

Claremont Colleges

## Scholarship @ Claremont

---

CMC Senior Theses

CMC Student Scholarship

---

2022

### NFT-Related Companies: Token Sale Returns

Robert Liu

Follow this and additional works at: [https://scholarship.claremont.edu/cmc\\_theses](https://scholarship.claremont.edu/cmc_theses)



Part of the [Economic Theory Commons](#), [Finance Commons](#), and the [Other Economics Commons](#)

---

#### Recommended Citation

Liu, Robert, "NFT-Related Companies: Token Sale Returns" (2022). *CMC Senior Theses*. 2869.  
[https://scholarship.claremont.edu/cmc\\_theses/2869](https://scholarship.claremont.edu/cmc_theses/2869)

This Open Access Senior Thesis is brought to you by Scholarship@Claremont. It has been accepted for inclusion in this collection by an authorized administrator. For more information, please contact [scholarship@cuc.claremont.edu](mailto:scholarship@cuc.claremont.edu).

Claremont McKenna College

# NFT-Related Companies: Token Sale Returns

submitted to  
Professor Janet Smith

by  
Robert Liu

For  
Senior Thesis  
Fall 2021  
December 6th, 2021



## **Abstract**

Non-fungible tokens (NFTs) have emerged as a new means of digital asset ownership and many companies are building projects that revolve around the technology. These companies are blockchain-based and raise capital for their projects through cryptocurrency token sales, which have become a new mechanism of entrepreneurial finance. In a sample of 62 NFT-related companies, I examine which company, fundraising, and token sale process characteristics are associated with the performance of 7-day and 60-day market returns after a token's public listing. A multivariate regression analysis finds that the total amount of capital raised before a token launch has a negative relationship with the 7-day and 60-day market returns. Ethereum returns, the length of the team token lock-up period and the presence of a vesting schedule have positive relationships with 60-day token returns.

***Keywords:* non-fungible token, NFT, blockchain, cryptocurrency, token sale, token return.**

## Table of Contents

<b>1. Introduction</b> .....	1
<b>2. Literature Review</b> .....	4
2.1 Evolving Blockchain and Token Technology.....	4
2.2: NFT Applications and Companies.....	10
2.3: Token Sales.....	14
2.3.1 Process and Mechanics.....	15
2.3.2 Cryptocurrency Exchanges.....	21
2.3.3 Offering Methods.....	23
2.3.4 Advantages and Disadvantages.....	25
2.4 Token Sale Success Determinants.....	27
<b>3. Data</b> .....	31
3.1 Response Variables.....	31
3.2 Explanatory Variables.....	32
3.3 Control Variables.....	33
<b>4. Empirical Strategy &amp; Results</b> .....	36
4.1 The Model.....	36
4.2 Results and Discussion.....	37
4.3 Limitations.....	43
<b>5. Summary and Conclusion</b> .....	44

## 1. Introduction

Trading and collecting rare and unique items has been a phenomenon that has existed for as long as society has. People have always traded and collected art, cards, coins, comic books, stamps, etc., and this behavior has only continued to surge. For example, in 2020, a unique Mike Trout rookie baseball card sold for \$3,936,000 and became the highest-selling price sports card of all time.<sup>1</sup> In the past, these rare collectibles were limited to physical space, but there has been a paradigm shift. A new generation of blockchain technology has enabled true ownership of one-of-a-kind digital assets, taking the concepts of scarcity and uniqueness online. An outstanding example of the mainstream recognition of NFTs is the \$69.3 million sale of a piece of digital art by artist Beeple titled *Everydays: The First 5000 days*.<sup>2</sup> Similar to the Mike Trout baseball card, the art piece is unique, but the difference is that the ownership of the card exists in the physical world, whereas the art manifests itself as unique data that is owned in a virtual space online. Because the traits of scarcity, collectability, and uniqueness remain the same, the art is valuable for the same reasons the card is. Society is beginning to buy into the concept of the value of these digital assets.

The market for this unique digital property known as non-fungible tokens (NFTs) has attracted an astounding amount of capital and investor interest in a short period over the past several months. NFTs are one-of-a-kind digital equivalents of any rare collectible. This includes digital artwork such as GIFs, collectibles, music, and videos, trading cards, and in-game assets such as characters, skins, or items. The growth in the volume of sales demonstrates the attention the NFT market is attracting. In Q4 2020, the volume of sales of NFTs was an estimated \$52.8

---

<sup>1</sup> VanHaaren, T. "Mike Trout rookie card becomes highest-selling sports card of all time." *ESPN*, 23 Aug. 2020, [www.espn.com/mlb/story/\\_/id/29723239/mike-trout-rookie-card-becomes-highest-selling-sports-card-all](https://www.espn.com/mlb/story/_/id/29723239/mike-trout-rookie-card-becomes-highest-selling-sports-card-all).

<sup>2</sup> Chohan, Usman W. "Non-Fungible Tokens: Blockchains, Scarcity, and Value." *Critical Blockchain Research Initiative (CBRI)*, Working Papers, Mar. 24 2021, pp. 1-4.

million. This increased to a whopping \$1.2 billion in Q1 2021, \$1.3 billion in Q2 2021, and surged to \$10.7 billion in Q3 2021.<sup>3</sup>

Over the last five years, cryptocurrency token sales have become a popular method for raising capital for blockchain startups. While many of these early-stage blockchain ventures still receive capital through traditional means of financing from venture capitalists (VC) and angel investors, what they offer differs. Instead of offering equity, or a shareholder stake in the profits that the company generates, these companies offer tokens that are meant to have utility for the project that is built.<sup>4</sup> These projects are distributed applications (dapps) which are programs built on top of blockchain technology. Because token sales impose virtually no costs on the issuer compared to the underwriting and legal costs associated with IPOs, token sales have become the norm of how NFT-related startups raise capital.<sup>5</sup>

Most past literature is informational and serves as background information in this study. There is no past literature that explores the predictors of market performance, but some investigate similar research questions. In *Initial Coin Offerings: Financing Growth with Cryptocurrency Token Sales*, Howell, Niessner, and Yermack investigate a wide range of issuer and token sale process characteristics to predict successful real outcomes which are defined as increasing issuer employment and avoiding enterprise failure. They use a sample of all types of ICO issuers that publicly launched their tokens from November 2018 through July 2019. In *Success of Initial Coin Offering. The Empirical evidence from 2016-2019*, Myalo and Glukhov investigate how the choice of token launch chain or platform for creating smart contracts,

---

<sup>3</sup> Howcraft, E. "NFT sales surge to \$10.7 bln in Q3 as crypto asset frenzy hits new highs", *Reuters*, 4 Oct. 2021, [www.reuters.com/technology/nft-sales-surge-107-bln-q3-crypto-asset-frenzy-hits-new-highs-2021-10-04](https://www.reuters.com/technology/nft-sales-surge-107-bln-q3-crypto-asset-frenzy-hits-new-highs-2021-10-04).

<sup>4</sup> Catalini, Christian and Gans, Joshua S. "Initial Coin Offerings and the Value of Crypto Tokens" *MIT Sloan Research Paper*, No. 5347-18, Rotman School of Management, Working Paper No. 3137213, Mar. 5 2019, pp. 3.

<sup>5</sup> Howell, Sabrina T and Niessner, Marina and Yermack, David. "Initial Coin Offerings: Financing Growth with Cryptocurrency Token Sales." *European Corporate Governance Institute (ECGI) - Finance*, Working Paper No. 564/2018, Sep. 3 2019, pp. 5.

volatility of Bitcoin and Ethereum, and availability and quality of information on ICObench for ICO projects impact success. Success is defined as the amount of capital raised, the ratio of the fundraising hard cap that was raised, and the survival of a project. They use a sample of all types of ICO issuers with data that publicly launched tokens from 2016-2019. In *The non-fungible token (NFT) market and its relationship with Bitcoin and Ethereum*, Ante investigates the interrelationships between NFT sales, NFT users (defined as unique active blockchain wallets), and the pricing of Bitcoin and Ethereum.

The purpose of this paper is to explore a different metric for success, using many of the same company characteristics examined by previous literature to determine the significance of the relationships of these factors on token market performance post-token sale. While my research shares many of the same independent variables, the findings for their relationship with market performance differ because token returns are not directly correlated with capital raised or employment growth. My sample also differs in that it is very targeted. It consists only of NFT-related companies which have recently been popularized and do not include companies that have been delisted from public exchanges. While Ante looks at NFT sales and users, these metrics are not the same as company token returns.

I find that the total amount of capital raised during a company's seed, private, and public rounds before a token's listing has a statistically significant negative relationship with the 7-day and 60-day token return and Ethereum returns, the length of lock-up, and the presence of a vesting schedule have statistically significant positive relationships with 60-day token returns.



## **2. Literature Review**

Literature review is divided into 4 parts: Section 2.1 covers background information on the evolution of blockchain technology leading to the creation of NFTs, Section 2.2 covers background information on NFTs and their applications, Section 2.3 covers background information of token sales, and Section 2.4 covers past research that relates to token sale success determinants and how these factors contribute to my investigation of short-term token market performance and my hypotheses.

### **2.1 Evolving Blockchain and Token Technology**

Although NFTs are technically cryptocurrencies like Bitcoin, their functionality differs tremendously. To truly understand NFTs and the significance of the technology that enables them, it is imperative to understand blockchain technology, cryptocurrency tokens, and their evolution. There are three types of cryptocurrency tokens.

#### **2.1.1 Security Tokens**

The first tokens to exist were security tokens and among them are two types that fall under this designation. Some serve solely as a store of value and medium of exchange such as Bitcoin and Litecoin. These tokens and their networks are not owned by one entity or backed by projects and have no inherent utility or value. They derive value from their scarcity, or limited supply, and demand for them.

Others are essentially digital, liquid contracts that represent percentage ownership for any asset that has tangible value, such as real estate, cars, or corporate stock. These tokens ensure that investor ownership stake is preserved on a cryptographically secured blockchain ledger.<sup>6</sup>

---

<sup>6</sup> Liebkind, J. "Is 2021 the Year of the Security Token?" *Investopedia*, 21 Jun. 2021, [www.investopedia.com/tech/2018-year-security-token](http://www.investopedia.com/tech/2018-year-security-token).

Security token networks are simply decentralized crypto ledgers or public, unhackable, decentralized databases. These tokens are built on top of the most elementary blockchains, which function as distributed ledgers that are owned by no one but can be written to by anyone. These distributed ledgers are essentially public databases of lists of transaction history and who owns what. Because anyone can write to the database, a mechanism of verification is necessary to ensure the validity of the database.

The bitcoin blockchain is a great example of how this technology works. The blockchain can be thought of as a book of transactions. Anyone is able to access and write to the book, but before the page gets added to the book, everyone must see it and confirm it. These pages are numbered, laminated, and sealed when added. This system prevents fraudsters from adding new pages at will, tearing out pages, or altering transactions from an earlier page in the book because it is obvious to everyone else that a book is not legitimate when its sealing is broken or it is missing a page. The system is rooted in the fact that everyone maintains their own copy of the book and constantly checks each copy against one another.<sup>7</sup>

In this analogy, pages represent blocks that hold data for a group of transactions. Through the process of “mining,” whereby miners use computers to compete to solve a complicated mathematical function, transactions are verified in a process that is analogous to laminating and sealing them.

Mining utilizes a mathematical relationship whereby an input that is hashed generates a unique alphanumeric string of limited length. This function must be collision-resistant, which means it must ensure that it is impossible for two different inputs to produce the same output.

---

<sup>7</sup> Fairfield, Joshua. “Tokenized: The Law of Non-Fungible Tokens and Unique Digital Property.” *Indiana Law Journal*, *Forthcoming*, Apr. 6 2021, pp. 15-16.

The hash function for bitcoin is called SHA-256 which is commonly used for authentication and encryption protocols like secure password hashing in Unix and Linux.<sup>8</sup>

Anything can be hashed. Possible inputs include pictures, different texts, numbers, or in the case of blockchains, a database that is a list of transactions that shows who owns what. The most important element of a hash is that if the input is changed in any way, the hash changes, which indicates that a fraudster or attacker has altered some piece of data in the input.

New blocks are created through mining, whereby miners compete to solve a complicated math problem, and the one that does so first is rewarded the right to add the block to the blockchain. The transactions are recorded on that block and hashed, which creates a unique identifying number. Each subsequent block in the chain uses this number as an input for the next problem the miners try to solve. Thus, each block is mathematically linked to the block before it, and altering one block would require altering every block that was hashed and came before it. This connectedness of the entire blockchain secures and confirms that all the data that is added to it is legitimate.<sup>9</sup>

This consensus mechanism is called proof of work, which gets its name from making it nearly impossible to falsify the ledger because it would take too much computing power. There is a correct answer to solving the function, and because all of the computers in the network are trying to solve the same function, they are all incentivized to solve it and add it to the blockchain correctly. If a fraudulent miner attempts to falsify a transaction in the new block, it will be evident that the new block is faulty and the fraudulent miner's block will be rejected by the rest of the network. The fraudulent miner wastes the computing power it used to attempt to do so.

---

<sup>8</sup> "SHA-256 Algorithm Overview." *N-able*, 12 Sep. 2019, [www.n-able.com/blog/sha-256-encryption#:~:text=SHA%2D256%20is%20used%20in,SHA%2D256%20for%20verifying%20transactions](http://www.n-able.com/blog/sha-256-encryption#:~:text=SHA%2D256%20is%20used%20in,SHA%2D256%20for%20verifying%20transactions).

<sup>9</sup> Anascavage, Robert and Davis, Nathan. "Blockchain Technology: A Literature Review." May 3 2018.

Essentially, the network of computers trying to solve the block serves as a majority rules verification system for blockchain networks. It uses a probabilistic approach to eliminating potential fraud. An attacker who tries to corrupt the shared database would need to own a majority of the computational power of the entire network used to verify transactions, which is virtually impossible with a global network of the likes of bitcoin.<sup>10</sup>

### 2.1.2 Utility Tokens

Blockchain technology has advanced to do much more than simply keep records of transactions. Blockchains are simply databases that remember their state which means that they can serve as a database of anything, including executable code which allows for programming on blockchain networks. The ability to build programs on blockchains opened the potential for blockchain technology to decentralize applications which paved the way for the invention of the second type of token: utility tokens.

This resulted in blockchains like Ethereum, which is the most widely used utility token. The Ethereum network functions not only as a global decentralized book like bitcoin, but also functions as a global decentralized computer. Ethereum is a platform for distributed apps (dapps), which are programs that are run on the Ethereum network. Each dapp that is created on the Ethereum network runs on the global computer, and every computation, process, or transaction requires some computing power from the distributed computer to complete the activity.

A way to conceptualize this is to imagine Ethereum as a Google Drive database. Dapps can be compared to individual spreadsheets databases that are held within the greater Google Drive database. In essence, dapps are their own databases running on the Ethereum database.

---

<sup>10</sup> Fairfield, Joshua. "Tokenized: The Law of Non-Fungible Tokens and Unique Digital Property." *Indiana Law Journal*, Forthcoming, Apr. 6 2021, pp. 16-20

This processing power is paid for by the user who executed the activity with ether, Ethereum's native token. This is an example of how utility tokens function. To use the ethereum network and the dapps programmed on the ethereum blockchain, users must spend ether for every transaction or process they run, which is known as a gas fee. These fees are paid to validators of the network.

Ethereum also allows dapps to create their own token systems. This is done by initiating smart contracts, which are essentially programs that act as their own registries with their own tokens and functionalities on the ethereum blockchain. These tokens are called ERC-20 tokens, which are the standard used for smart contracts on the Ethereum blockchain for token implementation. ERC-20 tokens are the most common utility token as most dapps are built and issued on the Ethereum network.<sup>11</sup>

### 2.1.3 Non-Fungible Tokens

When information, intellectual property, and content became readily available to consumers through the internet, it was difficult to prevent reproduction and theft. Copyright law and liability and Digital Rights Management (DRM) were put in place to curb these issues, but do not provide a foolproof solution to digital asset ownership. With the invention of blockchain technology and its development, creating unique digital assets and means of true ownership now exists.

Security tokens and utility tokens provide rivalrousness, which means the consumption or ownership of the token by one consumer prevents simultaneous consumption or ownership by other consumers. In other words, I have a thing, you don't or if I give it to you and you have it, I don't. While these tokens are rivalrous, they are not unique. Each bitcoin or ethereum is worth

---

<sup>11</sup> Fairfield, Joshua. "Tokenized: The Law of Non-Fungible Tokens and Unique Digital Property." *Indiana Law Journal, Forthcoming*, Apr. 6 2021, pp. 20-22.

the same as any other bitcoin or ethereum. They have no unique characteristics or meaning and have the same attributes as any other. Any ethereum can be used to pay a gas fee, just as any dollar can be used to buy a product. They are fungible, or able to replace or be replaced by another identical item. The third type of token differs from the first two in that it is non-fungible, hence the name non-fungible token.

Unlike other rivalrous but fungible tokens, gains or losses in the value of one NFT do not imply gains or losses of the value of any other NFTs or tokens. If Ethereum increases in price, all other Ethereum tokens increase in price because there is no differentiation between them. If an NFT is tied to the digital equivalent of Van Gogh's *Starry Night* and rises in value, another NFT that is tied to Beeple's *The First 5000 Days* would not be directly affected.

Similar to ERC-20 utility tokens, NFTs are issued through smart contracts on Ethereum and are a subset of Ethereum tokens. The most commonly used standard to issue NFTs is ERC-721. ERC-721 produces tokens that are one-of-a-kind, with different ties to assets, worth, and characteristics. These tokens are coded to have unique IDs and other metadata that is exclusive to the tokens and cannot be replicated.

The way this works is that the ERC-721 token contains a pointer that links the token to the digital file and a hash of the file as proof. For example, this link can be created when an ERC-721 token contains a URL that points to a piece of digital art and a hash of the art file. By the same process, NFTs can represent ownership and rights for real-world assets through RFID-linked goods. Thus, NFTs can represent all things digital and not stored directly on the blockchain, as well as real-world assets.

This functionality allows NFTs to convey ownership interest in any digital file or real-world asset. They can be managed and transferred on the blockchain which acts as a decentralized ledger and tracks ownership and transaction history for them like any other token.<sup>12</sup>

## 2.2 NFT Applications and Companies

Blockchain technology only makes the existence of NFTs possible. Like anything, without mass adoption through projects or applications that implement NFT technology, the functionality of NFTs is rendered meaningless. Because NFTs are completely unique tokens that can be bought and sold like real-world objects, the potential use-cases are endless. They can be used to create and represent digital artwork and collectibles, or function as something more practical like a database of real estate that utilizes electronic deeds for ownership that are passed by owners with little to no transaction costs. NFTs can also serve as in-game items which give gamers true ownership of their in-game assets and allow them to resell what they buy or earn from playing. NFTs have introduced new industries and new economies.

### 2.2.1 NFT Content Creation

One of the applications of NFT technology is digital art. The motivation for ownership of digital art mirrors that of physical art; displaying the artwork or treating it as an investment in an attempt to profit from the artwork's rise in value. Until NFTs allowed for ownership of digital art and proof of its legitimacy on the blockchain, these motivations for ownership of digital art did not exist.

There are many content creation projects that enable people to create their own NFTs and buy or sell them. For example, Rarible, an NFT company built on-chain, allows artists to create an art piece and tokenize copies of the artwork by minting NFTs. The artwork is thus tokenized

---

<sup>12</sup> Fairfield, Joshua. "Tokenized: The Law of Non-Fungible Tokens and Unique Digital Property." *Indiana Law Journal*, Forthcoming, Apr. 6 2021, pp. 20-25

and limited in number and the smart contract that governs the token ownership cannot be altered once hashed to Ethereum. These NFTs can be transferred to others through the marketplace, which allows creators to sell their art and for patrons to trade it. Rarible also implements a feature that grants creators the ability to collect royalties on future sales of their artwork. When minting NFTs, creators are able to set a royalty percentage so that every time anyone sells any copies of the artwork on the secondary market, the creator receives the specified percentage of the new sale price. Marketplaces like Rarible not only enable digital art to be owned outright and traded, but have also created a method for artists to make a continuous stream of income from their work.<sup>13</sup>

### 2.2.2 NFT Platforms

Platforms refer to projects that are primarily infrastructures such as an open NFT marketplace for NFTs digital collectibles or trading cards. Digital collectibles are similar to digital art, but there are nuanced differences between them, just as there are differences between physical art and physical collectibles. Real-world collectibles adhere more to things like Beanie Babies and trading cards, whereas real-world art adheres more to things like Picassos. In addition to their ability to be displayed and sold, the value of collectibles comes from their social context which can come from a game, sport, or shared experience they are a part of. The ability to utilize and transfer these collectibles is enabled through platforms.<sup>14</sup>

Cryptokitties collectibles are actually the first success story for NFT technology.<sup>15</sup>

Cryptokitties are virtual cartoon pictures of cats with different characteristics that are tied to

---

<sup>13</sup> Jakhola, H. "Rarible NFT Guide for Artists - How to add your Artwork to the Ethereum Blockchain." *Darkdays*, 3 Dec. 2021, [www.darkdays.photography/rarible-nft-guide-for-artists](http://www.darkdays.photography/rarible-nft-guide-for-artists).

<sup>14</sup> Fairfield, Joshua. "Tokenized: The Law of Non-Fungible Tokens and Unique Digital Property." *Indiana Law Journal*, *Forthcoming*, Apr. 6 2021, pp. 27-30.

<sup>15</sup> Varshney, N. "Someone paid \$170,000 for the most expensive CryptoKitty ever." *TNW*, 5 Sep. 2018, [thenextweb.com/news/most-expensive-cryptokitty](http://thenextweb.com/news/most-expensive-cryptokitty).



ERC-721 tokens. This captured the attention of people within the crypto space because it created a sense of digital novelty and large profits could be made by trading them. The value of cryptokitties stemmed from its own ecosystem; other people wanted them and were willing to continue paying higher prices for them. Users of the platform also found the ability to breed and play with the virtual cat NFTs intriguing, which created more demand. While Cryptokitties did not initially garner as much mainstream adoption as some real-world collectibles in the past such as Beanie Babies, taking the step to creating the first project in a new market, paved the way for more mainstream applications of NFTs.

The trading card collectible space has also been taken digital. Traditional intellectual rights holders like the NBA have started to adopt NFT technology. The NBA released their platform, NBA Top Shot, which mints NFTs of players, brief highlight reels of plays from NBA games, scores, stats, and team logos in the form of tradable digital cubes instead of cards. Users are able to buy packs just like physical trading cards and trade them on the marketplace. This platform has been wildly successful. Since its launch, NBA Top Shot has collected almost \$780 million in sales through 10.5 million transactions from more than 350,000 buyers<sup>16</sup> and has over 1.1 million registered users.<sup>17</sup> Incorporating traditional IP with NFT technology has created major success and mainstream adoption of the NFT marketplace.

### 2.2.3 NFT Games

The game sector includes companies that build video games on-chain. Digital assets have existed in gaming for decades. Prominent examples of this are character skins within a video game, which apply to many popular games such as Fortnite, Counterstrike, and League of

---

<sup>16</sup> Hakki, T. "NBA Top Shot Sales Up 128% After New Drop Features Shaquille O'Neal." *Decrypt*, 17 Oct. 2021, [decrypt.co/83668/nba-top-shot-sales-up-128-after-new-drop-features-shaquille-oneal](https://decrypt.co/83668/nba-top-shot-sales-up-128-after-new-drop-features-shaquille-oneal).

<sup>17</sup> Dillet, R. "NBA Top Shot creator Dapper Labs raises another \$250 million." *TechCrunch*, 22 Sep. 2021, [techcrunch.com/2021/09/22/nba-top-shot-creator-dapper-labs-raises-another-250-million](https://techcrunch.com/2021/09/22/nba-top-shot-creator-dapper-labs-raises-another-250-million).

Legends. These skins alter the physical appearance of a player's in-game character or their in-game items. Players are willing to pay exorbitant amounts of money for skins for status. The more unique or scarce a skin is, the better and more valuable it is. The issue with this in traditional gaming is that an in-game asset is simply data in the game regulated by the gaming company's centralized system. At will, a gaming company could ban or remove any player's account along with all of their in-game assets.

Implementing NFTs in games has revolutionized gaming asset ownership. For the first time in gaming history, with in-game characters and items as NFTs, in-game assets are unique, and players have full ownership and control over them.

The idea of playing games to earn money is also not a new concept. The idea of earning fiat currency from playing video games has existed for many years. Even when there were no in-game mechanics to do so, there have always been ways to trade in-game assets or accounts for fiat currency. In many cases, these transactions occur on black markets because real-world trading often violates a game's terms of service. These markets still exist because people are always willing to pay to play. For example, PlayerAuctions is a gaming black market platform that allows players to trade in-game currency, items, skins, and accounts for hundreds of games.<sup>18</sup> It functions as a marketplace and escrow for these transactions because there is no in-game functionality to allow players to trade their assets amongst each other for real money.

The implementation of blockchain technology in gaming has made the Play-To-Earn space more efficient and secure. Blockchain legalizes and encourages in-game currency and assets to be transferred between players who love playing the game and invested in by investors who see high potential returns in the newfound metaverse economies, or economies created by

---

<sup>18</sup> "Playerauctions." *Wikipedia*, 29 Jul. 2019, en.wikipedia.org/wiki/Playerauctions.

on-chain games. Blockchain technology provides elegant solutions to long-standing problems in the gaming industry.<sup>19</sup>

Axie Infinity, an on-chain game (game built on the blockchain), utilizes NFTs and cryptocurrencies to make Play-To-Earn possible on the blockchain. The characters in the game function as NFTs and are collectible digital pets called Axies, which are like Pokemon and Cryptokitties. In order to play, users must purchase these NFTs in an Ethereum wallet and connect their Axie Infinity accounts to the wallets that hold the NFTs. Within the game, players assemble 3-Axie teams and progress through a story mode or battle against other players. Upon winning battles and completing in-game tasks, players are awarded in the in-game currency, Smooth Love Potion (SLP), which is also a cryptocurrency that trades on the market for fiat currencies. SLP can be used to breed more Axies, so players are willing to pay fiat currency to buy it from others who are earning it by playing the game then selling it for profit. On average, play-to-earn Axie Infinity players make nearly \$500 per month by playing a few hours a day. This is a meaningful amount of supplemental income in third-world countries like the Philippines, where the game is most popular. Blockchain enables people to actually make a living by playing on-chain games like Axie Infinity.<sup>20</sup>

### 2.3 Token Sales

Token sales are a method of raising capital for early-stage startups on the blockchain that have become increasingly popular over the past few years. The token sale market first exploded in 2017 and early 2018, raising over an estimated \$31 billion from 2016 to 2019 and \$14.8

---

<sup>19</sup> AAG Ventures, "Play-To-Earn & Our View." *AAGV*, [litepaper.aag.ventures/litepaper/play-to-earn](https://www.aagventures.com/litepaper/play-to-earn). Accessed 4 Dec. 2021.

<sup>20</sup> Mourya, E. "Here's how Axie Infinity players are earning nearly \$500/month in crypto rewards." *FXStreet*, 19 Aug. 2021, [www.fxstreet.com/cryptocurrencies/news/heres-how-axie-infinity-players-are-earning-nearly-500-month-in-crypto-rewards-202108190844](https://www.fxstreet.com/cryptocurrencies/news/heres-how-axie-infinity-players-are-earning-nearly-500-month-in-crypto-rewards-202108190844).

billion alone in 2019.<sup>21</sup> There is no available data on how much has been raised in 2020 and 2021, but the overall cryptocurrency market capitalization has seen explosive growth from being valued at \$178 billion at the beginning of 2020 to \$2.6 trillion as of October 2021. This does not mean that \$2 trillion+ of capital was raised through token sales, but it is indicative of the capital that cryptocurrencies are attracting. There is no question that well over the \$14.8 billion raised in 2019 has been raised in 2020 and 2021.

### 2.3.1 Process and Mechanics

Conducting a token sale as a means of financing is a complex process. This section explains the concepts and processes behind this method of fundraising and details the mechanics of the distribution of tokens and ways companies use them as incentives for investors, the community, and employees.

#### 2.3.1a Fundraising

A blockchain-based project raises capital by creating its own utility token systems and issuing tokens in exchange for funds. The concept behind the value of these tokens bears resemblance to a practice that dates back to the 19th century in which stadiums or churches in Europe financed their projects.

For example, a developer sets out to build a stadium and does not have capital, so they raise money to finance the development of the stadium from prospective customers by selling future ownership rights to the seats. Initially, these seat ownership rights theoretically have no utility because the stadium does not yet exist. However, these customers are willing to purchase the rights to the seats because they expect the stadium to be built, and are paying for the right to use them in the future. These ownership rights are tradable, so after purchasing them, initial

---

<sup>21</sup> de Best, R. "Amount of funds raised for cryptocurrency initial coin offering (ICO) projects worldwide as of November 2019, by leading industry." *Statista*, 11 Feb. 2021, [www.statista.com/statistics/802925/worldwide-amount-cryptocurrency-ico-projects-by-industry](https://www.statista.com/statistics/802925/worldwide-amount-cryptocurrency-ico-projects-by-industry).

investors could sell them to others, creating a secondary market. The more valuable the seats are predicted to be once the stadium is completed, the more the future ownership rights trade for.

Cryptocurrency tokens work in the exact same way. However, instead of fundraising to develop a stadium by selling seats that have future utility for the completed stadium, companies fundraise to build blockchain-based projects and sell tokens that have future utility for the completed project. Like tradable ownership rights of seats for a stadium that is being developed, utility tokens derive value from the speculation of how valuable tokens will be when utilized on the project in the future, and how valuable the overall project will be.<sup>22</sup>

Crypto companies often issue whitepapers to attract attention to the project and use sales or marketing elements to persuade their community of investors to commit capital. A white paper is an informational document that companies create to describe the product they are planning to build and the services they intend to offer. They generally lay out the market opportunity for the project and illustrate how the project intends to provide solutions. Much of the important information of the company can be found in the whitepaper including the project's roadmap, tokenomics, use of funds, and team information.<sup>23</sup>

One of the first steps of fundraising is determining how much to raise. When companies raise capital, they do so with a fundraising goal that is determined by how much capital they need to execute the plans to build the project. Some projects meet these goals and others do not. When a company meets its raise goal and has too many investors that want an allocation to contribute, it is considered oversubscribed. This is common for popular projects as investors

---

<sup>22</sup> Howell, Sabrina T and Niessner, Marina and Yermack, David. "Initial Coin Offerings: Financing Growth with Cryptocurrency Token Sales." *European Corporate Governance Institute (ECGI) - Finance*, Working Paper No. 564/2018, Sep. 3 2019, pp. 2.

<sup>23</sup> Hayes, A. "White Paper." *Investopedia*, 1 Jan. 2021, [www.investopedia.com/terms/w/whitepaper.asp](http://www.investopedia.com/terms/w/whitepaper.asp).

want to get in earlier for a better price before the tokens hit the demand of the market drives the price higher.

### 2.3.1b Tokenomics

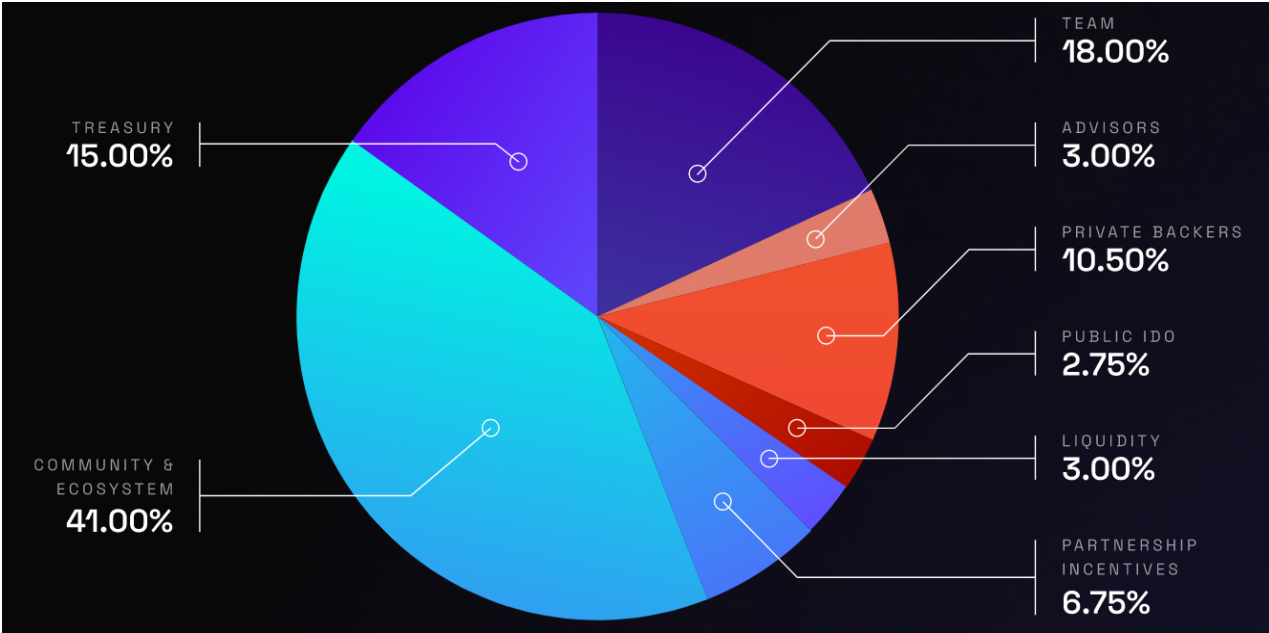
Although this concept is fairly simple, there is a lot more to fundraising with token sales than simply determining the raise goal. Companies must figure out the pricing and how many tokens they want to sell and the pricing and fraction of the total supply of issued tokens at launch determine valuation.

The amount of tokens sold during presales and public token sales is only a fraction of the total supply. The other tokens are reserved for employee compensation, company operational capital, future partnership incentives, and future community and ecosystem distributions, etc. An example of how this works in practice is best demonstrated through a real-world tokenomics scheme. Figure 1 details the breakdown of the allocations for the use of total tokens for the NFT-related project, AAG Ventures.<sup>24</sup>

---

<sup>24</sup> AAG Ventures, “Tokenomics.” *AAGV*, [litepaper.aag.ventures/litepaper/tokenomics](https://www.aagventures.com/litepaper/tokenomics). Accessed 4 Dec. 2021.

Figure 1: AAG Ventures Tokenomics Chart



**Team tokens** refer to tokens reserved for the Co-Founders and Core Team of the project as compensation for driving the development of the company. **Advisor tokens** refer to tokens reserved for experts and thought-leaders in the crypto industry, who contribute their consultation and connect the company to partners. **Partnership Incentive tokens** refer to a reserve fund dedicated to incentivizing future partnerships for the company. **Community & Ecosystem tokens** refer to a reserve fund that is distributed to the project community to encourage participation and contribution to the community and ecosystem. **Treasury tokens** refer to a reserve fund that serves as the operational capital for the company so that it can execute on its roadmap and R&D. **Liquidity tokens** refer to an initial allocation of tokens that are used to provide liquidity on marketplaces so that public trading can begin. **Private Backer tokens** refer to early backers of the project before the public offering. These include seed investors, angels, and VCs. **Public IDO tokens** refer to tokens that are sold to the general public at launch price.

These allocations and categories differ across companies. They should be carefully thought out and engineered in a way that ensures the future success of the company as well as the token market when it is listed on a public market to trade.

### 2.3.1c Lock-up and Vesting

After the token is publicly launched and issued, certain allocations can be subject to a lock-up and vesting period. Figure 2 and Figure 3 detail these mechanics for AAG Ventures.<sup>25</sup>

It is typical that there is an initial lock period, where the founders and team are unable to initially access any of their tokens to ensure their dedication to building the project. This can have an impact on the market because a large number of tokens cannot be sold immediately after launch and create major supply and price fluctuations.

After the lock-up period, the tokens are distributed in a number of different ways. They can fully unlock immediately or they can vest incrementally until the full allocation is unlocked. Daily and quarterly increments are the most common vesting schedules. Vesting is put in place to bake in gradual team compensation and capital for the distribution of incentives.

---

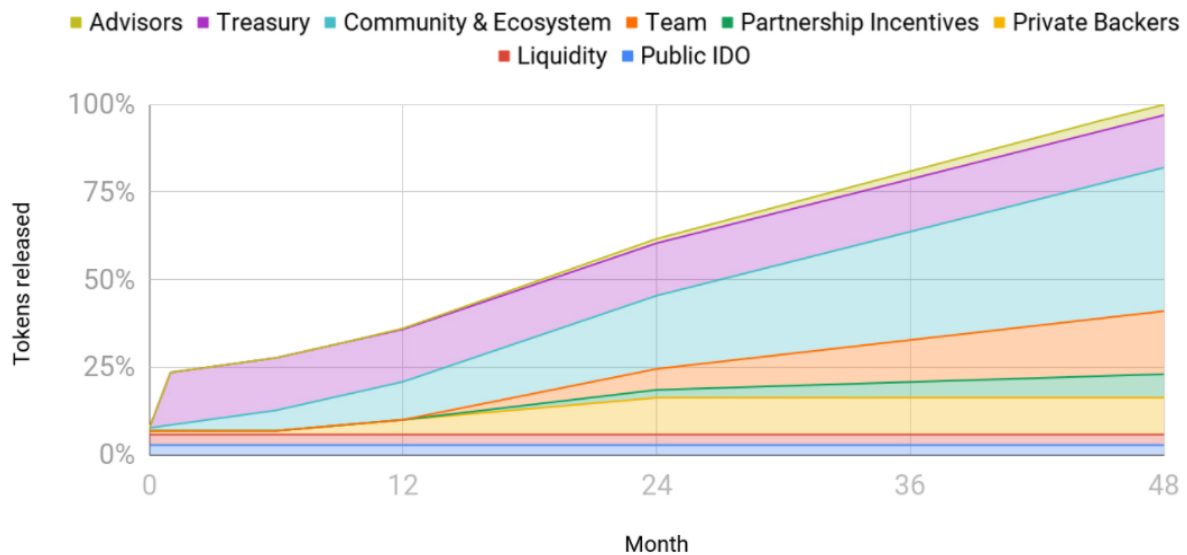
<sup>25</sup> AAG Ventures, “Tokenomics.” *AAGV*, [litepaper.aag.ventures/litepaper/tokenomics](https://www.aag.ventures/litepaper/tokenomics). Accessed 4 Dec. 2021.



Figure 2: Time frames of token lock-up and vesting schedule

Allocation	% of Tokens	Release Schedule
Team	18.00%	1-year lockup. Daily vesting over 3 years
Advisors	3.00%	9-month lockup. Daily vesting over 3 years
Private Backers	10.50%	10% of allocation (1.05% of total supply) unlocked at TGE. 6-month lockup, then 90% of allocation daily vesting over 18 months
Public IDO	2.75%	Unlocked at TGE (Day 1 after IDO)
Liquidity	3.00%	Unlocked at TGE (Day 1 after IDO)
Partnership Incentives	6.75%	1-year lockup. Daily vesting over 3 years
Community & Ecosystem	41.00%	Daily vesting over 4 years
Treasury	15.00%	40-day lockup

Figure 3: Graph of the unlock/distribution of the total supply of tokens over time



### 2.3.2 Cryptocurrency Exchanges

Cryptocurrency exchanges are places where one can buy or sell crypto tokens and are a medium that companies use to launch tokens. It is important to understand what exchanges are and how they work in order to understand token sale methods. Every exchange is different; they have their own rules and regulations. They support trading of different tokens and some have token launch functionality while others do not. There are mainly two types of exchanges: centralized and decentralized.

#### 2.3.2a Centralized Exchange

A centralized cryptocurrency exchange is a platform owned by a company that allows users to buy or sell tokens. It is essentially a stock brokerage for cryptocurrency tokens. The exchange functions as a third party to monitor and facilitate the transaction on behalf of the buyer and seller. These transactions are not tracked on the blockchain as the buyer and seller are not actually transferring their tokens to each other with their own wallets. Examples of popular centralized exchanges include Coinbase, Binance, and Gemini.

Each country has its own laws regarding cryptocurrencies. If an exchange allows users from certain countries to utilize their platform, the exchange must comply with the countries' cryptocurrency laws. The regulations these centralized exchanges adhere to revolve around the legalities of the countries they support. Oftentimes, these regulations include requiring users to provide personal information for identity verification so trading history can be tracked for tax purposes. For example, the United States requires exchanges to provide KYC identity verification.

Centralized exchanges are easy to use as the process to access them mirrors the process of creating a traditional stock trading account. Additionally, they typically feature user interfaces

that are also similar, so using the platform is natural and intuitive. For these reasons, centralized exchanges are the most popular way to trade crypto. Due to this popularity, they have the most liquidity and can execute orders very quickly as it is all done in-house. These exchanges provide their service for users for fees per transaction.<sup>26</sup>

The potential downside to centralized exchanges is that they give the company that operates the platform full control of the assets. The company owns all of the tokens themselves so they are subject to the risk of hacking. Attackers can hack the exchange which uses private keys to access all of their users' funds and steal the tokens.<sup>27</sup>

### 2.2.2b Decentralized Exchange

A decentralized exchange (DEX) is a peer-to-peer platform that operates on the blockchain and is owned by no single entity. DEXs facilitate transactions whereby users directly connect their wallets to the platform to make trades. When executing an order, the data for the order is recorded to the blockchain of the exchange and a matching process occurs to exchange the user's current tokens for the desired token using smart contracts.

Unlike centralized exchanges, DEXs do not charge third-party fees. There are processing fees associated with the computing power required to execute the transaction on the blockchain, but those can be close to zero charges. DEXs are anonymous and offer complete privacy. Because only a wallet is required to access the platform, there is no need for identity verification which is problematic in some ways, but makes them more globally accessible. There is also no hacking risk; users never transfer their tokens to a third party that controls their tokens because the transactions are executed peer-to-peer.

---

<sup>26</sup> Sahu, M. "Centralized vs Decentralized Cryptocurrency: Difference Between Centralized vs Decentralized Cryptocurrency." *upGrad*, 3 Dec. 2021, [www.upgrad.com/blog/centralized-vs-decentralized-cryptocurrency/#What\\_is\\_a\\_Cryptocurrency\\_Exchange](http://www.upgrad.com/blog/centralized-vs-decentralized-cryptocurrency/#What_is_a_Cryptocurrency_Exchange).

<sup>27</sup> Arora, K. "Centralized and Decentralized Cryptocurrency Exchanges." *AnalyticSteps*, 5 Aug. 2021, [www.analyticsteps.com/blogs/centralized-and-decentralized-cryptocurrency-exchanges](http://www.analyticsteps.com/blogs/centralized-and-decentralized-cryptocurrency-exchanges).

A downside to DEXs is that they are complex to use for users who are not familiar with using crypto-wallets. The exchanges are not user-friendly in relation to traditional asset brokerage platforms which most people are used to. Due to these deterrents, liquidity constraints can occur. Users may sometimes not be able to transact quickly and higher spreads may result.<sup>28</sup>

### 2.3.3 Offering Methods

There are several methods to conduct a token sale. Among these are Initial Coin Offerings (ICOs), Initial Exchange Offerings (IEOs), and Initial Decentralized Exchange Offerings (IDOs). They all serve to raise capital through crowdfunding, but the way the token sale takes place differs.

#### 2.3.3a ICOs, IEOs, and IDOs

When a company conducts an ICO, it conducts the fundraising process on its own. This means that the company will have a landing page, typically its own website that it will direct potential investors to so that they can send funds. Typically the company will conduct the majority, if not all of the marketing for the sale on its own. After fundraising, the project will issue its tokens, but they will not be listed on any exchanges and are thus illiquid. The company must reach out to centralized exchanges (e.g. Coinbase, Binance, etc.) and get their token listed so that their investors can trade them. Companies rarely raise through ICO today. The ICO market was responsible for giving the crypto industry the notorious reputation of being filled with scams, jokes, and frauds. People would create fake projects with no intention of executing on them and could run with the funds raised because the funds were sent directly to an ICO issuer's wallet with no restriction. The IEO and IDO processes have helped curb this.<sup>29</sup>

---

<sup>28</sup> “What are decentralized exchanges, and how do DEXs work?” *Cointelegraph*, [cointelegraph.com/defi-101/what-are-decentralized-exchanges-and-how-do-dexs-work](https://cointelegraph.com/defi-101/what-are-decentralized-exchanges-and-how-do-dexs-work). Accessed 4 Dec. 2021.

<sup>29</sup> Craig, J. “What is an Initial DEX Offering (IDO): How does it compare to an IEO?” *Phemex*, 20 Oct. 2021, [phemex.com/blogs/what-is-a-dex-ido](https://phemex.com/blogs/what-is-a-dex-ido).

In IEOs, companies directly sell their tokens on centralized exchanges platforms to individual participants without offering an ICO. In this process, the tokens are created before the exchange and the company creates an agreement for when the token sale will occur and at what price. This is a safer process as the exchange team serves as an intermediary that vets the project and has conditions to make sure the project is strong and legitimate. There is a joint marketing effort between the exchange and the project teams as they are both incentivized by the success of the token launch. It is typical that the exchange also charges the company a large fee or receives a large early-round allocation for the tokens they launch and list. There is typically no vesting period for private investors. After fundraising, the tokens are immediately distributed and tradeable on the exchange.<sup>30</sup>

IDOs have become the most common and elegant way to launch a token. Instead of publicly offering tokens through a centralized exchange, companies fundraise through Launchpads or DEX platforms. The significant difference between IDOs and IEOs is that IDO token launches can be autonomously carried out by the token project and the tokens are trustlessly listed on a decentralized exchange through smart contracts. Companies are thus able to engage directly with their investors rather than through centralized exchange intermediaries. When tokens are distributed, project teams and investors instantly receive and maintain control of their tokens secured in their own wallets, as they never need to transfer their tokens to a centralized exchange to trade. Additionally, companies that launch through IDOs have complete control over the parameters of the sale and their tokenomics. There is also no requirement to pay a huge launch and listing fee or to offer a portion of tokens to the listing exchange. Private investors and public investors who receive allocations for the small amount of money raised

---

<sup>30</sup> Zab Technologies Pvt Ltd. "What is IEO Initial Exchange Offering? Is this the new phenomenon in Crypto Capital?" *Hackernoon*, 21 Mar. 2019, [hackernoon.com/what-is-ieo-initial-exchange-offering-is-this-the-new-phenomenon-in-crypto-capital-64fdd60a6e7a](https://hackernoon.com/what-is-ieo-initial-exchange-offering-is-this-the-new-phenomenon-in-crypto-capital-64fdd60a6e7a).

during the actual IDO are typically subject to vesting schedules facilitated by smart contracts, so investors cannot sell huge amounts upon token listings. Demand tends to be more sustainable with this fundraising model, and a healthier market can develop as a result.<sup>31</sup>

Of all the token sale methods, IDOs provide the most cost-effective and non-custodial design for companies to raise capital. It protects both the company and the investors by ensuring trustless distribution of tokens and offers quick liquidity and instant trading on DEXs.

#### 2.3.4 Advantages and Disadvantages

As a financing instrument, token sales pose a number of advantages and disadvantages not only to the companies that raise capital but also to their investors.

##### 2.3.4a Advantages as a Company

Token sales have proven to be an advantageous method of fundraising for many different reasons. Firstly, it significantly expands the company's potential investor base as participation is global. Theoretically, anyone with an internet connection and capital is able to invest in a project. As a result, the publicity for the company is also worldwide. At this stage, the disclosures required for fundraising are minimal, especially compared to those required for a traditional IPO. Thus, the process for raising capital is also considerably quicker and more simple, making it easier for a startup to move quickly and build traction early. These factors combined allow startups to raise an incredible amount of capital in short periods of time.

##### 2.3.4b Disadvantages as a Company

Token sales are advantageous in many ways, but these factors come with downsides and can be double-edged swords. While the lack of a requirement for disclosures allows crypto startups to raise a lot of capital quickly, it also comes with the risk that regulators will

---

<sup>31</sup> Merre, R. "From ICO to IDO: Evolution of the Crypto Funding Hype Cycle." *NGrave*, 30 Jun. 2021. [medium.com/ngrave/from-ico-to-ido-evolution-of-the-crypto-funding-hype-cycle-5f867a1c367d](https://medium.com/ngrave/from-ico-to-ido-evolution-of-the-crypto-funding-hype-cycle-5f867a1c367d).

retroactively come back to crack down on companies for noncompliance. Because of this, companies must be extremely careful in picking what jurisdictions they fundraise in. Although having a global investor base is beneficial from a popularity standpoint, it also makes the community-building process considerably more difficult. Managing a global community requires constant work and needs to be done well in order to maintain success. Additionally, crypto investors are fickle with their investment decisions and are used to the highly speculative nature of token investments. It is inevitable that token prices are volatile and it is a difficult task to manage operational decisions that are funded by a volatile budget. The community also puts an enormous amount of pressure on the company to perform.

#### 2.3.4c Advantages of Token Sale Participation as an Investor

Token Sales are not only advantageous to the companies but can also offer many great investment opportunities to investors. Being an early investor in these startups can give investors high multiple returns on investment and potential for rapid capital growth. Tokens are high-risk, high reward assets that are mostly uncorrelated from traditional markets, so they can offer investors a means of diversification and hedge against typical political and economic shocks. Additionally, all transactions and wallets are on the blockchain and are traceable, so there is transparency in a company's use of funds compared to that of traditional companies. Investors can also have ownership of their assets without intermediaries; if a token holder holds their assets in their own wallet, no third-party or institution can interfere with ownership.

#### 2.3.4d Disadvantages of Token Sale Participation as an Investor

While investing in token sales can result in high returns, they can be a highly risky investment with a huge downside. For this reason, they are not typically supported by institutional investors. Token sales are also not fully regulated and offer investors little

protection. This lack of regulation means there is no enforceable obligation for a project to disclose its progress. Additionally, the projects themselves are often very immature with no guarantees of successful delivery, so the failure rate of these companies is dangerously high. In many cases, these projects simply begin as ideas without solid plans for execution and implementation. Even if the token sale is legitimate and the project is strong, the market is extremely volatile and investors can still lose a lot of money due to outside factors contributing to volatility. Crypto wallets can also be confusing and difficult to manage. If an investor mismanages their assets in some way, there is practically no way of retrieving them.<sup>32</sup>

## 2.4 Token Sale Success Determinants

Previous research explores the factors of the success of token sales. Because fundraising through this new financing method is a relatively new phenomenon, the literature that focuses directly on the performance of token sales is limited.

### 2.4.1 Past Findings

In *Initial Coin Offerings: Financing Growth with Cryptocurrency Token Sales*, Howell, Niessner, and Yermack find that apparent token utility value, presence of voluntary disclosures of budget via a white paper, presence of the lockup or vesting period for the sale of the issuer's ICO tokens, past success in raising VC funding, and when the Founder/CEO has professional experience as an entrepreneur or in computer science are significant predictors of survival and employment growth. They also discover a positive correlation between having an entrepreneurial background to volume and liquidity, but no correlation to returns.

---

<sup>32</sup> Merre, R. "ICO 101 — Initial Coin Offerings (ICOs) - What is an ICO & What are the Pros and Cons." *Hackernoon*, 22 May 2019, <https://medium.com/hackernoon/initial-coin-offerings-icos-what-is-an-ico-what-are-the-pros-and-con-s-c40813a8d419>



In *Success of Initial Coin Offering. The Empirical evidence from 2016-2019*, Myalo and Glukhov find that the volatility of main cryptocurrencies has a significant impact on the amount of capital raised and survival. The sector of the project, location region, and quality of the team was only significant in certain cases, depending on the definition of success.

These research papers share many of the same independent variables revolving around extensive company characteristics and their samples likely have a good amount of overlap given that they examine all types of ICOs during overlapping time frames. For the most part, they also have similar definitions for success. All of them share the survival of the company as a metric. Howell's research is slightly different in that its other definition of success is employment growth while Myalo's and Glukhov's research success definitions revolve around the amount of capital raised. These are reasonable metrics for success, but none of the past literature considers token market performance. These samples are also outdated. The majority of the samples of the past literature consist of ICOs that occurred in 2017-2019. While this is still somewhat recent, the cryptocurrency industry is fast-paced and has changed significantly over the last two years.

In *The non-fungible token (NFT) market and its relationship with Bitcoin and Ethereum*, Ante finds that the larger cryptocurrency market, including Bitcoin and Ethereum, affects the growth and development of the NFT market, but there is no reverse relationship.

#### 2.4.2 Contributions

This study seeks to determine characteristics associated with short-term token market returns immediately after a public token sale, which is not explored in past literature. My study also investigates a more recent, specific sample of NFT-related companies.

It seems intuitive that the characteristics associated with the success in employment growth, fundraising, future survival, or NFT sales would also be significant in company token

market returns, but this is not necessarily the case. The cryptocurrency market is incredibly volatile and token price or returns do not necessarily directly reflect the underlying value of the company that issues them. After all, tokens should derive value from their future utility for the future project rather than entitling a token holder to a portion of revenue or ownership of the company. Most companies do not have a fully developed product at launch, which makes their token prices subject to speculation rather than traditional means of valuation. In this way, employment growth, fundraising success, and future survival may be more accurate assessments of the actual quality and success of a company. However, token returns are meaningful to explore as they are very important to a company and investors. For this reason, I created a different model with factors which I expect to be more pertinent to token returns.

My explanatory variables come from past studies, including market volatility/sentiment, the presence of a lock or vesting periods for sale of the issuer's tokens, and fundraising characteristics. Some control variables also come from past studies, such as the presence of a whitepaper, and founder/CEO backgrounds. I added other control variables which include the number of applications, offering methods. I investigate how these factors correlate to the 7-day and 60-day token returns immediately following their public listing.

#### 2.4.3 Hypothesis

I hypothesize that the volatility of main cryptocurrencies, presence and lengths of lock-up and vesting periods for sale of the issuer's tokens, and fundraising characteristics including the amount raised, whether or not the raise goal was met, and percent of the total supply sold for launch will have a significant positive relationship with token returns.

The returns of main cryptocurrencies, Bitcoin and Ethereum, are expected to have a significant positive relationship with token market returns due to the fact that the cryptocurrency

market is largely driven by speculation and market sentiment. My rationale lends itself to Myalo and Glukhov's past finding that main cryptocurrency returns have a significant positive relationship with the amount raised for a token sale. The overall cryptocurrency market sentiment is driven by the performance of main cryptocurrencies, so it is expected the entire market will perform similarly.

The presence and lengths of lock-up and vesting periods are expected to have a significant positive relationship because lock-up periods and founder/team token vesting schedules ensure that founders cannot take quick profits and negatively impact the market by selling a large portion of tokens after going public. Although a different rationale, this expectation is consistent with Howell, Niessner, and Yermack's findings that lock-up and vesting periods are a predictor of future employment growth and company survival. Additionally, the presence of these features is a signal that potentially attracts more investors, both private and public, as it demonstrates the team's dedication to the project and their confidence in its long-term success.

I expect fundraising characteristics such as the amount raised, whether or not the raise goal was met, and the percent of the total supply sold for launch to have significant positive relationships. The more a company raises and successfully meets its fundraising goal implies the interest of investors before the token is listed for trading, so it is expected that this interest remains and has a positive impact on token returns. The higher the portion of tokens a company sells for launch, the lower the fully diluted market cap and supply reserved for future distribution. The lower the market cap, the more potential the token has to appreciate.

### **3: Data**

This section covers the data collected for this study. It also outlines the way the variables are used in the regression and the reasons for removing the variables that were not included. The initial sample consisted of 215 NFT-related companies that launched between 2017-2021, were operational, and publicly listed during the time of the writing of this research. I retrieved the data from company websites, whitepapers, and a number of web sources including coinmarketcap.com, cyptorank.io, icodrops.com, and chainbroker.io. However, detailed information for token sales in the sample was limited. After clearing through all the data, the final sample consists of 62 NFT-related companies.

#### **3.1 Response Variables**

The response variable of this study is the market performance of NFT-Related tokens after public launch. Table 1 gives descriptive statistics for the response variables collected for the study.

##### **3.1.1 NFT-Related Token Returns**

The variables *tokensevendayret* and *tokensixtydayret* are continuous variables equal to the 7-day and 60-day logged returns of the underlying token respectively.

To calculate these, I used the following formula:

$$([\textit{time-frame}] \textit{price} - \textit{public sale price}) / \textit{public sale price} = \textit{token return}$$

Because the range of returns was extreme, I transformed these returns to normalize the data using a continuously compounded return formula as follows:

$$\ln(1 + \textit{token return}) = \textit{logged return}$$

Table 1: Response Variables Summary Statistics

Descriptive Statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
<i>tokensevendayret</i>	62	1.669	1.74	-2.46	5.49
<i>tokensixtydayret</i>	62	1.643	1.988	-2.99	5.61

### 3.2 Explanatory Variables

The explanatory variables of this study include market volatility/sentiment, the presence of a token lock-up and vesting schedule, and fundraising characteristics. Table 2 gives descriptive statistics for the explanatory variables collected for the study.

#### 3.2.1 BTC/ETH Returns

The variables *btcsevendayret*, and *btcsixtydayret* are continuous variables equal to the 7-day and 60-day logged returns of Bitcoin respectively. The variables *ethsevendayret*, and *ethsixtydayret* are continuous variables equal to the 7-day and 60-day logged returns of Ethereum respectively. These are calculated in the same way that the NFT-Related Token Returns were and are measured over the associated intervals.

#### 3.2.2 Team Token Lock/Vesting

The variable *lock* is a dummy variable equal to 1 if team tokens had an initial lock period and equal to 0 if not. The variable *locklength* is a continuous variable equal to the duration of the lock period in months. The variable *vesting* is a dummy variable equal to 1 if team tokens had a vesting period and equal to 0 if not. The variable *vestinglength* is a continuous variable equal to the duration of the vesting period in months.

#### 3.2.3 Fundraising Characteristics

The variable *amountraised* is a continuous variable equal to the amount of capital in millions that a company raises through contributions during its seed, private, presale, and public rounds of fundraising. The variable *metgoal* is a binary variable that takes the value of 1 if the

company meets its fundraising goal and takes the value of 0 if not. The variable *pctsoldforlaunch* is a continuous variable equal to the percentage of the total supply of tokens that a company issues during its seed, private, presale, and public rounds of fundraising.

Table 2: Explanatory Variables Summary Statistics

Descriptive Statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
btcsevendayret	62	.028	.116	-.28	.33
ethsevendayret	62	.048	.151	-.31	.52
btcsixtydayret	62	.126	.374	-.57	.89
ethsixtydayret	62	.225	.381	-.68	1.12
lock	62	.726	.45	0	1
locklength	62	7.742	7.313	0	36
vesting	62	.903	.298	0	1
vestinglength	62	24	16.658	0	72
amountraised	62	8.083	13.076	.18	66
metgoal	62	.935	.248	0	1
pctsoldforlaunch	62	26.178	13.324	3	80

### 3.3 Control Variables

The control variables of this study include a number of company characteristics and token sale processes. Table 3 gives descriptive statistics for the control variables collected for the study.

#### 3.3.1 Launch Chain

The variable *ethereumchain* is a binary variable that takes the value of 1 if the token is launched on the Ethereum network and takes the value of 0 if not. The variable *binancechain* is a binary variable that takes the value of 1 if the token is launched on the Binance Smart Chain and takes the value of 0 if not. The variable *otherchain* is a binary variable that takes the value of 1 if the token is launched on a network other than Ethereum or Binance Smart Chain and takes the value of 0 if not.

There is high collinearity between *ethereumchain* and *binancechain*, so I do not include *binancechain* in the regression. I use *ethereumchain* and *otherchain* as control variables as I expect that the launch chain will have some insignificant correlation to token returns.

### 3.3.2 Sector

The variables *contentcreationsctr*, *platformsctr*, and *gamesctr* are dummy variables equal to 1 if the company is categorized under the content creation, platform, and game sector respectively, and equal to 0 if not. The variable *sumsctr* is a continuous variable equal to the sum of the *contentcreationsctr*, *platformsctr*, and *gamesctr* values.

I use *sumsctr* in the regression to represent the number of applications a company has and use it as a control because I expect that it will have some insignificant correlation to token returns. I do not include the individual sectors because these dummy variables create collinearity in the regression.

### 3.3.3 Founder/CEO Background

The variables *blockchainbkgd*, *financialservicesbkgd*, *computersciencebkgd*, and *entrepreneurshipbkgd* are dummy variables equal to 1 if the Founder/CEO of the company has professional experience in blockchain, financial services, computer science, and entrepreneurship respectively, and equal to 0 if not. The variable *sumbkgd* is a continuous variable equal to the sum of the *blockchainbkgd*, *financialservicesbkgd*, *computersciencebkgd*, and *entrepreneurshipbkgd* values.

I use *sumbkgd* in the regression to represent the amount of relevant professional experience a Founder/CEO has and use it as control as I expect it to have some insignificant correlation to on token returns. I do not include the individual dummy variables because they create collinearity in the regression.

### 3.3.4 Whitepaper

The variable *whitepaper* is a binary variable that takes the value of 1 if the company issued a whitepaper and takes the value of 0 if not.

Most of my sample comes from 2021 and it has become common practice to issue a whitepaper so there is very little variation within the *whitepaper* variable. 90.3% of the sample includes one. The lack of variation and outliers made it an inconsequential control variable and interfered with the regression, so I do not include it.

### 3.3.5 Offering Method

The variables *ico*, *ieo*, and *ido* are binary variables that take the value of 1 if the token sale offering was an ICO, IEO, and IDO respectively, and take the value of 0 if not.

Most of my sample comes from 2021 and it has become common practice to issue tokens through IDO. 59.7% of my sample used IDO as an offering method. While this is not excessively high, *ico* and *ido* were collinear which led to a more stark lack of variation. Additionally, including these dummy variables created collinearity issues and interfered with the regression, so I do not include them.



Table 3: Control Variables Summary Statistics

Descriptive Statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
ethereumchain	62	.597	.495	0	1
binancechain	62	.339	.477	0	1
otherchain	62	.065	.248	0	1
contentcreationsctr	62	.21	.41	0	1
platformsctr	62	.532	.503	0	1
gamesctr	62	.629	.487	0	1
sumsctr	62	1.371	.52	1	3
blockchainbkgd	62	.387	.491	0	1
financialservicesbkgd	62	.419	.497	0	1
computersciencebkgd	62	.597	.495	0	1
entrepreneurshipbkgd	62	.919	.275	0	1
sumbkgd	62	2.323	.919	0	4
whitepaper	62	.903	.298	0	1
ico	62	.226	.422	0	1
ieo	62	.177	.385	0	1
ido	62	.597	.495	0	1

#### **4. Empirical Strategy & Results**

This section covers the empirical strategy and results of the study including the regression model equations, analysis of results, interpretations, and intuition.

##### **4.1 The Model**

I study the factors associated with token returns using variants of Equation 1:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (1)$$

I regress  $Y_{it}$  which represents time-varying token returns on a vector  $X_{it}$  which represents a vector of explanatory and control variables including time-varying market returns and company, fundraising, and token sale characteristics which are not time-varying. Variable  $i$  denotes individual,  $t$  denotes time, and  $\varepsilon$  is an error term with the usual properties.

## 4.2 Results and Discussion

The results begin with an analysis of the model using 7-day token market returns (Table 4) and are followed by an analysis of the model using 60-day token market returns (Table 5).

### 4.2.1 Token 7-day Returns

I find that the total amount of capital raised during a company's seed, private, and public rounds prior to a token's listing is negatively correlated with the 7-day token return. All other factors were insignificant. These results are inconsistent with my hypothesis but upon reflection, they are logical.

While the total amount raised is the success metric in Myalo's and Glukhov's research, it has a statistically significant negative relationship with the success metric of 7-day token market returns at a 1% level. A one-unit increase in the amount raised (\$1m) is associated with a 0.052 decrease in logged 7-day token returns. This is likely due to the fact that the more capital a company raises for its tokens prelaunch, the less interested capital there is to bolster the token's price once it is listed on the secondary market. Additionally, with more pre-listing token holders comes more potential sellers of tokens during the first days of trading. Conversely, if a company caps its raise at a low amount and many investors are not able to secure an allocation, those investors likely attempt to buy in as soon as the token is listed and push the price higher. While this relationship exists, raising less capital is not necessarily beneficial for the company overall or in the long-run. Although an increase in the token price in the secondary market increases the amount of capital in tokens reserved for operations, it is important that the company secures the capital it needs without having to rely on the performance of the token to fund its initial operations.

Launching on a blockchain other than Ethereum or Binance also yielded statistically significant results at the 10% level. This was supposed to serve as a control variable but actually had some explanatory power. It may not be the most meaningful result because companies that launched on another chain only represent 6.5% of the sample, but it is actually interesting to consider the explanation. The vast majority of utility tokens launch on the two most popular and long-standing protocols: Ethereum and Binance Smart Chain. Because it is so uncommon, when a utility token launches on a newer protocol such as Solana or Avalanche, it can generate a lot of extra attention and investor interest consequently. It is also interesting to note that Binance Smart Chain was excluded from the regression due to high collinearity with Ethereum, implying that there is no difference in their correlation to the 7-day token return.

Bitcoin and Ethereum returns, presence and lengths of a lock-up or vesting schedules, whether the fundraising goal was met, and the fraction of tokens sold for the launch were all statistically insignificant in explaining 7-day token returns. While I expected these factors to have positive relationships, it is understandable that they do not for a variety of reasons.

The overarching explanation is likely due to the lack of variance in 7-day returns caused by the short timeframe and the phenomenon of initial listing exuberance. Listing exuberance refers to the initial attention and excitement that is associated with a new token listing. This excitement can cause a price spike dictated by artificial interest or traders attempting to make quick profits. The effects on token pricing can last for longer than seven days so the variance of tokens that do not end up performing well over a longer time frame is not captured in the 7-day token return. This is evident when referring to Table 1 and comparing the descriptive statistics of the 7-day and 60-day token returns. The mean of the 7-day returns is higher while the standard deviation and range are lower.

Regarding Bitcoin and Ethereum returns, these variables are supposed to capture the overall market sentiment. However, seven-day price action for Bitcoin and Ethereum is simply noise. This is likely the reason that these returns do not explain nor have a strong correlation with 7-day token returns.

Meeting the fundraising goal seems like it would be a significant factor in token returns because it is expected that a company that could not even attract enough capital to complete its raise before listing would perform significantly worse in the secondary market. However, the insignificance is likely due to the lack of variance in the sample. 93.5% of the companies in the sample met their fundraising goal so the other 6.5% did not perform worse enough to create any significance.

The fraction of total supply sold for the launch was expected to have a significant positive relationship because a higher proportion of tokens sold would lead to a lower overall valuation, which would give the token higher potential. For example, if a company sells 10% of its tokens for \$1m, the fully diluted market cap would be \$10m. If the same company sells 20% of its tokens for \$1m, the fully diluted market cap would be \$5m. The potential multiple for the token return growth is theoretically two times larger in the scenario that the company sells 20% assuming that in either scenario, they would both reach the same total market capitalization.

However, it seems that this is simply not the case.

Table 4: 7-day Token Return Regression

<b>Linear regression</b>							
tokenseven-dayret	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
btseven-dayret	-1.034	3.358	-0.31	.76	-7.785	5.718	
ethseven-dayret	1.016	2.458	0.41	.681	-3.927	5.958	
lock	-.262	.757	-0.35	.73	-1.784	1.259	
locklength	.03	.043	0.70	.486	-.057	.118	
vesting	1.507	.992	1.52	.135	-.487	3.501	
vestinglength	.005	.017	0.30	.769	-.029	.039	
amountraised	-.052	.018	-2.83	.007	-.089	-.015	***
metgoal	.203	.992	0.20	.839	-1.791	2.197	
pctsoldforlaunch	-.015	.018	-0.85	.4	-.051	.021	
ethereumchain	.092	.571	0.16	.873	-1.057	1.24	
otherchain	1.688	.947	1.78	.081	-.216	3.593	*
sumsetr	-.22	.446	-0.49	.624	-1.118	.677	
sumbkgd	.086	.248	0.34	.732	-.414	.585	
Constant	.692	1.537	0.45	.655	-2.398	3.782	
Mean dependent var		1.669	SD dependent var		1.740		
R-squared		0.340	Number of obs		62		
F-test		1.900	Prob > F		0.054		
Akaike crit. (AIC)		245.922	Bayesian crit. (BIC)		275.702		

\*\*\* $p < .01$ , \*\* $p < .05$ , \* $p < .1$

#### 4.2.2 Token 60-Day Returns

I find that Ethereum returns, the length of lock-up, and the presence of a vesting schedule are positively correlated with 60-day token returns and that the total amount of capital raised during a company's seed, private, and public rounds prior to a token's listing is negatively correlated with 60-day token returns. These results are more consistent with my hypothesis than those of the 7-day token returns.

I hypothesized that Bitcoin and Ethereum returns would be significant but found that only Ethereum returns were. A one-unit increase in the logged 60-day returns of Ethereum is associated with a 2.377 increase in the logged 60-day token returns. The fact that Ethereum returns were significant is consistent with Ante's findings that the larger cryptocurrency market affects the growth and development of the NFT market, and hence NFT-related company token returns. However, the fact that Bitcoin returns were not significant is not in line with this theory.

This could be due to the fact that while Bitcoin and Ethereum trends are both strong indicators of overall crypto market sentiment, they themselves are not closely correlated using short-term time frames. There is a phenomenon in the crypto market where the market moves in a certain pattern of cycles. In a bull market, Bitcoin is usually the first to appreciate, Ethereum and the rest of the market follow, and then there is a slight correction and the cycle repeats itself. In a bear market, the entire market generally downtrends, but bitcoin usually depreciates least. Bitcoin is uncorrelated with the rest of the market in this sense when looking at a 60-day timeframe while Ethereum is positively correlated, and it is evident based on the results. The Ethereum 60-day return has a statistically significant positive relationship on 60-day token returns at the 5% level, which is consistent with the hypothesis and intuition.

The presence and lengths of lock-up and vesting schedules were expected to have significant positive correlations on 60-day token return, but only two of the four factors, the lock length and presence of a vesting schedule did. This is likely due to the collinearity between all of these factors (e.g. if a company has a lock-up period in place, it likely also has a vesting schedule). Regardless, lock length and the presence of a vesting schedule had significant positive relationships at the 10% level which is in line with the hypothesis and demonstrates the relationships of these mechanics in general on 60-day token returns. A one-unit increase in lock length (1 month) is associated with a 0.084 increase in logged 60-day token returns and the presence of a vesting schedule is associated with a 1.870 increase in logged 60-day token returns.

This is likely due to the fact that lock-up periods and vesting schedules ensure that founders cannot sell their tokens upon the token's market listing. These features are also a signal that is attractive to investors, as it demonstrates the team's dedication to the project and their confidence in its long-term success.

The amount of capital raised had a statistically significant negative relationship with 60-day token returns at the 5% level. A one-unit increase in the amount raised (\$1m) is associated with a 0.045 decrease in logged returns.

Launching on a blockchain protocol other than Ethereum or Binance had a statistically significant positive relationship with 60-day returns at the 5% level. Whether or not the company met its raise goal and the fraction it sold for the launch were statistically insignificant. The explanation for these results is the same as those for the 7-day token returns.

Table 5: 60-day Token Return Regression

<b>Linear regression</b>							
tokensixtydayret	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
btesixtydayret	-1.001	1.02	-0.98	.331	-3.052	1.05	
ethsixtydayret	2.377	1.062	2.24	.03	.241	4.512	**
lock	-.673	.857	-0.79	.436	-2.396	1.049	
locklength	.084	.049	1.70	.096	-.015	.184	*
vesting	1.87	1.102	1.70	.096	-.346	4.085	*
vestinglength	0	.019	0.00	.998	-.038	.038	
amountraised	-.045	.021	-2.11	.04	-.087	-.002	**
metgoal	.523	1.133	0.46	.646	-1.755	2.801	
pctsoldforlaunch	-.021	.02	-1.09	.282	-.061	.018	
ethereumchain	.074	.63	0.12	.907	-1.192	1.34	
otherchain	2.224	1.038	2.14	.037	.137	4.312	**
sumsctr	-.102	.483	-0.21	.834	-1.073	.87	
sumbkgd	.17	.292	0.58	.563	-.417	.757	
Constant	-.633	1.797	-0.35	.726	-4.245	2.979	
Mean dependent var		1.643	SD dependent var		1.988		
R-squared		0.397	Number of obs		62		
F-test		2.431	Prob > F		0.013		
Akaike crit. (AIC)		256.789	Bayesian crit. (BIC)		286.569		

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

### 4.3 Limitations

This study has three main limitations: a small and targeted sample size, the lack of consideration of social media characteristics, and the lack of consideration for strategic backers like angel investors and VCs.

I started with a relatively robust sample of 215 NFT-related companies but ended up with a working sample of 62 NFT-related companies due to the lack of available data. Additionally, these 215 companies only included companies that were publicly listed and operational, so my sample does not include companies that have failed. Including all NFT-related companies that I originally sampled and adding those that are no longer operational would have given me a much more representative data set and improved the results of the study.

Social media and community characteristics are expected to have a strong positive relationship with initial token returns because they directly show how many users or investors are interested in the project. I wanted to include this data by using the number of followers and members a project had across its social media platforms, but I was not able to retrieve this data for the day before the token launch. I initially hypothesized that this would have the most significant relationship with initial token returns, but was not able to test it.

I expected that the presence and quality of strategic angel investors and VCs to have a strong relationship with token returns as well. Not only is it a key signal to public investors regarding the quality of the project, but these backers also provide advice and contacts that can greatly impact the success of the token launch. I was not able to include this data in my study because it was not only mostly unavailable but also very difficult to accurately assess quality.



## **5. Summary and Conclusion**

Blockchain technology is taking the world by storm. All in the last year, cryptocurrency trading has been implemented by digital payment companies and traditional brokerages of the likes of PayPal<sup>33</sup>, Square<sup>34</sup>, and Robinhood<sup>35</sup>. Other large institutions such as Tesla<sup>36</sup> and MicroStrategy<sup>37</sup> have added Bitcoin to their balance sheets. The Staples Center in Los Angeles is becoming the Crypto.com Arena<sup>38</sup> and Facebook's parent company has rebranded to Meta<sup>39</sup>.

NFTs and NFT-related companies have been in the spotlight of this revolution in 2021. With the development of the metaverse and next-generation internet, digital asset ownership is more pertinent now than ever. It is clear that the push for mainstream adoption of blockchain technology is here. Understanding blockchain technology, token sale financing, and the factors in a blockchain-based company's success is only going to become more relevant as the industry continues to advance.

Past literature from Howell, Niessner, and Yermack finds that apparent token utility value, presence of voluntary disclosures of budget via a white paper, presence of the lockup or vesting period for sale of the issuer's ICO tokens, past success in raising VC funding, and when the Founder/CEO has professional experience as an entrepreneur or in computer science are significant predictors of employment growth and survival. Myalo and Glukhov find that the

---

<sup>33</sup> "PayPal allows Bitcoin and crypto spending." *BBC*, 21 Oct. 2020, [www.bbc.com/news/technology-54630283](http://www.bbc.com/news/technology-54630283).

<sup>34</sup> Stankiewicz, K. "Square saw 1 million users buy bitcoin for first time during January's upswing, CFO says." *CNBC*, 24 Feb. 2021,

<https://www.cnbc.com/2021/02/24/square-saw-1-million-users-buy-bitcoin-for-first-time-in-january-cfo.html>.

<sup>35</sup> "Cryptocurrency Investing." *Robinhood*, <https://robinhood.com/us/en/support/articles/cryptocurrency-investing>, Accessed 4 Dec. 2021.

<sup>36</sup> Kovach, S. "Tesla buys \$1.5 billion in bitcoin, plans to accept it as payment." *CNBC*, 8 Feb. 2021, <https://www.cnbc.com/2021/02/08/tesla-buys-1point5-billion-in-bitcoin.html>.

<sup>37</sup> Roberts, J. "Software firm MicroStrategy makes a massive bet on Bitcoin with a \$250 million purchase." *Fortune* 11 Aug. 2020, <https://fortune.com/2020/08/11/buying-bitcoin-microstrategy-cryptocurrenc>.

<sup>38</sup> Dean, S. "Goodbye, Staples Center. Hello, Crypto.com Arena." *LA Times*, 16 Nov. 2021, <https://www.latimes.com/business/story/2021-11-16/crypto-staples>.

<sup>39</sup> Heath, A. "Mark Zuckerberg on why Facebook is Rebranding to Meta." *The Verge* 28 Oct. 2021, <https://www.theverge.com/22749919/mark-zuckerberg-facebook-meta-company-rebrand>.

volatility of main cryptocurrencies has a significant impact on the amount of capital raised and survival. The sector of the project, location region, and quality of the team were only significant in certain cases. Because blockchain technology and token sales are new tools in finance, the data for research is limited and there is a limited number of academic papers in this area of study. There are no existing findings on individual token market returns and most existing literature regarding blockchain-based company success is not recent.

This paper studies the market for NFT-related companies and the characteristics associated with short-term market returns post-listing. I sample 62 NFT-related company token sales, most of which launched in 2021. I find that the total amount of capital raised during a company's seed, private, and public rounds prior to a token's listing has a statistically significant negative relationship with the 7-day and 60-day token return. This is likely due to the fact that the more capital a company raises for its tokens, the less interested capital and demand there is after its listing, which negatively impacts return. Ethereum returns have statistically significant positive relationships with 60-day token returns. This is consistent with the rationale that all tokens in the crypto market are correlated with main cryptocurrencies, which indicates overall market sentiment. The length of lock-up and the presence of a vesting schedule also have statistically significant positive relationships with 60-day token returns. These mechanics ensure that the founders and team cannot sell their tokens upon the token's market listing, so it makes sense that their presence is positively correlated. These features also demonstrate the team's dedication to the project and their confidence in its long-term success, which is a positive signal and attractive to investors.

This study contributes to the growing literature about blockchain technology, NFTs, and token sales. While the results of this research are informative and intuitive, it is preliminary at

best. The study does not consider some potential key indicators such as social media and community characteristics and the quality of strategic investors. Further research on token market returns should include these factors to provide more holistic findings. Additionally, this study only takes into account NFT-related tokens primarily launched in 2021. Further research should also consider companies from other sectors within the crypto market to investigate whether the characteristics associated with the performance of initial token market returns are shared throughout the entire industry.

## References

1. Anascavage, Robert and Davis, Nathan. "Blockchain Technology: A Literature Review." May 3 2018.
2. Ante, Lennart. "The non-fungible token (NFT) market and its relationship with Bitcoin and Ethereum." Jun. 6 2021.
3. Catalini, Christian and Gans, Joshua S. "Initial Coin Offerings and the Value of Crypto Tokens" *MIT Sloan Research Paper*, No. 5347-18, Rotman School of Management, Working Paper No. 3137213, Mar. 5 2019.
4. Chohan, Usman W. "Non-Fungible Tokens: Blockchains, Scarcity, and Value." *Critical Blockchain Research Initiative (CBRI)*, Working Papers, Mar. 24 2021.
5. Fairfield, Joshua. "Tokenized: The Law of Non-Fungible Tokens and Unique Digital Property." *Indiana Law Journal*, *Forthcoming*, Apr. 6 2021.
6. Howell, Sabrina T and Niessner, Marina and Yermack, David. "Initial Coin Offerings: Financing Growth with Cryptocurrency Token Sales." *European Corporate Governance Institute (ECGI) - Finance*, Working Paper No. 564/2018, Sep. 3 2019.
7. Myalo, Alina and Glukhov, Nikita. "Success of Initial Coin Offering. The Empirical Evidence from 2016-2019." Aug. 21 2019.

### Web source:

1. AAG Ventures, "Play-To-Earn & Our View." *AAGV*, [litepaper.aag.ventures/litepaper/play-to-earn](https://www.aagventures.com/litepaper/play-to-earn). Accessed 4 Dec. 2021.
2. AAG Ventures, "Tokenomics." *AAGV*, [litepaper.aag.ventures/litepaper/tokenomics](https://www.aagventures.com/litepaper/tokenomics). Accessed 4 Dec. 2021.

3. Arora, K. “Centralized and Decentralized Cryptocurrency Exchanges.” *AnalyticSteps*, 5 Aug. 2021,  
[www.analyticssteps.com/blogs/centralized-and-decentralized-cryptocurrency-exchanges](http://www.analyticssteps.com/blogs/centralized-and-decentralized-cryptocurrency-exchanges).
4. Craig, J. “What is an Initial DEX Offering (IDO): How does it compare to an IEO?” *Phemex*, 20 Oct. 2021, [phemex.com/blogs/what-is-a-dex-ido](http://phemex.com/blogs/what-is-a-dex-ido).
5. “Cryptocurrency Investing.” *Robinhood*,  
<https://robinhood.com/us/en/support/articles/cryptocurrency-investing>, Accessed 4 Dec. 2021.
6. Dean, S. “Goodbye, Staples Center. Hello, Crypto.com Arena.” *LA Times*, 16 Nov. 2021,  
<https://www.latimes.com/business/story/2021-11-16/crypto-staples>.
7. de Best, R. “Amount of funds raised for cryptocurrency initial coin offering (ICO) projects worldwide as of November 2019, by leading industry.” *Statista*, 11 Feb. 2021,  
[www.statista.com/statistics/802925/worldwide-amount-cryptocurrency-ico-projects-by-industry](http://www.statista.com/statistics/802925/worldwide-amount-cryptocurrency-ico-projects-by-industry).
8. Dillet, R. “NBA Top Shot creator Dapper Labs raises another \$250 million.” *TechCrunch*, 22 Sep. 2021,  
[techcrunch.com/2021/09/22/nba-top-shot-creator-dapper-labs-raises-another-250-million](http://techcrunch.com/2021/09/22/nba-top-shot-creator-dapper-labs-raises-another-250-million).
9. Hakki, T. “NBA Top Shot Sales Up 128% After New Drop Features Shaquille O'Neal.” *Decrypt*, 17 Oct. 2021,  
[decrypt.co/83668/nba-top-shot-sales-up-128-after-new-drop-features-shaquille-oneal](http://decrypt.co/83668/nba-top-shot-sales-up-128-after-new-drop-features-shaquille-oneal).
10. Hayes, A. “White Paper.” *Investopedia*, 1 Jan. 2021,  
[www.investopedia.com/terms/w/whitepaper.asp](http://www.investopedia.com/terms/w/whitepaper.asp).

11. Heath, A. “Mark Zuckerberg on why Facebook is Rebranding to Meta.” *The Verge*, 28 Oct. 2021,  
[www.theverge.com/22749919/mark-zuckerberg-facebook-meta-company-rebrand](http://www.theverge.com/22749919/mark-zuckerberg-facebook-meta-company-rebrand).
12. Howcraft, E. “NFT sales surge to \$10.7 bln in Q3 as crypto asset frenzy hits new highs”, *Reuters*, 4 Oct. 2021,  
[www.reuters.com/technology/nft-sales-surge-107-bln-q3-crypto-asset-frenzy-hits-new-highs-2021-10-04](http://www.reuters.com/technology/nft-sales-surge-107-bln-q3-crypto-asset-frenzy-hits-new-highs-2021-10-04).
13. Jakhola, H. “Rarible NFT Guide for Artists - How to add your Artwork to the Ethereum Blockchain.” *Darkdays*, 3 Dec. 2021,  
[www.darkdays.photography/rarible-nft-guide-for-artists](http://www.darkdays.photography/rarible-nft-guide-for-artists).
14. Kovach, S. “Tesla buys \$1.5 billion in bitcoin, plans to accept it as payment.” *CNBC*, 8 Feb. 2021, <https://www.cnbc.com/2021/02/08/tesla-buys-1point5-billion-in-bitcoin.html>.
15. Liebkind, J. “Is 2021 the Year of the Security Token?” *Investopedia*, 21 Jun. 2021,  
[www.investopedia.com/tech/2018-year-security-token](http://www.investopedia.com/tech/2018-year-security-token).
16. Merre, R. “From ICO to IDO: Evolution of the Crypto Funding Hype Cycle.” *NGrave*, 30 Jun. 2021.  
[medium.com/ngrave/from-ico-to-ido-evolution-of-the-crypto-funding-hype-cycle-5f867a1c367d](https://medium.com/ngrave/from-ico-to-ido-evolution-of-the-crypto-funding-hype-cycle-5f867a1c367d).
17. Merre, R. “ICO 101 — Initial Coin Offerings (ICOs) - What is an ICO & What are the Pros and Cons.” *Hackernoon*, 22 May 2019,  
<https://medium.com/hackernoon/initial-coin-offerings-icos-what-is-an-ico-what-are-the-pros-and-con-s-c40813a8d419>

18. Mourya, E. "Here's how Axie Infinity players are earning nearly \$500/month in crypto rewards." *FXStreet*, 19 Aug. 2021,  
[www.fxstreet.com/cryptocurrencies/news/heres-how-axie-infinity-players-are-earning-nearly-500-month-in-crypto-rewards-202108190844](http://www.fxstreet.com/cryptocurrencies/news/heres-how-axie-infinity-players-are-earning-nearly-500-month-in-crypto-rewards-202108190844).
19. "PayPal allows Bitcoin and crypto spending." *BBC*, 21 Oct. 2020,  
[www.bbc.com/news/technology-54630283](http://www.bbc.com/news/technology-54630283).
20. Roberts, J. "Software firm MicroStrategy makes a massive bet on Bitcoin with a \$250 million purchase." *Fortune* 11 Aug. 2020,  
<https://fortune.com/2020/08/11/buying-bitcoin-microstrategy-cryptocurrenc>.
21. Sahu, M. "Centralized vs Decentralized Cryptocurrency: Difference Between Centralized vs Decentralized Cryptocurrency." *upGrad*, 3 Dec. 2021,  
[www.upgrad.com/blog/centralized-vs-decentralized-cryptocurrency/#What\\_is\\_a\\_Cryptocurrency\\_Exchange](http://www.upgrad.com/blog/centralized-vs-decentralized-cryptocurrency/#What_is_a_Cryptocurrency_Exchange).
22. Stankiewicz, K. "Square saw 1 million users buy bitcoin for first time during January's upswing, CFO says." *CNBC*, 24 Feb. 2021,  
<https://www.cnbc.com/2021/02/24/square-saw-1-million-users-buy-bitcoin-for-first-time-in-january-cfo.html>.
23. VanHaaren, T. "Mike Trout rookie card becomes highest-selling sports card of all time." *ESPN*, 23 Aug. 2020,  
[www.espn.com/mlb/story/\\_/id/29723239/mike-trout-rookie-card-becomes-highest-selling-sports-card-all](http://www.espn.com/mlb/story/_/id/29723239/mike-trout-rookie-card-becomes-highest-selling-sports-card-all).
24. Varshney, N. "Someone paid \$170,000 for the most expensive CryptoKitty ever." *TNW*, 5 Sep. 2018, [thenextweb.com/news/most-expensive-cryptokitty](http://thenextweb.com/news/most-expensive-cryptokitty).

25. Zab Technologies Pvt Ltd. “What is IEO Initial Exchange Offering? Is this the new phenomenon in Crypto Capital?” *Hackernoon*, 21 Mar. 2019, [hackernoon.com/what-is-ieo-initial-exchange-offering-is-this-the-new-phenomenon-in-crypto-capital-64fdd60a6e7a](https://hackernoon.com/what-is-ieo-initial-exchange-offering-is-this-the-new-phenomenon-in-crypto-capital-64fdd60a6e7a).
26. “Playerauctions.” *Wikipedia*, 29 Jul. 2019, [en.wikipedia.org/wiki/Playerauctions](https://en.wikipedia.org/wiki/Playerauctions).
27. “SHA-256 Algorithm Overview.” *N-able*, 12 Sep. 2019, [www.n-able.com/blog/sha-256-encryption#:~:text=SHA%2D256%20is%20used%20in,SHA%2D256%20for%20verifying%20transactions](https://www.n-able.com/blog/sha-256-encryption#:~:text=SHA%2D256%20is%20used%20in,SHA%2D256%20for%20verifying%20transactions).
28. “What are decentralized exchanges, and how do DEXs work?” *Cointelegraph*, [cointelegraph.com/defi-101/what-are-decentralized-exchanges-and-how-do-dexs-work](https://cointelegraph.com/defi-101/what-are-decentralized-exchanges-and-how-do-dexs-work). Accessed 4 Dec. 2021.