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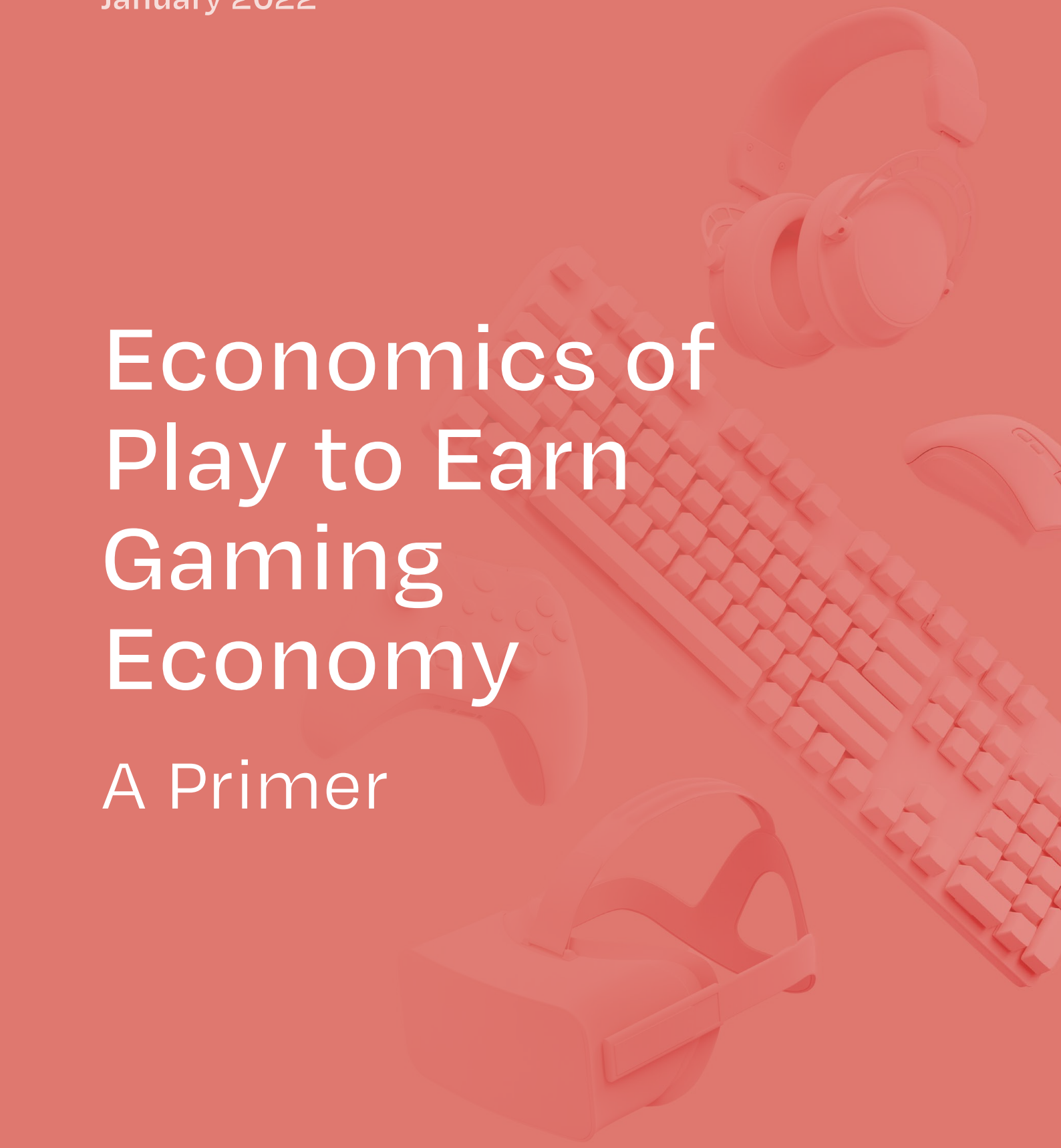
Economics of Play to Earn Gaming Economy

A Primer



Economics Design

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Glossary

P2E: Play to earn. A new business model for gaming companies, where users are rewarded for their participation either with an in-game currency generated by the platform or with unique items within the game. The ownership of both these assets is recorded on-chain through token standards, either fungible or not.

Metaverse: Persistent online virtual environment where users can interact through avatars. Ownership and value exchange in metaverses could be regulated through the use of Blockchain technology.

NFT: Non-fungible tokens. These are tokens that represent ownership of unique assets recorded on a Blockchain platform. Most commonly implemented through non fungible token standards such as ERC-721 or ERC-777 on the Ethereum Blockchain.

Value: Relative utility of an asset in the economy.

Gameplay: Features of a video game specifically contributing to the gaming experience it offers to its users.

Game scope: Intended game experience, its breadth and scope. It determines the complexity of the gameplay and economics design.

Adverse selection: Market situation where buyers and sellers have different information. Users with more information participate selectively in trades when they deem it profitable, decreasing the quality of market for everyone.

Economics design framework: The economic design framework analyses economic systems in the crypto industry by dividing each topic into three macro categories: market design, mechanism design and token design.

TVL: Total value locked. The value of collaterals or assets locked in a game.

Executive summary

Play to Earn (P2E) Games is the new paradigm in video games that combines DeFi and entertainment to create a new game genre that allows players to make money while playing. There are more and more games and projects that aim to create economies that sustain themselves by feeding incentives that balance NFT and tokens' utilities.

In this research we have delved into the concept of Play to Earn games. We started with analyzing the type of users, the incentives applied to these users and subsequently the project's gameplay, and how these incentives work together. These games aim to become the new way we interact with the internet-economy by creating new ways to earn money and monetize our free time. This is aligned with the concept of a metaverse.

Twelve games were selected and analyzed taking into consideration the most different mechanisms, designs and game type. The research is divided into three main sections, a concluding part with recommendations on the most interesting models and an appendix with a small intro to the various games analyzed.

First, we analyzed the different personas and agents inside the game ecosystem delving into their incentives on taking part on the metaverse and becoming part of a community.

Then we used the usual framework to classify and categorize the projects defining the mechanism, the market, and the token design to understand the fundamental blocks of this new genre of game and finance.

Lastly, we analyzed how the design of a game affects the P2E economic model combining different research areas to identify pros and cons of the project and to make some considerations about the solution.

The research seeks to analyze the economics and user interaction aspects within games rather than the aesthetics of the game itself. The new trend of the metaverse, the potential of non-fungible tokens as a digital property right, the secondary and open economy and a market of 2.5 billion people are just the outline to understand how strong the interest in this sector is.

Introduction: Play to Earn GameFi Economic Model

Play to Earn or GameFi has taken the cryptocurrency world by storm this year, combining DeFi and entertainment to create a new genre of gaming allowing people to make money by playing. It's no secret that in some developing economies some are making a living[1] by playing these games. How is it possible that playing a video game provides so much economic value that these mini economies sustain themselves and grow into the hundreds of millions in TVL? Behind it all is a carefully designed token economics system with incentives balancing NFTs which usually represent some sort of in-game property and a utility token that represents a sort of internal currency. Players use these NFTs to earn the utility token, which has a value on the market and can be exchanged with ordinary DeFi infrastructure[2] into other currencies. While owning the NFTs of some of the more popular games like Axie Infinity are reserved for whales with high entry points[3], new games are popping up every week where anyone can get a small stake in the game economy and start playing to earn. Some games go further than that, implementing passive income schemes like owning digital land[4] or other assets. By no means are these games reserved for children, they aim to become the new way we interact with the economy and spend our free time.

1 cnunley7. (2021, June 28). *People in the Philippines are earning cryptocurrency during the pandemic by playing a video game.* CNBC. Retrieved December 7, 2021, from https://www.cnbc.com/2021/05/14/people-in-philippines-earn-cryptocurrency-playing-nft-video-game-axie-infinity.html.

2 These DeFi instructure are financial products or tools like (decentralized) exchanges.

3 *Metaverse project axie infinity sold Virtual Land slot for over $2 million.* Market News & Forecasts, Charts, Broker Reviews. (n.d.). Retrieved December 7, 2021, from https://www.fxempire.com/forecasts/article/metaverse-project-axie-infinity-sold-virtual-land-slot-for-over-2-million-821728

4 R. S. (2021, June 18). *Why people are buying digital lands in the Sandbox and why you should too – sponsored Bitcoin News.* Bitcoin News. Retrieved December 7, 2021, from https://news.bitcoin.com/why-people-are-buying-digital-lands-in-the-sandbox-and-why-you-should-too/

In the first section we looked at different games from the perspective of 5 key agents of this type of economy. Every agent has different incentives to interact with the game. A good economic design should align the incentives of all its stakeholders towards a common goal: a healthy and sustained growth of the metaverse and ecosystem. They require different monetary or time investments and different skill sets so they appeal to different demographics.

In the second section we applied the usual framework[5]: mechanism, market and token design to identify key design areas in the economics of blockchain games. Among these thematic areas some, like governance[6], are also fundamental to the design of other blockchain projects outside gaming. Others are characteristic of Play to Earn games, as an example the incentivization of User Generated Content. This allowed us to delve deep into which game mechanics interact with the economics design of GameFi to make the games fun and profitable.

In the third section we combined different areas to identify common problems and find holistic solutions in the design of the game. Drawing from our experience in DeFi, tokenomics and governance considerations largely overlapped with what we know from established DeFi protocols. Some considerations were specific to the gaming industry where we have less experience but did our best to critically analyze this new genre of finance.

5 Tan, L. (2019). Token economics framework. *Available at SSRN 3381452.*

6 Mitra, R. (2019). What is blockchain governance: Ultimate beginner's guide.

Segment 1

Personas Considerations

Personas for economics design consideration

	Market Design *Parameters highly customised by game designer and developer*	Mechanism Design *Rules for users interacting within the ecosystem*	Token Design *How the value interaction in the ecosystem affect its in-game assets*
Players	• Free to play vs play to play • Closed/open source dev • Player's roles • Interaction with others • Player types	• Gameplay • Incentive loops • Pay to win vs play to win • Game scope	• Hourly earning potential • Inflation rate • New vs existing player • Access to rev share • Gov power
Builders	• Demographic reach • In vs off-game activity • IP protection rights • In-game development model	• Dev and maintenance • IP protection rights • Control release/dev	• Value recognition from others • In-game governance
Developers	• Potential Partners • Different player types • Game upgrades and dev	• Resource Supply Regulation • DAO gov changes • Fixed design by dev	• Token Monetary Policy • Utility of different tokens • Relation among different tokens
Investors	• Composability and interoperability • Network effects • Game-play metrics	• Collectibles • Sustainability • In-game mechanics	• Tools for assets • Token vs game expansion • Value creation and capture
NFT collectors	• Publicity and visibility of NFT • Notoriety of project • Long-term attractiveness and sustainability	• NFT asset utility • Decentralisation analysis • In-game rev model • Asset vs governance	• Supply and inflation rate • Rarity and desirability • Revenue generation profile

When designing any economy, be it P2E or non-blockchain based, it is important to first consider the types of economic agents in the space. These economic agents can be split into 5 personas - players, builders, developers, investors and NFT collectors.

We see these agents in traditional, non-blockchain based games too, although NFT collectors are the first of its kind. There are investors in non-blockchain games which are also a new dimension as the investor model has shifted. Because we see a new addition to the economic agents involved, the economics of P2E can change drastically, depending on the incentives to them.

For all economic agents, we look at them from the perspective of the existing economics design framework: Market Design, Mechanism Design and Token Design. The market design is the economy's parameters, typically defined by the game developer, and by extension, game designer (aesthetic and economy design). Mechanism design is the rules for economic participation in the game's world. These determine both the gameplay and rules of how these agents interact with each other. Token design is the value creation when users interact in the game world.

The reason for having these personas is that they help to scope out the right economic policies in each unique game economy. As the underlying game is different, the economic policies can also differ greatly.

1.1 Players

Players are the core value creator in the game universe. The way the market can be created will affect the players entering. For instance, a Free to Play vs Pay to Play model. That can greatly affect the number of players, thus the thickness of the market.

The development for the game is also important as players do not just take on a single role. They can also take on the role of builders, and the open vs closed-source development can impact how market thickness is bootstrapped.

Depending on the level of ideal decentralisation, the players can also take on leadership and governance roles. Having such a plan in the roadmap can help in the ideation of the native governance token's monetary policy.

If decentralisation is the goal, the interactions between agent types will be something to think about when designing the economic policies and token economics. After all, the token model emphasises the policies for these agents.

Understanding the player types help to have a better sense of the player behaviours. For instance, certain promotions might encourage adverse selection of bots and players, as opposed to real players, focusing on game play and value creation. That can definitely affect the effectiveness of increasing market size of the game.

In the context of mechanism design, traditional gameplay is of essence to players. The various incentive loops, pay to win and game scope enhance how fun the game is played, which helps in value creation by the players.

Lastly, in a Play to Earn model that we see in blockchain, tokens play a new and important role in the economy. Considerations like potential earnings in dollars, inflation rates, tradeoffs for late entrants and revenue share are important considerations of the player in any game.

1.2 Builders

Builders are a specific type of player in the game. Whilst they are not core infrastructure developers, they help to build the world, which then facilitates the game world for players. It is possible for one to be both a player and builder.

When building the game universe, assets and infrastructure, the builder considers the market at large. Such as the demographic reach, the in-game vs off-game activity, white-label vs license model and connectivity to off-game blocks and use-cases. This increases the utility of infrastructure built, which increases the value creation multiplier to the builder.

For the mechanism design, this means the ability to leverage development of the main game to build new infrastructure. And to do that, it is important to be mindful of the rules of interaction.

In token design, there needs to be value recognition for external parties. This value is realised by holding the tokens, hence it becomes a consideration when designing the monetary policy of the token.

1.3 Developers

As the core game developer, the market is not just players, but also potential partners and different types of players in the game. This increases thickness and also increases the type of users. A diversification of user-types helps to build a more antifragile, potentially countercyclical, system.

Mechanism design will be core principles for developers. That includes the resources supply regulation, DAO functions to update rules of the game and the balance between having the entire game's economic policy designed by the developer or to allow for new rules to be created by the community.

In terms of monetary policy, the developer has to balance between the token monetary policy, utility of various token types and most importantly, the relationship among different tokens, and players, to help with value creation.

1.4 Investors

Investors take a different approach to market design. Looking internally, that is the various metrics to understand market growth, to look at long-term performance. Externally, that is the ability to cross various metaverses and grow the network effects.

On the mechanism design side, depending on the type of investors, some play the game, so they hold the player persona; in-game mechanisms considerations are similarly applied. For non-players, that is the rules around collectibles, economy, passive value accrual and long-term sustainability of the resources and tokens in the game.

Token design considerations for investors are both micro in terms of using the native tokens for game expansion and addition, as well as macro in terms of value capture by the token and real value realisation in the game.

1.5 NFT Collectors

NFT collector is a new persona in the gaming and metaverse space. There are virtual game collectors in traditional games, but trading happens in the black market, which incurs a middlemen fee to the players. In addition, the risk of trading in the black market[7] includes not receiving the assets, receiving counterfeit assets and receiving illegally stolen assets that are not usable in the game. As NFT is publicly traded, this allows for a new paradigm of market to exist. This includes visibility of NFT collection, notoriety of overall project and long-term attractiveness of the NFT within the game market and external metaverse market.

The utility and contribution of the NFT asset in the game and its subsequent mechanism design becomes crucial to NFT collectors. Beyond that, the risks, business rationale of the game and relationship between assert owners and governance also play an important role in the mechanism considerations for NFT collectors.

Lastly, as with NFTs, the supply and inflation nature of the asset, together with the rarity and revenue generation profile become the key incentive for NFT collectors in the space.

All in all, these are the 5 core persona types and their subsequent considerations in the economics design framework. This builds the core building block for economists to design the right incentives for the game.

7 Lee, Y. H. (2005). An Irrational Black Market? Boundary work perspective on the stigma of in-game asset transaction.

Segment 2

Economic Design analysis of P2E models

Economics design framework for P2E economic models

Market Design

Parameters highly customised by game designer and developer

- User generated Content
- NFT & in-game usability
- Value Creation

Mechanism Design

Rules for users interacting within the ecosystem

- Governance
- Revenue model
- Network effects

Token Design

How the value interaction in the ecosystem affect its in-game assets

- Monetary Policy

The economics design framework was developed to allow economists, ecosystem creators and platform designers to focus on the important aspects when developing a sustainable and working economy. Similar to that of designing a country's economy from scratch, it looks at 3 pillars: market design, mechanism design and token design.

We have used this framework in the token economics book, 2 prior stable coin[8] macro market analysis and other micro DeFi[9] economies. In this report, we share how the framework is updated with other factors of consideration, when designing another form of economy: Play to Earn game economy.

2.1 Market Design

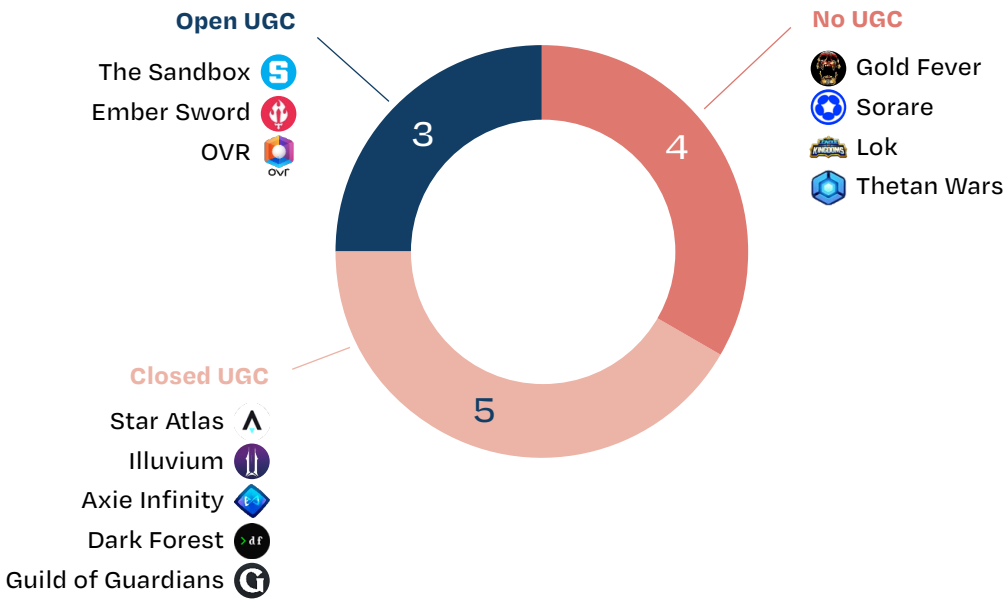
Market design are the various parameters initially decided by the game designer and developers. This is important to limit the effectiveness of the mechanism design and token monetary policy designs moving forward. In addition, market design includes factors that build the core parameters to build a multi-sided market in the game. This involves user generated content, NFT and its usability and value creation by the economy.

8 https://econteric.com/markets/

9 https://econteric.com/fundamentals/

2.1.1 User Generated Content

Game and User Generated Content



Incentivizing the creation of User Generated Contents represents a central challenge in the design of a game's economic system. Usually IP rights are protected by NFT tokens representing ownership in the newly created asset. However, when the content generation process allows users to freely create new assets, scarcity cannot be achieved only with NFTs.

For example, imagine a newly minted NFT in a game like The Sandbox. This NFT is extremely attractive and its creator is able to generate consistent revenues from it. In this case a new user could generate a slightly different version of the asset and offer access to it at half the price. This mechanism would destroy creators' prospects to generate value from their creation and would disincentivize them from putting the creative effort in the first place.

A potential solution, although extremely complex, could consist in a gatekeeper algorithm. This automatic algorithm could check potential NFTs for similarity with other, already minted NFTs to constrain the growth at the expense of value creation. Alternatively, a solution found among the projects analysed only in an embrional form,

is community gatekeeping. Newly created contents would need the approval by the community to be minted as a new NFT. This way, the community could check, among other things, for plagiarism.

Star Atlas

Star Atlas has a rigid UGC design as developers are in charge of releasing recipes for the production of new technology. Builders have the option to combine different technologies in novel and more efficient ways, however, the emphasis here is not on rewarding and protecting creativity with intellectual property mechanisms. Rather builders have limited possibilities and are rewarded through competitive advantage in the game.

The Sandbox

The Sandbox has an open UGC system. Builders are provided with extremely high levels of freedom in designing their creations. Ownership and intellectual property rights are protected with NFT standards, however without some kind of "enforcement" (which in game is less of an utopia than in the outside world) free riding on others' creative work is still possible.

Illuvium

Illuvium has a rigid UGC design. Players are allowed limited freedoms in creating and/or personalizing their assets. For example Imbues (cosmetic changes that can add value to a player's collection) are modular in nature. The creative potential of the community is harnessed through game expansions, which however require actual developers.

Gold Fever

Gold fever has a rigid UGC design if any. NFTs record ownership of in-game assets. These assets however are created and introduced into the game by game developers exclusively.

Axie Infinity

Axie has a rigid UGC design, players can choose to breed new axies by combining different creatures. Furthermore they can upgrade land, however this processes are hard coded into the game and do not allow enough freedom on the builder's part for IP to be a major concern.

Dark Forest

Dark forest has a closed UGC design.

Guild of Guardians

At the moment the design of the game suggests that UGC is implemented with a rigid model. However, interestingly enough, the team expresses interest in developing a metaverse with community lead growth (We understand the value that a community brings to the game. Guild of Guardians will involve and reward the community for contributing to the growth of the overall ecosystem, and empower creators to build long-term businesses in the Guild of Guardians metaverse).

Ember Sword

Through the Artist Workshop Ember Sword allows for the creation of unique NFTs. Mostly focused on appearance, the system allows creators high freedom. Interestingly enough, the issuance of new community created NFTs is regulated by a gatekeeper: the community. With this design it is possible to prevent free riding, however using community governance always entails some issues.

Sorare

Being based on collectible cards representing real football players, Sorare may not be the best game to take advantage of UGC, as asset creation is based on the actual football players, not virtual assets.

Lok

Lok does not seem to leverage user generated content in the game.

Thetan Wars

Thetan Wars does not seem to leverage user generated content in the game. However this could change when cosmetics are implemented in the future[10].

OVR

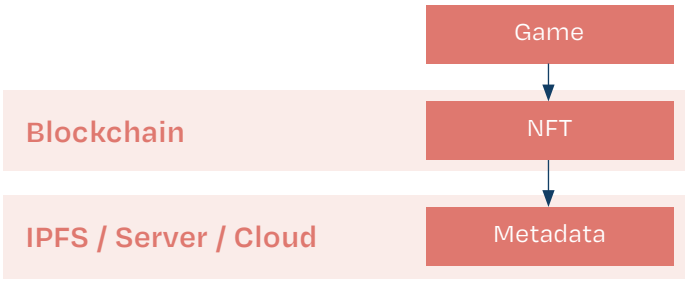
Being an open source AR platform, OVR is based on UGC. However builders are not responsible for the monetization of their assets as they would work on a commission agreement. The problem however persists with OVR owners.

10 https://doc.thetanarena.com/gameplay-1/cosmetics

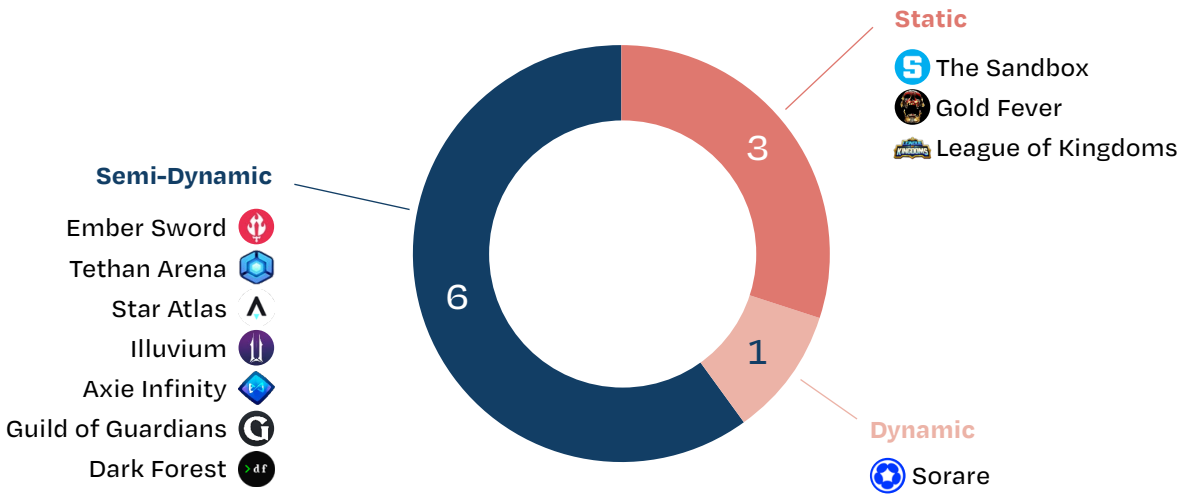
2.1.2 NFT and In-Game Usability

How does NFT create value to the game? Developing NFTs and adding them into a gameplay and game system requires some care in defining. Metadata represents the essence of the NFT and thus the certification of the same that comes from the technological point of view. Defining tradable tokens and usable in-game items is very important, such as identifying the rate of creation and inflation of them.

The simplest idea when thinking about NFT in games is the concept of "skin", that is an object belonging to the in-game customization of the avatar in the hands of the user. In the projects analysed, the concept of NFT develops and assumes forms that are very often adapted to the context of the game typology. They can take the form of dynamic figurines, they can be digital real estate and many more. It's therefore interesting to define how through the definition of the game and its style developers can adapt in a dynamic way by creating non fungible tokens and linking them to customizable metadata.



Game's metadata



The Sandbox

Type: City-building

The Sandbox is a game focused on owning non-fungible asset types: LANDS and in-game items. LANDS are non-fungible tokens developed using the ERC-721 standard for NFTs that represent the "physical" spaces of the metaverse. They allow players to own a portion of the Metaverse and thus be able to host content, i.e. in-game items. The Sandbox Metaverse is based on a map of 166,464 LANDS. LANDS are used to publish an attraction or game and can be rented to game creators. In the future, players will be able to combine LANDS to form ESTATES In the future, ESTATES will have the ability to be owned by multiple players to form DISTRICTS. LANDs are unique ERC721 with the metadata representing the coordinate of the spaces owned. In-game items are non-fungible tokens developed with the ERC1155 with the metadata being saved as a game-readable file. The asset can be created directly from the in-game editor.

Illuvium

Type: RPG

Iluvium uses Immutable X which allows users to trade their NFTs without paying gas rates using ZK Rollups. Aside from simply saving money on fuel expenses, this provides a number of benefits, improving the liquidity of NFTs to ensure that as a buyer you can find what you're looking for, and as a seller you can find someone who wants your NFTs. There is also a concept known as a "metadata order," or the ability for buyers to quickly and easily purchase assets (single or in bulk) based on the underlying properties of an NFT. This is a great advancement over today's high-friction trading, where users are often forced to search through thousands of NFTs that differ little to find what they are looking for at the best available price.

Immutable X also offers shared liquidity, allowing assets to be listed instantly on any exchange that supports Immutable X.

A successful capture results in a new NFT token minted and stored in your portfolio. When the user manages to capture a few of the same type, they merge together, which burns the existing tokens and mints a more powerful creature.

The DEX Illuvium is an online marketplace, governed by the DAO Illuvium, for players to buy and sell all NFTs in-game. The main component of the IlluviDEX is trading Illuvials, but all NFTs found in the game can be traded there.

Some tradeable items are:

- Mining or Harvesting
- Shards
- Weapon
- Armor
- Imbues

Guild of Guardians

Type: RPG gameplay

Guild of Guardians is a mobile RPG game. RPG games are massive, fragmented, and have a very high spend per player. There is a large opportunity to break into and completely disrupt this category. RPG-based assets such as heroes and items have deep collectability and can be differentiated by utility/power, making them highly appealing to trade or collect.

All blockchain assets in the game (items, heroes, pets) are ERC-721 tokens.

Dark Forest

Type: Strategy

Dark Forest is one of the first decentralised "incomplete-information" games. An example of complete information games is CryptoKitties. Here, players know the full state of the game universe, who owns what kitty, the traits of the kitties. Incomplete information games have hidden attributes. The full state of the universe is not disclosed and the players have to grind it out.

Dark Forest is basically a real-time strategy space-conquest game where players discover and capture planets in an infinite, procedurally-generated, cryptographic universe. Players can earn xDAI by broadcasting planet locations in the space strategy game.

NFT generation, metadata and utility TBD

Ember Sword

Type: MMORPG

In Ember Sword, skins, avatars, emoji, pets, mounts can be collected. Collectables never have any impact on gameplay or make the player stronger. All collectibles in Ember Sword will exist in a finite amount. Each month, new collectibles will be introduced and distributed through PvP and PvE objectives (or occasionally sold through themed sales), and after the month has passed, these collectibles will no longer be introduced.

This is what makes them collectible; they will be truly scarce, digital items. They will all have a history of the item, with details about who owned them, how they were first forged, and more. This makes each item 100% unique. Players who wish to acquire a certain collectible item that is no longer being distributed will have to buy it from other players for Ember.

The creation of new tokens and token metadata will be done by the community so as to encourage new players and creators to join the ecosystem. The Artist Workshop is the way to provide fans with a talent for 3D modeling, animation, and drawing the opportunity to have their art immortalized within Ember Sword.

Artists will be able to submit skins, emotes, animations, etc. to the Artist Workshop. Each month, the community will vote on the best ones, and we will eventually implement some of them as in-game collectibles that will be rewarded through end-game PvP and PvE. Artists who end up implementing their artwork into the game will be rewarded with Ember whenever collectables are traded between players, in perpetuity!

Within the game there will also be the concept of LAND, NFTs that take the form of different types of land that players can purchase, build, develop, and, if they wish, trade.

LANDs are made up of the following metadata:

- **Properties:** with the type of land plot
- **Statistics:** the coordinates of the plot

Star Atlas

Type: Strategy

Within the Star Atlas metaverse, political influence is yet another strategic consideration in the management of territory and the navigation of space. Controlling this political influence introduces a number of advantages for player status, which is represented by the POLIS token.

Holders of POLIS will be in a unique position of jurisdictional ownership over entire regions, regardless of who owns title (NFT) to the land and equipment rights. However, POLIS represents voting rights, not dictatorial ownership.

New NFT assets will be released periodically by the game developer with careful consideration surrounding the inflationary impact of release. Analysis of current demands for assets by new players, growth in user-adoption, asset availability on NFT marketplaces, and the natural deflation of assets resulting from high-risk zone engagements will be conducted prior to the release of a new tranche of assets.

The majority of assets traded on the Marketplace will be earned doing in-game tasks. However, it is also a place to list assets purchased from the pre-sale and concept sales.

Other players will place bid offers or settle immediately for the price limit. Due to the permanent loss during normal economic activity, all assets are considered deflationary. This deflationary, asset-burning mechanic ensures that assets are unique and of finite supply.

In the marketplace the user can buy new ships, structures, access and collectibles like skin, gear or posters. The metadata of every item represents its in-game feature and there's an interesting focus on supply of that particular asset.

Axie Infinity

Type: MMO

Within Axie Infinity there are mainly three types of objects that are developed using the NFT standard:

- Axies,
- Lands,
- Items.

Axies are small animals that fight each other in 3 vs 3 races. Each Axie has unique characteristics that define its cost, rarity, and tradability. The Axie metadata defines:

- properties, in which we find the four skills/moves and the body parts of the Axie
- level, which contains all of the Axie's characteristics such as Back Attack, Back Defense, experience, accuracy, morale, skills and more.

Each Axie has basic characteristics that characterize it and "dynamic" characteristics that can be modified through items. They are developed with the ERC-721 standard and two Axies can be joined together to form a new one.

League of Kingdoms

Type: MMO strategy

League of Kingdoms is an MMO strategy game where players fight to conquer territories. You can fully own and seamlessly trade digital assets through NFT technology.

The game is structured on a map where we find lands. These lands represent lucrative real estate (NFT) and can be used for digital real estate investments. The map is divided into zones A, B, C and D. Each zone has several LANDs within it.

There are lucrative dividends from your lands that flourish. As more kingdoms flourish on your LANDS, they will increase the level of your property. The higher the level of the player's LANDS, the more profits the user can earn! For now, the LAND level starts at 1 and goes up to 7.

LAND metadata is structured as follows:

- **properties**, that define their location in the map, id and color
- **statistics**, which represent the earnings of that land and the rewards you can receive,
- **level**, which defines the level of activity and development of the land.

In addition to the LAND there are also skins and resources that can be purchased directly through the store. For the rewards, DAI reward pool will accumulate 10% of the net amount of in-app purchases made in the game by gamers. Landowners must make contributions to developing Lands to claim their DAI rewards.

Sorare

Type: Tradable cards

Sorare is a soccer game that uses NFTs as player cards to create a team and participate in tournaments. Tokenomics and the use of NFT standards is interesting and is based solely and exclusively on players owned by a user.

Tokens have different levels of rarity and have a well-defined set of attributes and characteristics that define them.

The standard used is ERC721 and the characteristics are:

- **Properties:** define player characteristics such as club, name, rarity and season
- **Stats:** define the serial number of the token depending on the rarity and power in the game
- **Level:** define the level and experience of the token
- **Dates:** defines the creation timestamp for the token.

Tokens are created every season and for each player there are different levels of rarity which are: unique, super rare, rare, limited and normal.

Another interesting feature of the tokens used by Sorare is the use of oracles to define the performance of the players after each game. Sorare's tokens are therefore defined as Dynamic NFT because their score varies from day to day.

Thetan Arena

Type: MOBA & Battle Royale

Thetan Arena is an e-sport game based on Blockchain technology and uses NFTs as in-game items. The gameplay of Thetan Arena is designed to revolve around the combination of your personal skills and teamwork. There are two types of challenges which are: MOBA & Battle Royale.

It is both a Free to Play and Play to Earn game that uses NFTs and in-game currency to incentivize players to improve their position and earn new heroes.

The Rarity of a hero is determined by 2 elements: the base rarity of that hero and the rarity of its skin. Heroes with a higher rarity have more unique playstyles, abilities and will have a chance to get bonuses in battle rewards.

There are 3 different levels of rarity for heroes:

- Common Hero
- Epic Hero
- Legendary Hero

Skin Rarity: Skin rarity is determined by the frequency of the skin in the selling pool. The rarer the cosmetic is, the better it looks like, with more visual effects and bonuses in battle rewards. There are 3 different levels of rarity for skins:

- Default Skin
- Rare Skin
- Mythical Skin.

Trophy Class represents the mastery of using a hero, which means that hero has been played in thousands of matches. The higher the Trophy Class is, the more reward that the hero can earn through the battle end. The Trophy Class will be graded from H to SS.
The game therefore consists of two types of NFT which are the heroes and their skins. The heroes start from a base rarity that allows anyone to play and level up in order to afford those of a higher level and rarity. Free heroes allow you to democratize access to the game and subsequent rewards. Skins on the other hand are the typical customizable item for the character but do not affect the physics used within the game.

Gold Fever

Type: RPG

Gold Fever is a Free to Play hybrid survival RPG game that leverages the blockchain to create a decentralized economy around its limited resources and various in-game items defined as NFTs.

Through NFTs you can own the items you create, find, or purchase. The user can participate in the development of the infrastructure needed for players to navigate and play in our huge world or buy expensive planes or gold tools and rent them to other players.

NFTs are collectible and limited edition like clothes, weapons and companions. The user can buy NFTs that can earn passive income even when you're not playing. Buy and rent necessary items from other players such as planes, boats or gold mining tools.
Mining concession license owners set the rules for each game to attract adventurers, who are the only participants able to mine gold from the map. The adventurers keep a portion of the gold they find during the game, while the Investors (the license owners) pocket the rest. In this way, the Investors need the Adventurers, and the Adventurers need the Investors.

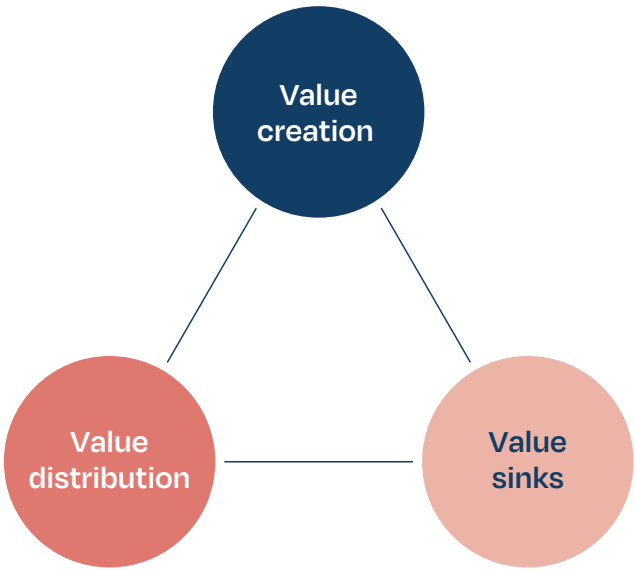
The Company, meanwhile, establishes the incentives necessary to attract Tribals, who act as an important balancing force. In addition, highly motivated Tribals are essential to enable much of the strategic, action-packed gameplay in Gold Fever. Tribals earn gold for themselves by killing Adventurers and returning the stolen gold to their ancestral gods. NFT standards have yet to be defined.

2.1.3 Value creation, sinks, distribution

In any ecosystem, be it a country, a market or a video game, the key asset of transfer is value. Value can be captured in forms of goods (i.e. barter trade of cheese for yogurt), in forms of common currency to be used in later dates (i.e. sovereign currency to be used to pay taxes) or in internal tokens, currencies (i.e. in-game currency for in-game activities) and NFTs (i.e. representation of digital assets).

Specifically in a game, be it on-chain or off-chain, it is an art to balance between the value being transacted, and the asset that represents such value. It is not uncommon for a variety of assets to be created, namely resources, currency and unique items. That is why, for a successful gaming development, the value strategy needs to be accompanied by a so-called monetary policy that smoothens the enthusiasm or depression of upward and downward value creation cycles.

When value is being discussed, we focus on 3 aspects:



1. **Value creation** — long-term productivity growth and structural transformation
2. **Value distribution** — short-term balance of economic growth and asset inflation
3. **Value sinks** — real value growth of active player class

2.1.3.1 Value Creation

Value creation is system-specific, it occurs when new assets are minted, new users join the system or long-term productivity gains are achieved. Long-term productivity happens when productive, not merely financial, resources are attracted into the ecosystem that can contribute to the future growth. This can be compared to population growth in a country and investing in intellectual capabilities of the population.

This naturally creates inflationary pressure. The key to balance is the 2 types of inflationary pressures — both asset inflation and currency and/or price inflation.

Asset inflation

Asset inflation is where there are **too many resources**, currencies and/or unique items. There is not enough value to back the resources.

For example in the case of Sandbox, the availability of lands and currencies are important to consider. As much as there is a fixed supply to both LAND and SAND, it is important to consider the amount of new LAND and SAND added into circulation. If there is too much SAND available, it increases the price of LAND and other assets, since SAND is the form of payment in this ecosystem.

Currency / Price inflation

Currency/ price inflation is where currency growth, due to certain capital dynamics, outpaces value growth. This is what we typically think about as **"inflation" in traditional economics**.

If the value vehiculated through a currency is more than the currency that represents it, prices increase. Whilst while happening in an orderly manner this is good, it makes assets too expensive to be afforded by new players and impacts negatively the investing vs. consuming incentive balance. In the example of Axie, each Axie is too costly that new players find it challenging to afford and play.

2.1.3.2 Value Distribution

Once value is created and captured, the goal is to use the resource (currency, NFT, in-game asset) for economic growth. This is done through distributing the value by transactions.

In value distribution, we consider 2 aspects, new value and circulating value.

New Value: new tokens

In Gold Fever, new tokens are not just its native tokens, but also access to other resources. NGL is required to be locked up to purchase mining claims. NGL is issued to liquidity providers and other relevant users. After a vesting period, the tokens are released to the market. The other tokens will also have their own token inflation schedule.

Circulating Value: existing tokens

In the example of Illuvium, fees accrued by the game through users transacting are used to buyback the ILV tokens. Transactions are not priced in ILV. The ILV bought back are then redistributed to users of the system.

In Sandbox, all revenue earned will be split equally to the company and the foundation. This is because transactions are priced in SAND. The company holds SAND for 6 or 12 months, before reselling them to the market. The foundation uses SAND to be reintroduced to the market as rewards.

2.1.3.3 Value Sinks

Value sinks are important as they balance between token growth to active players and real growth. With the value creation and distribution, it is not uncommon to create a world of hyperinflation. This reflects worse on active players, as assets get more expensive and they do not have enough funds to pay for the in-game assets.

With Value Sink

To combat this, value sinks are required. This means burning or destroying the assets. The assets here typically mean the native token but it can also include resources like NFTs.

In Star Atlas, the fees earned will be used to purchase ATLAS to reduce the circulating supply. The tokens are then redistributed to stakers and liquidity providers. In addition, ATLAS will be purchased as part of the revenues earned, and subsequently burned from the circulating supply. This helps to combat hyperinflationary pressures in value creation.

2.2 Mechanism Design

Mechanism design are the rules to define the interaction between agents of the game. The 5 main agents were discussed in section 1. Here, we look at governance of the game, various revenue models, business models, winning models and network effects. Network effects and its intra-agent interaction is key to allow these rules to be followed.

Mechanism design is built upon market design, which attracts users into the game's economy and defines the parameters in which these mechanisms will be valid. E.g. if someone trades off chain, mechanism design rules are not valid. We want to prevent this from happening.

2.2.1 Governance

Similar to DeFi, decentralized governance rarely makes sense at the start of any big or small project. In DeFi, decentralized governance is good especially when it comes to regulatory optimization without an external actor. However, here in gaming, this does not always apply. Thus, there is a reason to delay the building of DAO, until the community is ready for it. In this way, you save developer resources, money and brain power and dedicate it to developing the actual game. Once the game is done and has a large user base, decentralization makes sense when combined with the Play to Earn model. Users will be primarily interested in yield from the governance tokens and to a lesser extent advancing the game from a developer standpoint. An AAA game has so many moving parts that building it from scratch in a decentralized way is borderline impossible. It remains to be seen if maintaining and updating an existing game is possible in this way or not. We've seen how slow developing eth 2.0 has been with its decentralized approach.

We can understand the developer that wants to raise capital through an IDO and must promise ownership of the protocol to buyers. If ownership doesn't come with governance powers it is not exactly ownership, so a DAO makes sense and is a natural part of the roadmap. The fact is, however, that most games raise enough money long before any IDOs to develop the full game so lack of funding cannot be a good justification here.

The philosophical inclinations towards decentralized gaming should not come before creating an actual game. A DAO controlling just a skeleton of a game that could have been great makes no sense, when you can have the cake and eat it too, if you give yourself enough time. Yielding decision power to token holders in a critical time is too dangerous for an early development team and the success rate will go up if executive power is centralized.

The games we analyzed seem to understand this well and are not in a rush to decentralize, many don't have concrete governance plans at all, pointing towards centralized governance in the short run.

2.2.2 Revenue Models

How do investors generate recurring returns? There are four primary ways that NFT investors earn recurring revenue from their investment. They can earn returns on their investment through a direct revenue share from the game, rental, using it themselves, or through an employee/scholar using the asset to generate revenue.

2.2.2.1 Direct revenue

A direct revenue share is the closest to a traditional investment in a company. The investor funds game development and in return gets some sort of passive revenue share. This is most attractive to pure investors (rather than player/investors), but many of them may not actively participate in the game. If the game designer wants these NFTs to be actively used, a solely passive revenue share does not properly incentivize that behavior. This is often implemented through land sales, like in Embersword and League of Kingdoms.

2.2.2.2 Rental revenue

Rental revenue is a good way to have a passive earning option for investors with little effort on their part, while still having an economy in which the investible NFTs are utilized. Simplifying the rental process is a good step for game devs. This model can be seen in The Sandbox and Guild of Guardians, where investors can rent out their assets to players.

2.2.2.3 Employee or scholarship program

Having an employee or scholar program can be a sign of many users getting priced out. The best way to implement this is to set it up so investors are hiring employees who have particular skills or knowledge that allow them to use the asset effectively for earning, with revenue being based more on skill than just participation. Staggered pricing tiers are also useful, to avoid having a large divide of non-playing rich investors and working scholars without a strong middle class of players. Axie Infinity has this scholar model, but has a large divide between investors and scholars with the high cost of axies. Star Atlas likely will have a much more staggered employment model with a large variety of jobs that will be best done by those with specialized skills.

2.2.2.4 Asset utilization

Lastly the investor could use the asset themselves. Often this is the alternative to either renting or hiring an employee, but having this option is important to cater to wealthy players who still want to be fully involved in the game.

2.2.3 Business Model: Free to Play vs Pay to Play

Play to Earn games can be Free to Play, Pay to Play, or somewhere in the middle with opportunities for both.

2.2.3.1 Free to Play (F2P)

Free to Play games have no upfront cost in order for users to participate. An example would be Ember Sword, in which the purchasable assets are not necessary for gameplay. These economies are open to the widest audience of players, attracting not just low income players, but potentially more middle-class players that make up the core of the audience. The key aspect of F2P game success is that the game must be highly engaging and popular on its own, without taking earning potential into account. This drives demand for cosmetic assets with social, rather than gameplay, utility. This consumption is what sustains the earning potential for F2P games. It gives value to the NFTs that players earn through gameplay and drives fees that can give utility to the fungible tokens distributed to players.

Risk

The drawback of F2P games is that the lower barrier to entry makes it easier for a large number of low-income participants and bots to extract value from the economy. This has more of a negative impact on the economy if the game has a pay-to-win model than if it does not as they would depress the price of game assets.

In addition, depending on the assets given to the F2P players, if the assets can be traded in a secondary market, it could cause unnecessary inflation in goods and assets in the long-run.

Potential Solutions

One way to reduce this risk is to distribute rewards based upon skill rather than participation. The Play to Earn game Splinterlands made a step in this direction by reducing the rewards for players in the lowest league, so that players needed to demonstrate some skill in order to earn. Another way to reduce the risk is to force players to do different things to earn instead of repeating the same thing. This requires players to be more engaged with the game to earn and is more difficult to bot. Implementation

could be through reward decay over time for repeating the same activity or creating limitations on the number of players that can be doing the same task at once. Lastly, technical security measures should be in place to mitigate multi-accounting and botting.

If the rewards and assets are distributed based on skills and with bot management, the risk of over-inflation in rewards and assets can be better managed. Depending on the gameplay, the rewards to the players can vary on its trading ability. For example, some rewards can be traded whereas some rewards can be destroyed through a game battle or the usability of the assets diminishes with each use.

2.2.3.2 Pay to Play (P2P)

Pay to Play (P2P) games require that users make initial expenditures before being able to participate in gameplay. In some cases this can be an upfront requirement for purchasing an asset, such as needing to buy a team of axies in Axie Infinity. Often it will involve recurring expenses as well, like needing to pay for fuel and ship maintenance in Star Atlas. While demand for cosmetics can drive some of the value for game assets, much of the revenue that drives asset value is likely to come from required utility expenditures. The asset demand from pure players, rather than investors, is the key differentiator between having a positive-sum and a zero-sum economy.

Risk

If the economy becomes too reliant on new users coming in, it can become ponzi-like and have severe crashes if returns drop and new players stop coming in.

Potential Solutions

Generally having more of the game revenue coming from recurring expenses, rather than the initial expenditure, is more sustainable. This reduces reliance on new users and keeps the focus on existing players driving revenue. The project should also be marketed as a game, not an investment vehicle. Targeting gamers will bring inelastic demand for game assets as they will not be quick to leave the project if returns drop, lowering the severity of market cycles.

2.2.3.3 In the Middle

Some games aim to offer both F2P and P2P options. How this normally looks is that the game will be available for free, but users do not have any earning potential until they pay. In League of Kingdoms, users can get a free gameplay experience that is almost exactly the same as a traditional non-blockchain game, but can opt to purchase land NFTs to earn income. In Splinterlands, people can play the game for free, but need to make a single setup purchase in order to earn tokens and NFTs. The benefit for this model is that

users can be brought into the system with a low barrier to entry, but later be converted to a paying user. In essence, these games have a Pay to Play revenue model with a Free to Play sales funnel.

Risk

The primary risk of this model (on top of the P2P risks) is confusion for users. If the game is marketed as Free to Play as well as Play to Earn, users could naturally expect that they could earn with no investment, while that is not really the case.

Potential Solutions

In order to avoid misleading users, marketing teams should add some more clarification around the earning methods, rather than just using the "Free to Play" and "Play to Earn" titles. This clarification is beneficial to the space overall as games in this category can add confusion for participants on what these titles mean.

Free to Play vs Pay to Play

	Pros	Cons
Free to Play	• Wider potential audience • Simplest method for allowing earning opportunities for low-income players	• Easier value extraction for bots/bad actors
Pay to Play	• Greater earning potential for players • More realistic economy	• Perceived more as an investment than a game • Greater user sensitivity about returns can create more severe market cycles

2.2.4 Effect of Bankroll on Winning: Pay-to-Win or Not

In pay-to-win games, players are able to purchase assets with in-game utility that can improve their performance. Generally, players are against P2W games given the perception that this gives rich players an unfair advantage. The severity of the issue depends on the relative importance of the player's skill vs the advantage given by the assets, with higher skill requirements reducing the problem by diminishing the importance of the assets. The alternative is to not have items with utility be tradable assets, with the market focusing just on cosmetics or other items that do not affect gameplay (like the Embersword economy).

The way that players react to a game being P2W also depends on if the game is player vs player (PVP) or player vs environment (PVE). In PVP games, rich players buying the best assets can mean that players who do not pay as much have a lower chance at success. This upsets many players who may otherwise make up the core of the game's playerbase, but large purchases by whales can help drive much of the revenue for the game. A good way to balance this issue is through offering separate PVP options for whales and normal players. An example of this is Illuvium's split arena system where the Ranked Arena will have normalized creature stats to even the odds and prioritize skill, while the Leviathan Arena will not be normalized and allow players with big bankrolls to leverage their expensive high stat creatures.

In PVE games (where users fight alone or in a group against non-playable characters), having a P2W game structure is less problematic as the purchased advantage does not mean a disadvantage for other players. They are just taking a shortcut by paying with money instead of time. The key part to balance here is that users should be able to complete all of the game with assets they can earn for free. If users feel that it is extremely difficult to progress without paying, users will respond negatively. An example of this is Diablo III, which had a real-value market for assets, and got negative feedback from players about the excessive challenge of beating high-difficulty levels without buying equipment that would only drop in even higher levels. This made users feel that they needed to make purchases in order to finish the game, but was improved by tweaking the drop setup to allow easier earning of high-level items.

Another issue with PVE games exposed by Diablo III's auction house[11] (and reason for its eventual closure) was that trading can undermine the reward loops within the game. The game focused on playing the game until you find good loot and can take on more difficult bosses, but trading allowed paid players to skip the grinding (but realize they had no more reason to play). Even players who did not buy assets on the market still had their reward loop thrown off since they could now sell the loot that otherwise was useless to them and speed up their ability to get better gear. Pushing users towards a market for assets can be disastrous when the reward loop is based on getting assets through gameplay. The reason for progressing in the game needs to give more weight to skill and strategy over getting loot in order to support real value trading without compromising the incentive for playing.

2.2.5 P2E Game Quality: Real Game or Investment Vehicle in Disguise?

Along with the emergence of high-quality P2E games comes a proliferation of low-quality games, drawing in players with Play to Earn mechanics. It is important for players, investors, and game developers to understand which of these categories a particular P2E game falls into, since a high-quality game can be sustainable while the latter category generally becomes a pump-and-dump.

11 Ag. (2018, June 27). *Diablo III's failed auction house: Why true ownership won't save your game.* Medium. Retrieved December 21, 2021, from https://blog.hoard.exchange/diablo-iiis-failed-auction-house-why-true-ownership-won-t-save-your-game-c6d692b9de1

In a low-quality game, the players' motivation to play is almost completely driven by the pursuit of profit, while in high-quality complex games, the motivation is a mix of fun and profit. The gameplay must be able to stand on its own, otherwise it is just an investment vehicle in a game wrapper. Having real gamers who play regardless of the investment returns is important because they make the economy positive-sum and bring inelastic demand that mitigates the severity of market crashes.

So how do you determine if a particular game is low-quality or high-quality, as it pertains to P2E game viability? A good test is to think about if the game were launched as a traditional Free to Play game with no token-earning component. If it could be monetized well through in-game microtransactions, then it would be high-quality since that shows people are very willing to pay for something in the game out of enjoyment, even with no expectation of financial return. If it is not engaging enough to work with microtransactions and needs to resort to advertising, then do not expect there to be any real investment demand from gamers. That just leaves those who see it as an investment, leading to a zero-sum economy.

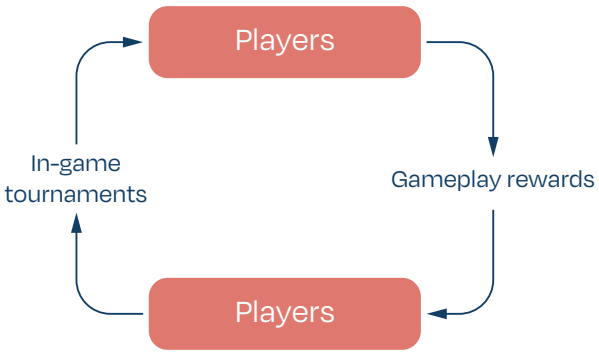
2.2.6 Network Effects & Intra-Agents Economics

Network effects are the phenomena by which the value or utility a user derives from a good or service depends on the number of users of related and compatible products. We start with the assumption that network effects are typically positive, resulting in a given user (in our case, our personas) deriving more value from a product as other users join the same network.

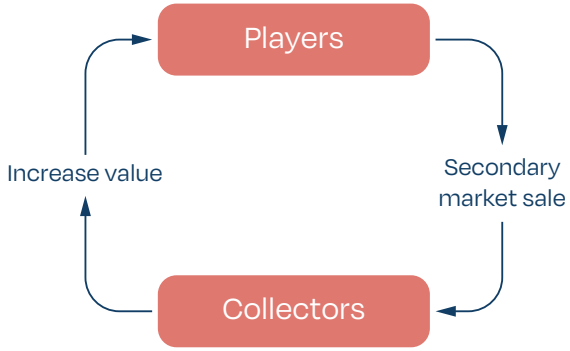
Gaming has by definition, important structural network effects that are magnified by the economic additions introduced by the Play to Earn dynamics. There are many network effects that we identified across the different personas and they play an important role in strengthening the economic relationships between them.

2.2.6.1 Players

We identified the following, major network effects springing from many of the possible actions that players can entertain.

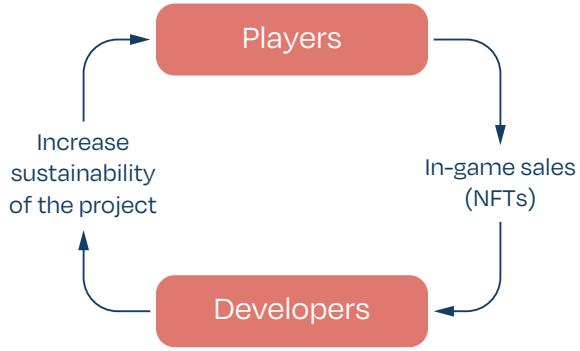


Gameplay economics is, possibly, one of the most important drivers that attract new players into a P2E game. Whilst the space is new and empirical data is limited for now, it has been observed that the most successful P2E games (Axie overall) are currently playing for the economic benefits and earnings originated by the game. More broadly, in-game tournaments and consequently E-sports events are all strong sources of network effects.



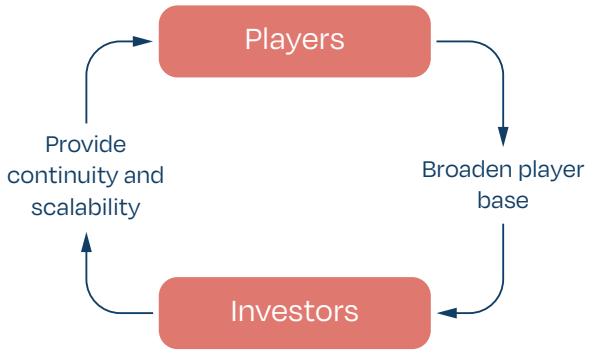
Secondary market sales on in-game items and currencies

Besides the most direct earnings from in-game play, secondary sales of in-game assets (notably NFTs) creates a strong incentive for players to play and earn valuable assets. Those can be either held for appreciation, held for direct or indirect game dynamics, and/or sold to collectors and/or other players (the last phenomenon being even stronger on Pay to Play models).

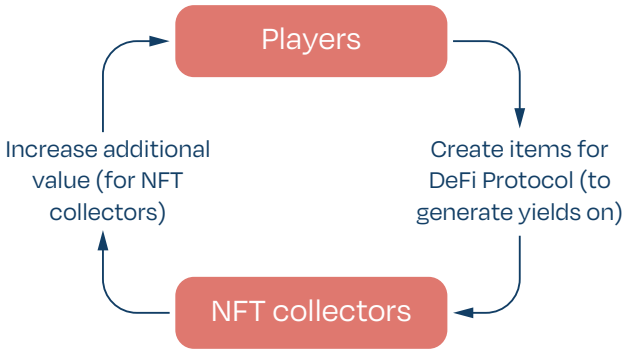


Accruing fees

Another, interesting angle of the above mentioned network effect is the portion of fees that developers (or game treasuries) might earn as a part of in-game NFT sales. The activity of players and collectors can directly accrue to the developers of the game or the community via treasury.



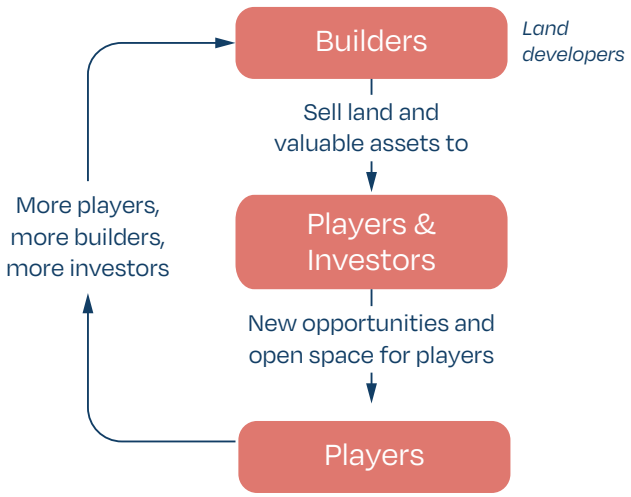
Crypto native guilds have created a very strong network effect where capital from investors is flowing on those dedicated DAOs for gaming and the collected resources are deployed to buy in-game assets to then be lent out to scholars. This constant buying pressure of guilds increases the demand for those assets that increase the appeals for collectors and increase the incentives for developers to build the game.



In-game assets, NFTs and native tokens are the facto holding a value that makes them a sort of financial instrument. Those assets then become conceivable instruments for DeFi protocols leveraging them for a variety of second-degree financial practices such as lending/borrowing.

2.2.6.2 Builders

Builders are particularly crucial on user-generated content-driven ecosystems. We identify the following main network effects:



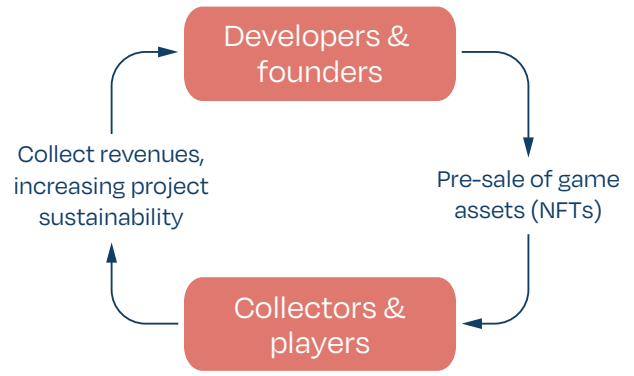
Some ecosystems (games and/or metaverses) foresee the opportunity for creative agents to conceive new attractive pieces of land (or possibly other valuable assets) and place them for sale to players and/or investors. This creates a strong network effect where artists create pieces of metaverses and attract unique investor profiles into the loop.

New land development brings novelty and innovation into an ecosystem that is by design, meant to be dynamic. Existing and new players can interact with freshly new created spaces and start building on them. More players obviously attract more investors and collectors, increasing the overall value of the game ecosystem.

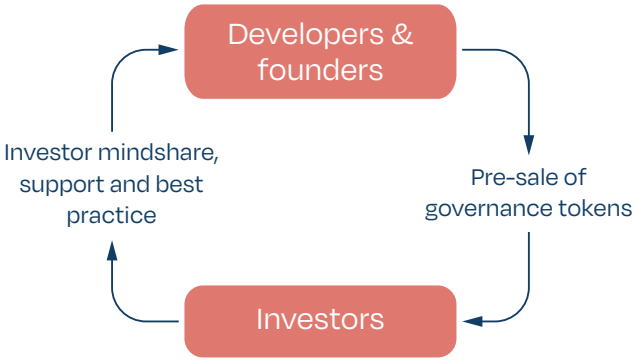
2.2.6.3 Developers and Founders

Developers and founders (including DAO) are extremely aligned to the economic potentials originating from the development of in-game assets and NFTs, let alone on the sale of native tokens.

Here the main network effects:



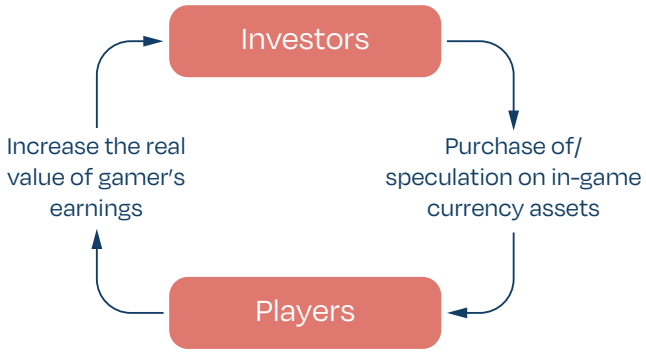
Definitely one of the main (early) drivers for games and metaverse projects. NFT drops have attracted a multitude of interest from players and collectors. Early (often called genesis) drops are the first way for a project to engage with its community. Those revenues are directly going to the treasury or founders to bootstrap the continuation of the development.



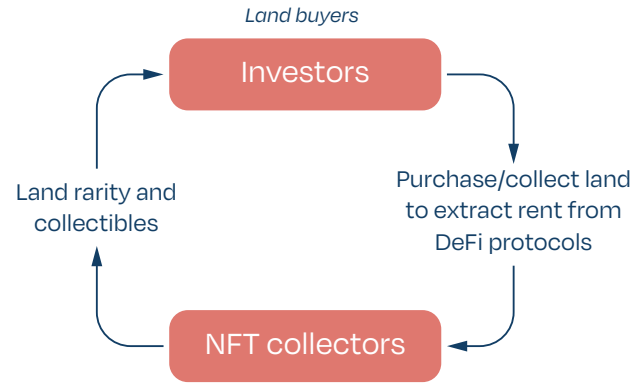
A healthy portion of governance tokens are often sold by founders to investors who become the facto stakeholders in the ecosystem and provide a full suite of additional services and support for the growth and expansion of the game/metaverse.

2.2.6.4 Investors (Speculators)

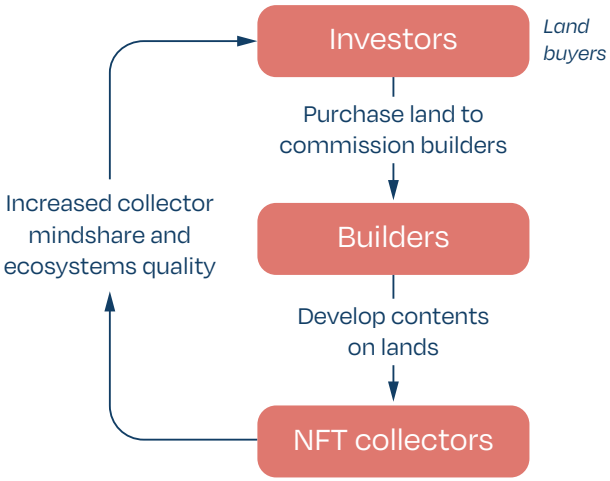
Investors play a crucial role in creating and sustaining network effects in games. Direct access to valuable assets triggers a speculative wave that affects builders and collectors in particular.



Interest from investors (and often speculators) naturally increases the demand for tokens that represent either in-game currencies or governance tokens. Either way the collateral effect is shown by the increased value that gamers can earn within the game itself. This consequently attracts new players into the ecosystem.



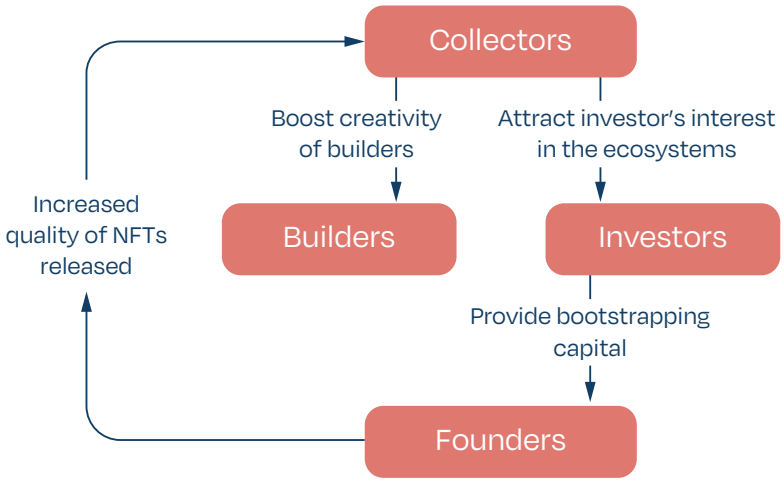
Interesting dynamics are starting to appear at the crossroad between DeFi and NFT/gaming platforms. We foresee a lot of new intertwined economics between investors and collectors. Speculators can buy assets driving the price upwards to deploy those assets in DeFi protocol for cospiscous interests. This appreciation attracts collectors who can target their purchases also in consideration of the potential interest coming from DeFi protocols. Interests can also derive by rarity and increase lending and rentable opportunities.



Another compelling network effect that could emerge from those newly created game economics are investors who purchase land and commissions builders to curate and develop the land, including specific NFTs that can be then appetible for collectors. In this way, investors, builders and collectors are all triggering strong and sustainable network effects for the game/metaverse.

2.2.6.5 Collectors

Collectors play a crucial role to support the all in-game ecosystem, setting the bar for those assets' appetite, increasing the overall quality of it with their mindshare. They support the community of players, often ending up overlapping with one or more personas. In fact, collectors are rarely only passive collectors, but they engage in the game to different levels of involvement.



2.3 Token Design

Token design is important as it translates the value created, through the market and rules of the economy, into real value earned by users. Hence, the "Earn" part of "Play to Earn". The most important part of token design is to balance its monetary policy of NFT assets, currencies and other tokens, to increase in real value earned by players.

2.3.1 Monetary Policy

Gaming metaverses are, in all shape and form, synthetic and simplified representations of sovereign nation states, although they share some characteristics with the corporation model. The ambition of growing sustainably such ecosystems shares several parallels with the effort of modern national treasuries and central banks in pulling the levers of monetary and fiscal expansion and contraction.

Although what is discussed below applies to a vast set of games, the case of Axie Infinity remains the most interesting - both for its recognised success and influence in the real world, and for the complexity of its ecosystem.

If we look at **Axie Infinity** as an example, it is clear how games share more with the *state model* than the *corporate model*. Axie:

- Has a centralised governance system empowered by coercion, as a nation state
- Doesn't have a fully personal democratic representation (one-person-one-vote) but rather a one-token-one-vote model resembling that of a corporation
- Has a fully sovereign monetary system, as a nation state
- Enforces private ownership of assets, as a nation state
- Controls a centralised treasury, as a nation state
- Maintains international legal sovereignty, as a nation state
- Might, or might not, have the shared sense of purpose that characterises modern nation states

2.3.1.1 Monetary Policy Stylised Traditional Framework: A Reminder

Flourishing, export-led, economies are characterised by a significant trade surplus and, on the other side of the equation, a net inflow of currency from foreign markets. The net inflow of capital puts pressure on the domestic currency that, typically, appreciates. An appreciating currency increases the purchasing power of citizens in foreign goods, with deflationary effects on local prices and distorting ones on the national industrial footprint. Due to the imbalances of its industrial policy, the internal economy remains exposed to the volatility in foreign demand, often with destructive effects. Such a

trap is often evident in commodity-led economies, and that is why it is often called *commodities' curse*[12].

The mission of monetary policy remains that of balancing deflationary and inflationary effects, and that of the treasury directing spending and investments in a productive way for a sustainable and balanced economic growth.

2.3.1.2 The Axie Infinity Case

As a state, Axie is not different from any other, broadly speaking. Its economy is flourishing, running a huge trade surplus and, we can imagine based on the latest treasury data, a fiscal surplus as well - with treasury revenues far exceeding development and running costs. In other words, due to a strong demand for its native NFTs, Axie is currently a net importer of ETH - and, indirectly, fiat.

This puts significant upwards pressure on its currency, SLP. Although Skymavic seems to currently manage such pressure effectively, it generated a spike in currency prices in the P2E summer of 2021. Although such effects might be considered beneficial for the players (who earn in-game currency and spend in another economy, i.e. the physical world), they might have destructive effects in the long term. An appreciating currency is deflationary in relative terms, and deflationary currencies reduce incentive to participate (i.e. invest) in the ecosystem and reduce the pace of value creation and ecosystem expansion.

With NFTs being the main good to be produced and exchanged in the economy, the effect of an appreciating SLP (and to a lesser extent AXS) would be deflationary, making (relatively) more convenient for Axie players to swap SLPs for other tokens and purchase NFTs abroad, rather than producing them internally, to satisfy global investors' demand. This, in the long run, would be detrimental for Axie, as it would reduce engagement, the appeal of its currency and economy, and its future viability.

Axie knows it and has been actively trying to balance those deflationary effects with inflationary measures. Increases in the USD/SLP exchange rate tend to be followed by drastic reductions, due to the parametric minting activity of new SLPs. Axie's monetary base - i.e. SLP market cap, which stood below USD 1m at the beginning of 2021, reached USD 300m and then stabilised initially around USD 150m and now at USD 200m following the launch of Axie's native AMM, Katana. Independently from the long-term

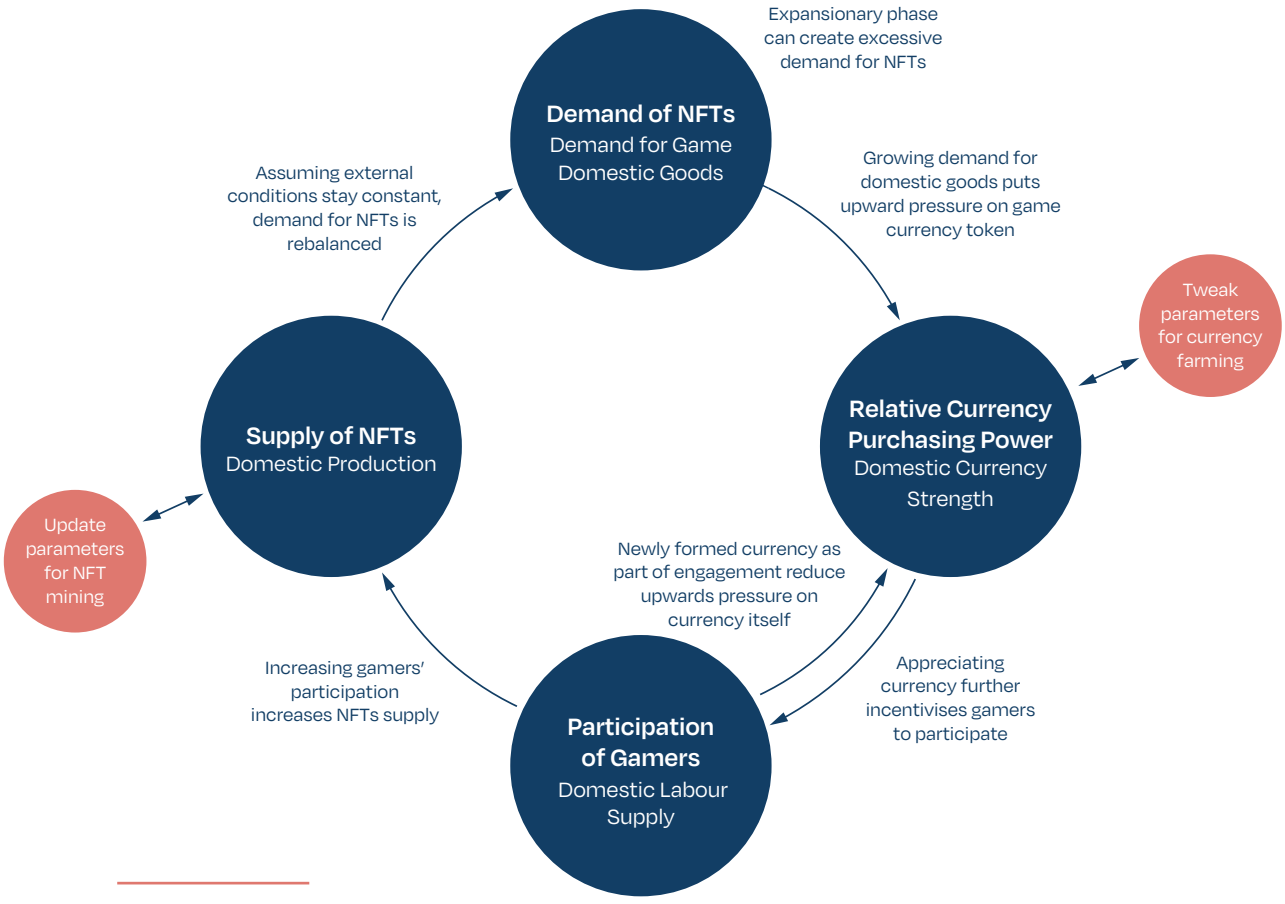
12 Alberola, E., & Benigno, G. (2017). Revisiting the commodity curse: A financial perspective. https://doi.org/10.3386/w23169

success or failure of Axie Infinity, the launch of Katana needs to be considered as a landmark in the P2E-DeFi convergence.

Excessive inflation, however, is not good either for Axie, as it would reduce the participation incentive for those players who earn in SLP and spend in ETH and fiat. It is, in other words, a trial and error game, where Sky Mavis has been experimenting to find a balance.

The Lunacian[13] (Axie's substack) has published several economic adjustments over the course of the last months, modifying the way SLP is earned and making minting more difficult to favour expert players - i.e. dampening inflation and promoting skilled labour, using macroeconomic jargon. As mind-blowing as it might sound, Sky Mavis has done proper monetary, fiscal, and industrial policy for its metaverse.

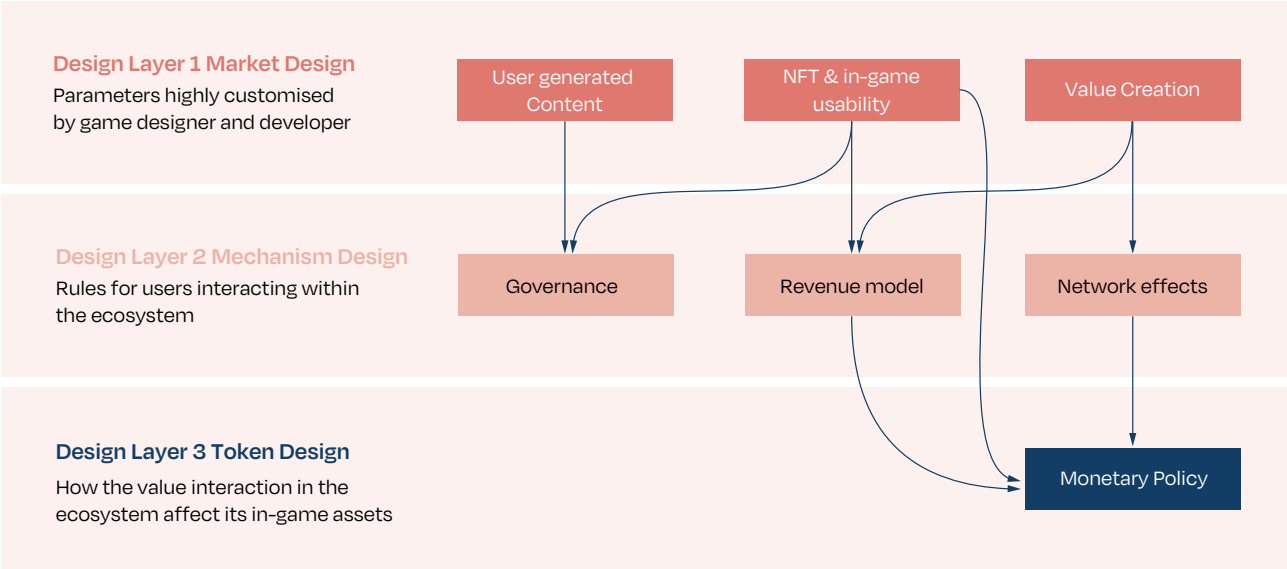
The chart below wants to outline (in simplified form) the deflationary and inflationary forces at play, and that a proper monetary and fiscal policy tries to keep in check.



13 https://axie.substack.com/

Segment 3

How design affects P2E economic models



3.1 UGC, Patents and Governance

It is clear how metaverses and blockchain based games constitute a new trend in the gaming industry. What might be overlooked is how this trend is causing a fundamental shift in the sector's business models. As an example, game assets are represented by NFT tokens and players have ownership over them. For this reason, unlike with traditional centralized business models, the game is not the only available seller.

Among the many revolutionary aspects of blockchain based games, here we are going to focus on User Generated Content. We will discuss issues and opportunities, then, we will explore possible approaches and see how they relate to two technical topics: Governance and Non fungible tokens standards.

Games like Minecraft showed how the creative power of the community of gamers can become an invaluable way to enrich the gaming experience. Traditionally, community contributions to gaming experiences are not rewarded in monetary terms. With blockchain systems instead, it becomes possible to incentivize content generation in novel ways. By introducing monetary incentives to reward content generation, decentralized games and metaverses will be able to grow at an incredibly fast pace. A pace that is just not possible to achieve with in house development.

But how should games incentivize user generated contents? Many possible designs are possible, each with its own strengths and drawbacks.
As a first alternative, we could consider a platform offering a fixed reward for every

new content generated; be it a piece of artwork, a new game experience or a new game object. The development team would then proceed and add the new content into the platform. This approach is problematic in many ways. As a start, by offering a fixed reward, the platform puts every new content on the same level and fails to reward works of superior quality. Secondly, the need for the development team to integrate new content into the game takes some freedom from the users hands and makes the game less decentralized.

A better system could take inspiration from the function of modern economies. In modern systems the production of innovation is rewarded with "temporary monopoly" rights. These rights are enforced through specific legal instruments: patents. Patents grant exclusivity rights on the use of certain innovative solutions for the production and distribution of a good. Being initially issued to the inventor, patents can be freely traded and reach the hands of those having the best use for them (at least this is what ought to happen in an efficient economy).

On the blockchain, where "code is law", we cannot rely on traditional systems to enforce exclusivity rights. We must instead translate these institutions (e.g. judicial processes in patents) into hardcoded procedures (e.g. smart contract to tokenize patents).

Of particular interest for the case at hand are Non Fungible Token standards. With NFTs, it is possible to obtain ownership over a specific on-chain asset. The defining characteristic of an NFT is the metadata associated with it. Although NFTs function extremely well in granting ownership over a specific asset, they might not function efficiently in protecting Intellectual property rights. NFT metadata are very specific; ideas instead, are abstract. Even if the platform forbids the issuance of identical NFTs, it cannot control the issuance of copy NFTs deriving from the same creative idea. As an example, consider a platform letting users issue images as NFTs. Now take an artist minting its work of art on the platform and using it to generate revenue. I could certainly be prevented from minting the same exact NFTs, but what if I changed one pixel? What if I changed more? What if I took the original idea and modified it in a way no machine could automatically detect? Well in this case, I could offer substantially the same service of the original NFT owner for a fraction of the price. It is then clear how this type of competitive pressure would eat into creators revenues and would disincentivize them from putting their creative effort in the first place. This issue is more relevant for NFTs whose value is mainly based on their utility, being aesthetic or functional to in-game mechanics. On the other hand, if the value of the NFT is linked to the artist's name, then the revenue prospects of the creator might not be damaged by NFT clones. For instance, fake paintings do not constitute a substitute for original artwork. People still visit

museums to see original pieces even though there exist almost indistinguishable fake versions of them.

Solutions to this problem can come in various forms. However, they would all be aimed at protecting creators from free riding on innovation.

A first set of improvement proposals could see the implementation of algorithmic procedures to detect patterns of similarity between two NFTs. This approach would however be quite limited. It could be almost impossible to define mathematically the boundary between free riding and legit inspiration. We think that algorithms should be rather used to advise token holders in a design based on governance.

As establishing the legitimacy of new NFTs is an extremely delicate task, we think that governance might be used to allow new NFTs into the platform. Specifically, we thought of a system where holders of the governance token can vote in favor or against the issuance of a new NFT.

3.1.1 Governance

Content creation could definitely become a sensitive point in gaming platforms and the resulting economics must be safeguarded. The possibility of copying content and reselling it in the same marketplace could create a negative effect on the incentive for novelty, leading to possible imbalances in the game. The definition of an algorithm that identifies the degree of similarity between two objects could be fundamental: understanding if two skins created by two different players are very similar is necessary to understand if it has been copied or not.

The algorithm presented earlier must adapt to the various games and metadata present in the assets. The fundamental part of this intelligence is undoubtedly the parameters that define the similarity or not. For this it is necessary to develop in advance a standard game metadata and to identify the essential characteristics of them. The more free the creation of new content is, the more it will be necessary to investigate the intrinsic characteristics of the objects created by training the intelligence appropriately.

The output of the algorithm will be a number that will define the degree of similarity on a previously defined scale of values. Since machines tend to have little margin of tolerance, it is fair that the choice falls on humans. For this reason it was thought to define a DAO able to make this type of decisions supported by artificial intelligence that does the dirty work. For each object the algorithm checks the degree of similarity to

those already present, bringing to attention only those creations that can actually create disputes. The DAO will be composed of a group of users defined by the community itself that through the dynamics already known will go to make a decision in cases of dispute. Once the community is sufficiently formed and a strong user engagement is created, this process could be transported to the common dimension in order to decentralize even more the choices. So, human discretion must be supported by mathematics and programming in order to create a union able to decide rationally.

3.2 Market Design's Impact on Revenue Model

A NFT's metadata and token standard can impact its revenue-generating potential in Play to Earn games. Revenue to the game developers, and NFT investors who are entitled to a revenue stream, can depend on the fee earned from secondary market trading volume. The ERC-1155 standard can handle the creation and exchange of multiple NFTs more efficiently than ERC-721, which facilitates increased trading volume. The metadata is also important for tracking the history of that asset and who should be paid when it changes hands. For example, Embersword will give a portion of all future trading fees for an item to the owner of the land the item dropped in, which is tracked through metadata. Metadata can express a wide range of features for a particular NFT, which may or may not impact the owner's gameplay. If it has in-game usability, it can lead to the game being perceived as Pay to Win. Conversely, if the NFT metadata only expresses cosmetic features, then rich players cannot gain any "unfair advantage" with them.

The way value flows through the game also impacts the game's revenue model. Game assets that undergo value inflation become too expensive and price out new players. This leads to the scholarship model of investor monetization where rich investors buy the asset and then hire low-income players to play with the asset in return for a cut of the returns. This is only possible because the entry price inflated to the point where it was unattainable for many players.

The velocity at which value circulates through an economy varies depending on if the game is Free to Play or Pay to Play. If fees are mostly generated through optional content, like cosmetics, then value circulation may be lower than a game with forced purchases (all else equal). For example, much of the fees to land investors in Embersword will come from cosmetics trades, while in Illuvium users will also need to pay for actions in the game that will drive revenue to ILV holders.

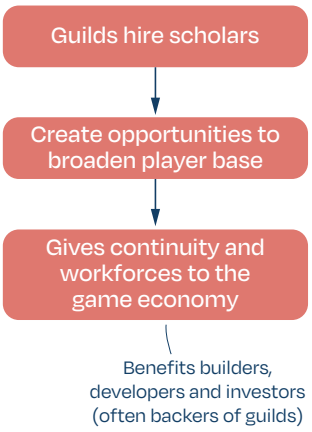
3.3 Value Creation's Impact on Monetary Policy

When new value is created in a game ecosystem, the new resources can be:

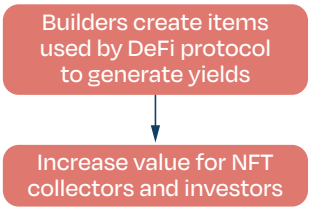
1. either deployed by a specific persona for new economics activities (such as being sold for cash), or
2. other personas, attracted by the newly created value, enter the picture and start interacting with the physical representation of these value assets, often being either NFTs or in-game currencies (tokens).

The key elements between value creation and sustainable economic growth are indeed network effects. They lie between creativity and inflation. They are the bridge between creation and continuity.

Network effects are the power that fuels the ecosystems and we identified a number of actions that personas would perform, directly or indirectly, creating economic incentives for other personas to participate in the game.

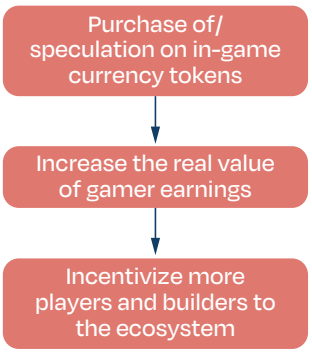


Crypto native guilds have created a very strong network effect where capital from investors is flowing on those dedicated DAOs for gaming and the collected resources are deployed to buy in-game assets to then be lent out to scholars. This constant buying pressure of guilds increases the demand for those assets that increases the appeals for collectors and increases the incentives for developers to build the game.



In-game assets, NFTs and native tokens are the facto assets holding value, which makes them a sort of financial instrument. Those assets then become conceivable instruments for DeFi protocols leveraging them for a variety of second-degree financial practices such as lending/borrowing.

Some ecosystems (games and/or metaverses) foresee the opportunity for creative agents to conceive new attractive pieces of land (or possibly other valuable assets) and place them for sale to players and/or investors. This creates a strong network effect where artists create pieces of metaverses and attract unique investors into the loop.



Possibly the most intuitive, yet not trivial economy of scale is the demand and speculation from investors for in-game tokens and currencies. That appreciation attracts (often cyclically) large sets of stakeholders which brings novel mindshare, innovation, curation and opportunities for the overall in-game ecosystem.

Through the process of value creation, NFTs and other fungible tokens are created to represent these values. Whilst it is easy to grow and appreciate the assets in terms within the market, it is also important to consider the impact of the long-run monetary policy and international market policy. The appreciation in the local market (in-game token value appreciation) increases the purchasing power of foreign goods (e.g. offchain physical world or another game in the metaverse), which increases the net capital outflow or creates deflationary effects on the monetary policy of the game. This is where the treasury plays a pivotal role in this economy, where its role is to balance the spending and investments to grow as value is created through these various persons.

Recommendations

The following series of questions are ones that prospective Play to Earn game developers should consider for their game. Our recommendations, based on the answers, are meant to apply broadly, with the possibility for exceptions based on more specific aspects of the game. This line of questioning can also be applied by potential investors to judge the viability of a P2E game.

Is the game engaging enough to stand on its own?

While developers may be biased about the quality of their game, a more specific test of this would be to examine it as if it were a traditional Free to Play game with no token-earning potential. If it could be successfully monetized through microtransactions (meaning people are willing to pay with no expectation of financial return) then the gameplay is sufficiently engaging. If it would not make much through microtransactions and would need to be monetized with ads, then the gameplay cannot stand on its own.

YES: Congratulations, your game will have demand from real gamers, as well as those just looking for an investment, and is a good candidate for P2E. This consumption from gamers continues regardless of investment returns, helping smooth out market cycles and improve economic sustainability.

NO: Sorry, your game is not a good candidate for P2E monetization. If players would not pay for assets without earning potential, then the only reason they would pay with P2E is as an investment. This makes the game zero-sum and leads to a pump and dump, ponzi-ish scenario. It is more of an investment vehicle with a game wrapper than an actual game.

Is it important that the NFTs be actively used?

YES: If a particular NFT is designed for active use within the ecosystem, the incentive must be there for that activity to happen. A passive revenue distribution would not achieve this, so tie the earning payout to the action. For example, a game character NFT that is supposed to be played with should earn by playing a round of the game, not passively earning a portion of total game revenue.

NO: Distribute game revenue directly to NFT holders passively. This increases the appeal from investors since they do not need to be actively managing the NFT, allowing for increased fundraising from NFT sales. However, do not expect these users to be frequently engaging with the project.

Is there a way to measure player skill or strategic ability?

This question is most relevant if revenue is distributed in response to an activity taken by the player, but the recommendation can still be applied to some extent in most games.

YES: Then distribute revenue to players based on that measure of skill, instead of purely on participation. This helps mitigate the amount that bots and multi-account players can extract from the system, leaving more profit potential for the real players who make up the core user base.

NO: Then make do with distributing revenue based on pure participation. Put additional care into technical measures to prevent botting and multi-account usage. Another method to reduce this issue is to force variation in participation activity by limiting earning methods for repeating the same action. This could be reward decay for repeated actions or caps on the number of players who can do the same thing at once to earn. Also consider limiting total earning potential at a global level, rather than at a per-player level.

Do you want the game to reach a wide playerbase?

YES: Choose a Free to Play model for the game. This is open to the widest variety of potential players. If you still choose a Pay to Play model, but highly value accessibility, ensure that there are very low cost options for players. This may include increasing the supply to keep price down, reducing the asset's attractiveness as an investment.

NO: Feel free to select a Pay to Play model. This narrows down the audience to those willing to make an investment to get started. This can increase earning potential for users and creates a more realistic economy, but shifts some user attention towards investment returns rather than the game itself. The creation of scholarship programs can give some additional accessibility for players who do not want to invest, but the process still has more friction than direct Free to Play access.

Is the game player-vs-player or player-vs-environment?

PVP: Since players are competing against each other, paying more for better gear can disadvantage other players. This necessitates considering the acceptability of a pay-to-win component, discussed further below.

PVE: Here players are competing against NPCs, so paying more for better gear is primarily just a shortcut rather than hurting the experience of other players. But by creating that shortcut, game designers should consider the impact on the player reward loop, discussed further below.

Is the game's reward loop reliant on dropping items with gameplay utility?

YES: If this is the case, game assets with utility should not be tradable. Since gradually getting better gear to be able to progress is so important, having the ability to skip to high quality gear through payment can leave players with the realization that the game is no longer fun to play. This is a key point developers should keep in mind as they add in P2E components to ensure they do not undermine the core gameplay. Monetization can be focused around trading cosmetic assets and this often pairs well with a Free to Play model.

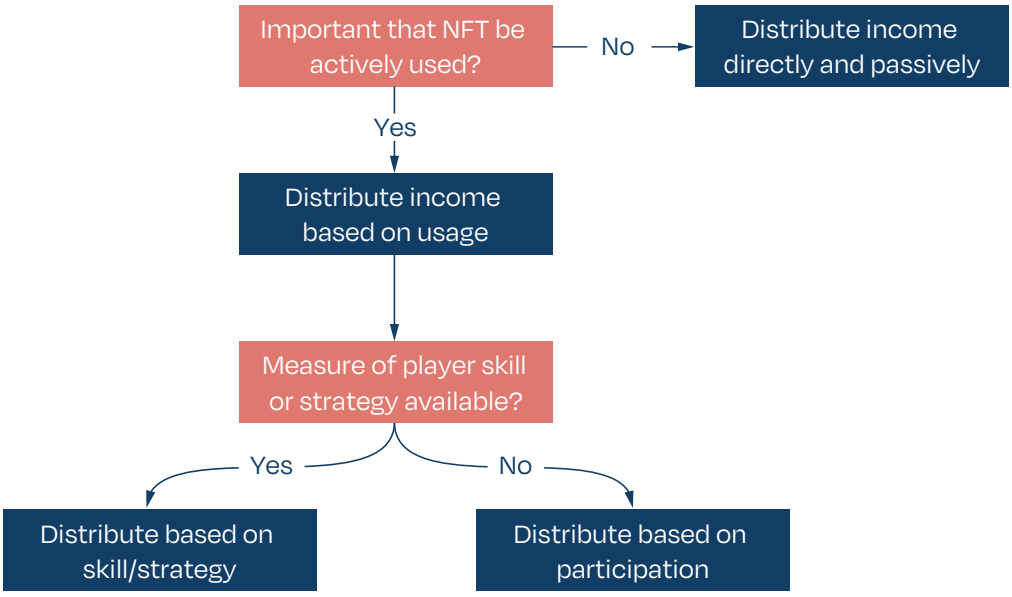
NO: Great, you should be able to safely have game assets with utility be tradable while keeping the reward loop intact.

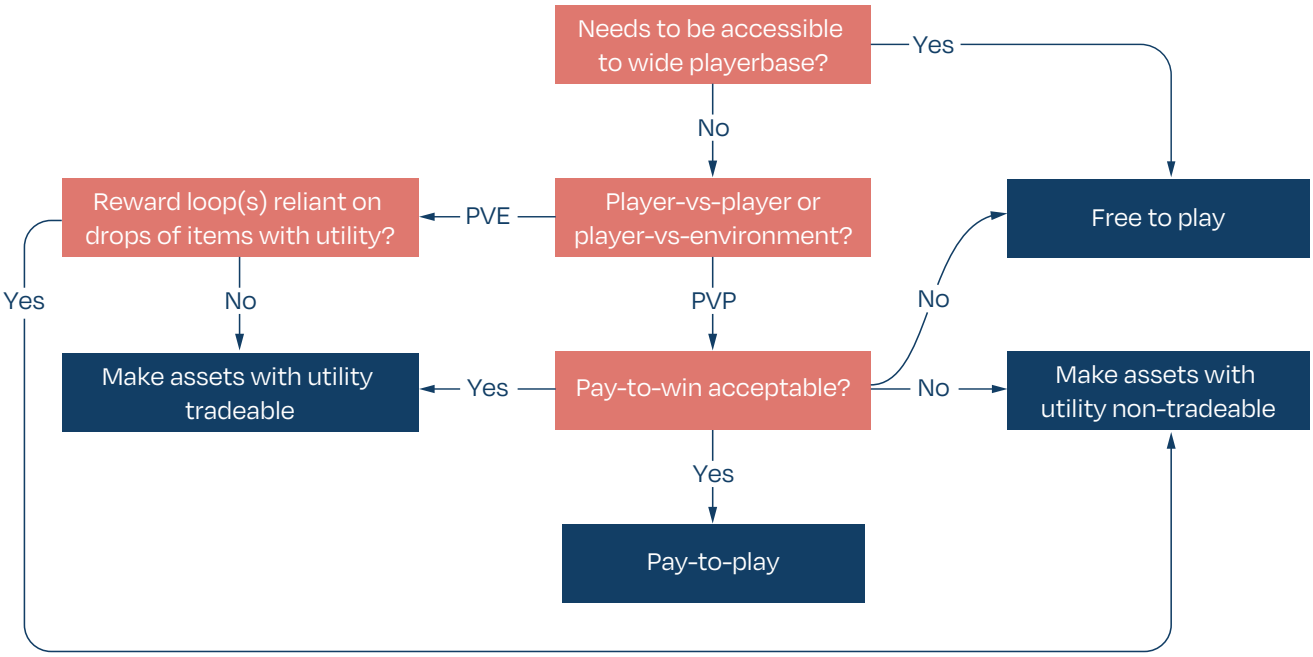
Is the game being somewhat pay-to-win acceptable?

YES: Then it is possible to have assets with utility be tradable, which often pairs well with a Pay to Play model. The downside is that there may be pushback from discouraged low-bankroll potential players, leading to a lower user base.

SOMEWHAT: A middle ground option is to offer multiple gameplay modes. One in which users who pay for high-utility assets can take full advantage of them and another where utility for assets is normalised to even the playing field. This is often a good option to balance keeping a high valuation for good assets and not discouraging low-bankroll users from playing.

NO: To avoid the perception of being pay-to-win, assets with utility cannot be tradable. This removes the possibility for players to pay for an advantage. This often pairs well with a Free to Play model.




Needs to be accessible to wide playerbase?
Yes
No
Free to play
Player-vs-player or player-vs-environment?
PVE
PVP
Reward loop(s) reliant on drops of items with utility?
Yes
No
Make assets with utility tradeable
Yes
Pay-to-win acceptable?
No
No
Make assets with utility non-tradeable
Yes
Pay-to-play

Conclusion

Crypto Gaming

Analyzing the world of crypto gaming industry as it relates with tokens and metadata there are several insights that can be taken. The games being considered have a variety of in-game assets that depend heavily on the type of game and the profitability these assets may have.

Generally game assets in the form of non-fungible tokens are:

- characters to be used in the game,
- virtual terrain,
- in game items.

The most widely used standard is definitely ERC-721 in games where the uniqueness of the asset is essential. The ERC-115 standard has not yet gained a lot of traction, but over time it will take on an increasingly central role due to its efficiency in the exchange and creation of collections of unique tokens. This can be used in games where there is a fixed amount of supply for each asset and where the metadata is constant and static across the game.

However, the real match in terms of P2E games and tokens is played on the metadata level. In many games we have seen the phenomenon of digital real estate in which the metadata certifies the coordinates of the land owned by the user. In others we have seen the use of asset characteristics directly onchain, in which properties, statistics and the level of the same are saved. These features can be either static, dynamic or even semi-dynamic.

- In the static features we find the characteristics that represent that unique token and that cannot be modified by the user or the interaction with the game.
- In the dynamic ones there is the use of oracles to modify the parameters and performance of these objects within the game.
- The semi-dynamic ones, on the other hand, have basic initial characteristics that represent them, but by interacting with the game and making a career they can evolve over time.

Another very important aspect to consider with a future perspective is the example of The Sandbox. The creation of a dedicated tool for the generation of non-fungible assets allows users to create whatever comes to mind. However, the metadata underlying the NFT can only be read by that game and the engine that creates the graphics and user interactions. This phenomenon is very interesting and will undoubtedly continue to develop in the coming years given the advent of the metaverse as a new communication standard.

Macro Considerations

Each part of this research spurred a distinct and stimulating wave of reflection. The outcome was quite obvious to note: this new field is both very complex and extremely enative. To borrow a crypto-native analogy with DeFi, Play to Earn and GameFi is exceptionally more intricate and less intuitive than DeFi. In the latter, agents act rationally in order to magnify their outcomes, more than often solely economic.

In GameFi the spectrum broadens to completely unrelated and uncorrelated factors such as the fun of the game-play, the vanity of showing off valuable non-fungible assets, the speculation for the future value of user generated contents and many others.
A DeFi protocol might have 2 agents swapping assets, and create massive value with the recurring of simple actions. In GameFi countless actions can be taken and a multitude of personas can create new, tremendous network effects and additional values for the ecosystem. We are well aware that we have just started scratching the surface of what is a new extension of the creator economy, powered by a dynamic set of Web3 tools.

Well aware of all of this mechanism design bonanza, are the developers and builders who are jumping into the space with creative ideas and innovative models. The aim of this research was primarily to provide inputs, frameworks and guidelines to designers for the development of sustainable, robust and fun to engage with ecosystems.

Appendix

In the appendix, we share the 12 P2E games we analysed.

Axie Infinity

Axie Infinity is an online NFT based game powered by the Ethereum Blockchain and Axie-specific Ronin Ethereum sidechain. The game revolves around Axies, small creatures capable of battling among themselves. Axies can evolve and be bred using the platform governance token, AXS, and its internal currency token, SLP.

- Although the game is technically Free to Play, one must own a certain number of Axies to start, which must be purchased somehow
- Axie infinity is currently live and can be played by anyone owning enough Axies
- In addition, purchasable assets include Axies (tradable NFTs, generated by users through breeding), Land (tradable NFTs), SLP (platform currency, ERC-20 fungible token specification on Ethereum), and AXS (governance token, ERC-20 fungible token specification on Ethereum)

League of Kingdoms

League of kingdoms is a strategic MMO game where players compete for the conquest of new lands. Each player builds his own city that he must defend from opponents while trying to conquer others. All lands are owned and governed by players who can permanently own, actively develop, launch massive alliance warfare, and earn lucrative rewards.

- The game is Free to Play but land can be purchased.
- The game is live and anyone can start playing it.
- There is no utility token at the moment but only NFTs representing lands owned by players.

Thetan Arena

Thetan arena is an MOBA game that focuses on upgrading personal skills and collaborating with other players to win matches.

- It is a Free to Play game.
- This game is live.
- There are 2 tokens and an NFT that represents the player's character. The 2 other utility tokens function as an in-game currency and an investment token.

OVR

OVR is an Ethereum-based platform that merges AR (Augmented Reality) and VR (Virtual Reality) through geo-localisation. Through the platform, different types of content can be created and consumed in pseudo-geographical locations. Each location, i.e. a hexagon, has been identified and can be owned in NFT form.

- It can be Free to Play
- The game is live
- Each hexagon is a tradable NFT token, and the platform also owns an ERC-20 OVR token on the Ethereum blockchain used for governance and exchange of value within the platform

Sorare

Sorare is a trading card game focused on the world of football. Each card represents a real player with a specific rarity and users must create teams and compete with each other in different leagues and tournaments.

- The game is both Free to Play and Pay to Play to have rarer cards.
- The game has been live since 2019 and has raised several funds.
- For now the game does not have a utility Token but only NFTs that can be purchased and earned in the form of prizes.

Guild of Guardians

Guild Of Guardians is a multiplayer, fantasy, action RPG where players build their dream team composed of Guardians and compete in a guild to earn rewards.
The game vision is to build a popular RPG where players can turn their passion for gaming into real assets. Gamers can play a game they enjoy while simultaneously earning and trading as part of a massive, open-world economy.

- Guild of Guardians is a Free to Play mobile game that operates the game as a service.
- The game is not live yet.
- There are seasonal NFTs, an ERC-20 token as currency. The ERC-721 will be traded on ImmutableX.

Dark Forest

Dark Forest is an MMO space-conquest game where players discover and conquer planets in an infinite, procedurally-generated, cryptographically-specified universe featuring zksnarks. The cryptographic component is very instrumental to the game where a player who wants to make a move, they submit the hash of the planet they're moving from and the hash they're moving to, along with a zero-knowledge proof to prove that this constitutes a "valid" move. In Dark Forest, artifacts hidden on different planets have different values due to their different types and scarcity. Each planet conquered and developed by players has different coordinates and levels, attributes, so the power of the planet is also different with each other. All of these resources constitute the rich NFT assets in the Dark Forest game. In the future, players can even take their planetary assets to the NFT trading market for trading, just like trading game props between players in traditional games.

- It is a Free to Play game.
- It is live.
- They include ERC20 and NFT tokens.

The Sandbox

The Sandbox is a Minecraft-like game where users can perform an indefinite amount of actions. In fact, the game is not limited to a single type of gameplay, instead the gameplay is implemented by users and content creators on different pieces of the map. These pieces are owned through LAND NFTs, land owners can choose to monetise on the gaming experience offered on their land as they see fit.

- The game is technically Free to Play, however different gameplays on different lands can have different pricing mechanisms.
- The Sandbox is currently live with the Alpha version launched on 29th November 2021
- Assets include: LAND (tradable NFT), ASSETS (tradable NFTs, generated by users too), SAND (platform currency, fungible token specification on ethereum)

Illuvium

Illuvium is an open world RPG game with a Pokemon style model of catching monsters and using them to fight. These monsters are represented by NFTs which can be bought and sold, or used to fight other players and earn ETH.

- The first part of the map will be free to access, higher levels will require ownership of NFTs or other assets
- Beta in Q1 2022, possible release in Q3
- Assets: NFTs of Monsters, $ILV token (governance, ingame items)

Ember Sword

Ember Sword is a MMORPG where users can choose whatever weapon type they want to take on monsters or other players. There are no set classes, so players are free to develop any skills they want. Land will be owned by players, allowing them to affect gameplay by shaping the world.

- The game will be Free to Play
- It is not yet live, expecting an Alpha launch in Q1 2022
- Types of assets: land (tradable NFTs), collectables (tradable NFTs), Ember (tradable fungible tokens), equipment (non-tradable)

Star Atlas

Star Atlas is a strategy MMORPG based around space exploration. It has a huge open world, where players will form alliances and fight for territory. It will have a complex economy with a wide variety of resources and craftable assets.

- The game will be Pay to Play with initial costs (like ships) and ongoing costs (like fuel)
- The game is not yet live and may take several years to launch due to scope
- Fungible currencies: Atlas and Polis, all other assets will be tradable NFTs

Gold Fever

Gold fever is an RPG game that focuses on mining gold in different virtual lands. Players play various roles in this mining economy and compete for resources and virtual assets.

- The game uses both Free to Play and Pay to Play models.
- The game is in beta release and testing as of 2021Q4.
- There are 3 tokens, NFT, in-game currency and a tradeable utility token with a governance function.

Economics Design

Lemniscap