BINANCE RESEARCH

GameFi Tokenomics Deep Dive



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Key Takeaways

- In this report, we'll dive into key aspects of the gaming world and think about key elements a crypto-native game should bring. We'll further think about tokenomics in the context of games in more detail and discuss elements such as inflation and the overall sustainability of tokenomics. In addition to that, we'll propose a sustainable tokenomics design for crypto games.

- We see significant benefits to users and developers. Ownership over your assets, the ability to earn rewards while playing, and decentralized governance power are just a few.

- While still in its early stage, we believe that web3 games will likely do for blockchain technologies what solitaire did for the computer in the 1990s - drive further adoption and education.

- Looking at the tokenomics element in more detail, we believe that fun and entertainment remain key elements to consider - tokenomics should add to this rather than distract from it. One key issue that P2E games are facing is sustainability since a majority of players are putting too much focus on the ability to earn tokens rather than enjoying the game itself. As such, we see that while there are benefits to a two-token model, it isn't an underlying necessity for games to be successful. We rather see that truly fun games can design sustainable tokenomics with a single token alone.

- One of the obvious challenges with creating sustainable web3 games is tokenizing all game assets without sacrificing control of the game's economy. It is important to keep in mind that just because an in-game asset can be turned into an NFT or fungible token, it doesn't mean it should be made into one.

Introduction

Not too long ago, we published a **deep-dive into Tokenomics**. In that report, we defined tokenomics as the study of determining and evaluating the economic characteristics of a cryptographic token. We subsequently looked at key characteristics of tokenomics and explored both the supply and demand dynamics of tokens, deep-diving into the many facets of token design. However, considering the complexity of the space, we left out one key area of tokenomics - that is, tokenomics for gaming. While also being impacted by the classic tokenomics design aspects, GamFi tokenomics are slightly different in certain aspects, which is why we felt that they deserve a standalone report. Many of the concepts covered in the original tokenomics report apply here, so we do encourage you to check them out if you haven't. If you have (and if you're into gaming), you will probably already know that the utility of games and GameFi tokens is quite different from that of decentralized financial applications.

In this report, we'll dive into key aspects of the gaming world and think about key elements a crypto-native game should bring. We'll further think about tokenomics in the context of games in more detail and discuss elements such as inflation and the overall sustainability of tokenomics. In addition to that, we'll propose a sustainable tokenomics design for crypto games. Before all that, however, let us look a bit closer at the history and evolution of gaming first.

Setting the Scene

Games have been around for a very, very long time. Since humans' earliest existence, there has been evidence of our seemingly innate infatuation with games. Prehistoric and ancient civilizations initially used bones to mold the early forms of dice. The first pair of dice, found in the Shandong Province, have been dated all the way back to 5,000 years ago and, quite interestingly, had fourteen irregular sides as opposed to the contemporary six sides. The evolution of dice serves as just one example of how gaming has played an important role throughout human history.

Perhaps, the most influential type of games throughout human history have been video games. The origin of video games began in the 1950s as computer scientists began designing simple games and simulations on minicomputers and mainframes. Soon after came the first home video game console - the Magnavox Odyssey - and the first arcade video games - Computer Space and Pong. It wasn't until the 1990s, however, that we saw the introduction of optical media via CD-ROMs and real-time 3D polygonal graphic rendering.

Games have always been one of the ways for us to adopt different technologies - Microsoft Solitaire was there in the '90s to teach us how to use a mouse to click, drag and drop, and interact with the graphical user interfaces, and now it has become almost intuitive. Sony's decision to include a Blu-ray player in their PlayStation 3 was one of the deciding factors for the high-definition optical disc format war between HD DVD and Blu-ray. It is likely that many people use a VR headset for the first time because of the immersive gaming experience. Games will likely do the same for blockchain technologies by educating users on how to operate a wallet, pay gas fees for transactions and interact with smart contracts.

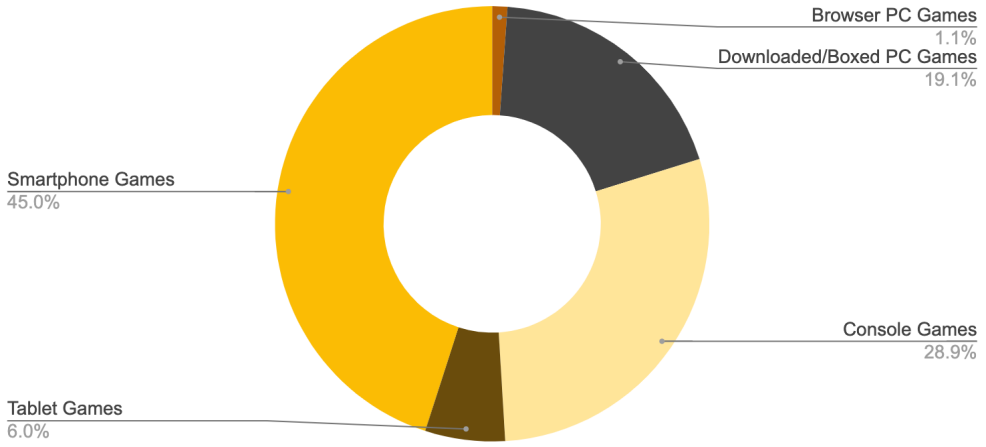
From the 2000s and into the 2010s, casual gaming and streaming have become an overwhelming force in the gaming industry and have served to embody a much more mainstream consumer. The industry has shifted to mobile gaming on smartphones and tablets instead of handheld consoles. Additionally, gaming has touched almost every geographic region of the world, and is growing outside the traditional bounds of North America and Western Europe.

It is expected that in 2022, a staggering 3.2 billion players will consume video games, leading to an estimated US$185 billion in generated revenue. By 2025, this number will grow even further, reaching around 3.5 billion players and generating around US$210 billion (Figure 1).

While the coronavirus pandemic remains a harsh reality in some parts of the world, many countries have lifted their restrictions. This means that consumers are no longer confined to their homes, and are readily participating in the activities that were part of their lives before COVID-19. Naturally, we have seen a slight slowdown in growth of games sold this year compared to 2020 and 2021. **However, engagement with games is sticky, as many gamers tend to form bonds with characters, storylines, and gaming objectives.** We anticipate gaming to continue to grow in the long run, despite recent falls in engagement in the short run.

The essence of gaming is ingrained into the human fabric. As shown by the evolution of dice and video games, gaming constantly evolves and adapts to whatever technological medium is most pervasive at the time. For these reasons, it is advisable to pay close attention to how gaming takes form in a blockchain environment.

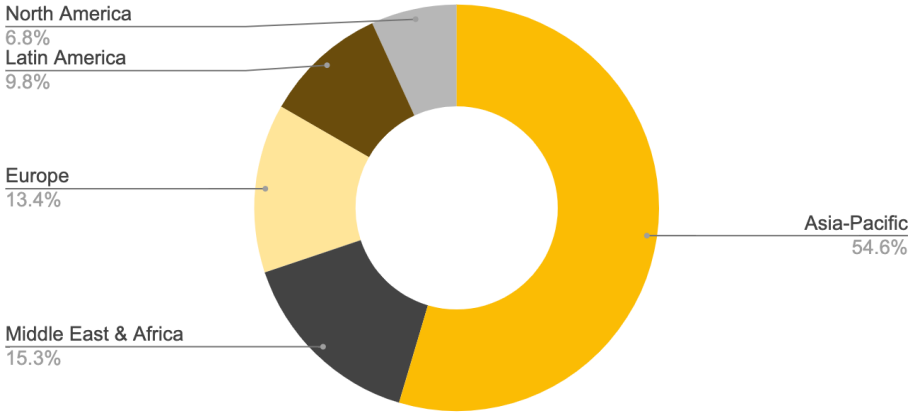
Figure 1: Global Gaming Market share



Source: Binance Research, Newzoo.com

If we consider tablet and smartphone games as one broad mobile market, we can see that this category accounts for more than 50% of the total US$200B+ market this year. Looking closely at the geographical split, Asia Pacific is by far the biggest market. That being said, Latin America and the Middle East & Africa are both growing fast and will likely account for a larger share in the coming years.

Figure 2: Global Gaming Distribution



Source: Binance Research, Newzoo.com

One area of gaming that has already proven to be well-suited to a blockchain environment is play-to-earn ("P2E") games. P2E refers to games that effectively pay you for playing the game. P2E is not a completely new concept to gaming - gold farming in World of Warcraft was widely reported more than 10 years ago. The ownership of assets and freedom of transfer from blockchain technologies make it more feasible. More specifically, **P2E games on the blockchain offer cryptocurrency in return for in-game achievements, items, and other forms of engagement.** In order to pay players, most P2E games require a crypto wallet to play them.

In its current form, the P2E space feels relatively immature; **The market is dominated by financially-oriented P2E titles whose core focus is on experimenting with economic incentives rather than the gameplay itself.** Consequently, most of the current games are plagued with sustainability issues. Players are not incentivized to engage with the games for reasons other than financial gain, leading to a system that can only sustain itself if there is a continuous influx of players (*and funds*) into the game. As a result, P2E gaming has received a lot of criticism from the gaming community.

However, it is important to remember that this kind of progression is natural. Gaming requires time to evolve and become more complex (*just as we moved from dice to pong to full-story RPGs)*. As time passes, we believe that we will see more competition in the P2E space. As a result, blockchain gaming will attract top developers and ultimately challenge traditional AAA titles in terms of technical complexity and player base. More importantly, we will witness how the benefits of blockchain technology serve to enhance gaming in its current form to become more engulfing and compelling. To overcome the current shallowness in the P2E blockchain games space, we must explore in more depth what qualities make a good game.

What Makes a Good Game

If you are a game developer, you will know that designing a successful game is an incredibly difficult feat. **A successful game must be continuously alluring, leading players to come back time and time again to accomplish some task.** At the same time, a game can have the best graphics, gameplay, and control, e.g., Star Wars™ Battlefront™ II, but it can be ruined by an in-game economy that encourages pay-to-win. As such, a successful game must be engaging and stimulating in ways other games aren't.

For games built on the blockchain, there is another idiosyncratic requirement to creating a successful game: Complementary tokenomics. Incorporating tokenomics into a game adds a whole new layer of complexity for game developers. **It is important that the tokenomics complement the overall game design - If tokenomics are carelessly integrated, player incentives become easily misaligned and may overshadow a game's inherent value.**

In this section, we will describe traditional best practices for building a successful game. Additionally, we will propose how to properly incorporate tokenomics into your game design.

Best Practices for Building a Game

1) Challenges

Who doesn't love a good challenge? Demon's Souls, for example, is known as one of the hardest games, which contributes to its overall appeal to players. A good game designer gives his players continuous challenges, with one constantly leading to another, to keep them hooked on playing a game. The goal is that most of these challenges satisfy some kind of learning objective. This could include answering questions, completing a portion of a map, or obtaining a new in-game item.

Good games should be easy to learn, but hard to master.

2) Flexibility

Everyone has their own way of going about things, and **limiting a gamer's flexibility often can lead to more frustration than people expect.** Thus, allowing for flexibility, by ensuring that there are many different ways to accomplish each goal, is important. Instead of

designing a step-by-step progression, it is best to let each player work out their own strategy to the endpoint while still keeping the game challenging.

3) Rewards

To make the game feel rewarding, successful players can be granted new capabilities, skills, and equipment. In-game rewards have the ability to be surprisingly motivating to players. The value of the game is not just to win it, but instead to keep playing and to collect rewards. One challenge that most game designers face is finding the perfect balance of difficulty and reward.

4) Entertainment

Excessive realism can be boring. There is nothing wrong with making some incorrect assumptions about how the world works or allowing for unrealistic behaviors or skills. Most gamers are looking for an escape from reality, and fun is a crucial element that makes them return to the games they're playing. It is the element of fun and challenge that makes gamers return. This is something that we should keep in mind when thinking about how to design a sustainable GameFi experience.

5) Controls

Even if everything about your game is amazing, it won't matter if your players can't properly interact with it. Therefore, designing controls that fit the game and enhance the experience is one of the key elements of fostering an addictive game experience. This also includes any usage of tokens within the game. They should be intuitive to use and not introduce new barriers to entry. If any of you remember Super Mario 64, you will know what we mean when we talk about great controls. If the main game mechanics aren't fun, your game may as well have been a movie.

6) Captivating Worlds

Nailing down the gameplay is certainly important. However, the visuals of a game and creating captivating worlds still remain a critical secondary component to a game's success. Skyrim and The Legend of Zelda are examples of games that have not only created stunning visuals but also a world that is captivating and fascinating. The best games usually have a level design that serves to complement the main game mechanics. Well-planned levels will help push the story forward while keeping players engaged as they face new challenges.

In addition, whether your game is heavy on narrative or not, your game should contain characters that are not mundane or forgettable. You want to be able to relate to the protagonist. This means designing characters that are visually interesting, well-written, and that the player can relate to. Most storytellers would even argue that it's the characters, not the plot nor setting, that separates a good story from a great one. After all, humans love being touched, entertained, and encouraged by intriguing stories with memorable characters, plot twists, and more. Since games are interactive, they are also capable of serving as a storytelling medium that no other can compare to.

7) Something Different

Last but not least, it's great if games are unique. While following the same formula of another great game may seem like a profitable idea, it's the games that introduce something unique that captivates audiences. Every game designer should strive to create a game that offers a new experience that players can't get anywhere else, even if it means just adding a few tweaks to an already-existing genre or style of game.

It is evident that there are a lot of elements that are needed when designing an amazing game. This makes it all so clear why the job of a game designer is anything but easy. Further adding crypto to this equation adds another layer of complexity, making it even harder to achieve all of the above aspects while also maintaining sustainable and effective tokenomics.

Figure 3: The Seven Pillars of Game Design



Source: Binance Research

Gaming in a Crypto Context

At this point, we understand a bit better what it takes to design a good game. However, putting a good game into the context of crypto adds new layers of complexity. Looking at gaming in a more crypto-native context, we can see that the primary reason people want to engage is still similar to traditional gaming. It is not for financial benefits but for playing a fun and entertaining game. After all, users are willing to invest time to install, set up the game, and learn how to operate it. As such, we can crystalize **fun and entertainment** as key elements for crypto native games as well. While this is a requirement for almost all games to be successful, **the introduction of tokenomics and blockchain technology can often distract from this fact**.

Let's look at it more in-depth in a crypto-native context. Non-fungible tokens ("NFTs"), if available in the game, can be seen as tools with in-game utilities. They could be collectibles (artwork worth collecting with potential use-case across platforms, like StepN Asics sneakers instead of the random-looking sneakers) or items that offer some form of utility. Interestingly, a majority of blockchain primitives (such as ERC-721) have been motivated by traditional gaming. Vitalik Buterin, explained that one of the main motivations for him to create a non-fungible token standard was a World of Warcraft ("WoW") update. In 2010 the WoW patch 3.1.0 made him "realize what horrors centralized services can bring", motivating him to create Ethereum just two years later and allow for items to also have non-fungible characteristics.

Players don't play because of earnings, they play to have fun

Retention rate is one of the most important key performance indicators ("KPIs"), for crypto game developers. This is actually very similar to the free-to-play realm, where we often have monetizing in the form of advertisements. When exactly you measure your retention rate is up to you — and varying this can lead to valuable information on your game's performance. Measuring a one-day retention rate shows if you are effectively onboarding new users and will let you know what kind of first impression your game makes on people who have just downloaded it. In contrast, a seven-day retention rate helps you to determine how much people like your app — looking at drop-off from day one to day seven is a valuable insight into app performance and will help determine how long people will play your game or use your app. **After a month, expect your user base to have shrunk dramatically. Users remaining will likely be using the game regularly and are a valuable revenue driver — this is the ideal segment to target with crypto-native games.**

A current barrier to use for crypto games is the need for a web3 wallet connection. Considering that time being spent on installing and setting up a game can impact sales (mobile games have a huge advantage here), it is important to note that within the GameFi space, ease of use should be at the center of attention.

Assuming that the GameFi space will evolve more going forward, we expect more high-quality games to be introduced into the market. Games of similar quality should be able to attract gamers from traditional markets and thus set up the crypto gaming space as a key entry point for people into web3 and crypto.

The Value Proposal of Blockchains

Now, we're really getting started. After all, this paper is about GameFi tokenomics. To understand the need for strong and sustainable tokenomics better, let us look at the value that blockchain technology brings to the gaming industry.

User Benefits

1) Digital Asset Ownership

There are significant benefits to users who choose to dabble into GameFi: Ownership over your assets, the ability to earn rewards while playing, and decentralized governance power are just a few.

Let's take the popular video game Fortnite as an example. Fortnite is a free-to-play game that generates revenue from in-game purchases. Purchases made don't bring any extra benefits to the gameplay but are rather enhancements to the look of your characters, such as skins and accessories - the community element is crucial to the success of Fortnite. However, these skins are not unique, and there is no way to verify ownership. If Epic Games (the Fortnite game developer) wanted to permanently deactivate any skins purchased, they could easily do this and leave you stranded the same way World of Warcraft did with Vitalik. If you're deciding to quit the game and you're looking to sell your in-game purchases, you're often faced with a lot of challenges and satisfying results.

In comparison, let's take a closer look at a classic game built on the blockchain. Oftentimes, similar to Fortnite, players can either play the game for free with the ability to purchase skins. One key difference could be that unless you purchase a skin, you won't be able to earn rewards from playing the game. Additionally, unlike Fortnite skins, these skins are NFTs that are actually owned by the player. As the player increases in levels, the earning potential for the player increases as well, further increasing the value of the NFT simultaneously. If you wish to sell your skins, you can often do so through popular NFT marketplaces.

Having ownership over your assets could potentially mean that you can transfer your skins, avatars, or items into another game or across games developed by the same project and give you more freedom than you had before.

2) Governance

Another key aspect to look at is that of control. Heading back to the Fortnite example, the developers are the ones purely in control of the game's direction and roadmap. **With emerging decentralized organizational structures like DAOs, crypto-native games can allow user-based input into the direction and roadmap of the game driven by tokenized ownership.** The DAOs can not only help in steering development but also in the project's growth strategy with regards to capital and community. Tokens allocated to the DAOs treasury can be used for further development.

3) Decentralized Gaming Economies

By creating decentralized gaming economics, players gain the ability to receive a portion of the game revenue, which can lead to better player retention and lower customer acquisition costs. In addition to that, due to the decentralized nature, players don't have to rely on a centralized party and could potentially contribute to the game themselves.

4) Transparency

A key element of fraud prevention is avoiding what is known as the double spending problem. **The double spending problem is the outcome of spending the same money more than once.** Of course, there is a possibility that a digital currency can be spent twice, too, which would immediately turn them into useless code. As such, overcoming the double spending problem was a key milestone achieved with blockchain technology. Using cryptocurrencies, you don't need to depend on a third party to confirm your transactions. Instead, blockchain makes it possible to algorithmically solve the double-spending problem and also introduces the concept of digital scarcity.

Putting this into the context of crypto gaming, we can see that users had little insight into how the supply of their in-game currency was being managed. Consequently, they had little understanding of how the value of their in-game currency was fluctuating. By double-spending or minting more in-game currency, hackers or even the game's developers themselves could increase the in-game currency supply without users knowing. As a result, users could be negatively impacted and blindsided by the dilution of their in-game currency holdings. In web3 games, there is much greater transparency into the supply side of in-game currencies. web3 games are oftentimes accompanied by a whitepaper that almost always gives an in-depth breakdown of the in-game currencies' tokenomics. Additionally, the circulating supply and total supply can be verified by tracking the in-game currencies

contract through block explorers. Lastly, blockchain technology in itself prevents double-spending by maintaining consensus amongst a group of validators/miners. As a result, no malicious actor can continuously spend the same in-game currency twice, or degrade the perception of the currency's value.

Developer Benefits

1) Royalties

Outside of user value, there is a lot of value derived for game developers, too. In the current model, game revenues are solely driven by the actual purchase of the game and then in-game purchases if available. **Through embedded smart contracts, the blockchain-enabled model allows for revenue generation upon asset transfers as well, thus adding a new revenue stream for developers.** Users are free to transfer assets as they please, with the developers generating revenue from transaction fees in the form of royalties (if they decide to do so). This and other monetization opportunities can be especially lucrative for developers. With blockchain games, creators generally retain much more of the value they create as well as benefit from on-chain royalties.

2) Economics Alignment

Giving players the ability to receive a portion of the game revenue should, in theory, lead to better player retention and lower customer acquisition costs. While so far still debatable, having a stake in the game can be seen as a net positive for players.

3) Unique Developer Controls

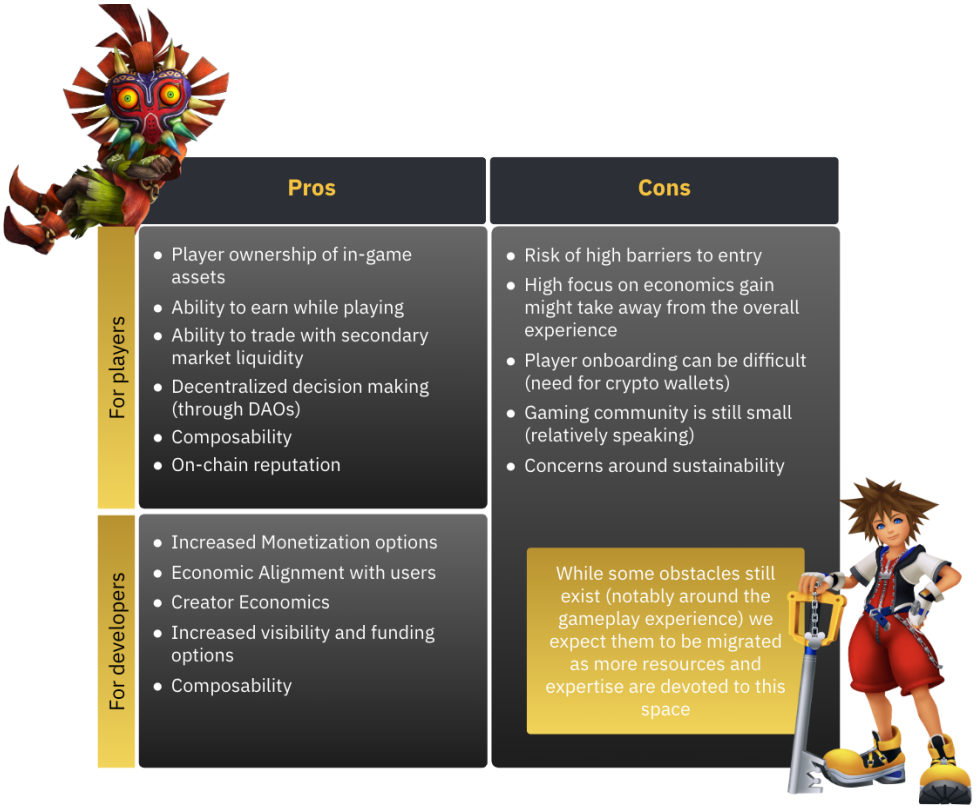
Developers can regulate their gaming economies effectively through smart contracts, setting specific predefined conditions to control trading within their games. This ensures that trades are conducted fairly and can limit the over-saturation of the in-game market.

blockchain platforms could potentially also provide a safer and more secure environment to build on. They use powerful data encryption technologies to secure transactions, and hackers can't destroy a decentralized blockchain network since there isn't a single centralized server or set of servers to destroy. On top of this, blockchain allows developers to communicate more openly with players and hear their feedback.

4) Composability

Composability is a key benefit for both users and developers. Allowing completely different games to interact with one another can help to unlock new gaming use cases that have never been possible before. It can further alleviate the overall use cases for skins and NFTs. The key benefits oftentimes are most notable when looking at a single game developer as they can assure the composability of skins and operation on the same blockchain for the games they develop.

Figure 4: Benefits and Drawbacks of blockchain for Gaming



Source: Binance Research

Other Noteworthy Benefits

There are other benefits to be aware of that apply to multiple forms of tokenized projects. While these benefits are not exclusive to crypto gaming - we believe that they're still noteworthy to mention.

1) Raising Capital

Tokens can be a new and innovative way of raising capital,further bringing additional benefits that might not be possible with more traditional ways. For example, a significant advantage of token fundraising over equity raising is that it allows early contributors/adopters to invest in the project and gain upside, whereas only accredited investors are traditionally able to invest at the initial public offering ("IPO") stage. This might take many years, usually far longer than it would take to create and distribute a token. **This level of inclusivity and potential for active community governance can be an important factor for both game developers and investors alike.** Additionally, given that smart contracts allow you to program mechanisms into tokens, we have a distinct technical advantage over traditional markets. This means that tokens can be more dynamic and provide more use cases than alternative means of funding.

2) Trust

Broadly speaking, almost every kind of value can be managed through a dedicated virtual token. It is important to remember that when tokens represent the right to access a game (or service) or allow for participation in a vote within a regulated ecosystem, the token holder grants trust to the token issuer. In the case of tokens representing a right, trust lies within the enforceability of this right. **Ultimately, it is possible to define tokens as quantifiable representations of decentralized and disintermediated trust**.

3) Utility

The potential for early adopter upside is a very advantageous tool for marketing purposes and can perhaps be one reason why we see increasing token allocations for early adopters. **By offering solutions to problems, having a loyal and engaging community, and other innovative features, a project might see an increase in its demand.**

Right now, the key roles that tokens play within the crypto space encompass: Right, Value Exchange, Toll (or Fee), Function, Currency, or means of Earnings. We will look at each of these aspects in more detail below. Looking closer at the utility token, we can see multiple layers of utility that can apply here.

- **Right -** Tokens can give the right to engage with a protocol. This can come in multiple forms. Governance is the most common one, allowing for proposing

changes and voting on the directionality of a project. They can further give access to a protocol and allow for product usage or offer ownership

- **Value Exchange -** The usage of tokens can lead to the creation of "mini" economies. Within this, tokens can facilitate the creation and the existence of economies by allowing for buying and selling as well as rewards for work and commitment

- **Toll -** Tokens lead to participants, investors, and users having skin in the game. Often, security deposits or usage fees can help to create a barrier to entry when running a smart contract platform or protocol

- **Function -** Tokens can frequently enrich a user experience by allowing them to join a network, participate in a game, connect with users and other participants, and can even incentivize them to participate

- **Currency -** Be it with a game or a DeFi protocol - often, a token can function as a form of currency by being a store of value and a medium of exchange

- **Earnings -** Protocols share their earnings through token incentives and distribute benefits to participants of a protocol. This can help to foster the growth and development of an ecosystem

Figure 5: Token Utility Overview



Source: William Mougayar, Binance Research

What GameFi is missing

For the last two years, GameFi and P2E have been terms that have grown in popularity alongside the early success of projects such as StepN and Axie Infinity. Since then, many games have experimented with GameFi. However, **most current GameFi incentives require high emissions and have led to questions surrounding the sustainability of these systems.** Prior to learning how to create more sustainable gaming Tokenomics, we must learn more about what GameFi and P2E actually entail.

What is GameFi

GameFi is an acronym, combining the terms **gaming** and **decentralized finance** ("DeFi"), and concerns how gameplay is monetized in a decentralized system. **P2E projects allow players to obtain in-game rewards (usually tokens) by completing tasks and progressing through various game levels.** Unlike traditional gaming rewards, self-custodial ownership over in-game rewards means that players have the ability to easily list rewards on decentralized marketplaces. Thus, allowing for the value of rewards to be easily traded on the open market. The financialization of blockchain gaming has proven to be powerful at attracting players. With the possibility of monetizing in-game rewards, crypto enthusiasts are onboarding onto games to earn rewards. This recent financialization of the gaming industry can represent a drastic change to traditional gaming, where the only incentive to play the game was the element of fun alone.

Current Approaches

We can differentiate mainly between the two approaches. One is that of casual gaming, which is similar to many mobile games and focused on those who only play once in a while (e.g. during their commute back home). Another is that of AAA-rated games that is focusing on those that actively seek out games as a free-time activity.

1) Casual Gaming

The first approach is casual gaming. People in this category might only play once in a while and enter the market for social aspects or to simply "kill some time". Casual gamers represent a big audience, and games targeted toward them should have low barriers to entry and simple controls. As such, especially for blockchain-native games, it is important to make the usage of tokens in the game easy. Sometimes this means that not everything

needs to be done on the blockchain directly and that free elements are simple code and only for paying customers NFT technology will be utilized.

One example of casual games is Axie Infinity - one of the largest P2E games on the blockchain. Players in Axie Infinity are tasked with collecting, breeding, and training creatures called "Axies." Eventually, players can put their Axies to the test by engaging in player vs. environment or player vs. player battles. Axie Infinity can be categorized as a casual game due to its widespread popularity and relatively informal gameplay. Axie Infinity established a two-token GameFi model, in which one token serves to provide in-game utility ($SLP), and the other serves as a claim to engage in DAO governance ($AXS). Years later, the two-token GameFi model has proven to become an industry standard and can be found across a plethora of games on the blockchain.

2) AAA-rated Games

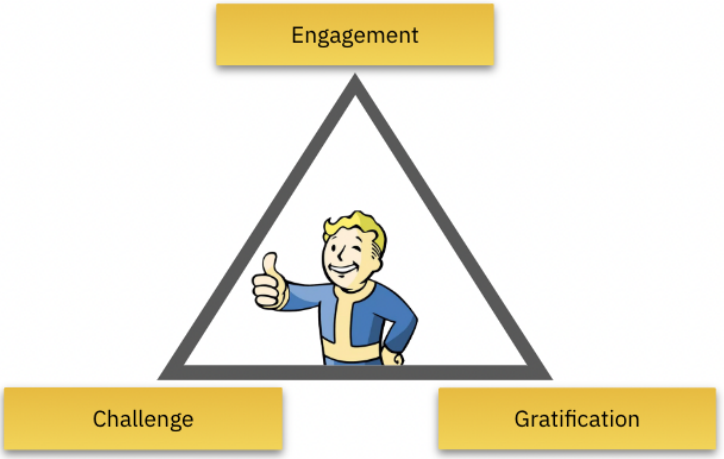
The second model of blockchain games is AAA-rated games. This model is the most likely to onboard typical gamers that aren't accustomed to the web3 space. There is a lot of hype around upcoming AAA-rated games, which are expected to have industry-grade gameplay. However, onboarding traditional gamers onto the blockchain might come with some barriers. As such, focusing on strong game design and industry-grade gameplay that is better than that of traditional platforms but utilizes blockchain technology might be the best approach here. Similar to casual games, in-game purchases should be seen as enhancements to the user experience and not create barriers that would make the game unenjoyable. AAA-rated games, compared to casual games, might prove to be more sustainable over the long run as they might be able to create a loyal customer base (similar to League of Legends) that is enjoying the game for what it is. This should be an overall net positive as it most likely means that people are willing to hold tokens and NFTs for longer.

Illuvium is a highly anticipated, AAA-quality role-playing game. In the world of Illuvium, players are tasked with journeying across seven different graphically rich, alien landscapes to capture beasts known as Illuvials. Players in Illuvium can additionally wager on battles between Illuvials and purchase land to house and level up their Illuvials. Illuvium was created to fill the lack of "AAA gaming titles with cinematic quality 3D special effects" on the blockchain. As an AAA-rated game, players of Illuvium should expect high-quality visuals and game mechanics. Unlike Axie, Illuvium will follow a one-token GameFi model, in which it has only one native token ($ILV) for governance purposes. For in-game utility, Illuvium players will have to use ETH or convert their $ILV into synthetic $ILV (in a 1:1 ratio).

What GameFi is missing

Designing a game while utilizing crypto is not easy. Tokenomics can often distract the developers as they don't focus on the key elements of what makes a good game, as mentioned above. Simplifying the seven pillars we outlined earlier, we can see how game developers aim to optimize for a trilemma between challenge, gratification, and engagement.

Figure 6: Web3 Gaming Trilemma



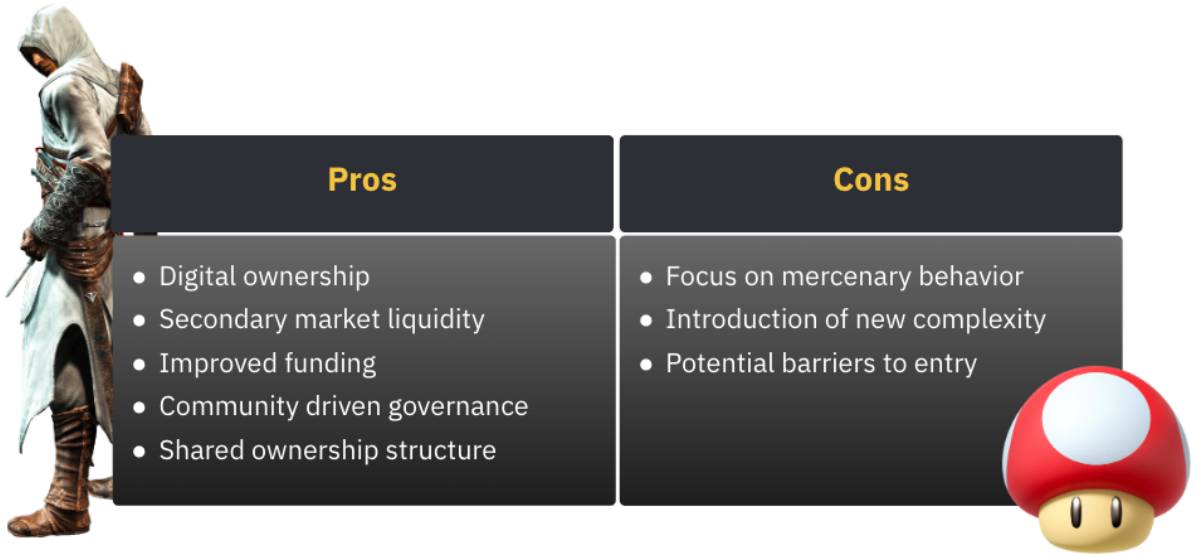
Source: Binance Research, Galaxy

It is important for game developers to continue to emphasize all three of these aspects rather than just optimizing for one. Tokenomcis within a gaming ecosystem can introduce risks that limit the ability to optimize for these elements as control of the game's economy can be impacted. One key element to pay close attention to is sustainability.

Sustainability

One key issue that P2E games are facing is sustainability since a majority of players are putting too much focus on the ability to earn tokens rather than enjoying the game itself. As such, GameFi is currently in a stage where "mercenaries" are still part of the ecosystem, and while it will likely remain like this for the foreseeable future, it is important to onboard users that enjoy the game for what it is - a fun gaming experience.

Figure 7: Benefits and Drawbacks of Blockchain within Gaming



Source: Binance Research

Current web3 gaming projects are aiming to onboard gamers at a larger level, but so far, they are struggling to reach users in traditional markets. **Mobile gaming offers one of the key markets that could be tapped into due to its ease of use.** Especially if these games are integrated into an already existing web3 ecosystem. As our society becomes more digital and people across the world have increased access to affordable smartphones, successful GameFi projects on mobile could build huge user bases through simple tokenomics models.

As of now, however, a key focus has been on creating tokenomics without thinking about the sustainability of its mechanisms, which in a worst-case scenario, can create unsustainable token economics.

Designing tokens can be negatively impacted in cases where players develop their avatars over a longer time period. The same holds true when a player's revenue depend on the token design. As with many games, introducing changes is not always welcomed by the community. User backlash is common and might be more pronounced in cases where the decision was not backed by the community itself through a DAO but by the developers directly. Most importantly, many of the current tokenomics within GameFi projects are based on wealth transfers between new joiners to early adopters of the game, which oftentimes creates a unsustainable condition in which the game relies on continued growth.

How to create sustainable Tokenomics

Having looked at some key elements of the gaming ecosystem and blockchain space, let us dive into the main part of this report. How to create a sustainable GameFi project with good underlying tokenomics.

One- vs. Two-Token Model

To facilitate token economics, a two- and n-token model can be used to separate the functionality of tokens. Two-token models are the most common form of a multi-token ecosystem. A two-token model provides two different tokens at the same time. This helps to specialize the use cases for each token by separating the "ecosystem" from a "purpose-solving" token. In most cases of two-token models, we have a **utility token** and a **governance token**. The utility token offers utility across most of the network to perform a specified task (e.g. to allow for in-game transactions). The governance token helps to decide on the directionality of a project by allowing to vote on proposals.

Governance Token - Governance tokens help to manage a protocol without impacting the price of the utility token. This becomes important when we consider use cases of a two-token model within games (amongst others) where the game design could be negatively impacted if a single-token model is used. If you want to make an in-game transaction (e.g. buy a collection item) but only have one token that is also used for governance, the game design might be negatively impacted due to speculation and price fluctuations. In extreme cases, this could lead to some gamers being excluded from the game due to high barriers to entry. **As such, the main "task" of a governance token is to help separate the management of a decentralized project from the remaining aspects that should be considered.**

Utility Token - This token is used only within the game. With this token, investors cannot raise funds as it is used to serve specific purposes based on the platform's architecture. Utility tokens could enable specific actions or provide specific rights within a platform or GameFi project. The best way to think about utility tokens is to imagine them as in-game currency, where you wouldn't want to see large price fluctuations to exclude a huge majority of gamers and have an infinite supply to be able to scale the game without negative impacts from scarcity.

Evaluating the benefits and drawbacks, we believe that less dilution of the governance token is a key advantage of a two-token model. Conceptually, when a reward is given in a

second token, we shouldn't have a diluting effect on the first token. Furthermore, a separate utility token can allow for unlimited emission, which - especially for games - is a key aspect to consider. As such, a second token and a separation between governance and utility tokens can help to provide control over the inflation of the utility token. This, in return, is important since you want to be able to maintain a growing economy without leading to high barriers to entry due to high token prices. In addition, in some cases, supply restrictions would be favored by investors. As such, separating the use cases might help to tailor a token to the right audience.

Despite the benefits that a two-token model can bring, we also have to note some negatives. Use cases of a token are separated - which can lead to unnecessary complexity. Furthermore, this complexity can lead to wrong expectations. So far, some investors have expectations of tokens being somewhat correlated where it shouldn't be the case.

Depending on the use cases, each model offers some advantages and disadvantages. **For some games, we believe that the advantages could outweigh the disadvantages when it comes to a two-token model.** The separation between governance and utility tokens comes with clear benefits that are important for games - such as inflation control and incentive through fixed supply for investors. However, considering the above-mentioned downsides of two-token models**, we believe that it should be enough for projects with well-designed tokenomics to function on a one-token model** - especially if they leverages the usage of NFTs and other innovations. Especially if the game is truly fun to play. In the end, both of them offer two separate approaches that can work well depending on the specific design characteristics.

The Role of NFTs

Another aspect to look at is that of NFTs. NFT collectibles are perfectly suited for the GameFi space as they can represent characters, items, or even land. It's not always necessary to own an NFT to earn in P2E games, but in most cases, this is a way to maximize your income. Since every NFT is unique, this digital item is yours until you sell it.

A key question to ask around NFTs is whether or not people would be willing to hold them without the game built around them. While this should hold true for very popular games or unique designs, the majority of NFTs will most likely be of little value outside of the game itself.

Sinks and Faucets

Another key element we want to touch on as well is that of Sinks. Sinks and faucets aim to bring balance in value flow within a game. Simply put, sinks remove digital assets from circulation while faucets introduce them.

We can differentiate between two types of sinks

- **Inflationary sinks -** What you pay is sunk immediately, but what you earn will be minted in the longer term
- **Deflationary sinks -** A voluntary spend with no monetary benefits

Thinking about sinks and faucets from a web3 perspective we can see that introducing more and more inflationary sinks without a deflationary counterpart can be a dangerous endeavor since it might negatively impact the sustainability of a project.

That being said, together with deflationary sinks, the usage of sinks can bring a multitude of benefits since they incentivize traditional gamers to stay, given they leverage ownership and status. If players don't have an in-game activity to spend their tokens on, the supply of those tokens will create enough inflationary pressure to sink the price of the game's token. One of the simplest and most effective sinks is selling ultra-rare collectibles.

Targeted Token Model



Key Idea: If a game cannot maintain a steady user retention ratio, it cannot be sustainable in the long run

When designing GameFi tokenomics, a key aspect is their inflation design and overall sustainability. Similar to traditional games, the marketing budget is finite and has to rely on a constant stream of incentives to onboard renewable solutions for games on the platform. Instead, a key focus should be put on the overall innovation of the game design and gameplay aspects (new characters, skins, levels) that help to keep players engaged. As such, we believe that GameFi projects have a justification for a higher initial token allocation towards their treasury, as this helps to fund future development and growth.

There can be benefits of using a two-token models as outlined above, and depending on the game design, splitting governance and utility token can benefit investors by decreasing the overall dilution and lead to a larger overall supply for user bootstrapping. However, we don't see two-token models as a requirement for crypto games.

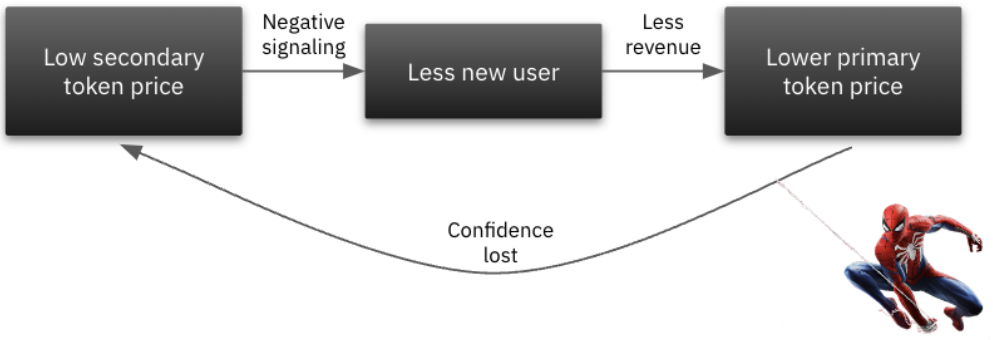
We believe that for a game that is truly entertaining, a single token can be sufficient. This can offer a multitude of benefits. Two noteworthy benefits are:

- It minimizes the confusion and dilution of in-game utilities
- It helps to focus market demand (and market-making resources) efficiently

Currently, the underlying issue with a two-token model is that it can lead to a downward spiral. As such, if developers incorporate tokens, they should be cautious that these tokens are designed in a way that avoids this. Furthermore, a two-token model relies on constant balancing between the two tokens, as can be seen with Axie Infinity which relies on a constant adjustment in the breeding fees in SLP and AXS to maintain the demand of both.

Another underlying drawback of a two-token model is managing the token prices of underlying tokens that have a large supply, which is a key risk factor that could cause a death spiral.

Figure 8: Death Spiral Scenario



Source: Binance Research

To create a healthy balance we suggest the following:

- Restrict the reward token to a fixed percentage of the total supply to be distributed over a predetermined period of time (e.g. 1 year) to put a cap on the governance dilution

- In order to create a sustainable design any future addition to the reward token allocation from the treasury or revenues should depend on key user and revenue metrics (e.g. calculate cost of user acquisition, revenue per user, as well as % of paying users). Only once this is done the overall budget should be determined. A model of marginal diminishing returns should be considered

- We see an initial higher allocation towards the treasury and dev community as justified to finance further development and innovation

In conclusion, we believe that there is a justification for both one and two-token models with both bringing their own benefits and downsides. As such, the decision on the model should be made in a project-specific context. We believe that for a truly entertaining game, a single token can be sufficient. Just creating a two-token model without having designed a healthy mechanism can introduce new risks to a game.

User Bootstrapping



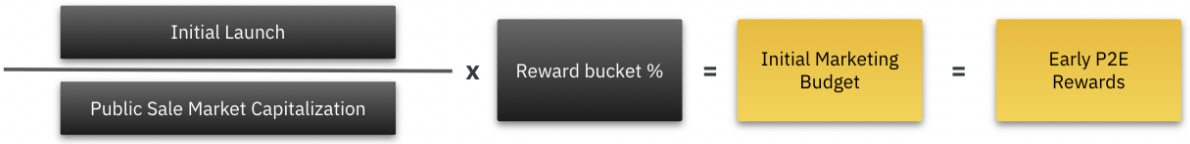
Key Idea: Using the traditional game launch model to determine the go-to-market budget and initial % of the reward bucket

Bootstrapping and onboarding new users is a key element for traditional and crypto-native games. The initial and ongoing user bootstrapping can often determine the overall success of a project and should thus play a key role in the overall strategy. We believe that an initial marketing budget should be comparable between traditional games and those that launch on a blockchain. The focus here is especially on the initial launch. As thus we see the justification for an overall higher allocation towards a treasury or marketing allocation that is similar to that of traditional games.

- **AAA games -** allocate 1:1 between marketing budget & development cost

- **Casual games -** allocate ~25-50% of the development cost towards marketing

Figure 9: Bootstrapping allocation



When thinking about user bootstrapping the initial goal should be to achieve a base layer of users that will create networks effect for the game. As such, we believe that reaching an initial 50,000-100,000 users is a key milestone for projects. Considering that retention rates can vary widely we should and customer acquisition costs can be higher for more complex (and niche) games we believe a realistic assumption should be that 10-25% of users will be retained. Word-of-mouth marketing is a key aspect to consider to onboard further users in the future.

At its peak, StepN had around 3 million monthly active users ("MAU") with a key part of the growth being driven by word of mouth.

We further believe that due to the niche nature and user behavior of GameFi, an overall higher acquisition cost for new users should be expected - slightly surpassing that of traditional mobile games.

In our view, it is key that a healthy balance between the percentage dilution of ownership and the overall marketing is created. Once a healthy bootstrapping is created it is important that further incentives should come from the revenues generated and not from the treasury.

Revenue Accrual

Key Idea: Revenue distribution and allocation should be structured in a way that rewards the long-term sustainability of the game

Once the project is bootstrapped and a basic level of monthly active users is playing the game it is important to manage revenue accruals in a way that is sustainable. As such, **revenue distribution and allocation should be structured to reward long-term sustainability by incentivizing the team to continue developing the token**, instead of

using buyback and burn mechanisms that lead to a shrinking economy. While this is benefiting token holders in the short term we believe that it contradicts the overall idea of sustainability in a GameFi context.

In our view, revenue accrual should go exclusively (100%) to the DAO which should be controlled by token holders. Additionally, any revenue distribution at the token generation event should follow the below rules:

- Allocate a percentage towards the “reward bucket” - This allocation should be used for tournaments, loyal rewards, and skilled players
- Allocate a percentage to pay off development debt (if any)
- Allocate a percentage towards a team bonus that will be available if specific milestones are achieved

Team Incentives

🔎 **Key Idea:** Reward game development instead of token performance

Let’s continue talking about team incentives. The overall idea should be that team performance is encouraged not just by the overall token performance but by the game development instead. As such, in contrast to many games now, the key milestones should incentivize ongoing development, which allows for a more sustainable environment. As such, operational metrics such as the number of gamers, monthly active users, or key in-game developments (new levels, skins) should be at the forefront of this.

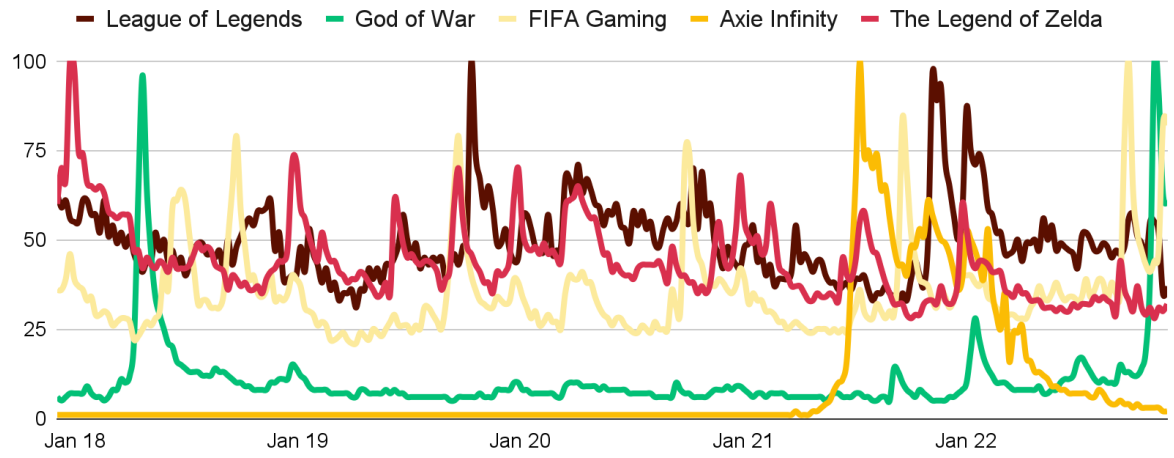
One way to do so is by agreeing to pre-defined milestones such as new maps, number of users, etc. It is important that these milestones will be adjusted by the DAO over time based on the overall performance and direction of the game. The goal should not be to make these milestones easier to reach but to create continuous motivation.

Game Lifecycle

🔍 **Key Idea:** The DAO should act as the management and the supervisory board of the company looking at the long-term future of the project

If we're looking at web2 Games, we can see that they often move in cycles and that the overall game lifecycle is limited if no innovation takes place. This is especially true if we compare console games (little to no change after release) to online and mobile games such as League of Legends, which expanded its lifecycle through constant innovation.

Figure 10: Google Trend Comparison for different Games



Source: Binance Research, Google

As we can see above, a game's lifecycle isn't infinite and only constant change and innovation (which is easier in mobile and online games) is helping to keep the projects alive. That being said, looking at the traditional gaming space, revenue generated by sales from early games usually help to fund future projects.

Considering the lifecycle of games, a DAO should act as the management and board of directors of a company by focusing on the long-term future of the project. It is important to note that this future does not have to be defined by a single game, but can include many iterations of the same or different games. This can help to incentivize the community and core developers to stay invested in the project, thus prolonging the token life-cycle as well.

A few elements of games have also proven to prolong a game lifecycle and focusing on these elements can help to improve the overall sustainability of a project.

- **Social Elements -** Creating communities and engaged members that come to the game not just for the graphic but for the community (similar to what Counter Strike and League of Legends have created) can help to add an additional element of "stickiness" to the game that can prolong the overall game lifecycle

- **Features -** As mentioned above, bringing continued innovation to a game and introducing new features, content can help to increase the longevity of a project.

Once the popularity of a game has died, it can be proven helpful if the DAO and (the community behind it) allocate new bonus schemes out of the revenue towards content development. This is a key element to improve the need for the token. As such, we should think about tokens of gaming projects more of tokens of a game developer that creates continued innovation and games that people enjoy.

Inflation



Key Idea: If rewards are funded by revenue in a controlled and calculated way inflation should not be a long-term issue

While inflation might not always be an issue, it definitely is a key element to look at for two-token models. Inflation in the context of two-token models is important as inflation in the secondary token can trigger a downward spiral that could be hard to reverse once taken place.

In terms of inflation control, it is important to note that if the budget for initial rewards is fixed and any subsequent rewards are funded by the revenue generated (in a controlled way) then inflation should not be a long-term issue for the project.

However, selling pressure from an initial allocation towards a reward budget would still need to be mitigated. This could be done either by introducing vesting periods for the rewards (to give enough time for the players to get addicted to the game and become loyal users) or by mercenary players absorbing the selling pressure. With enough control, the selling pressure should be reduced compared to the incentive rewards programming of the two-token model.

As we can see in Figure 12, reinvesting in the game and building continued improvements is a key way to mitigate inflation risk. As such, we believe that DAOs should continue to focus on building new innovations and that the introduction of events, new unlocks and accessory is important in doing so. In a worst case scenario, the introduction of tokens could trigger a downward spiral, and as such we believe that the token utility should always outweigh the risks.

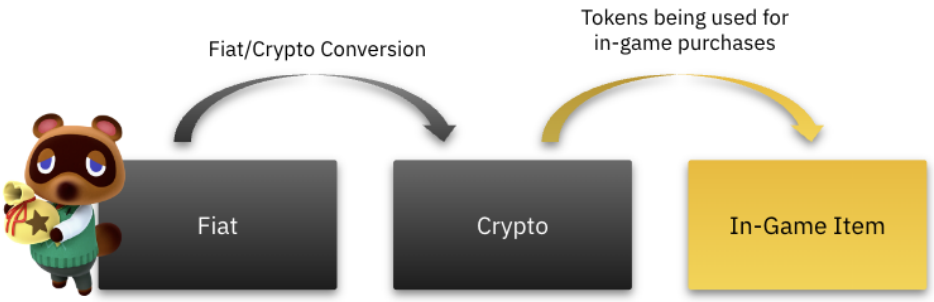
Token Utility

🔍 **Key Idea:** Create demand for the token carefully in order to balance user adoption (free-to-play) and pay-to-win

As mentioned in earlier chapters, utility is a key aspect of every tokenomics design. Within the gaming space, it is important to create a reason for the players to buy the token and play the game. In terms of tokens, the most direct way can be by accepting the token as a medium of payment (rather than using a stablecoin).

In order to create utility and adoption outside of the crypto space and attract traditional gamers, fiat on-ramps can be important applications to help users to pay with credit cards - despite the underlying mechanism being crypto-native. As such, fiat should only enable you to buy the token which can in return be used to operate in-game transactions.

Figure 11: Fiat On-Ramp



Source: Binance Research

One element that needs to be considered here is that of know-your-customer (KYC), which is why it might be beneficial for the game to manage the fiat on-ramp steps for the players, rather than the players doing it themselves.

When thinking about designing a token economy, a developer is usually faced with the decision of whether to price everything in USD and have a token to pay for it or to price everything in the token directly.

As can be seen, if everything is priced in USD but paid with a native token, in case of a price appreciation of the token, users may be reluctant to spend their tokens on in-game items. However, this could be balanced by introducing new rare items and constant innovation to the game that allows users to value the items higher.

For the second case, if everything is priced in the token and also paid for it with the token, we run the risk of creating an environment where the entry requirements will become higher as the token appreciates, creating an unfair gameplay experience and barriers to entry. As such, we believe that the best solution is to price in USD since overall gameplay is less affected. This is in contrast to the majority of games now, however.

Currency distancing is a key aspect of in-game economic design. The goal is to de-couple the in-game currency from its underlying currency.

Furthermore, we believe that it is necessary to create a healthy balance between addictive, free-to-play elements and the pay-to-win characteristics of a game. Ideally, paying should only affect cosmetics (like League of Legends) and does not impact the gameplay itself. To go down this route, patience is a key element, as monetization will only happen over time as the popularity of the game progresses. For social games, paying should only increase the convenience, but not negatively impact the overall experience.

To evaluate the effectiveness of parameters, we believe that e a more quantitative way is appropriate. This could be based on traditional game data to predict user attraction, retention ratio, paying ratio, and revenue per paying user.

When a well-capitalized game studio wants to develop a web3 game without worrying about token design, there is also the option of not issuing new tokens at first and using only stablecoins like BUSD and USDC, though we believe that this option would limit the overall design choices and mechanics of the game.

Figure 12: GameFi Token design Key Ideas Summary

Targeted Token Model	If a game cannot maintain a steady user retention ratio, it cannot be sustainable in the long run
User Bootstrapping	Using the traditional game launch model to determine the go-to-market budget and initial % of the reward bucket
Revenue Accrual	Revenue distribution and allocation should be structured in a way that rewards the long-term sustainability of the game
Team Incentives	Reward game development instead of token performance
Game Lifecycle	The DAO should act as the management and the supervisory board of the company looking at the long-term future of the project
Inflation	If rewards are funded by revenue in a controlled and calculated way inflation should not be a long-term issue
Token Utility	Create demand for the token carefully in order to balance user adoption (free-to-play) and pay-to-win

Source: Binance Research

Conclusion

Designing games is hard. Designing games on the blockchain - while bringing a lot of new innovations - might even be harder. Incorporating tokenomics into a game adds a whole new layer of complexity for game developers. However, numerous benefits make it a worthwhile endeavor.

We have seen how important it is for game developers to design tokenomics that truly complement the overall game design rather than being carelessly integrated. **In a worst-case scenario, player incentives become misaligned and may overshadow a game's inherent value**, which will negatively impact the overall longevity of the game.

While still in its early stage, we believe that web3 games will likely do for blockchain technologies what solitaire did for the computer in the 1990s - drive further adoption and education. By educating users on how to operate a wallet, pay gas fees for transactions and interact with smart contracts, crypto games are potentially the next key driver of growth and adoption within the crypto space.

Looking at the tokenomics element in more detail, we believe that fun and entertainment remain key elements to consider - tokenomics should add to this rather than distract from it. One key issue that P2E games are facing is sustainability since a majority of players are putting too much focus on the ability to earn tokens rather than enjoying the game itself. As such, we see that while there a benefits to a two-token model, it isn't an underlying necessity for games to be successful. We rather see that **truly fun games can design sustainable tokenomics with a single token alone.**

One of the obvious challenges with creating sustainable web3 games is tokenizing all game assets without sacrificing control of the game's economy. I**t is important to keep in mind that just because an in-game asset can be turned into an NFT or fungible token, it doesn't mean it should be made into one.** Instead, it is important to consider how this will impact the overall gaming experience and if there are net benefits to it. Each asset that is introduced within a game needs to justify its existence and bring value across user acquisition and retention.

About Binance Research

Binance Research is the research arm of Binance, the world's leading cryptocurrency exchange. The team is committed to delivering objective, independent, and comprehensive analysis and aims to be the thought leader in the crypto space. Our analysts publish insightful thought pieces regularly on topics related but not limited to, the crypto ecosystem, blockchain technologies, and the latest market themes.



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