure, and decentralized financial system (Investopedia.com).

DeFi aims to provide financial services that are accessible to everyone, regardless of their location or financial status. By leveraging blockchain technology, DeFi eliminates the need for intermediaries, reducing costs and increasing financial inclusion. Some of the services offered by DeFi include lending, borrowing, savings, insurance, and investment: wherever there is an internet connection, individuals can lend, trade, and borrow using software that records and verifies financial actions in distributed financial databases (Investopedia.com).

The key feature of DeFi is that it operates on a transparent and secure ledger, which is maintained by a decentralized network of computers. This ensures that financial transactions are secure, transparent, with a reduced risk of frauds or thefts. Additionally, DeFi operates on open-

source software, which makes it accessible to anyone with an internet connection.

Another characteristic of DeFi is that it provides access to financial services that are not available in traditional financial systems, such as yield farming and tokenization. Yield farming refers to the practice of depositing assets into a DeFi platform in exchange for interest. Tokenization, on the other hand, refers to the process of converting assets into a digital form that can be traded on a blockchain network (Investopedia.com).

Obviously, there are some advantages and some disadvantages that are really similar to the ones of the underlying technology, the blockchain (Medium.com).

Advantages (Medium.com):

- Immutability: As for the blockchain, once data is stored in the chain, are immutable and cannot be changed or altered. This removes the potential adverse effects of bad actors and human mistakes that are sometimes found in traditional finance.
- No human errors: Working on autonomous smart contracts without any human intervention, DeFi eliminates the problems caused by human mismanagement.
- Transparency: One of DeFi's most significant accomplishments is transparency. In addition to its immutability, DeFi offers transparency thanks to the openness of blockchain data, which is available for anyone to access at any time. Decentralization always leads to more transparency, and the distributed ledger contains data on all operations and transactions conducted through the blockchain network.
- Fair access to financial services: Cutting out the middleman, assuring a fair access to financial services to everyone with the

right credentials (with the blockchain acting as judge, since it prevents issues like double-spending and the principal-agent dilemma) is an enormous advantage.

Disadvantages (Medium.com):

- Scalability: an issue shared with the underlying technology, scalability could be a big problem if not treated. Current financial systems can sustain thousands of transactions per second, while blockchains (and not all of them, of course) have to be twisted and implemented with other layers, applications and improvements to achieve comparable results.
- Liquidity: Illiquidity is often an issue of DeFi, being newborn and with fewer users than the traditional system. This problem should become smaller when DeFi will gain more mass adoption.
- Shared Responsibility: One of the many characteristics of DeFi that users find problematic is the fact that users must share responsibility for maintaining the network. Any errors committed by contributors are not the responsibility of the DeFi application. It is up to the users to take care of their own money and property. As a result, the DeFi space necessitates the use of the appropriate technologies that can reduce the chance of mistakes and errors. By returning control to people, DeFi can be powerful and replace many aspects of conventional banking.



## **CHAPTER 2 – Strategic analysis**

In the second chapter of this dissertation, we will analyze the crypto industry, starting with a brief explanation of the market movements of the last two years, from the 2021 bull run to the capitulation of 2022, explaining what and why causes the market to rally or plummet, or, in other words, explaining its volatility and its correlation with other asset types; then we will proceed with a strategic analysis from an M&A investor point-of-view, using Porter's five forces model to determine the industry attractiveness.

### **2.1 The last two years in the crypto market: a rollercoaster**

The best way to start analyzing how the market moved in the last two years is to have a look at the market capitalization graph, to understand how capitals have moved and how investors have acted.



FIGURE 13, TOTAL MARKET CAPITALIZATION FROM 2017 TO 2022,  
COINMARKETCAP.COM, NOVEMBER 2022

Figure 13, taken from the reference site CoinMarketCap.com, shows the movements of the total market capitalization from 2017 to 2022. It should not amaze that this graph resembles very closely the one shown in Figure 3, namely the one showing bitcoin capitalization, since we already said bitcoin represents almost 30% of the total market capitalization (see also Figure 4, paragraph 1.4).

We can see the first bull run occurring from the end of 2017 to the first half of 2018, where the market almost touched the \$1 trillion market cap milestone, the following decrease, with the Covid-19 pandemic in the middle, and the rollercoaster of the last two years. To give the full picture of what happened, we have to introduce a key person in the crypto industry, one capable of moving millions of dollars with a single tweet: Elon Musk, Tesla’s CEO. Mr. Musk has always been a crypto supporter and enthusiast, given its influence over the tech world, and



simultaneously bitcoin hit his personal ATH at \$30,000 (CoinMarketCap.com). In this context, in the first two weeks of February, Mr. Musk joined the parade, telling the world Tesla had purchased \$1.5 billion in bitcoin to be held as an investment and store of value for its excess cash. And it is not stopping here: he had also told in an interview he is “late to the party but I am a supporter of Bitcoin”, and that now Tesla had started accepting bitcoin as payment (CoinDesk.com).



FIGURE 15, BTC-USDT 1W CHART, TRADINGVIEW.COM, DECEMBER 2022

These events started an incredible bull run that reached new ATHs both for bitcoin and market capitalization, respectively at \$63,523.75 and \$2,544 billion (CoinMarketCap.com). Figure 15 clearly shows the new tops reached by bitcoin, with several weeks in the 50 to 60 thousand dollars price range. And then, suddenly, the collapse of the entire market: during May 2021 the entire crypto market faced a spectacular sell-off, with \$1 trillion burned in capitalization and with bitcoin performing an incredible -45.64% alone, burning \$322 billion.



Why this happened? It was due to various bad news, that combined all together plummeted investor's expectations, rose fear, uncertainty, doubt (the infamous "FUD" acronym), and the market sank down.

The first bad news was that Elon Musk turned back Tesla's commitment to accept bitcoin as payment, citing concerns over the cryptocurrency's massive carbon footprint (CoinDesk.com). In addition, regulatory concerns were rising ahead, with Federal Reserve Chairman Jerome Powell warning about potential risks cryptocurrencies pose to the financial system (CoinTelegraph.com).

The final blow was given by the Chinese authorities, which announced a crackdown on crypto use in the country. The central bank issued a warning to Chinese financial institutions and businesses not to accept digital currencies as payment or offer services using them (CoinDesk.com).

These separate events were not as bad if taken singularly, but all together became a devastating blow to the market, which nosedived to its lowest point since January. After that, as seen in Figure 14, for 9 weeks bitcoin price was stable around 32 - 37 thousand dollars, just before the second and final bull run of the year, which led bitcoin to his current ATH of \$69,000 achieved on November 10, 2021.

What caused this second bull run? First, in August an unconfirmed source had reported retail giant Amazon is looking to accept bitcoin payments by year's end and is considering minting its own token by 2022 (CoinDesk.com). None of this ever happened, of course, but the rumor was sufficient to recover the bullish sentiment among investors and retailers (BTC +13.60%, Aug 2021 CoinMarketCap.com data). In addition, during the first week of October, Securities and Exchange Commission (SEC) Chair Gary Gensler reported to Congress that the SEC has no plans to ban cryptocurrencies (CoinTelegraph.com). These two factors plus the fact that traditional markets started gaining

momentum in that period (S&P 500 +6.91%, Oct 2021 CoinMarketCap.com data) laid the base for another bull run.

Euphoria didn't last long among investors, though. After achieving the new all-time high in early November, the entire market went on another spectacular nosedive, wiping out all the gains of the previous months: at Jan 23, 2022, bitcoin was back to 36,500\$, a -45% from the ATH. This was caused by primarily three factors: a widespread negative market sentiment, margin calls on leveraged long positions and the negative direction of traditional markets (Jan 2022: S&P 500 - 5.26%; Euro Stoxx 50 -2.57%; Nasdaq -8.53%; TradingView.com).

After a few months in that price range, the final blow was given by the geopolitical and economic conditions of 2022, with the protracting war in Ukraine, the energy supply issues and the increase of interest rates in all western economies. All these factors negatively affected bitcoin price and the market capitalization, and everything went down, respectively to 20,000\$, a strong technical and psychological support (it is the 2017 ATH) and below the \$1 trillion benchmark.

### 2.1.1 FTX Bankruptcy

The last and final blow to bitcoin price, market capitalization and the overall industry was given by the fall of FTX Trading Ltd.

Founded in 2019 by American entrepreneur Sam Bankman-Fried, FTX was one of the biggest exchanges, with its peak in July 2021, when the company had over one million users and was the third-largest cryptocurrency exchange by volume (CoinDesk.com). Started as a trading firm (FTX is the abbreviation of "Futures Exchange") it offered a wide range of trading services, with an eye on advanced functionality and customers.

In August 2020 FTX acquired Blockfolio, a cryptocurrency portfolio tracking app, for \$150 million; in July 2021 the venture raised \$900 million at an \$18 billion valuation from over 60 investors, including Softbank, Sequoia Capital, and other firms (Wikipedia.com). It also sought new partnerships in sports, signing sponsorship contracts with NBA Miami Heat team, with their arena becoming the FTX Arena since June 2021 with a \$135 million contract (Espn.com); and with Formula 1 Mercedes Petronas team, with the company logo placed in the back wing of the car, as seen on Figure 16.

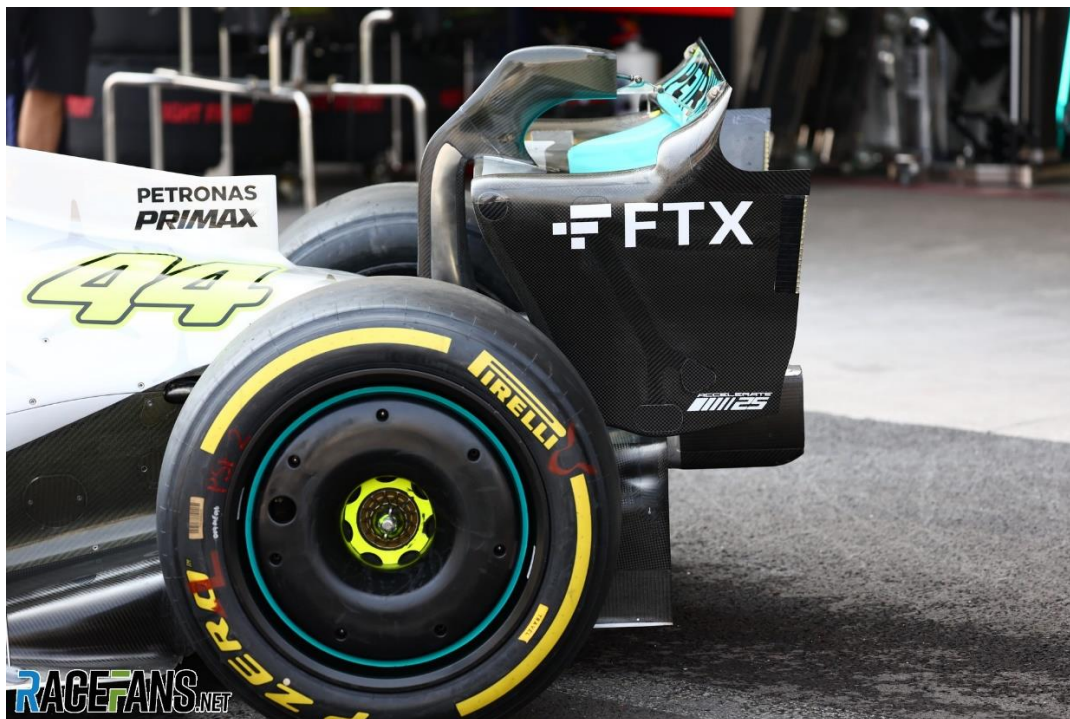


FIGURE 16, FTX LOGO ON HAMILTON'S MERCEDES FORMULA 1 CAR, RACEFANS.NET, 2022

Things were going very well for FTX and his founder until the catastrophe of November 2022. All started at November 2, when the crypto-news site Coindesk.com published an article stating that Alameda Research, a trading firm affiliated with FTX and owned by Bankman-Fried, held a significant amount (\$5.82 billion, as observed in FTX's balance sheet) of FTX's exchange token, FTT.

While there is nothing *per se* wrong about that, it shows Bankman-Fried's trading giant Alameda rested on a foundation largely made up of a coin that a sister company invented, not an independent asset like a fiat currency or another crypto. This was the setup of an enormous conflict of interest between the two companies, aggravated by the fact that Alameda Research's CEO was Caroline Ellison, Bankman-Fried's fiancée (Wikipedia.com).

After the Coindesk.com report, Binance CEO Changpeng Zhao (and former FTX early investor) stated on Twitter that his firm intended to sell all its FTT holdings.

This caused a massive selloff and spread panic in the market: on November 8 FTX faced an incredible \$6 billion in withdrawals, causing a liquidity crunch and sending FTX into the oblivion (CoinMarketCap.com). FTT token lost 80% of its value in less than 24 hours, erasing \$2.4 billion in market capitalization, as depicted in Figure 17.



FIGURE 17, FTT DROP ON NOV 8, 2022, TRADINGVIEW.COM, DECEMBER 2022

On November 9, FTX's website said that it was no more processing withdrawals. Bankman-Fried made a public undertake of responsibility, announcing FTX was still seeking capital to try remaining solvent and that Alameda Research would cease trading and end operations (Wikipedia.com). Capitals that were never found, since the credibility of the company was irredeemably lost, and on November 11, FTX, FTX US and Alameda Research and more than 100 affiliates filed for bankruptcy in Delaware (Wikipedia.com). Bankman-Fried resigned as CEO and was replaced by John J. Ray III, a corporate restructuring specialist who stated in an interview that in over 40 years of his experience in dealing with insolvencies, he had never encountered "such a complete failure of corporate controls and such a complete absence of trustworthy financial information as occurred here".

Obviously, the entire market was affected by this dramatic event, with bitcoin going below the \$20,000 support, settling in the range from 16 to 17 thousand; the stablecoin Tether dropped below its peg price of \$1.00 to \$0.97 due to the withdrawals pressure on the crypto ecosystem (CoinMarketCap.com). Total market capitalization lost the \$1 trillion support, settling in the 700-800 billion dollars range (CoinMarketCap.com). It was a huge selloff, and many advocated the end of crypto as we had known it, as Bloomberg reported that the collapse of FTX exacerbated institutional skepticism of cryptocurrencies as an asset class.

Worries that a similar thing could happen to other exchanges started spreading, with Crypto.com seeing his token CRO losing more than a billion dollars in value, and Gemini exchange forced to pause all withdrawals from its platform (Reuters.com). BlockFi, a cryptocurrency lender, was reportedly taking steps to file for bankruptcy, having earlier halted withdrawals, due to its heavy exposure to FTX.

At the end of this tragic event, as always when incidents like this happen, small investors, retailers and common people had to bear the highest cost: Between \$1 billion and \$2 billion in customer funds were reportedly missing as of 12 November, leaving more than 1 million customers facing deep losses (CoinDesk.com).

It was a bloodbath not only for retailers though, as many institutional investors had seen their participations in FTX rapidly gone down to zero: FTX reported on the bankruptcy filings it owes its 50 biggest creditors nearly \$3.1 billion. Sequoia Capital wrote down its equity in FTX to \$0 on 9 November, losing \$214 million (SequoiaCap.com).

As the storm passed by, many claimed the reason this happened was the lack of regulations in the industry. The New York Times and the Financial Times compared the FTX bankruptcy to the one of Lehman Brothers, as they stated: “is this crypto's Lehman moment?”. Jim Chanos, president and founder of Kynikos Associates, in an interview by Bloomberg predicted that the collapse of FTX would lead to increased scrutiny and regulation of cryptocurrencies.

This theme surely will be one of the most discussed in the following months, with institutions and industry participants which have to face the problem and find a suitable solution to let never happen again an event like this.

## 2.2 Volatility and correlation with other assets

This dissertation would not be complete if we don't mention these two major factors of the crypto market: volatility and the correlation with other asset types.

We will focus on bitcoin, since it's the biggest cryptocurrency and its moves, as we've already shown, influence the entire market.

## 2.2.1 Volatility

Investopedia defines volatility as “a statistical measure of the dispersion of returns for a given security or a market index”. In most cases, the higher the volatility, the riskier the security. In the securities markets, volatility is often associated with big swings in either direction. Bitcoin and other cryptocurrencies are no different.

But why cryptocurrencies are so volatile?

We can start by assessing the causes that make bitcoin price (and therefore, the price of all other cryptos) to crash or skyrocket. Analysts have found different causes, the more prominent being market events, international regulation, and traditional finance (CoinDesk.com).

Beginning with the first cause, market events are of course the primal cause to bitcoin movements. Events like the Covid-19 pandemic, FTX crash, the energy crisis and many others all have had an impact on BTC price. For example, bitcoin fell by 6.9% in late 2021 when traders feared that Evergrande, the Chinese real estate giant, was about to collapse, and again when Didi announced plans to delist from the New York Stock Exchange (CoinTelegraph.com).

A 2020 paper on Bitcoin volatility in the Journal of Economic Dynamics and Control found volatility is not influenced by “most scheduled U.S. macroeconomic news announcements” but that the waters become choppier when “forward-looking indicators, such as the consumer confidence index,” are published.

Also, leverage has to be considered. Systemic overleveraging exaggerates these shocks and contributes to volatility. With leverage we define the practice to borrow capitals from an exchange to turbocharge investment potential. Some exchanges and Decentralized

Finance applications made possible to borrow amounts as high as the 100x of the initial capital, which obviously increase liquidation risk. This generates opportunities to create artificial market movements by large bitcoin holders to take advantage of this situation: they move the coin's price in the other direction, triggering a cascade of liquidations, sending bitcoin's price to crash, and creating huge paper losses for leveraged long traders. The investors are then free to pick up bitcoin at a much cheaper price than before at the expense of liquidated traders.

International regulation is the second cause to bitcoin movements. This is because it determines which markets can access it, where companies can set up exchanges and other services and where bitcoin miners can operate. In particular, regulation laws in the US and in China have the most direct impact on the market, since the US are the larger crypto market and China was the biggest miners' host country. We used the past tense, because the crash happened to bitcoin price in May-June 2021 (from 65,000\$ to around 35,000\$) was in large response to China's crackdown on mining. And again, in September 2021 bitcoin fell by 6.96% due to the clarification by the Chinese government that cryptocurrencies are illegal in the country (CoinDesk.com).

Traditional finance is the third cause to assess. Moves within traditional finance can boost or burn bitcoin's price because they determine how easy it is for financial epicenters like Wall Street to invest in bitcoin. Bitcoin has often risen when big companies like Tesla or MicroStrategy have announced their investment in bitcoin, which mean the purchase of bitcoin in the market and adding them into their balance sheet. Logically purchasing big quantities made the price rise, since fewer bitcoins were available on the market.

This is true even on the contrary: when Elon Musk announced that Tesla would no longer accept bitcoin as payment, citing environmental



issues, the market crashed and the total market capitalization of crypto fell from \$2.43 trillion to \$2.03 trillion (CoinMarketCap.com).

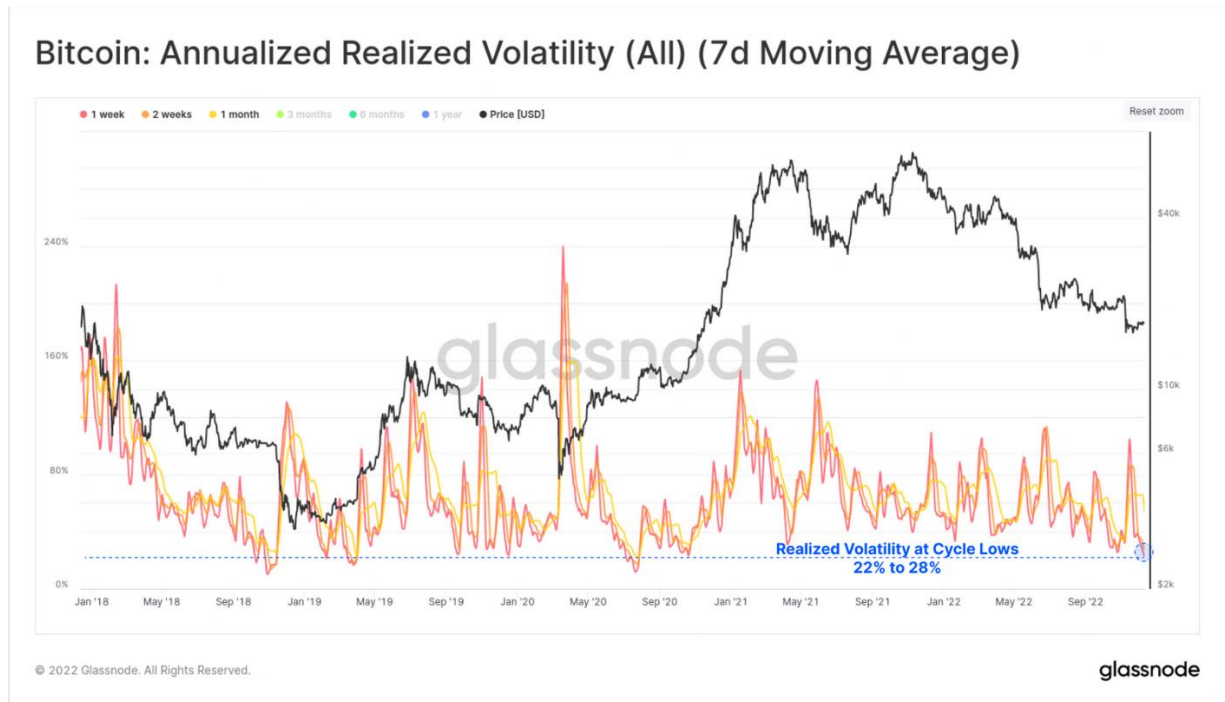


FIGURE 18, BTC ANNUALIZED VOLATILITY (7D MA), GLASSNODE.COM, 2022

Figure 18 introduces an empirical measure of what we have discussed so far. It is shown bitcoin annualized volatility calculated using a 7-day moving average, and is drawn the 1-week, the 2-weeks and the 1-month volatility in red, orange, and yellow respectively. The black line represents bitcoin price.

Volatility was very high at the end of the 2017 bull run, to descend after; then it spiked to 240% in March 2020, due to the Covid-19 pandemic, in line with the crash of traditional markets. After the 2021 bull run, volatility started declining again, with an all-time low measure of 22% for the 1-week indicator and a measure of 28% for the 2-weeks indicator, recorded at the end of 2022; this is because the poor economic data and the negative sentiment now dominating the market. We can see that during the past 5 years overall volatility is steadily decreasing: this can be seen as a positive sign, a sign of maturity,

aligning the crypto market with traditional assets and markets, and therefore attracting more investors, less scared by the volatility of the market.

Lastly, we should check the volatility of bitcoin against other cryptocurrencies, or altcoins, as we've defined them. This is important to draw the full picture of crypto's volatility in relation to their market weight.

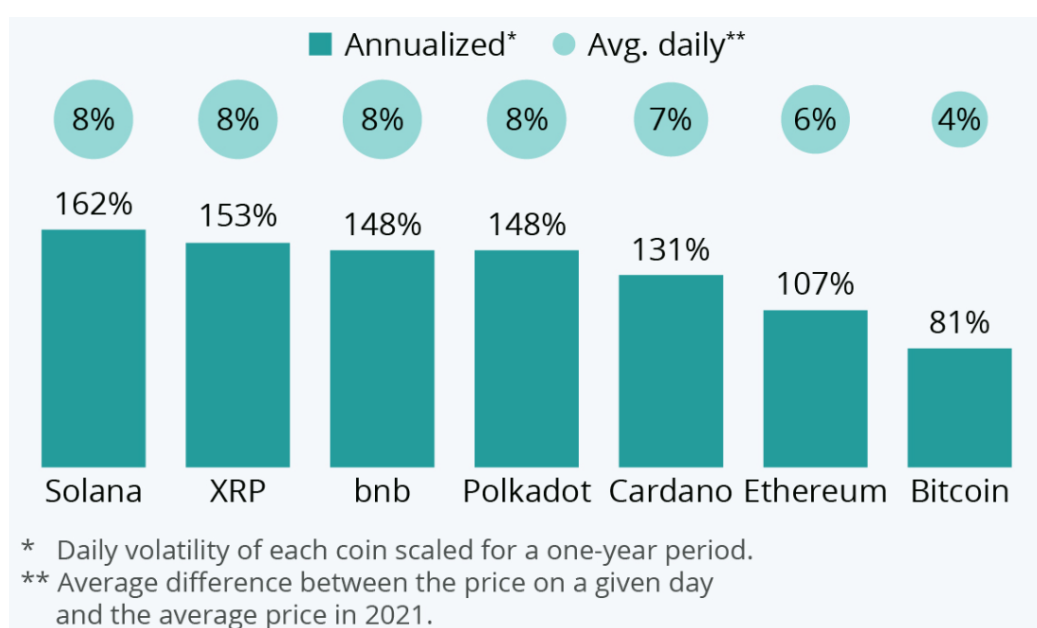


FIGURE 19, ANNUALIZED AND AVERAGE DAILY PRICE VOLATILITY OF SELECTED CRYPTOCURRENCIES IN 2021, STATISTA DIGITAL ECONOMY COMPASS, 2022

Figure 19 shows the annualized and average volatility which certain altcoins had in 2021. We can see that Bitcoin had the smallest volatility of the group with the 81% annualized volatility, followed by Ethereum, with a 107% annualized volatility. This should not amaze, given that these two are the biggest cryptocurrencies by capitalization and the eldest (and then, mature) of the market. All the other altcoins taken into consideration have a bigger annualized volatility, with values around the 150%.

The same argument can be done with the average daily volatility, with Bitcoin having the lowest of the group with the 4%; Ethereum is again in the second place acting as a middleman, with a 6% avg daily volatility, followed by all the other altcoins that stop the scale at the 8%.

## 2.2.2 Correlation with other assets

The other thing we have to discuss is correlation with other assets. Every asset can show a correlation with another, and bitcoin is no different. Crypto early adopters have long proclaimed bitcoin has no correlation with other assets, as they've seen it as a safe haven asset, a hedge against the excesses of Wall Street and the general stock market. Instead, its rising correlation, as we will see in a minute, can be seen as a sign of maturity.

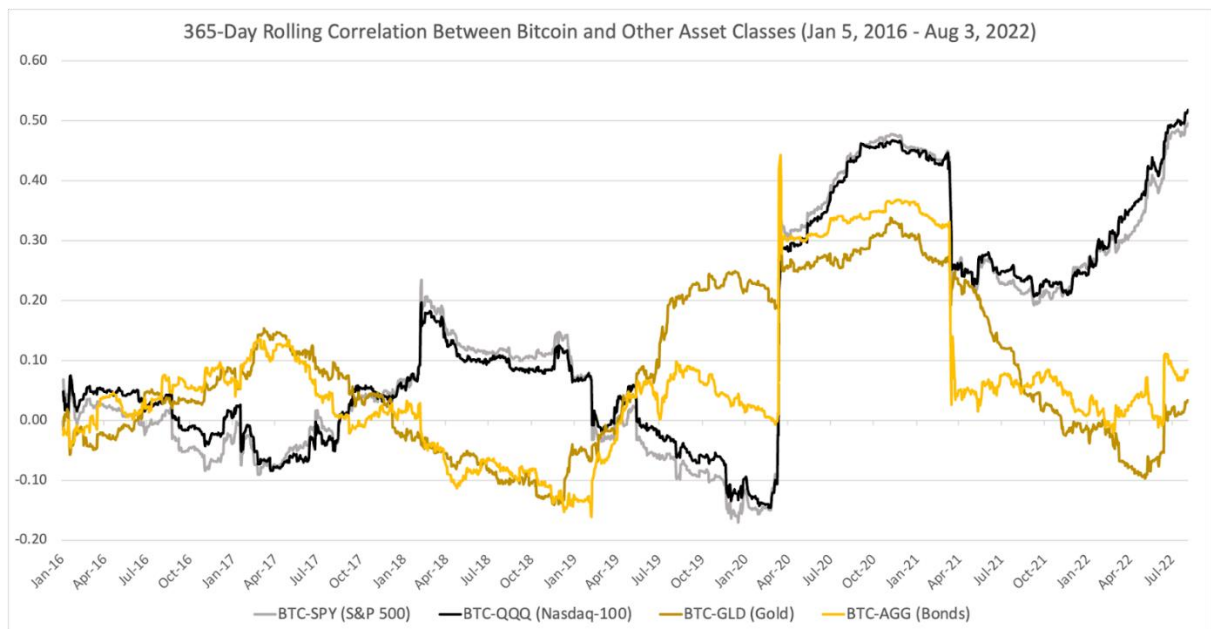


FIGURE 20, 365-DAY CORRELATION BETWEEN BITCOIN AND OTHER ASSET CLASSES, 21SHARES.COM, AUGUST 2022

Figure 20 shows the correlation between bitcoin and other 4 assets: S&P 500, Nasdaq, Gold, and Bonds. Gold and bonds do not have a correlation with bitcoin, apart from the Covid-19 period, in which the correlation went up, just to return to normal values thereafter. Instead, is interesting to note the correlation with the S&P 500 and the Nasdaq: they did not demonstrate any significant correlation before the Covid-19 pandemic, but after it the index did not return to its normal values like it did with bonds and gold, it continued to increase, reaching unthinkable values. Now the correlation with US stock indexes is stronger than ever before, surpassing the value of 0.5, sign of a strong positive correlation.



FIGURE 21, BTC - QQQ CORRELATION, TRADINGVIEW.COM, JANUARY 2023

The positive correlation between bitcoin and stocks can be seen much better in Figure 21, where on the upper side there is BTC price, shown with candles, and the Nasdaq index price, shown with the orange line; on the lower side there is the correlation index between the two. If before Covid-19 pandemic the correlation was low, now things have changed consistently, with an enduring positive correlation.

The same positive correlation with tech stocks can be seen not only with Bitcoin but also with other major cryptos as Ethereum and Binance Coin. Figure 22 and Figure 23 show the correlation between ETH and BNB with the Nasdaq index, respectively.



FIGURE 22, ETH - QQQ CORRELATION, TRADINGVIEW.COM, JANUARY 2023



FIGURE 23, BNB - QQQ CORRELATION, TRADINGVIEW.COM, JANUARY 2023

Bitcoin, and other major altcoins, are behaving more and more like a tech stock, as investors are treating them no more like a different type of asset, once used to hedge against the traditional economy, but more like another one of the existing technological companies.

With an increasing number of companies and institutions buying bitcoin (there are currently 23 public companies that have bitcoins on their balance sheets, with a total amount of 174,374 bitcoin, corresponding to around 2,933,850 dollars; CoinGecko.com) this can be seen as a positive force that will lead to a wider adoption of cryptocurrencies among the general public.

### 2.3 Industry analysis

We now start the industry analysis, entering the core of the paper. There are many ways to correctly analyze an industry and its profitability, but very few have the eminence of the model created by Harvard professor Michael E. Porter. The model, called the Porter's Five Forces framework, is a method of analyzing the operating environment of a competition of a business and it is well suited to investigate whether a particular industry or market is profitable or not.

Before digging into Porter's model, we must decide in which sector pointing the direction of our investigation. Blockchain technology has many applications in various branches, and it would be too broad speaking of every existing branch of the industry; in the next pages we explicit those diverse branches and we will narrow down our focus.

We will also talk about how this technology can impact the value creation process, assessing the "why" of the investment thesis, with the Blockchain Value Framework, model that emphasizes if and when the technology should be used from a company perspective.

### 2.3.1 Blockchain technology applications

Since its first development, blockchain technology has found numerous cases and various industries where it can be applied. After this brief examination, we will select our industry, establishing the main trajectory of the analysis.

The main industries where blockchain technology has found fertile soil to prosper are banking and finance, business applications, government applications and Non-Profit Organizations. Blockchain does not automatically mean “cryptocurrencies, bitcoins and speculation”: it’s a technology that has found its natural habitat in those expressions first, but it doesn’t mean it cannot be successfully applied into other areas.

In the banking and finance sector, we found blockchain uses in these cases:

#### 1) Money transfer and payments

Obviously the first application are money transfers and payments: this was the main purpose of Bitcoin and many other cryptocurrencies, as we have previously discussed. Blockchain’s properties of being transparent, immutable, and secure make it an incredible mean of payment and an excellent way to transfer money. Decentralization here is not granted, because it is determined by how the company has set up the chain: some can decide to not go fully decentralized to keep the hands on the wheel.

Companies like Coinbase, PayPal, Circle and Ripple all fall into this category (InsiderIntelligence.com).

## 2) Smart contracts

We have already defined a smart contract as “a self-executing contract with the terms of the agreement between buyer and seller being directly written into lines of code.” Smart contracts eliminate the middleman and add more accountability at all levels for all parties involved in the agreement. This saves businesses time and money, while also ensuring compliance from everyone involved.

These contracts are also used in many other branches like government services, healthcare, and real estate to further eliminate costs and improve efficiency (InsiderIntelligence.com).

## 3) Capital markets

Blockchain-based systems also have the potential to improve capital markets. This can happen in several ways, improving operational capabilities, assuring a faster clearing and settlement, and making the system overall faster and more reliable (InsiderIntelligence.com).

## 4) Regulatory compliance and audit

The extremely secure nature of blockchain can make the difference in this field, reducing human errors and dramatically improving the accuracy of the audits/compliances: It can prevent frauds and forgery of company documents and books (InsiderIntelligence.com).

## 5) Anti-Money Laundering

Once again, the encryption that is so integral to blockchain makes it exceedingly helpful in combating money laundering. The underlying technology empowers record keeping, which supports “Know Your Customer (KYC)”, the process through which a business identifies and verifies the identities of its clients.



This use case is controversial because cryptocurrencies are often involved in frauds, money laundering and other illicit activities or transactions. More on this topic in Paragraph 2.3.4.

#### 6) Insurance

Probably one of the best applications in the finance and banking industry, blockchain technology can dramatically help insurance companies using smart contracts, which allow customers and insurers to manage claims in a transparent and secure manner. Invalid and fraudulent claims would be noticeably reduced since the network would reject multiple claims on the same accident (InsiderIntelligence.com).

#### 7) NFTs

Finally, NFTs cannot be rigidly placed into one specific industry, so they can figure even in the banking and finance one. Particularly, with all the speculation and the hype risen around them, they can be seen as an investment and many companies are specializing in creating platforms to aggregate creators, users, and investors to facilitate the trade (BuiltIn.com).

Then we have the business application of blockchain technology, with many more interesting possibilities that are now being explored: we'll briefly explain the most important ones.

#### 1) Logistics

Supply chain management and logistics probably are the two principal employments that come to mind when thinking about blockchain applications. The technology enables data transparency, faster goods tracking, leaner and more automated processes, and a reliable cost-saving method. Many companies are already implementing it, for example the shipping giant DHL

and the world leader of container shipping line Maersk (InsiderIntelligence.com).

## 2) Media

Media companies have already started to adopt blockchain technology to eliminate fraud, reduce costs, and even protect Intellectual Property (IP) rights of content – like music records. Blockchain will bring disintermediation, reduce IP infringement, and enable micropayments (InsiderIntelligence.com).

## 3) Healthcare

Another industry that will benefit from the adoption of the blockchain is healthcare and the tremendous amount of data it generates and manages. Health data that's suitable for blockchain includes general information like age, gender, and potentially basic medical history data like immunization history or vital signs. On its own, none of this information would be able to specifically identify any patient, which is what allows it to be stored on a shared blockchain that could be accessed by numerous individuals without undue privacy concerns (InsiderIntelligence.com).

## 4) Real estate

Real estate can implement the technology to reduce frauds with accessible data available to everyone, expedite home sales by quickly verifying finances, records, and previous owners home management. The process of selling and purchasing would become more transparent and reliable (InsiderIntelligence.com).

Finally, there are government applications, with possibilities to apply blockchain to personal ID security, taxes, voting and record management. Again, smart contracts would be playing a vital role,

allowing secure, immutable, and fast transaction of things like properties, tax records, ID status changes and many more.

### 2.3.2 Blockchain industry and value creation

We assess now the “why” of the investment thesis: why an investor or a company should invest in a technology like the blockchain? What are the benefits? How can create and add value to the status quo?

As the Deloitte 2022 Tech Trends Report wrote, “Distributed ledger technologies are changing the nature of doing business and helping companies reimagine how they manage tangible and digital assets”. Even though cryptocurrencies and other new trends like NFTs and DeFi take the headlines and have all the market hype, the underlying technology is steadily taking more space among businesses, industries, and governments.

Blockchain and Distributed Ledger Technology platforms have emerged from the public hype and are now well on their way to boosting actual productivity.

They are profoundly altering how commerce is conducted across organizational borders and assisting organizations in rethinking the creation and management of identity, data, brands, provenance, credentials, copyrights, and other physical and digital assets.

### 2.3.3 Blockchain Value Framework

KEY DIMENSIONS	Improving profitability and quality				Increasing transparency among parties		Reinventing products and processes	
CAPABILITIES	<b>Automation</b> Self-validating network + smart contracts enable auto execution of business rules.		<b>Control</b> Control at the individual data element level, maximum flexibility over what data is shared and how.		<b>Distributed</b> No single-entity data ownership, consensus applied to transactions and shared access with no central point of failure.		<b>DAx (Decentralized Autonomous x)</b> Transparent, predefined rules mean new ventures may be created, providing autonomous products/services through decentralized model.	
	<b>Full traceability</b> Provenance and complete history of all new data added is known.		<b>Security</b> Data can be encrypted and segregated at the data element level, while also enhancing overall data security.		<b>Holistic view</b> Single source of truth - all stakeholders see the same information to which they have access.		<b>Enhanced identity</b> A combination of capabilities with advancements in digital identity (e.g. biometrics) increase confidence in, and improvement of, security and management of customer and personal identity data.	
	<b>Speed   efficiency</b> Can enable faster data transfer, streamline tasks to optimize process efficiency, particularly where intermediaries have been removed.		<b>Evidence tampering</b> Underlying mathematics and cryptography allow users with appropriate access to verify data has not been altered.				<b>Tokenization and digital assets</b> Physical objects with verified unique digital representation enable digital ownership, management and transfer.	
VALUE DRIVERS	Auditability	Compliance	Data management	Data security	Data sharing	Resiliency	Authentication	Identity management
	Ownership	Payments	Process automation	Reconciliation	Transparency	Trust	Marketplace creation	New   enhanced products and services
		Standardization	Track and trace					New   expanded partnerships

FIGURE 24, BLOCKCHAIN VALUE FRAMEWORK, WEF, 2019

Figure 24 shows the Blockchain Value Framework. It highlights the key dimensions, the capabilities, and the value drivers in which the technology can help an enterprise in creating value and improving the performances.

Key dimension 1 – Improving profitability and quality (Building Value with Blockchain Technology, WEF, 2019).

The most important value drivers in this dimension are:

#### 1- Auditability

Organizations can reduce their auditing costs and increase levels of confidence in the data they are producing without having to manually validate the data thanks to blockchain's ability to provide a shared ledger of transactions to all parties, with full traceability of any assets and associated activity.

#### 2- Compliance

If not handled properly, compliance carries a significant amount of risk and damage. Increased data confidence can

result from knowing that blockchain cannot be tampered with, which can also simplify administrative procedures and cut expenses.

A distributed ledger of all pertinent information can speed up processes including compliance checks that can take weeks. Connecting blockchain technology to cutting-edge innovations like Artificial Intelligence and Internet Of Things can enable real-time data collection and processing to boost overall compliance.

### 3- Data Management

Blockchain can improve the management of data in three main areas: 1) data provenance and accuracy through knowing more about digital assets and accompanying data; 2) data integrity through access/authentication to the network and easy identification of manipulation or tampering; and 3) data aggregation and organization, as blockchain enables the seamless sharing of real-time data from a single data source.

### 4- Data Security

Utilizing cryptography, blockchain technology enables a more secure environment for data sharing and storage, lowering the chance of a data breach and limiting the harm should it happen.

### 5- Payments

With the use of blockchain technology, it is no longer necessary to manually audit and track down payments to ensure that they are accurate. These payments can be automated with smart contracts, expediting the entire process and maybe removing pointless processing fees.

## 6- Ownership

By generating better intellectual property and individualized data profiles, blockchain technology can enable true digital ownership of both physical things and digital assets, without the need to verify the item's past or present condition.

Key dimension 2 – Increasing transparency among parties (Building Value with Blockchain Technology, WEF, 2019).

Here the value drivers are:

### 1- Data Sharing

Data begins to lose value and verifiability when it is kept in isolated systems, which are frequently fragmented and rarely shared between businesses. Without blockchain technology, a receiving organization must trust that the data it receives is authentic before it can benefit from it. But with blockchain, trading partners can exchange data in real time as well as its history and any alterations.

### 2- Transparency

Blockchain technologies' distributed ledger allows all designated parties to view the data in real time. With unlimited transparency, organizations can identify opportunities, improve decision-making and track and trace the outcome of those decisions.

### 3- Resiliency

Businesses that manage and maintain central and local data systems are vulnerable to data loss caused by unscrupulous or inept personnel, natural catastrophes, and other

unforeseen events. Blockchain reduces the likelihood of an isolated attack or incident by establishing a highly resilient network with numerous shared copies of the data.

#### 4- Trust

Trust is being challenged in the digital world, with organizations unable to verify essentials. Blockchain helps in enabling and even automating trust by providing data security via cryptography, and transparency regarding the status and the data history.

Key dimension 3 – Reinventing products and processes (Building Value with Blockchain Technology, WEF, 2019).

Finally, the third key dimension has these value drivers:

#### 1- Authentication

A key feature of blockchain technology is its public and private key cryptography, which may be used as a foundation for user authentication across numerous networks, boosting trust in the network as a whole and its users.

#### 2- Identity Management

It is no longer practical to rely solely on physical documentation to prove a user's or object's identity as more and more business transactions are being done online. Digital identity can now be controlled and used with improved qualities thanks to blockchain technology, which overcomes the constraints of being run by a single institution.

### 3- Marketplace creation

Blockchain technology increases consumer trust in goods and services while also enabling peer-to-peer transactions in real time via a shared ledger, smart contracts, and digital assets.

#### 2.3.4 Cryptocurrencies and illicit activities

This part of the topic is a controversial one, as cryptocurrencies, from their invention, were widely used to finance illicit organizations, to transfer and launder money, terrorism financing and many more crime-related activities. Cryptocurrencies are used to finance illicit activities for a few reasons (Chainalysis.com).

**Anonymity:** Cryptocurrencies transactions are pseudonymous, meaning that while transactions are recorded on a public ledger, the identity of the person making the transaction is not. This makes it difficult for authorities to trace the source of funds used for illicit activities.

**Borderless Transactions:** Cryptocurrencies can be transferred across borders easily and quickly, making it easy for criminals to move money from one country to another without detection.

**Decentralized:** Cryptocurrencies are not controlled by any government or financial institution, which makes them less likely to be subject to government regulation or seizure.

**Lack of regulation:** The lack of proper regulations and laws surrounding the usage of cryptocurrencies makes it difficult for authorities to track and stop illicit activities related to it.



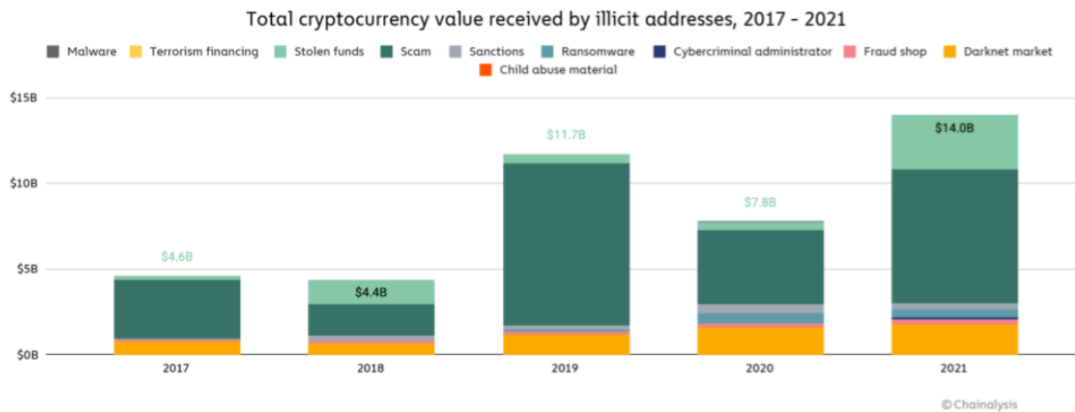


FIGURE 25, TOTAL CRYPTOCURRENCY VALUE RECEIVED BY ILLICIT ADDRESSES FROM 2017 TO 2021, CHAINALYSIS.COM, 2022

After seeing why cryptos are used by criminals and by mischievous individuals, let's have a look at Figure 25, which shows the total cryptocurrency value received by illicit addresses from 2017 to 2021. These are enormous numbers, with 2021 scoring the all-time record with more than 14 billion dollars. Every year the main component are scams: this a far too common phenomenon in the crypto market, where the raising public interest raised also scams and frauds, usually done with newly born crypto projects where the public (very often retailers) poured their money with the hope of double digits gains, only to discover thereafter that their funds were stolen, and the promoters were vanished.

Another important component is darknet market, which is defined by Investopedia as "Darknet markets are dark web black markets that offer illicit goods for sale, often using cryptocurrencies as a method of payment. Although some products for sale are legal, illicit goods such as drugs, stolen information, and weapons are common items in these markets." Cryptocurrencies are used in the dark web because they offer a level of anonymity and security that traditional forms of payment do not. Transactions made with cryptocurrencies are difficult to trace, and personal identifying information is not required to use

them. This makes them appealing to individuals who are looking to buy and sell illegal goods and services on the dark web.

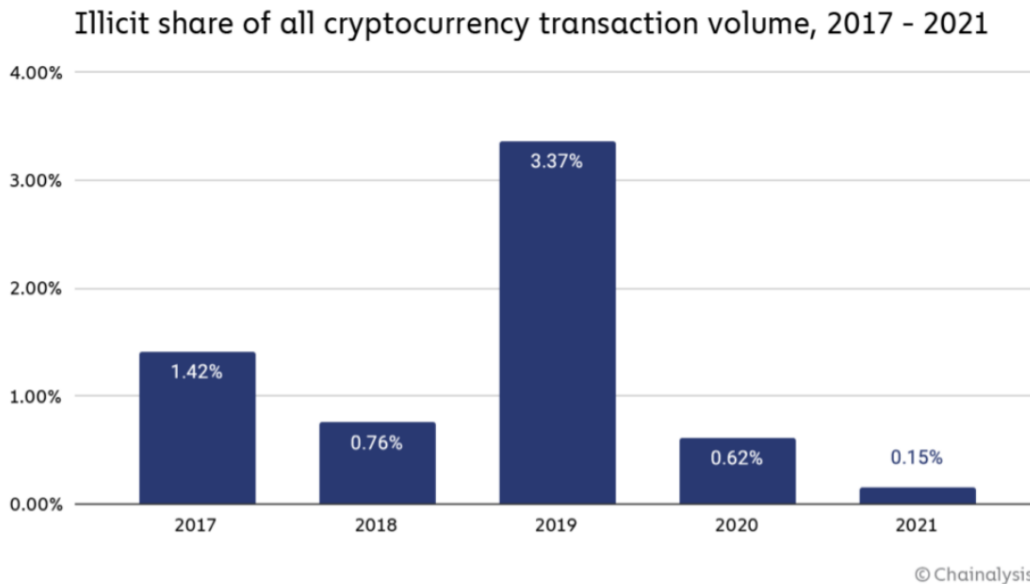


FIGURE 26, ILLICIT SHARE OF ALL CRYPTOCURRENCY'S TRANSACTION VOLUME FROM 2017 TO 2021, CHAINALYSIS.COM, 2022

We conclude this short examination of illicit use of cryptocurrencies with another interesting chart. Figure 26 shows the illicit share of all cryptocurrencies' transaction volume from 2017 to 2021. This chart tells us a very different story: despite of the growth of the value transferred with cryptocurrencies for illicit activities, seen in Figure 24, the percentage of this transactions is declining. In 2021 this share was at its all-time lows, with a value of 0.15%. If we don't count the 3.37% value of 2019 - an extreme outlier year for cryptocurrency-based crime largely due to the PlusToken Ponzi scheme - crime is becoming a smaller and smaller part of the cryptocurrency ecosystem, and this can only be a positive aspect for all the industry.

## 2.4 Industry definition

Now we must define the industry boundaries, and in a new a dynamic industry like this one it is no easy task.

The blockchain is a relatively new concept and it went mainstream thanks to the popularity gained by cryptocurrencies in the early 2010s. As a result, this technology can be assessed as an industry and as a common part of different industries: it is a technological improvement which can be applied to improve very diverse industries, as we said previously, like healthcare, logistics, finance, real estate and many more.

This analysis will treat the blockchain industry as a whole and not as a cross-industry technological improvement. Therefore, the focus is on the blockchain and on its natural and well-known development, the cryptocurrencies. This is a pivotal point: many cryptocurrencies are not developed just for trading and speculation but are the byproduct of a blockchain created with a real world use case application, designed to assess a specific problem.

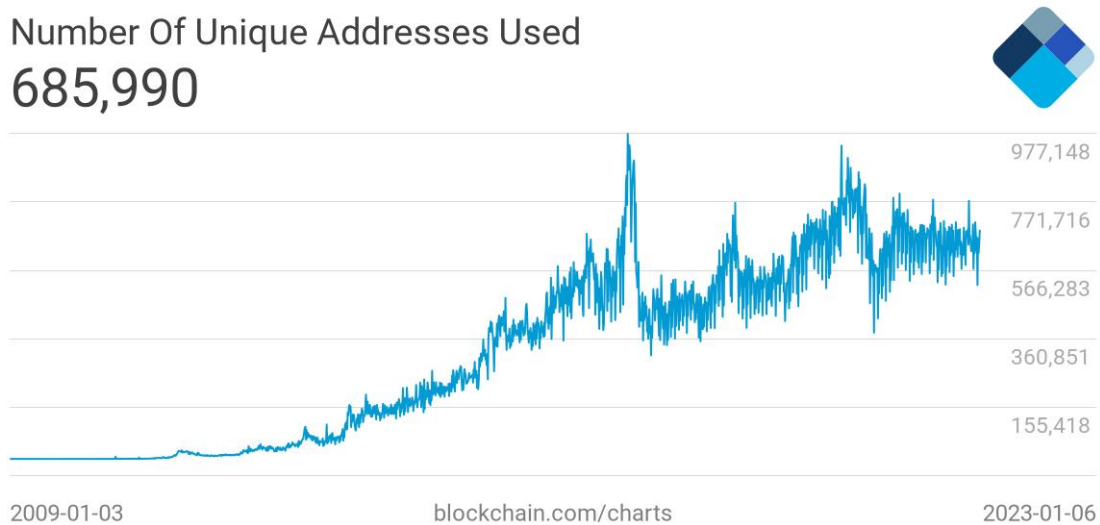
This is the case for cryptocurrencies like Ethereum, Binance Coin, Ripple, Solana, Cardano, Avalanche, Chainlink and many, many others.

Of all the diverse real world use cases, this analysis will focus on the financial, banking and government applications of the blockchain technology, therefore studying the related cryptocurrencies and including them in the industry overview. The same industry that in Chapter 3 will be at the center of the analysis from an M&A point of view.

## 2.4.1 Industry overview

Before entering the matter, a quick overview of the industry is mandatory.

Let's start with users of the Bitcoin network, the true litmus of the entire market: remember that bitcoin capitalizes more than 41% of the entire cryptocurrency market.



**FIGURE 27, NUMBER OF UNIQUE ADDRESSES USED, BLOCKCHAIN.COM, JANUARY 2023**

Figure 27 shows the positive uptrend of the total number of unique addresses used across the Bitcoin network. A unique address refers to any Bitcoin address because every address is unique and cannot be copied or cloned.

In 2018 we almost touched the incredible number of one million unique Bitcoin addresses, threshold almost touched again during the 2021 bull run. Still, the total number of addresses is rising and there are now 685,990 working addresses and remember that current market conditions are not positive at all: when the tide waves are going to change, the number is going to increase again, reaching new peaks.

## Total Number of Transactions 793,170,636

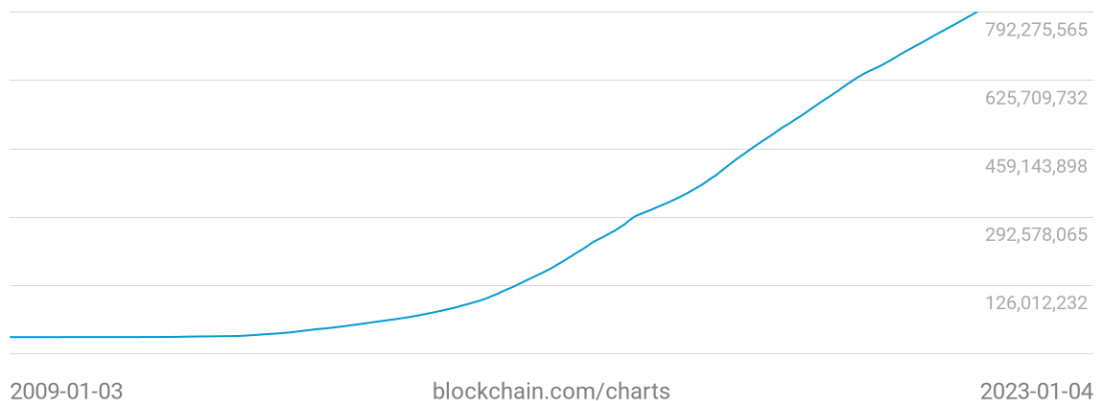


FIGURE 28, TOTAL NUMBER OF TRANSACTIONS, BLOCKCHAIN.COM, JANUARY 2023

The second interesting statistics about Bitcoin network usage is the one shown in Figure 28, the total number of transactions: is clear the constant and steady rise of this parameter, which is now almost touching 800 billion transactions.

This statistic and the previous one (Figure 27) both show the clear uptrend in the number of users and in the network usage.

After users, we dig into economic indicators. The global blockchain market size is expected to growth from \$3 billion to \$39.7 billion by 2025 (Cision PR Newswire, 2020) with a Compound Annual Growth Rate between 46.4% (IDC, 2020) and 84.5% (GrandViewResearch, 2022).

The banking blockchain industry is the one that has invested more into the technology, with the 29% of the total spending, followed by the process manufacturing industry with the 11.4%, the discrete manufacturing industry with the 10.9%, the professional services with the 6.6% and the retail service with the 6.0% (IDC, 2020)

Finally, the last statistics is the one regarding how much blockchain technology and its applications will boost global GDP: estimates are around \$1.76 billion by 2030. (IDC, 2020)

## 2.4.2 Competitive advantages and drivers

Published for the first time in the Harvard Business Review in 1979, the Porter's Five Forces quickly became a staple of every business analysis, due to its clarity, accessibility, and reliable results.

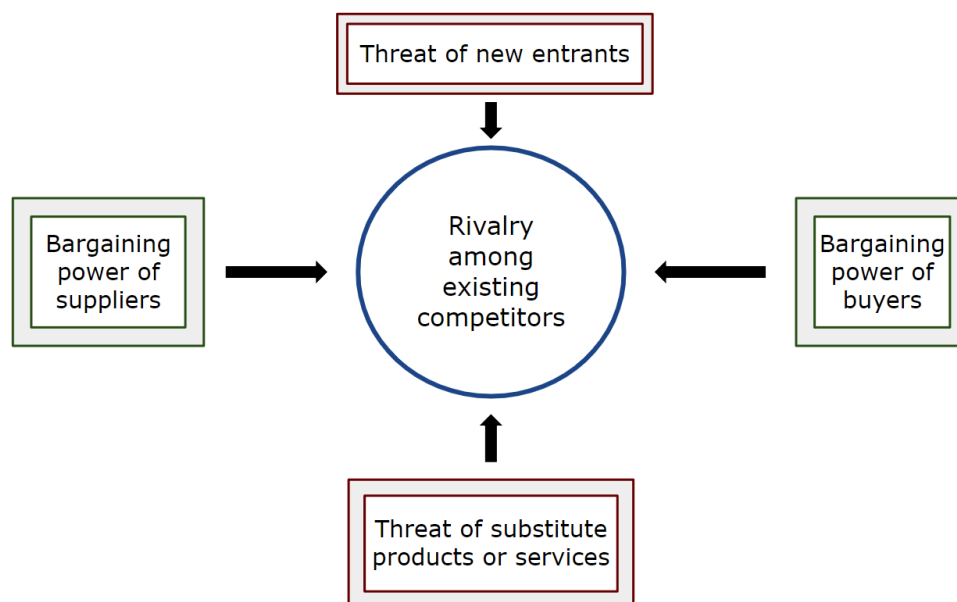


FIGURE 29, PORTER'S FIVE FORCES FRAMEWORK, MICHAEL E. PORTER, 1979

Figure 29 shows the 5 forces that shape strategy, starting with the rivalry among existing competitors, to the threats represented by new entrants and substitute products or services, concluding with the bargaining power of suppliers and buyers. All these factors, depending on how strong they are, influence the final profitability of an industry and therefore its attractiveness (The five competitive forces that shape strategy, Michael Porter, 2008).

## **Threat of new entrants**

As Porter wrote on his 2008 article “The five competitive forces that shape strategy”: “new entrants to an industry bring new capacity and a desire to gain market share that puts pressure on prices, costs, and the rate of investment necessary to compete”. The lower this threat is, the better: potential entrants (they don’t have to really enter the industry, the menace is sufficient) put a cap on the profit potential of an industry and when the threat is high, incumbents must hold down their prices or boost investment to deter new competitors.

Analyzing entry barriers will give us more clarity on the matter. Entry barriers are advantages that incumbents have upon new entrants. The more barriers and the higher and tougher they are, threat of entry is low, and the better is for profitability.

Economies of scale play a crucial role in this sense, both for the supply-side and the demand-side. They arise when firms that produce at larger volumes enjoy lower costs per unit because they can spread fixed costs over more units, employ more efficient technology, or command better terms from suppliers (The five competitive forces that shape strategy, Michael Porter, 2008).

Let’s start with market capitalization and another interesting graph. The market is almost a monopoly, with one player (BTC) having more than the 40% of the market capitalization. The first 10 most capitalized cryptocurrencies represent the 84.07% of the entire market as December 2022, as seen in Figure 30.



FIGURE 30, TOP 10 CRYPTOS STACKED MARKET CAPITALIZATION,  
COINMARKETCAP.COM, DECEMBER 2022

It's an incredible amount and it makes clear that there is little room for new entrants. This is especially true if seen from the demand-side point of view, where the so called "network effect" is very powerful: incumbents, that can be older cryptos or early comer companies, have the trust of the users in a market where now more than ever before trust is fundamental. Reputation, seniority, and preeminence matter a lot in this industry, as investors seem to base their selection choices on that (Nadler & Guo, 2020).

Another parameter useful to evaluate entry barriers is customer switching costs and their entity. Switching costs are fixed costs that buyers face when they change suppliers. In this case changing supplier does not represent a barrier. Transferring funds using a personal wallet to another person is a bit complicated but manageable; switching from a specific coin to another one is fairly easy and with very low



transaction fees; and the same can be said for switching between exchanges or platforms; all not so costly operations.

In many cases incumbents have advantages independent of size. Credibility, in this industry, is one of these.

This is a pivotal point: in an industry where credibility is of paramount importance, companies struggle every day to secure the customer base and to offer the best services and platforms. The smallest leak in the wall, if left unmanaged, can lead to disastrous damage and losses for all parties involved. A reputation of safety, trust and reliability built upon years of good practices can be undone in days (again, FTX case *docet*), in a market where opinions and news circulate very fast and spread like wildfire in a corn field. As a result, gaining credibility and a good reputation is tough.

In the end, we can say that the threat of new entry is low.

### **Threat of substitute products or services**

A substitute performs the same or a similar function as an industry's product by a different means (The five competitive forces that shape strategy, Michael Porter, 2008).

In this case, substitutes are represented by established technology, banks and financial institutions, governments currencies, and the status-quo.

Starting with the latter, governments have never approved the use of cryptocurrencies: there is a substantial conflict of interest between cryptos and fiat currencies. Cryptocurrencies were born with the precise purpose of changing the status-quo, taking away power from the establishment and giving it to people, in a sort of financial

revolution, as we have previously discussed in Chapter 1. Of course, this cannot be tolerated by the establishment and by governments, and they are taking measures to prevent this to happen.

Substitutes are easy to overlook because sometimes they are difficult to find, but it's very important to make them part of the equation: when the threat of substitutes is high, industry profitability suffers. Substitute products or services limit an industry's profit potential by placing a ceiling on prices (The five competitive forces that shape strategy, Michael Porter, 2008).

The threat is high especially if the substitute offers an attractive price-performance trade-off to the industry's product and if the buyer's cost of switching to the substitute is low.

In this industry, the threat of substitutes is high.

The first reason is that traditional finance and traditional financial services and methods are still very strong and worldwide used as a standard, not to mention fiat currencies. Something is moving across governments and central banks around the world to cope with decentralized cryptocurrencies, and institutions are starting to inquire about the possibility to have a government-backed cryptocurrency, called Central Bank Digital Currency or CBDC.

A CBDC is a digital currency issued and regulated by a nation's monetary authority or central bank, pegged to the value of one country fiat currency. Blockchain technology has awaken the interest of governments and central banks, eager to find a way to issue a proprietary digital currency, bringing back all the money now deposited in decentralized cryptocurrencies (Investopedia.com). The main goal of these digital currencies is to provide businesses and consumers with privacy, transferability, and financial security: in other words, apply all

the benefits of blockchain technology to a government-backed, centralized, and failsafe cryptocurrency.

The Federal Reserve defines CBDC as a “digital liability of a central bank that is widely available to the general public”, and like existing forms of money, it would enable the general public to make digital payments. And as a liability of the Federal Reserve, it would be more secure and safe, with no associated credit or liquidity risk.

The Biden administration has already given mandate to the FED to investigate whether a CBDC is feasible, with an executive order signed on March 9, 2022.

This is, of course, to limit the power of decentralized digital currencies, seen as a threat to the economy due to the various risks they pose. The executive order will call on the government to inquire the technical needs for a digital currency and recommend for the Federal Reserve to continue its research and development (FederalReserve.gov).

At the moment, the threat represented from fiat currencies is large: only a minority of people, often young and tech-savvy, can consider using cryptocurrencies as an alternative to fiat currencies, and only for specific needs or purposes. The average US crypto investor is 40 years old, white, with a median household income of \$102 thousand dollars (Mrsimmons.com).

The second reason the threat of substitutes is high has to be found in customer switching costs. Those are present but are low, hence not representing a sufficient obstacle. Customers face switching costs enter the blockchain technology, to exchange funds using it, using its applications and to transfer funds from a bank account to an exchange like Binance or Coinbase. But apart from some specific cases where the costs are relatively high (for example, transferring funds using the Ethereum was extremely expensive during the 2021 bull run due to

transaction fees) most of the situations don't have elevated fees or costs.

It may be true even the contrary: Binance and the other crypto exchanges offers very competitive transaction costs and trading fees, which outperform traditional brokerage fees (Binance.com). The cryptocurrency market is very liquid, even in this period when the wind is no longer blowing at full speed but is more like a breeze, the fees remain competitive, and users are staying in the market.

Trust is the final characteristic we consider. In a market where trust is everything, as we've already stated out, is fundamental to have a high level of trust in the underlying technology, to have positive future expectations. Lately this trust seemed to be missing from the industry, after all the events happened this year, and this is for sure a point in favor of traditional technology and finance institutions. We will see how the market develop in the future years.

### **Bargaining power of suppliers**

We can discuss now the third force, the bargaining power of suppliers. Suppliers can have an impact on the profitability of an industry, especially when they are powerful: they capture more of the value for themselves by charging higher prices, limiting quality or services, or shifting costs to industry participants (The five competitive forces that shape strategy, Michael Porter, 2008).

A supplier group is powerful if: it is more concentrated than the industry it sells to; if the supplier group does not depend heavily on the industry for its revenues; industry participants face switching costs in changing suppliers; suppliers offer products that are differentiated;

and the supplier group can credibly threaten to integrate forward into the industry.

Being said that let's analyze our industry of reference. In the blockchain industry the suppliers are represented by computers and electronic components manufacturers, by miners for Proof-of-Work blockchains and by capable developers' teams.

Starting with the miners, they represent the most immediate threat to the industry, since they have the power to completely shut down an entire network. This is of course an extreme scenario, but we must keep it in account; and there is to say that this can happen only for Proof-of-Work blockchains, which works on the pure calculus force carried by miners. As we already have explicated, miners are well compensated for their work, since they bring home the new minted coins and the network fees for every transaction they manage.

Miners represent a threat, but it is being kept at bay by two simple reasons: first, they can't really threaten to integrate forward or to shut down the network, since it is their first income source; second, and most important, PoW blockchains have days counted. In the year when the second largest cryptocurrency switched from Proof-of-Work to Proof-of-Stake, and in a world where ESGs and environmental questions are fortunately becoming of paramount attention, PoW blockchains are destined to fade, for their tremendous energy consumption and high climate impact (Hackernoon.com).

In sum, miners are gradually losing importance and weight in this process of renovation that's happening in the industry.

Suppliers are also represented by electronic components manufacturers. Giant companies like Nvidia and AMD have a role in this. These two companies are the main producers of GPUs, or Graphic

Processing Units, an electronic component used for graphic rendering and responsible to manage the graphics and the visuals of a computer. These units are widely used as the main crypto mining tool, since their price-performance is more favorable than using standards CPUs (PCs processors) (Investopedia.com).

And for this reason, GPUs are often scarcely available on the market, with inflated prices due to the great demand from crypto miners. It would be natural to conclude that AMD and Nvidia are two powerful suppliers, and they are: together have almost the 100% share of the GPUs market; but we have to mention again the fact that blockchains are progressively advancing to Proof-of-Stake algorithms and for that reason all this raw calculating capacity it would not be needed anymore.

To give an example, the Ethereum Merge, event we have previously discussed, reduced the network energy consumption by 99.95%, and GPUs prices started plummeting closely after (Arstechnica.com). Lots of these components are now repurposed to Artificial Intelligence, machine learning and VFX rendering.

GPUs are slowing but constantly declining as the main mining method, because of the improvement to PoS, to rising energy costs, to unfavorable market conditions and to rising “green” pressures from governments and the public.

For this, suppliers are slowly losing the grip on the market.

We have to also mention the fact that there are other electronic devices and components needed to proper function a blockchain network but are all components readily available and not scarce. What may be scarce are competent and talented developers and programmers: those are the people that really come up with new ideas and who can manage a network and resolve issues.

Human resources must be considered when analyzing suppliers, but the future is going to be bright for these roles: young people are more and more interested in the STEMs disciplines (Science, Technology, Engineering and Mathematics), with enrollment numbers on the rise (Educationhub.blog.gov.uk). This means that a shortage of developers is something we have not to fear.

After all these considerations, we can confidently say that the threat posed by suppliers is low to moderate, with a positive trend for the future where we will see even less concentration of power and more supplier fragmentation.

### **Bargaining power of buyers**

Continuing the analysis, the fourth Porter's force is the bargaining power of buyers.

As the professor wrote in his article, powerful customers can capture more value by forcing down prices, demanding better quality or more service (thereby driving up costs), and generally playing industry participants off against one another, all at the expense of industry profitability (The five competitive forces that shape strategy, Michael Porter, 2008).

Buyers are powerful if they have negotiating leverage relative to industry participants, especially if they are price sensitive. A customer group have negotiating leverage if: buyers are not many; the industry's product is standardized or undifferentiated; buyers face few switching costs in changing vendors.

The blockchain for financial services and banking industry is no different, it has its own customer groups divided into institutional

buyers and retailers; there are both “normal” users that actually use the various networks and investors that are into the industry just to make some profit.

This industry, as we’ve already stated out, it is funded upon many fundamental blocks, and one of the most important is the trust block: without trust, even the most advanced and promising project can crumble down like a sandcastle.

In a market where a single tweet can move millions of dollars and moves at an unprecedented speed, bouncing between social networks or Joe Rogan’s podcasts, customers can make a crypto “pump” or make it “dump” (Investopedia.com).

These are two of the many words utilized by users as crypto-jargon, and they refer to the extreme volatility certain coins sometime face (or the entire market, as we’ve seen) in the positive side, with double digits gains in less than an hour, or in the negative side, with the same thing but in the opposite direction.

Pumps and dumps often are triggered by an event, that can be simple as an Elon Musk’s tweet or as the FED’s announcing the new interest rates, and like a snowball effect a specific coin or the entire market starts running in the grip of a collective frenzy.

These events are nothing new in the economic history, as panicked bank runs or group euphoria have always happened, but in the hyperconnected world in which we live in, cryptocurrencies are the symbol of this high-speed ever-present connection. And this peculiar aspect must warn about the importance of users and customers in this industry: they have the power in their hands.

But small retailers are not the only ones to have the power of big market movements in their hands: whales have this power too. A “whale” is someone who has a significant amount of a cryptocurrency



and with that amount can create price movements. Usually, a whale is defined as an account which has more than 1000 BTC (approximately 16 and a half million dollars) (WorldCoin.org).

Crypto whales are usually institutional investors like funds, venture capitalists, investment firms, crypto exchanges, or eminent people in the crypto industry like Changpeng Zhao (Binance founder) or Brian Armstrong (Coinbase CEO) (WorldCoin.org).

All these entities have effects on prices and on liquidity, with risks of market manipulation: with their big bags of coins, they can generate large trading volumes and influence cryptocurrencies' market cap, creating price swings and therefore trading opportunities.

So, both small customers and big whales have an influence on the market, making very clear that this is a very user-centric industry. Adding to the equation that customers bear low switching costs, when changing blockchain or exchange, and the sum results in a high-level threat to profitability of the industry.

### **Rivalry among existing competitors**

The final force left to be examined is the rivalry among existing competitors. This force analysis may differ from the usual practice because we are examining a peculiar industry: there is no company behind Bitcoin or Cardano, practices like price discounting and advertising campaign are not applicable, and as a result we have to find a new road to assess this matter.

Starting as usual with Porter's words, high rivalry among competitors limits the profitability of an industry. The degree to which rivalry drives down an industry's profit potential depends, first, on the intensity with which companies compete and, second, on the basis on which they

compete (The five competitive forces that shape strategy, Michael Porter, 2008).

The intensity of rivalry is greatest if competitors are numerous and roughly equal in size and power; if the industry growth is slow; if exit barriers are high; if rivals are highly committed to the business, with goals beyond economic performance.

The dimension in which the competition happens also matters and whether rivals converge to compete on the same dimension.

A good starting point is looking at the market capitalization of the single coins.

Let's recall the Figure 24 graph. The first 2 coins, Bitcoin and Ethereum, represent the 58.4% of the total market capitalization, and the first 10 coins represent the 84.07%. The other 22,115 coins (22,225 total coins minus the first 10 - Coinmarketcap.com data) have less than the 16% of the total market cap. There are 36 coins with more than a billion of market cap, and the first 25 coins for market cap represent the 91.31% of the total (CoinMarketCap.com).

It is natural to conclude that other coins have very little room in the industry: in an almost oligopoly industry, the big fishes are all fighting for more room at the top, trying to dethrone Bitcoin and his lieutenant Ethereum; the small fishes are all fighting for more room at the bottom of the water, and there's a bloody battle going on. The chances to throw down Bitcoin from the number one position are very, very remote, and all other cryptocurrencies must fight to obtain market share, users, and notoriety. This makes things easier for the top coins: owning a big market share makes them less concerned about rivalry and competition, maintaining a higher level of profitability in the industry.

If the bigger cryptos have the incumbency advantage and do not have to bother competing with others, the smaller ones on the other hand must fight to gain market share, and the current economic moment is not very suitable for them.

The world economy just finished the first year of restrictive monetary policy, with interest rates being risen by central banks to reduce the galloping inflation that was afflicting western economies; now we enter on a more cautious macroeconomic phase, with many forecasting a recession for the year to come (Bloomberg.com). With these conditions, investors can no longer afford to invest in smaller coins or meme coins, hoping to make easy double-digit earnings (often succeeding, in the past). In a bear market, capital is moved from risky assets to safer ones, in this case to bigger and established cryptos like BTC, ETH, BNB and stablecoins, to cope with unfavorable economic conditions and a sluggish economy.

So, smaller cryptocurrencies are struggling to survive, and the battle is going to be tougher as time passes. Very few projects and cryptocurrencies have the right features to become notorious, gain market share (and therefore investors) attract sponsors and bigger funds; we must mention again the fact that seniority and reputation matters, things that can't be achieved overnight. In a market dominated by fear and uncertainty, risky coins are abandoned in favor of safer ones, with more capitalization, users, use cases and notoriety. It is not a case that all stablecoins have seen an increase in capitalization in the past month (Coinmarketcap.com), because those represent a safe haven in uncertain times.

Ecosystems also matter. As we have previously discussed, top cryptocurrencies do not only have their native blockchain token, like ETH for Ethereum and BNB for the Binance Smart Chain, but have built on top of their first layer a thriving ecosystem (ETH, BNB etc. are also

called “layer-1 blockchains” for this reason, because they are the base network of a blockchain architecture). A second and even a third layer was built on top of the first, with almost every dApp or application or new project being built upon an already existing architecture: there are currently 105 layer-ones, with the most capitalized being Bitcoin, Ethereum, BNB, XRP, Dogecoin and Cardano (CoinRanking.com).

It is clear that cryptocurrencies based upon a successful base layer have more probability of being successful themselves, therefore suffering less the economic conditions and the rivalry between other coins working in the same ecosystem.

Instead, competition can be seen as between ecosystems, and in this way the degree of rivalry decreases, passing from more than 22,000 cryptocurrencies to just 105 ecosystems. Looking at the top performers, just the first 21 layer-ones have more than a billion of market cap, going down to the first 45 to find the 100 million market cap milestone (CoinRanking.com).

After this examination, we can say that the threat represented by the fifth force, rivalry among industry competitors, is a low to medium level threat.

### **Five Forces Recap**

We are at the end of the Porter 5 Forces analysis. Just to give a brief recap, here are the five forces and the level of threat to profitability they have, represented by a number from 1 to 3, which 1 being a low level threat, 2 a moderate level and 3 a high level; 1.5 and 2.5 represent an intermediate value between two different levels.

- Threat of new entrants, low = 1

- Threat of substitute products or services, high = 3
- Bargaining power of suppliers, low to moderate = 1.5
- Bargaining power of buyers, high = 3
- Rivalry among industry competitors, low to moderate = 1.5

The average value is 2 making the industry slightly attractive overall.



## **CHAPTER 3 – Crypto industry and M&A deals**

### **3.1 An introduction to Private Equity**

We start this new chapter by giving a definition of private equity: “Private equity is an asset class consisting of equity securities and debt in companies not quoted on a public exchange” (Baker et al, 2015).

There are different types of Private Equity (from now on, referred to as PE), such as venture capital, buyouts, mezzanine capital, and turnaround investments.

Venture capital refers to equity investments made in younger companies, for the launch of a start-up company or an early-stage development.

On the other hand, buyouts are made on mature companies that require financing to pursue growth opportunities. This process involves a group of investors acquiring a target company from its current owners using a mix of equity and debt financing.

Mezzanine capital investments is a hybrid of debt and equity financing that gives the lender the right to convert the debt to an equity interest in the company in case of default, generally, after venture capital companies and other senior lenders are paid.

Turnaround investments, or distressed investments, refer to investments in equity or debt securities of financially stressed companies (Cumming 2010, 2012).

#### **3.1.1 Private Equity structure and organization**

Private Equity is usually organized in funds. PE funds are created with the only purpose of conducting PE operations and generate a return for

its partners. Speaking of which, there are two types of partners in a PE fund: General Partners, or GPs, and Limited Partners, or LPs.

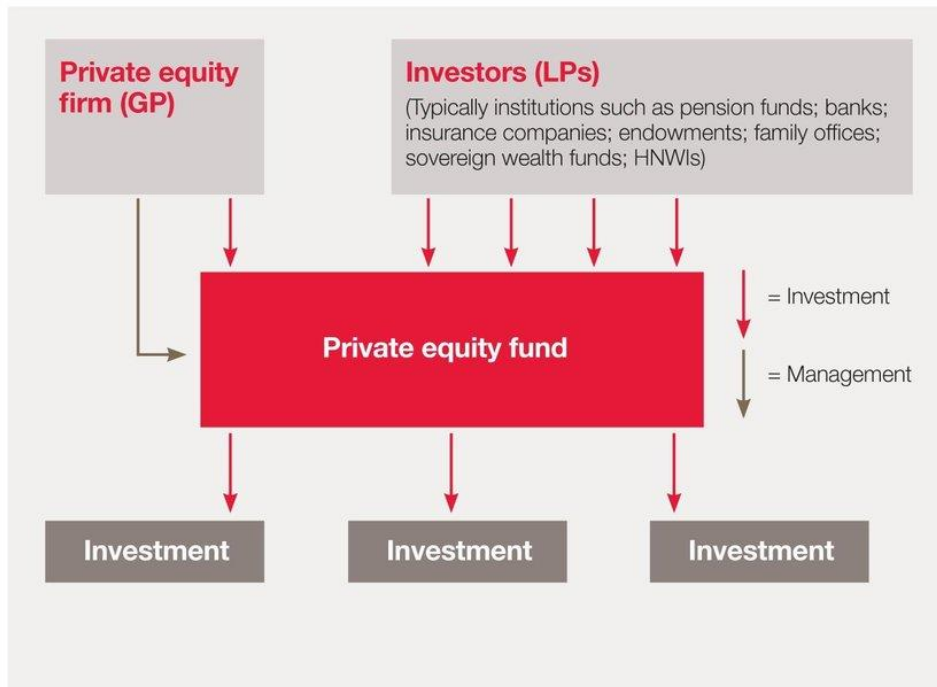


FIGURE 31, PE FUND STRUCTURE, RESEARCHGATE.COM, 2015

Figure 31 shows the structure of a PE fund.

GPs are the fund managers and often the promoters of the deal; they are responsible for the fund daily management and are personally liable for the partnership's debt and obligations.

LPs are the institutions that give their capital to GPs and therefore to the fund. They usually are High Net Worth Individuals (HNWIs), pension funds, sovereign wealth funds, banks, and other financial institutions.

Compensation structure is made up by three major components: management fees, carried interest and deal-level fees.

The industry standard compensation structure of a PE fund is known as "2-and-20": a 2% management fee on committed capital and 20% carried interest on profits.



Management fees are what LPs pay annually to the GPs, and it is a percentage of the amount invested. This fee is used to cover the operating expenses of the fund and it is usually the 2%. The fee basis could differ from the committed capital, for example it could be a combination of called and uncalled committed capital, or the net invested capital.

Carried interest, or carry, is the GPs' profit share. It's a performance fee and it is fundamental as it aligns the interests of the two partners. Usually, it is the 20% of the fund's profit. Also, often is set up a preferred return: if LPs don't get a minimum return in a year, GPs don't get their carry. The preferred return usually is the 8% per year.

Lastly, deal-level fees, or ancillary fees, represent the share GPs receive from their portfolio companies, as a compensation for the broad range of services they provide to those companies (Baker et al, 2015).

The process of PE can be fairly simple: General Partners seek companies to acquire with the equity given by Limited Partners, with the purpose to sell it later at a premium. The target has to be improved in some way, of course, in a process that is called *value creation*. This can happen in many ways, such as reducing costs, improving operating performance, generating growth, and enhancing corporate governance. The time horizon for this type of investment is 10 years, on average.

Leverage has a key role in PE, as it has given the name at one of the most common types of PE operations, the LBO or Leveraged Buyouts. With leverage we define the use of debt to amplify returns from an investment. In this case, debt is used to create a high levered financial structure to finance assets, invest in business operations, and generally improving the company to increase shareholder value (Baker et al, 2015).

Debt here has a main role for two reasons: first, interest expenses on that debt are tax-deductible, creating what is known as the “tax shield effect”. Second, as debt is paid with time, and so it being reduced, equity becomes more valuable, creating the so-called “mortgage effect”.

### 3.1.2 LBO Process

The mechanics of an LBO are straightforward. It is a 3-step process, consisting in a pre-investment phase, an investment phase, and an exit phase.

The pre-investment phase can be divided into 3 more steps, which are the search and screen, the deal orchestrating and the closing. During the first step, is defined the target company profile and the fund starts screening thousands of companies.

The target company profile is decided by the fund managers. They decide the typology of the deal (buyouts, capital restructurings, turnaround investments etc.), the industry the target operates and the geographical location.

In the second part, the deal is orchestrated. Preliminary Due Diligence, financing, negotiations, and management discussions are tackled.

This part of the deal process is fundamental, as are done the industry analysis, the competitive positioning analysis, the company analysis, and the business plan evaluation. The industry analysis is what we’ve done in Chapter 2 with the Porter’s 5 Forces framework applied to the crypto industry. The competitive positioning analysis investigates the firm positioning compared to its competitors, using instruments like the 4C framework and the high road/low road matrix; we have then the company analysis, where the goal is to build a fact-based document

that inquires about the reasons of the current and historical performance, with an eye on the definition of the company full potential and how to achieve it. Here the company is in-depth explored from a strategical, operational, and financial point of view.

Lastly, there is the business plan evaluation, which consists of the identification of strategic priorities, the creation of an implementation plan and the estimation of the future cash needs of the company.

Here are used ratios to understand the company performances: ratios like profitability ratios (gross margin, EBIT, EBITDA, ROE, ROA etc.) working capital ratios (inventory ratio, receivables ratio, cash cycle etc.) and investment ratios are all calculated and studied to better understand how the company is doing and how can it be improved after the acquisition.

Finally, there is the third and final step of the pre-investment phase, the closing. During this phase, the legal documentation is prepared, together with the Final Due Diligence, management negotiation and the financing commitment. The deal is then negotiated and bring to an end with the closing. The company is acquired and managed by the fund.

We have then the investment phase. During this phase the acquired company is restructured to increase economic value and to repay the LBO transaction debt.

There are four main categories of restructuring efforts: financial engineering, operational engineering, governance intervention and management monitoring.

#### 1) Financial engineering

Refers to the restructuring efforts connected to the financial structure and the financial accounting. Restructuring the

financing is both directed at the leverage effect and at the choice of the funding instruments. It starts with the replacement of all the existing debt and equity with the new capital apported by the PE fund (the industry standard is 80% debt, 20% equity). It's used more debt than equity because debt interest payments are tax-deductible, making the company generate higher FCFF (Free Cash Flow to the Firm) and therefore creating a higher value. Then there is the mortgage effect: by paying down the debt, the equity stake becomes more valuable over time, similar to the impact of making mortgage payments over the life of a loan for real estate property (Baker et all, 2015).

The other part of financial engineering is the financial accounting one. LBO funds often use the full potential of discretion in valuing certain assets to lower the target companies' taxable income through higher depreciations.

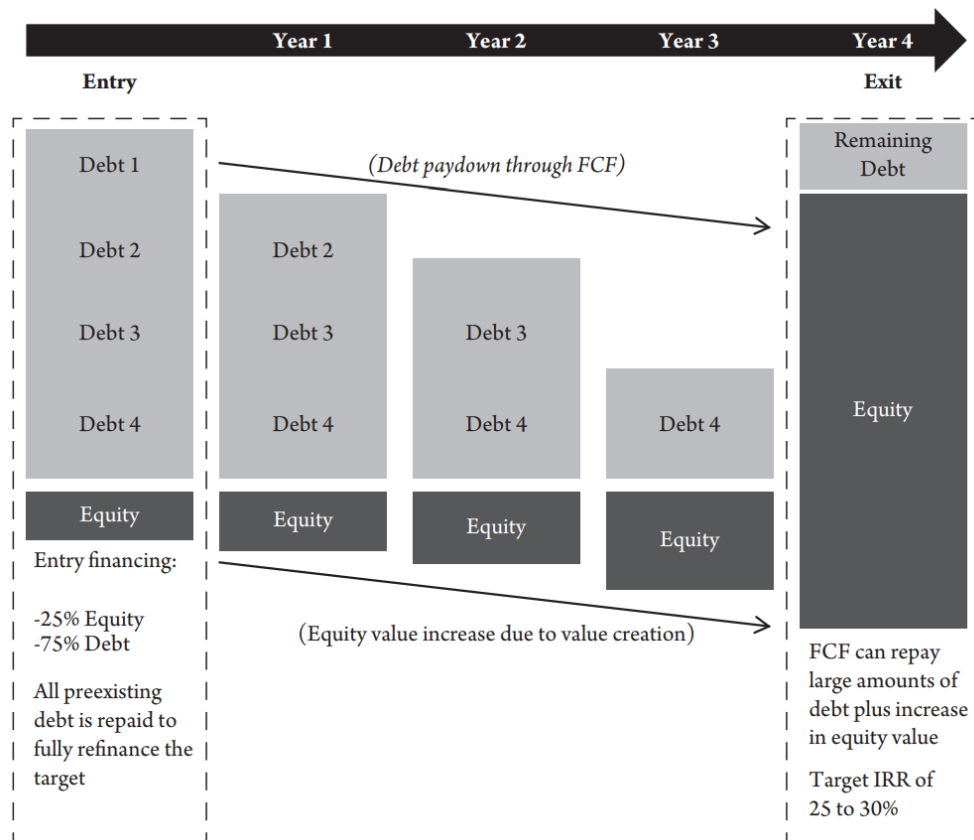


FIGURE 32, THE VALUE CREATION PRINCIPLE IN LBOs, BAKER ET ALL, 2015

## 2) Operational engineering

Describes the restructuring of the operating business of the target company. The goal is to either increase revenues or lower the costs to create more FCFO (Free Cash Flow from the Operations), and to make the company more efficient in their operations. This increase in efficiency is often achieved through the reduction of corporate overhead, the shutdown of unprofitable production lines or products (or the improvement of profitable ones) and from asset sales.

## 3) Governance intervention and 4) Management monitoring

These two mechanisms are done to lessen agency costs in target companies.

Governance intervention describes the active restructuring of the governance structures of the target to lower agency costs. High agency costs and internal inefficiencies due to bad corporate governance lower profitability. To assess this, fund managers replace the entire management of the target company; to align the interests of the two parts, usually the new management is awarded with ownership stakes in their company.

To further reduce agency costs and to make sure the managers act in the best interests of the equity investors, the LBO fund managers hold board seats to closely oversee the managers and their actions: this is management monitoring.

These two measures are very important and implemented together accomplish two things: first, the target company becomes more valuable due to a reduction of agency costs. Second, the LBO firm can make sure that all desired restructuring mechanisms are fully implemented by the management.

We have then the last phase of an LBO operation, the exit phase.

The exit phase consists in the selling of the target company and the distributing of the selling proceeds to the LPs.

There are four main exit channels: a trade sale to a strategic investor, a secondary buyout, an IPO, and a combination of different exit channels. Each exit strategy has of course its advantages and disadvantages.

For example, a trade sale to a strategic investor can generate a higher sale price because the willingness of the buyer to pay a premium for the synergies it has with the company. Or, another case, the sale to another buyout fund usually generates lower prices but it is generally conducted faster due to the M&A knowledge of both parties. The IPO is the most expensive process and at 6 to 12 months preparation time takes longer to complete than other exit options, but it usually generates the highest proceeds for buyout funds.

At the end of the day, the mechanics of an LBO are simple: the PE funds screen thousands of companies, focusing on those underperforming their peer group and that are relatively mature on their business. Then, the acquisition takes place and the acquired company is improved financially, operationally and in the governance. After some years, it is sold with the sale method most suitable for the specific case, and the partners of the fund, both general and limited ones, gain something in return.

### 3.1.3 Financing rounds

Before listing the market players and the past deals, a quick but necessary introduction to the various financing rounds that are part of the industry jargon.

In the venture capital industry, a company typically raises capital from investors in several rounds of financing. The rounds are referred to as "series" and each series represents a new stage of the company's growth and development. The following are the most common rounds of financing:

**Seed Round:** The first round of financing is typically referred to as the seed round. Seed funding is used to fund the initial stages of the startup, including market research, product development, and business planning. Investors in this round are typically friends, family, and angel investors.

**Series A Round:** Series A financing typically takes place after the seed round and is used to fund the company's growth. Series A investors are usually venture capital firms, and the funding raised in this round is used for product development, marketing, and expanding the team.

**Series B Round:** Series B financing takes place when the company is demonstrating traction and is looking to scale up operations. Investors in this round are usually venture capital firms, private equity firms, and sometimes strategic investors.

**Series C Round:** Series C financing takes place when the company has achieved significant growth and is looking to expand into new markets or acquire other companies. Investors in this round are typically private equity firms and institutional investors.

**Series D Round and Beyond:** Series D financing and beyond are used to provide additional capital for companies that have achieved significant growth and are looking to expand further. These rounds are typically led by institutional investors, such as mutual funds and pension funds.

It's important to note that the specific terms and structure of each round can vary depending on the company and the investors involved. The financing rounds are also not necessarily linear, as a company may skip a round or return to an earlier round if needed. The goal of each round is to provide the company with the capital it needs to achieve its next milestones and reach its long-term goals.

## 3.2 Crypto industry past deals and key players

### 3.2.1 Crypto industry M&A overview

After establishing this is a profitable industry to enter, as we've seen with the Porter's 5 forces model, we can start looking at the recent moves and deals made in the industry.

A needed premise: since acquiring PE specific data can be quite challenging, we can start our examination with the recent M&A deals in the market, trying later to find out the PE related ones. In this way we can analyze more data and transactions to give the full picture of the industry.



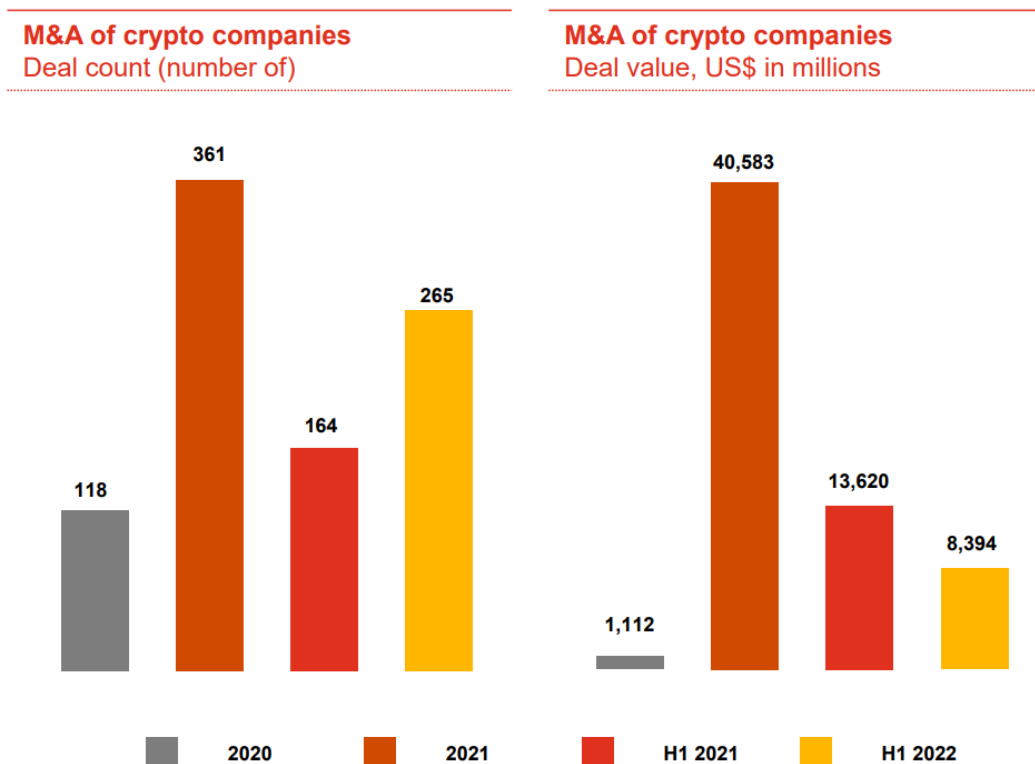


FIGURE 33, M&A OF CRYPTO COMPANIES: DEAL COUNT AND DEAL VALUE, PWC REPORT, OCTOBER 2022

Figure 33 highlights two different aspects of the M&A of crypto companies: on the left there is the chart with the number of deals and on the right the deal value in US\$ millions. We can see how the deal count skyrocketed from 2020 to 2021, following the positive sentiment of the market, with the number of deals increasing more than three times. In 2022, even though the negative sentiment and the steep downturn both of traditional and crypto markets, the number of deals remained high, with 100 more deals done than in H1 of 2021.

The deal value tells a different story though: the staggering 40,583 million of dollars invested in 2021 are a nice memory, with 2022 seeing only 8,394 US\$ millions invested in M&A deals. The average deal size shrank too: it fell from the 220.6 US\$ millions of 2021 to the 97.6 of 2022, a decline of the 33%.

Let's now analyze how these deals are differentiated from the investor point of view.

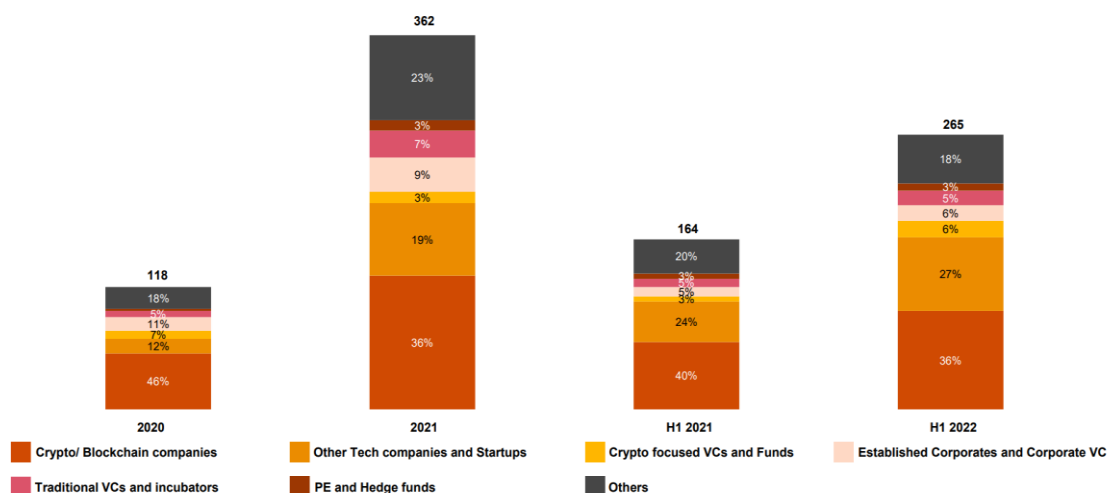


FIGURE 34, DEAL COUNT BY ACQUIRER TYPE, PWC REPORT, OCTOBER 2022

Figure 34 represents the total M&A deals of crypto companies from 2020 to the first semester of 2022, divided by acquirer type. As we can see, the majority of the deals are done by crypto and blockchain related companies, followed by other tech companies and startups. The portion of the deals represented by Venture Capitalists (traditional, crypto focused, and corporate ones) and by PE and hedge funds is a little one, with the 23% of the total deals in 2020, the 22% in 2021, and the 20% in H1 2022. In numbers, these are 27 deals in 2020, 79 deals in 2021, and 53 deals in H1 2022.

Bringing the focus down to PE and hedge funds deal, we have the 3% both in 2021 and in H1 2022, with a total of 10 deals and 8 deals respectively.

Comparing the H1 of 2021 and 2022, we can see that acquisition done by tech companies increased from 24% to 27%, and the ones done by VC and PE rose from 16% to 20% of the total. These numbers are very important, as they demonstrate that despite of the bear market of 2022 (in the first semester BTC lost the 56.85% and the market cap lost basically one billion, CoinMarketCap.com data), the interest in the industry was still high and sustained by these types of investors.

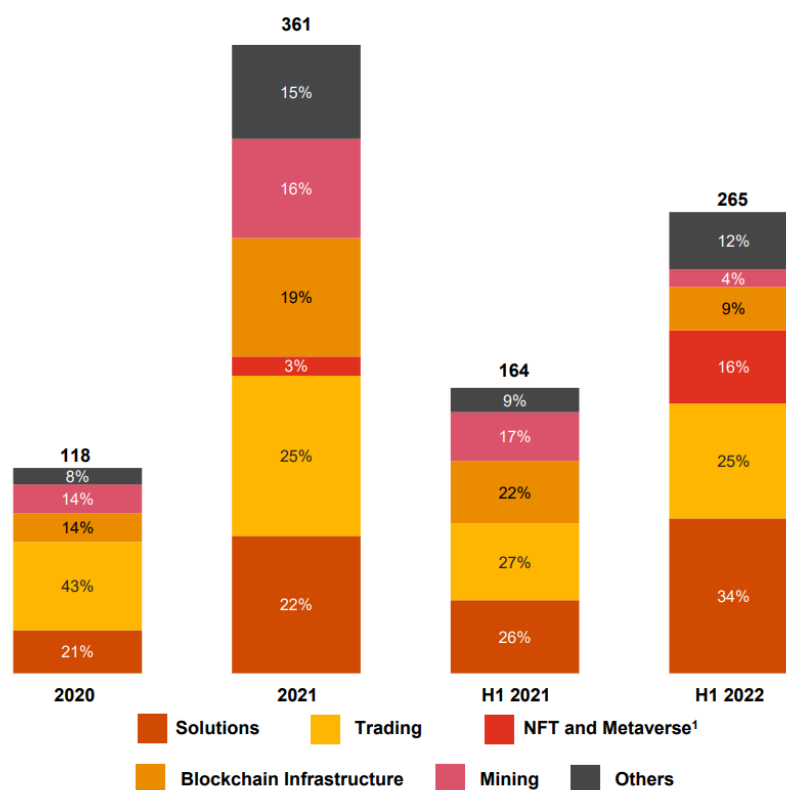


FIGURE 35, CRYPTO M&A DEAL COUNT BY SERVICE SECTOR, PWC REPORT, OCTOBER 2022

Lastly, we see with Figure 35 how the deal count is differentiated by sector.

In H1 2022, we can see how businesses offering solutions are the most represented sector, with the 34% of the deals, with the interest shifting away from mining and blockchain infrastructure. Trading sector stayed at the previous levels, while we see a steep increase in NFTs and Metaverse deals.

### 3.2.2 VC / PE players already in the market

Venture capitalists and private equity funds are already present in the market, as we've seen in the previous pages. Here we will briefly discuss about three of the most prominent asset management firms that operate within the blockchain industry and that are specialized in

this field, specifically with the financing of companies which offer crypto-related services, infrastructure, platforms etc.

### **Pantera Capital**

Founded in 2003, Pantera Capital is a blockchain investment firm focused exclusively on ventures, tokens, and projects related to blockchain tech and digital currency, and it is one of the biggest investment firms in the industry, with \$3.8 billion of asset under management.

It currently has 8 active funds, each one with a different focus, with a total of \$1 billion raised. The eldest fund is the Pantera Bitcoin Fund, founded in 2013, followed by the Venture I and II Funds. Other than these, are also active the Liquid Token Fund, which focuses on liquid tokens holdings, and the Early-Stage Token Fund, which invests in teams building new protocols in the blockchain ecosystem and follows an early-stage, venture-style model (PanteraCapital.com).

The firm has done more than 200 investments, with 50 of them made in 2022. Every investment or funding round made is related to the blockchain or cryptocurrency industry: from NFTs platforms to Decentralized Exchanges, from Web3 applications to wallets, they are specialized in finding new opportunities in this fluid industry, with an estimated revenue range from \$1 to \$10 million (Crunchbase.com) And with 18 exits done, it is one of the funds with the higher exits number.

Their latest deal, a Series A financing with \$12.5 million of the startup Obol Technologies, a research and software development team focused on proof-of-stake infrastructure for public blockchain networks (ObolTechnologies.com).

## **Multicoin Capital**

Founded in 2017, Multicoin Capital is a thesis-driven cryptofund that invests long term in tokens that reshape entire sectors of the global economy (Crunchbase.com), and with \$8.9 billion of asset under management is one of the biggest industry players (InfluencerMarketingHub.com).

The firm has 3 major investment theses for crypto, being what they call the “open finance renaissance” which they explain as “by making all units of value—stocks, bonds, real estate, currencies, and so forth—interoperable, programmable, and composable on distributed ledgers, capital markets will become more efficient and accessible to everyone on the planet.”; together with the Web3 concept and the idea of global, state-free money.

The Web3 concept is a very interesting one. It refers to the third generation of the World Wide Web that seeks to build a more decentralized, secure, and intelligent internet. It aims to empower users to own their data and digital identity, have greater privacy and security, and interact in a trustless manner without the need for intermediaries. Web3 is being built on decentralized technologies such as blockchain, peer-to-peer networking, and smart contracts (Investopedia.com).

With 112 investments done and more than \$605 million raised across three funds, it is one of the most prominent players in the market.

Their latest fund, the Venture Fund III, raised \$430 million, with the latest investment done in January 2023, when the firm financed the startup Sec3, which is a Web3 SaaS (Software as a Service) infrastructure that provides tools and security audits to secure smart contracts, with a seed round of \$10 million.

## **10T Holdings**

10T Holdings is a growth equity fund that invests in private companies operating in the digital asset ecosystem. It specializes in the fields of financial services, venture capital, and investment management. The firm was founded in 2019 and it currently has \$1.9 billion of asset under management. It also has one fund operative with more than \$750 million raised, with 12 investments made in 2022 (10TFund.com).

Their last operation was the series B funding with \$60 million of the startup QuickNode, which is a blockchain development platform that allows users to develop Web3 application and to scale them faster.

### **3.2.3 2022 M&A deals**

We can now analyze the M&A deals of year 2022, a year full of events as we've seen on Chapter 2. A needed disclaimer: the following data about the number of deals, their value, and the sector they are done may vary from the previous data from PWC: since it is a young industry and very fluid, every data collecting company has their own methods and labels to categorize deals data.

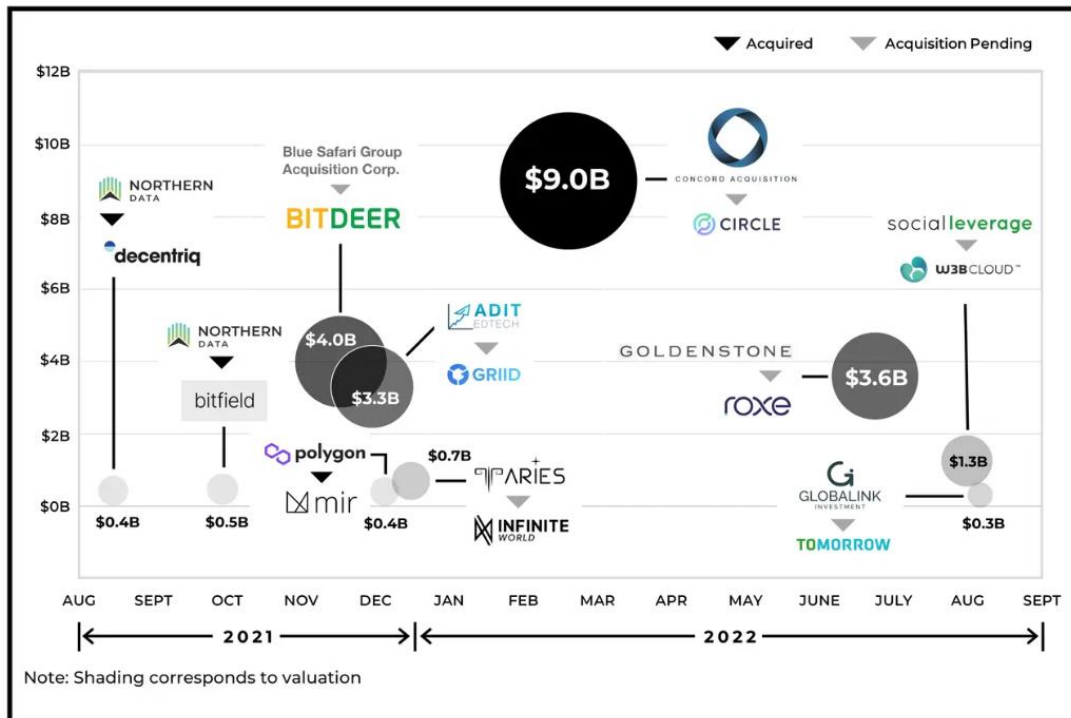


FIGURE 36, TOP 10 MOST VALUABLE BLOCKCHAIN AND CRYPTO M&A DEALS FROM 08/21 TO 08/22, BLOCKDATA.COM

Figure 36 shows the ten most valuable blockchain and crypto M&A deals from August 2021 to August 2022 (Blockdata.com). Let’s quickly analyze the most noticeable deals.

Unfortunately, Circle - Concord Acquisition Corporation and Roxe – Goldenstone deals were terminated due to complications. These would have been the largest and the third largest deals of the examined period, with \$9B and \$3.6B respectively. The second largest deal, the acquisition of Bitdeer for \$4B by Blue Safari Group Acquisition Corporation (a SPAC, Special Purpose Acquisition Company, a company without commercial operations and is formed strictly to raise capital through an initial public offering for the purpose of acquiring or merging with an existing company (Investopedia.com)), is still ongoing but delayed a few times (Decrypt.co).

Also, the fourth deal by size magnitude, which regards the mining startup Grid Infrastructure LLC and the SPAC Adit EdTech Acquisition Corporation, is being delayed. Announced in November 2021, the acquisition was planned for \$3.3B but never took off: we are now at the third delay from the announcement (Decrypt.co).

The fifth deal by deal size, the acquisition of W3bCloud, a Web3 infrastructure company, acquired by Social Leverage Acquisition Corp. (another SPAC) for \$1.3B, was concluded successfully. W3bCloud, as stated in their website, “provides the underlying physical (compute and storage) infrastructure needed to support the growth of the Web3 ecosystem, which favors developers, content creators, and consumers.”.

The last deal we’ll note is the acquisition of Decentric Europe by Northern Data AG for \$365 million. Decentric Europe is a Dutch company specialized on mining of cryptocurrencies, while Northern Data AG is a German B2B technology company. The acquisition took place in August 2021, and it was successful with no delays. We’ll analyze this deal later on.

### 3.3 Strategic M&A

We conclude this analysis with the strategic M&A part. Strategic M&A refers to the mergers and acquisition made by strategic buyers, which are acquiring other companies for strategic business reasons and not for financial reasons like a VC or PE fund would have.



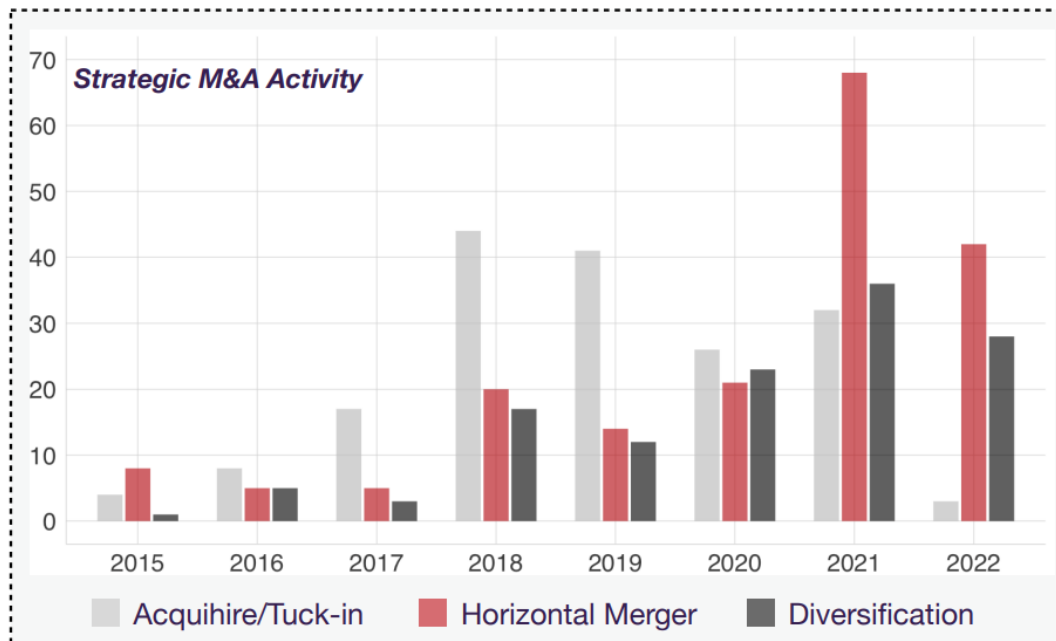


FIGURE 37, STRATEGIC M&A DATA, TOKENDATA REPORT, AUGUST 2022

Figure 37 shows strategic M&A data from 2015 to August 2022 (the disclaimer is the same as Figure 35) with the number of deals on the y axis.

We see that these M&A operations are divided into three distinct categories, being acquire or tuck-in, horizontal mergers, and diversification mergers.

Tuck-in acquisitions involve a larger company completely absorbing another, usually smaller, and integrating it into its own platform. The acquirer’s platform usually consists of the technological structure, inventory, software, and all other operational aspects of the business (Investopedia.com).

Horizontal mergers occur when companies operating in the same or similar industry combine together (CFI.com). The purpose of these kind of M&A operations are to increase economies of scale, market power, and explore and exploit possible synergies between the two companies.

Diversification mergers are when an acquisition happens for diversification purposes, where a company wants to further expand its

business operations by entering new markets or offering new products or services (CFI.com).

We can deduct from the figure above that there has been a shift in strategic M&A deals in the recent years. While before 2020 smaller acquihires and tuck-in acquisitions were the most predominant, now have faded leaving the place to horizontal consolidation and diversification mergers, which are now the real deal drivers.

### 3.3.1 Decentric Europe – Northern Data AG deal

We can now analyze an example of strategic M&A, the acquisition of Decentric Europe by Northern Data AG and the reason behind this type of deal.

Decentric Europe is a Dutch company, headquartered in Amsterdam, that operates within the blockchain mining industry, having in its facilities more than 2,000 GPUs (Graphic Processing Units) installed in more than 24,000 servers, dedicated exclusively to Ethereum mining and other altcoins. At the time Ethereum was still running on Proof-of-Work, so we can talk about Ethereum mining. Nowadays the Ethereum blockchain is relaying on Proof-of-Stake, as it was implemented with the Paris upgrade of September 6, 2022. Refer to Chapter 1 for more information.

The company was previously owned by Block.one LLC, a blockchain software solutions company.

Northern Data AG is a German B2B tech company focused on High Performance Computing (HPC) infrastructure, ASIC-based solutions (Application Specific Integrated Circuit, electronic circuits designed

specifically for mining digital currencies (Investopedia.com)) and GPU-based cloud technology.

The company has three main business areas which are: cloud services based on GPUs, as they have a prolific partnership with NVIDIA; data center providing, as they offer HPC infrastructure including planning, building, and operating decentralized and efficient data centers; and industrialized BTC mining, where they are able to combine carbon-neutral energy with maximum efficiency to industrialized BTC mining.

In August 2021 Northern Data AG (“Northern Data”) acquired Decentric Europe (“Decentric”) for \$365 million. The objective was, as stated in the Annual Report of 2021, “entering the mining business and being able to participate in the overall profits from the provision of computing power”.

This could be classified as a diversification merger. Northern Data, with the acquisition of Decentric, wanted to expand its business vertically, to gain access to the cryptocurrency mining industry and improve its capabilities in delivering its value proposition. Where Northern Data was already investing in the construction of new data centers and the recruitment of qualified employees, this deal allowed the acquirer to expand its business and to fully enter the mining sector.

This is due to the change in the business model of the acquirer, which changed from a mega-site approach to a multi-site approach. As written on the Annual Report 2021, “This will enable Northern Data to develop and build data centers simultaneously in different regions and countries with different teams and local suppliers”.

With this deal, Northern Data launched a large-scale project to build one of the world’s largest GPU-based distributed computing clusters

for HPC applications that will involve locations in Norway, Sweden, the Netherlands, and Germany. Northern Data acquired in this way all the GPU infrastructure of Decentric, which we already specified is currently 223,000 GPU cards produced by NVIDIA and AMD, that are installed in more than 24,000 server systems of Gigabyte Technology, a vendor of high-performance servers.

Going in depth, on August 12, 2021, the acquisition took place, and it was formally signed. For the transaction was used both cash and new-issued shares.

The cash component, which was offset against previously existing liabilities of Northern Data and then deferred by Block.one (the previous owner of Decentric) as a related party in the form of a loan in the total amount of €191,076 thousand. The loan is repayable within 12 months after closing (Northern Data Annual Report, 2021).

The share component involved the issue of 2,306,294 shares, issued by way of a capital increase through contributions in kind with the exclusion of shareholders' subscription rights. At a market value of €74 per share, this corresponded to an amount of €170,668 thousand at the time the agreement was concluded (Northern Data Annual Report, 2021).

The transaction cost to the acquirer €1,292 thousand for legal advice and due diligence in connection with the business combination.

To conclude, the strategic reason behind was the vertical integration that Decentric gave to Northern Data: the new acquired GPUs and servers will support the acquirer business and add more value throughout the area of high-performance cloud computing. This acquisition was part of a plan that aimed at expanding the business, as Northern Data is currently working on further strategic steps that will accelerate expansion of HPC business for applications that expand beyond blockchain use cases.

## 3.4 Decentralized M&A

Another important change that blockchain technology can apport to the current financial system is the decentralization feature applied to the Mergers and Acquisition process.

The idea behind decentralized M&A is to use a blockchain network to record all transactions securely and transparently, making the M&A process more efficient, secure, and cost-effective. In practice, is the point of conjunction of decentralized finance, known as DeFi, and the traditional M&A practice.

This is true especially for already decentralized companies, whose already are into the crypto industry: in the next paragraph we'll analyze how decentralized M&A is already used.

### 3.4.1 Polygon deals

The definition given above is intended to be applied for two traditional companies that would rely in blockchain tech to carry an M&A deal, and for this to occur, an immense amount of data would need to be transferred to a blockchain network, with the costs and time needed. However, if the two companies are already decentralized – like two crypto companies, both with their blockchain network and their cryptocurrency – this can be done, and it is already in use.

Polygon is a layer 2 or sidechain scaling solution that runs alongside the Ethereum blockchain, allowing for speedy transactions and low fees. MATIC is the network's native cryptocurrency, which is used for fees, staking, and more. As an Ethereum's layer 2, Polygon provides faster transactions and lower gas fees (gas is the term used for Ethereum's transaction fees) for users: to use the network is sufficient to "bridge" some of the supported cryptocurrency to Polygon

blockchain. Users have to use the Polygon's native token, MATIC, to pay fees on the Polygon network, for staking purposes (it runs on PoS) and for governance (Coinbase.com).

Founded in 2017 by 4 Indian software engineers, it steadily gained market share and market attention, when in early 2021 it definitively exploded, reaching more than \$12B in market capitalization. In the bull run of late 2021, it touched the \$20B in market cap, with a price of \$2.87 per token (the supply is immense: 8.7 billion tokens, with a predetermined max supply of 10 billion). Now the price per token is of \$1.30, with a market cap of \$11.5B, making it the eleventh cryptocurrency by capitalization (CoinMarketCap.com).

Polygon didn't score this numbers by chance: the quality of their network is impressive. It allows developers and users to connect, build and develop on the Ethereum network in a fast and easy way, while also being carbon neutral: it is the most used network to build and scale other projects on Ethereum (BlockWorks.co).

In August 2021 it completed the first ever merger of one blockchain into another. The merged network was Hermez Network, which is a Zero-Knowledge rollup. A rollup, in the crypto world, is a layer 2 blockchain that increase the scaling speed of the layer 1. Rollups process transactions on another, faster blockchain (the layer 2), then port the transaction data back to the parent blockchain (the layer 1) at a fraction of the price. This means that users can benefit from the speed and cheapness of the rollup while also benefiting from the security of the bigger blockchain (CoinDesk.com).

Lastly, Zero-Knowledge are protocols that use a complex piece of cryptography called a Zero-Knowledge proof to determine that a transaction is valid using only minimal information about that transaction (CoinDesk.com).

The acquisition of Hermez was one of the first fully decentralized M&A operations. Polygon acquired Hermez by paying \$250 million in MATIC tokens, based on MATIC's price on August 4, 2021. Hermez was absorbed into Polygon's ecosystem under the name Polygon Hermez, where it became part of the Polygon's line of products.

HEZ token, Hermez's blockchain token before the merger, ceased to exist and MATIC now is the utility token for the Polygon Hermez network (CoinDesk.com).

This deal was not the only one done by Polygon in 2021. On November 6, 2021, Polygon concluded another deal acquiring Mir startup for 250 million MATIC tokens, or \$400 million at \$1.60 per MATIC token.

Mir is another Zero-Knowledge (ZK) startup, very similar to Hermez, that developed a ZK rollup infrastructure for the Ethereum network (BlockWorks.co).

These acquisitions are part of Polygon's \$1 billion plan to increase its scaling capabilities, consolidating its position as the number one Ethereum's layer 2 by transactions per second, dApps built and users (Beta.Polygon.Technology).

## Conclusions

We've seen in Chapter 1 how the blockchain works, which are the major cryptocurrencies and what are the most recent trends in the market; in Chapter 2, we assessed how did perform and what happened in the last two years on the market, and what forces impact the level of profitability; in Chapter 3 we've seen the basics of Private Equity investments, how financing rounds works, the recent deals and the key players of the industry, finishing with the analysis of one strategic M&A and one of decentralized M&A.

Unfortunately, what started as the main topic of the dissertation, whether private equity is present in the industry, how it applies its methods and practices, how the use of debt can be applied to this industry and many other questions, remained unanswered.

This is because the tremendous lack of data about private equity and the blockchain and crypto industry: due to the youngness of the industry, which sees very few later rounds of financing (Series C and above) but more of the earlier rounds (seed and A Series).

Another component of the equation to include is private equity time horizon. Usually, PE investments are illiquid and generally only traded on acquisition and exits. So, almost all of the PE deals we've seen in Figure 34 are simply not concluded yet, because the fund is keeping the company into the portfolio, and it hasn't divested it yet.

This does not mean the industry is not profitable nor attractive. We've seen before from Porter's 5 forces model that the industry has a certain level of profitability, and that money is being poured into cryptocurrencies and blockchain application from many different economic players and institutions, and private equity is among these. But for the moment, the lack of data is simply too great to give a



precise answer about the operations of PE funds and how they operate within this sector.

So, the focus gradually shifted from the latest to the earlier rounds of financing, namely seed rounds, Series A and B. In the earlier rounds M&A operations are more frequent and livelier, with more deals and more companies involved, especially regarding the strategic M&A.

And it is precisely in the strategic M&A field that we've analyzed one deal, to see what synergies and what drives an M&A operation in the blockchain and cryptocurrency industry. In the Northern Data – Decentric deal, we've seen how the mining capabilities and the equipment of Decentric motivated the acquisition.

Decentralized M&A is a very new branch that is starting to come out from the recesses of the cryptocurrency industry. M&A operations of this kind are becoming more recurring as there are more companies operating within the industry, especially when there are fully decentralized companies involved. Polygon is not among the first cryptocurrencies by market cap by chance, and operations of this kind demonstrate the willingness to stay at the top of the Ethereum's layer 2 projects, maintaining a competitive edge.

Blockchain is a disruptive innovation that will change how the world works, and so are cryptocurrencies: their use is predicted to increase year by year. With this dissertation the goal was to inquire whether PE investors were already in the market and how they were creating value within this industry. Unfortunately, we did not answer to that question due to the lack of data. But we found with the explanation of two another deals, not from PE investors but from a strategic investor point of view that the industry is profitable and is attracting capitals and interest, especially if the deal is motivated by a strategic synergy.

## **Bibliography**

Baker K. et al (2015), *Private Equity. Opportunities and Risks*, Oxford University Press, 198 Madison Avenue, New York, NY 10016, United States of America

Carson B. et al (June 2018), *Blockchain beyond the hype: What is the strategic business value?*, McKinsey&Company

Carvalho N., Vaz R. (2022), *Tech Trends 2022*, Deloitte Insights

Cumming D. et al (2022), *Decentralized Finance, Crypto Funds, and Value Creation in Tokenized Firms*, SSRN

Crasti T. et al (October 2022), *H1 2022 Global Cryptocurrency Mergers and Acquisition and Fundraising Report*, PwC

Dumas J.G. et al (2021), *Blockchain technology and cryptoassets market analysis: vulnerabilities and risk assessment*, 12th International Conference on Complexity, Informatics and Cybernetics, International Institution of Informatics and Systemics, Orlando, US, hal-03112920v2

Gillai B., Mendelson H. (November 2020), *Creating value with blockchain. A value chain management perspective*, Stanford Graduate School of Business

Hammond S., Ehret T. (2022), *Cryptos on the rise 2022. A complex regulatory future emerges*, Thomson Reuters Special Report

Houben R. e Snyers A. (2018), *Cryptocurrencies and blockchain, Legal context and implications for financial crime, money laundering and tax*

*evasion*, Policy Department for Economic, Scientific and Quality of Life Policies, PE 619.024 - July 2018

J.P. Morgan's Corporate Finance Advisory, Digital Investment Banking, and Blockchain Center of Excellence teams (2018), *Blockchain and the decentralization revolution. A CFO's guide to the potential implications of distributed ledger technology*, J.P. Morgan

Nadler P., Guo Y. (2020), *The fair value of a token: How do markets price cryptocurrencies?*, Research in International Business and Finance, Vol 52 issue C

Nakamoto S. (2008), *Bitcoin: A Peer-to-Peer Electronic Cash System*, [www.bitcoin.org](http://www.bitcoin.org)

Northern Data AG (2021), *Annual Report 2021*, Northern Data AG

Porter M. (January 2008), *The five competitive forces that shape strategy*, Harvard Business Review

Sonali V. et al (2022), *Blockchain Technology. Exploring Opportunities, Challenges, and Applications*, CRC Press

Tan R. et al (August 2022), *The state of Crypto M&A*, TokenData Research

Warren S. et al (July 2019), *Building Value with Blockchain Technology: How to Evaluate Blockchain's Benefits*, World Economic Forum

## Websites

101Blockchains, <https://101blockchains.com/>  
10T Fund, <https://www.10tfund.com/>  
Arstechnica, <https://arstechnica.com/>  
Binance, <https://www.binance.com/>  
Blockdata, <https://www.blockdata.tech/>  
Blockworks, <https://blockworks.co/>  
Bloomberg, <https://www.bloomberg.com/>  
Cision PR Newswire, <https://www.prnewswire.com/>  
Coinbase, <https://www.coinbase.com/it/>  
Coindesk, <https://www.coindesk.com/>  
Coingecko, <https://www.coingecko.com/>  
Coinmarketcap, <https://coinmarketcap.com/>  
Coinranking, <https://coinranking.com/>  
Cointelegraph, <https://cointelegraph.com/>  
Collins Dictionary, <https://www.collinsdictionary.com/>  
Crunchbase, <https://www.crunchbase.com/>  
Decrypt, <https://decrypt.co/>  
Education Hub Gov UK, <https://educationhub.blog.gov.uk/>  
ESPN, <https://www.espn.com/>  
Ethereum, <https://ethereum.org/en/>  
Financial Times, <https://www.ft.com/>  
Forbes, <https://www.forbes.com/>  
Gemini, <https://www.gemini.com/eu>  
Glassnode, <https://glassnode.com/>  
IDC, <https://www.idc.com/>  
Independent, <https://www.independent.co.uk/>  
Investopedia, <https://www.investopedia.com/>  
Ledger Academy, <https://www.ledger.com/academy>  
Medium, <https://medium.com/>  
Multicoïn Capital, <https://multicoïn.capital/>

Nirolution, <https://nirolution.com/>

Northern Data AG, <https://northerndata.de/en>

Pantera Capital, <https://panteracapital.com/>

Reuters, <https://www.reuters.com/>

Sequoia Capital, <https://www.sequoiacap.com/>

Statista, <https://www.statista.com/>

Wikipedia, <https://it.wikipedia.org/>

Worldcoin, <https://worldcoin.org/>

XRP Ledger, <https://xrpl.org/>