Project Twelve Economic Whitepaper v0.1

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Abstract

Project Twelve, P12 in short, is a GameFi ecosystem with sustainable economy. It features the Editor, a full-featured Metaverse content engine for building game worlds; the Infra, a set of API/SDK and developer portals for bridging game content on-chain; and the Econs, a set of economic and governmental rules and mechanisms implemented in EVM smart contracts.

In this paper, we define key mechanisms and formulate auxiliary theorems and lemmas that derive from the definitions. As a principle, the P12 economy as discussed in the paper does not rely on forced or assumed behaviors from the individual game economy. All game worlds can have desired tokenomics, minting and burning mechanisms of their own. These game worlds will rise and fall as the ecosystem evolve. All of these will not affect the economic principles and objectives established in the paper and it goes to show that P12 ecosystem recovers from local flux.

This paper also goes to show how the P12 economic mechanisms facilitate and guarantee the design goals of true ownership, transparent price discovery, guaranteed liquidity, verifiable scarcity, and lastly enforceable governance. Overall, this paper aims to lay the foundation for the P12 ecosystem and establish the sustainability and viability of P12 economy.

Keywords: P12; GameFi ecosystem; Editor; Infra; Econs; GameMaster

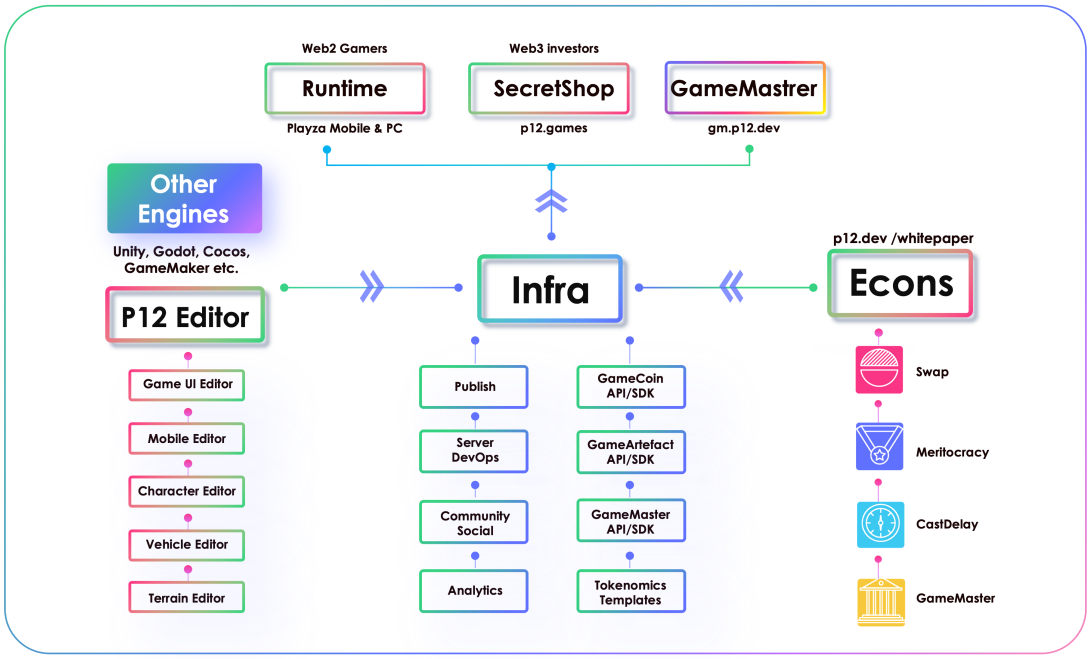

Figure 1. P12 Overview

1 Introduction

Project Twelve, P12 in short, is a GameFi ecosystem with sustainable economy. It features the Editor, the Infra, and the Econs. This paper discusses the economic and governmental mechanisms implemented in the P12 ecosystem. This discussion falls under the broader category of Virtual World Economy or Game World Economy.

1.1 10% Net Value of the World

All forms of virtual worlds and virtual experiences have taken up more than 10% of the awake time of the entire human civilization. However, virtual assets take up far less than 10% of the world's value, as measured in market capitalization. The authors of this paper attribute this mismatch largely to the fact that most virtual assets are currently centrally controlled by for-profit companies and horrendously underserved. When these obstacles were removed, the thesis is that virtual goods and assets would in the future take up more than 10% of the world's net value, demolishing the mismatch. This is held by many builders of virtual worlds (be it gaming, Metaverse, SocialFi, or NFT). We are seeing but the beginning of this 1000x paradigm shift for virtual assets.

1.2 Challenges for Virtual Assets

Most virtual assets are currently centrally controlled by for-profit companies. Some companies are building Metaverses under the same company-town paradigm. These companies thus have arbitrary and unvetted power over virtual assets in their respective virtual worlds or game worlds. This has led to a range of negative consequences in the past in the gaming sector, such as game currency inflations, shadow nerfs, fake scarcity and manipulations, and eventual server shutdown and database drop. As virtual assets are unprotected and underserved, their value is enormously impaired.

GameFi projects have employed Blockchain to eradicate this problem. However, most if not all of the current GameFi projects have unsustainable economic models, causing them to pump fast and crash faster. This leads to further consequences such as a lack of long-term R&D commitments as most GameFi projects have short lifespans. A most important design goal for P12 is to create a GameFi ecosystem with sustainable economy.

1.3 Sustainability and Other Goals of P12 Economy

Through economic and governmental rules and mechanisms, P12 seeks to achieve several design goals, including true ownership, transparent price discovery, guaranteed liquidity, verifiable scarcity, and enforceable governance. All these design goals revolve around and contribute to the central purpose of sustainability for the P12 economy. The above goals are defined mathematically for more precise examinations. Overall, this paper aims to lay the foundation for the P12 ecosystem and establish the sustainability and viability of P12 economy.

1.4 A Case for the Bits

To conclude the introduction section we briefly discuss the inevitability of virtual worlds, and present an unbiased, first-principle argument for bits over atoms. Virtual worlds and digital simulations are the cheapest and fastest way to run experiments. This holds for entertainment and scientific use cases. Consider two scientific fields, one digital and one physical, that start at the same time and are given the same resources. The digital one will always iterate faster, evolve faster, and thus grow bigger to attract and absorb future resources, including capital and brain, for its own use. In any random walk, the digital side wins. In our current incarnation, bits are winning over atoms, and it will keep doing so. As bits are winning, virtual assets will continue to grow. We are witnessing but the very beginning of the 1000x for virtual assets.

2 Mechanisms

The income earned in "Play to Earn" games usually has no real value support. When the rate of return declines and there are no more newcomers, such games will usually be eventually caught in a death spiral.

P12, however, is a GameFi ecosystem with a sustainable economy.

What we want to build is a long-standing, economically prosperous Game World. Game assets are truly owned by players, and liquidity and transaction history are publicly visible. You can see each player's collections and rare assets in the player's warehouse. In the game creation set, you can glimpse the thrilling story of Game World development from a wasteland into a thriving economy. The governance of the Game World is also kept open where players can participate in deciding the future direction of the game, resolving guild disputes, or impeaching developers for their evil deeds. Players become asset owners and masters of the Game World.

Players who invest the most time and effort in the game and put up high-quality content will be rewarded meritocratically with the help of the economic mechanisms of P12.

To realize this vision, P12 has designed the following important mechanisms:

- **Swap** P12 has its high-liquidity swap based on multiple automatic market making models. Game developers mint GameCoin and provide initial liquidity for P12-GameCoin Swap. A player can use P12 to exchange GameCoin for gaming.
- **CastDelay** CastDelay prevents developers from minting new GameCoin or removing liquidity without advance notice, to protect the interests of gamers. The mechanism delays a transaction by several blocks that are linearly positively correlated to the size of the transaction.
- **Meritocracy** Meritocracy is an important mechanism aimed at promoting sustainable economic growth of the P12 ecosystem. Meritocracy rewards high-quality content within the platform and behaviors which are beneficial to the platform. Rewards are given according to Usage Statistics, Economic Activities, and Keynesian Policies, and the mechanism ensures that there is no "reward fraud" behavior.
- **GameMaster** The GameMaster is the governance system of the P12 ecosystem. The voting power of GameMaster is measured by the number of veP12 obtained after staking P12. The GameMaster can implement fiscal and monetary policies similar to real economic systems, including taxes and transfer payments. Meanwhile, GameMaster also has a fine mechanism, which allows game players to initiate fine proposals for game developers who harm players, by effectively giving players the right to supervise.

Chapters 3-6 of this whitepaper introduce the four mechanisms of Swap, CastDelay, Meritocracy, and GameMaster respectively. Chapter 7 introduce the policy and vision of the P12 ecosystem's economic growth.

3 Swap

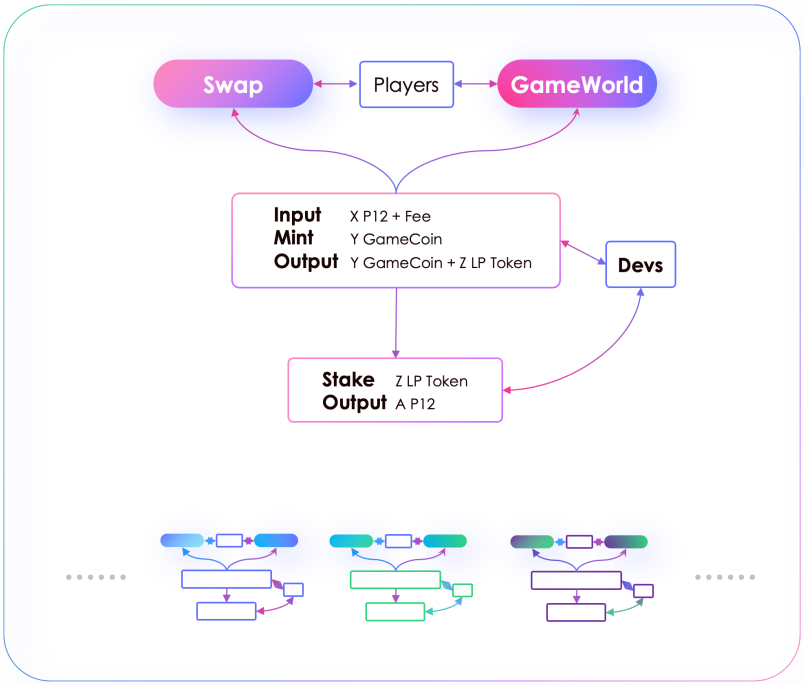

Figure 2. P12 Swap

3.1 P12 Swap

P12 is a GameFi ecosystem with native token P12, and many types of GameCoin customized for each game. Therefore, if the user wants to play the games included in the P12 ecosystem, it is necessary to acquire the GameCoin used by the specific game because this is the entrance to the Game World.

To get the specific GameCoin, the player can request them directly in decentralized exchanges such as Uniswap or Pancakeswap. However, to facilitate this process, the P12 ecosystem has the Swap system specially designed to exchange between the P12 ecosystem token and the different types of GameCoin. In this way, it allows a more significant amount of liquidity between these pairs, thus protecting the economic interests of the players. For this reason, we recommend that players obtain the P12 ecosystem token from other exchanges and then exchange it for the GameCoin they need through the P12 Swap system.

The transaction between P12 and GameCoin is done through an automated market maker (AMM). The Swap system supports multiple AMM models, including the Constant Product Market Maker (CPMM), such as

Uniswap. As well as Hybrid Function Market Makers (HFMM), such as Curve Finance, and weighted mathematics AMMs, such as Balancer,[1,4,6,11] and we will continue to introduce other appropriate models to Swap as needed.

During the first stage, we used the CPMM in the Swap due to its conciseness and proven success. In the P12 ecosystem, when implementing a CPMM market, liquidity providers create a liquidity pool by depositing traded assets (e.g., GameCoin and P12) into a trading pair contract. For instance, suppose that the pool reserves x tokens of P12 and y tokens GameCoin before a trade. If a trader buys δ amount of GameCoin by paying $p\delta$ amount of P12, the trader subtracts the corresponding value of GameCoin from the pool

$$y' = y - \delta \tag{3.1}$$

and adds the price-adjusted value of P12 to the pool

$$x' = x + p\delta \tag{3.2}$$

triggering a change in the liquidity pool from (x, y) to (x', y'). The algorithm of constant product market-making requires the (squared) geometric mean of the liquidity pool, net of trading fees, to be constant, $k = xy = x'y'$ with some k. This single equation derives the execution price p for this order.

3.2 Exchange Mechanism

The P12 ecosystem allows different types of AMMs to choose from. In addition to the widely adopted CPMM, the P12 system also allows StableSwap for developers who want the GameCoin to remain tied to the P12 ecosystem token.

In addition, if a game has more than two GameCoin or developers want to provide liquidity in different proportions, they can choose the Weighted Pool option.

3.2.1 CPMM

Web 3.0 users are already familiar with the Constant Product Market Maker (CPMM), so they know how it works. But, those who have just started to explore Web 3.0 are shown in detail how CPMM works, and the P12 ecosystem welcomes new users to the world of Web 3.0 games.

Liquidity providers inject tokens into an exchange which generate a pool of tokens (i.e., a liquidity pool). Consider P12 and GameCoin. Suppose that the exchange reserves of x amount of P12 and y amount of GameCoin. The constant product market-making requires the geometric mean of the liquidity pool (before fees) to be constant. That is, with some constant k, it holds that

$$k = xy \tag{3.3}$$

If a trader wants to buy Δy of GameCoin by selling $\Delta x = p\Delta y$ of P12 at price p, the trader adds Δx of P12 to the pool and withdraws Δy of GameCoin from the pool. Without transaction fees, it triggers the following change in the pool:

$$x' = x + \Delta x \tag{3.4}$$
$$y' = y - \Delta y \tag{3.5}$$

Note that the price of P12 in terms of GameCoin is

$$p = \frac{\Delta x}{\Delta y} \tag{3.6}$$

Since the geometric mean of the pool must be constant, it holds that

$$k = x'y' = (x + p\Delta y)(y - \Delta y) \tag{3.7}$$

Thus, the above equation determines p as a function of the current state of the pool (x', y'), and the trading quantity Δy. Also, by taking the derivative of the above equation concerning Δy, and by considering a small trading volume

$$\Delta y \to y' \tag{3.8}$$

the execution price for an infinitesimal trade is given by

$$P = \frac{x}{y} \tag{3.9}$$

Figure 3 shows a change in the pool's state caused by the above transaction: the exchange rate for one unit of trade is determined by the slope of the curve specified by

$$k = xy \tag{3.10}$$

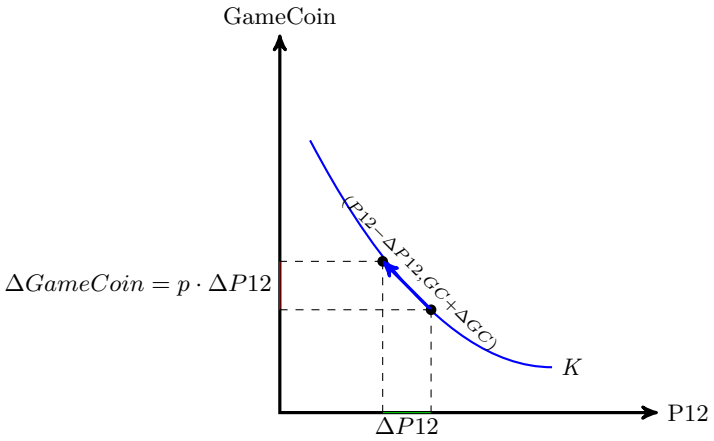

Figure 3. CPMM Model

When the exchange charges a transaction fee, the post-trade geometric mean of the pool, $x_f y_f$becomes higher than the pre-trade constant of k. To understand it, suppose that the pool takes a fraction f of traded assets as a fee and adds it to the pool. In this situation, (I)The execution price for a trade is determined by using the pre-trade state of the pool$k = xy$, as in the case with no fees; (II)A trade adds fees to the pool so that the post-trade pool has the larger geometric mean; (III)The execution price for the next trade is determined by using the updated state of the pool $k_f = x_f y_f$. With the fee, a trader who seeks to buy

$$\Delta x = p\Delta y \tag{3.11}$$

value of GameCoin must pay

$$(1 + f)\Delta x \tag{3.12}$$

for a trade. The execution price is determined by

$$k = (x + \Delta x)(y - \Delta y). \tag{3.13}$$

but it causes the following update to the pool state:

$$X \to x_f = x + (1 + f)\Delta x \tag{3.14}$$
$$Y \to y_f = y - \Delta y \tag{3.15}$$

Thus, the updated constant becomes

$$k'_f = x'_f y'_f = f\Delta x(y - \Delta y) + k > k \tag{3.16}$$

Figure 4 shows the transition of the pool from the pre-trade state to the post-trade state. With k constant updates, the curve that represents $y = \frac{k}{x}$ shifts upward. Then, the execution price for the next trade is determined by the updated equation

$$k'_f = x'_f y'_f \tag{3.17}$$

and so on. Since the pool is liquidated and reimbursed to liquidity providers, an increase in k can be seen as protocol fees.

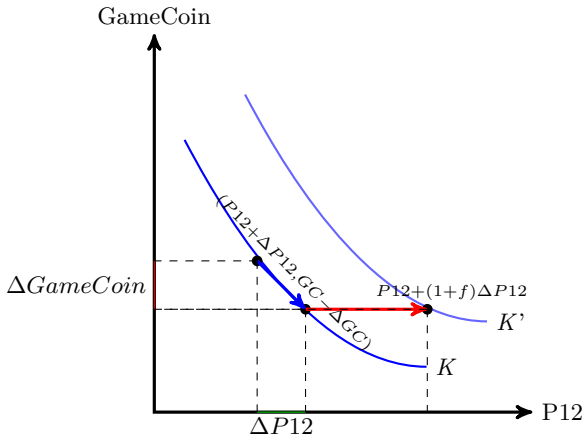

Figure 4. Change of pool liquidity

3.2.2 Stable AMM

The P12 ecosystem has built-in Stable Pools designed specifically for GameCoin with fixed exchange rate between P12. The Stable Pools use Stable Math, based on StableSwap that popularized by Curve, allowing significantly more trades to be made before encountering a substantial price impact. In this way, they increase substantially capital efficiency on like-kind trades.

The Stable Math function is defined as:

$$An^n \sum x_i + D = ADn^n + \frac{D^{n+1}}{n^n \prod x_i} \tag{3.18}$$

Where:

- n is the number of tokens
- x_i is is balance of token i
- A is the amplification parameter.

When a portfolio of coins xi is loaded up, we need to calculate D, and we need to hold this equation true when we perform trades (e.g. swap P12 into GameCoin). That is done by finding an iterative, converging solution either for D, or for GameCoin when all other variables are known.

3.2.3 Weighted AMM

In the ecosystem, P12 weighted pools allow developers to build pools with different token counts and weightings. To fulfill their function, weighted pools use the weighted mathematics proposed by Balancer to make exchanges between any asset possible, regardless of whether or not they have price correlation.

The value function V is defined as:

$$V = \prod_t B_t^{W_t} \tag{3.19}$$

Where:

- t ranges over the tokens in the pool
- B_t is the balance of the token in the pool
- W_t is the normalized weight of the tokens, such that the sum of all normalized weights is 1.

By making V constant we can define an invariant-value surface.

The spot price between any P12 and GameCoin is the the ratio of the token balances normalized by their weights:

$$SP_{P12}^{GC} = \frac{\frac{B_{P12}}{W_{P12}}}{\frac{B_{GC}}{W_{GC}}} \tag{3.20}$$

Where:

- B_{P12} is the balance of P12, the token being sold that is going into the pool.
- B_{GC} is the balance of GameCoin, the token being bought that is going out of the pool.
- W_{P12} is the weight of P12
- W_{GC} is the weight of GameCoin

From this definition it is easy to see that if weights are held constant, the spot prices offered by Weighted Pools only change with changing token balances. If the pool owner (developer) does not add or remove tokens to/from the pool, token balances can only change through trades. The constant surface causes the price of tokens being bought by the trader (GameCoin) to increase and price of tokens being sold by the trader (P12) to decrease.

Knowing the value function after the trade should be the same as before the trade, we can calculate the amount of GameCoin a player gets when sending P12 to the pool.

$$A_{GC} = B_{GC}(1 - (\frac{B_{P12}}{B_{P12} + A_{P12}})^{\frac{W_{P12}}{W_{GC}}}) \tag{3.21}$$

where:

- A_{GC} is the amount of GameCoin received
- A_{P12} is the amount of P12 sent.

In reality, V will increase as a result of trading fees applied after a trade state transition.

3.2.4 Omnipool

The Onmipool in the P12 ecosystem is the vision of the future, and P12 may introduce this mechanism in the right circumstances. This type of AMM is designed to end liquidity fragmentation by allowing crypto assets to be mobilized in a single trading pool. It is considered an ocean of liquidity; that's why it can be used to trade among P12 and a variety of GameCoin seamlessly.

The Omnipool uses P12 as a "hub" token through which all trades are routed, avoiding the segmentation of liquidity inherent to AMMs which require LPs to provide liquidity for a pair of tokens. Both transaction fees and partial impermanent loss mitigation are paid out in P12.

Swap Execution

In vesion 1, the prices behave as though each $GameCoin1$/P12 pool is a CPMM, although other CFMMs continue to be under investigation.

Let Q_1 be the quantity of P12 in the $GameCoin1$ pool and G_1 be the quantity of $GameCoin1$. Suppose a trader stipulates they wish to sell ΔG_1 of $GameCoin1$ for $GameCoin2$. Then $Q_1 G_1 = (Q_1 + \Delta Q_1)(G_1 + \Delta G_1)$, so with asset fee f_A and protocol/P12 fee f_p, we have

$$\Delta Q_1 = Q_1 \frac{-\Delta G_1}{G_1 + \Delta G_1} \tag{3.22}$$

$$\Delta Q_2 = -\Delta Q_1 (1 - f_p) \tag{3.23}$$

$$\Delta G_2 = G_2 \frac{-\Delta Q_2}{Q_2 + \Delta Q_2} (1 - f_A) \tag{3.24}$$

The P12 or "protocol" fee is $f_P \Delta Q_1$ (which is positive since ΔQ_1 is negative) and the asset fee is $-f_A G_2 \frac{-\Delta Q_2}{Q_2 + \Delta Q_2}$.

Providing Liquidity to Omnipool

Liquidity providers (LPs) may contribute a single asset, and in return receive a share of the pool of that asset. When the LP removes liquidity, they may receive both the asset they provided and P12.

Single-asset liquidity providers for some GameCoin cannot always be given only the token they contributed, because if the price of GameCoin has gone up and substantial amounts of GameCoin have left the pool, LPs of GameCoin are splitting a much smaller pot. The protocol, meanwhile, has a much larger amount of P12 that has been traded in for GameCoin. Instead of simply allowing LPs to take the loss, the protocol splits the matched pool with the LPs. If the price of GameCoin goes up (via P12 being traded into the pool for GameCoin), the LPs are entitled to some of that P12. On the other hand, if the price of GameCoin goes down (via GameCoin being sold to the pool for P12), the protocol is entitled to some GameCoin.

Let p be the current price of GameCoin, p_0 the price when an LP initially provided liquidity, Δs the number of shares the LP wishes to withdraw, B the number of GameCoin shares owned by the protocol.

Note that since shares are burned when liquidity is removed, $\Delta s < 0$.

If the price of GameCoin has gone down ($p < p_0$), the LP will be withdrawing only GameCoin (no P12). The protocol will take control of some GameCoin shares from them, while some shares will be burned.

We first calculate the change to the protocol share ownership of GameCoin:

$$\Delta B = max(\frac{p_0 - p}{p + p_0} \Delta s, 0) \tag{3.25}$$

Note that if $p < p_0$ (the price of GameCoin has gone down), ΔB is positive, meaning that the protocol is claiming some of the Δs shares from the LP. If $p > p_0$, the protocol claims no asset shares from the LP.

Next, we find the number of shares to burn:

$$\Delta S = \Delta s + \Delta B \tag{3.26}$$

We can then calculate the total amount of GameCoin the LP receives, which is simply proportional:

$$\Delta G = G \frac{\Delta S}{S} \tag{3.27}$$

$$\Delta g = -\Delta G \tag{3.28}$$

If $p > p_0$, lots of P12 was traded into the Omnipool for GameCoin, so the protocol has extra P12 go give the LP. Specifically,

$$\Delta q = -p(\frac{2p}{p + p_0} \frac{\Delta s}{S} G + \Delta g) \tag{3.29}$$

$$\Delta Q = Q \frac{\Delta G}{G} \tag{3.30}$$

Note that since $\Delta Q \neq -\Delta q$, the P12 that is not distributed to the LP who is withdrawing liquidity is burned by the protocol.

3.3 GameCoin Issuance Method

3.3.1 CPMM Offering

When using the CPMM model to issue GameCoin, the developer gets 50% P12 and 50% GameCoin in the pool they prepared. Thus, as players use P12 to buy GameCoin, the amount of P12 will increase, and GameCoin will decrease. However, the portion of the value of P12 and GameCoin will not be affected at any time and will continue to be 1:1.

The CPMM method of coin issuance is widely used because of its functionality and ease of use. In this method, the liquidity pool is established simultaneously when a GameCoin is issued so that you can use it for trading at any time. In addition, using the CPMM model is the most concise to sell GameCoin, but the disadvantage is that developers need to prepare more P12 for initial liquidity.

3.3.2 Bonding Curve Offering

In the Bonding Curve Offering (BCO), a bonding curve is used for GameCoin distribution. Through the bonding curve, new GameCoin is minted when they are bought by players and burned when they are sold upon redemption. This way, an autonomously fluctuating exchange is generated, and the price is actively adjusted.

As players buy GameCoin, the price of the next GameCoin increases and only decreases when users sell GameCoin back to the bonding curve. In this way, as the equation of the bonding curve is known, GameCoin prices become predictable and depend on the market supply at the time of realization.

The main advantage of a bonding curve is that it makes it easier for users to make purchases and sales. In addition, it allows for customization, resistance to manipulation, and fair distribution. Now that we have explained a bonding curve in detail, we will show an example to illustrate a BCO.

An example is that our function (not the actual GameCoin BCO price function) has the form of:

$$y = kx + b \tag{3.31}$$

Figure 5 illustrates the relationship between the amount of P12 required for the corresponding total supply of GameCoin. Thus, when the BCO starts, $y_0 = b$ amount of P12 is needed for 1 unit of GameCoin.

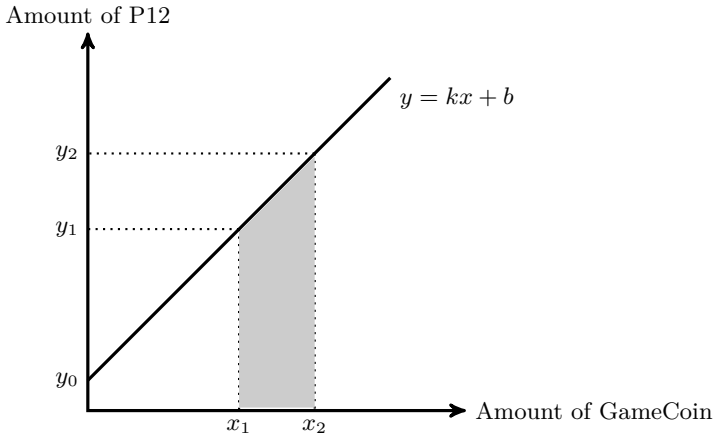

Figure 5. Bonding Curve Offering Example

Suppose a user wants to buy $\Delta x = x_2 - x_1$ amount of GameCoin when the current supply of tokens is x_1. The amount of P12 to be added to the pool is the function integral from x_1 to x_2. This is the area of the shaded part in Figure 5.

The integral of the function is:

$$Y = \int_{x_1}^{x_2} y dx = \int_{x_1}^{x_2} (kx + b) dx = \frac{1}{2} k x^2 \Big|_{x_1}^{x_2} = \frac{1}{2} k (x_2^2 - x_1^2) \tag{3.32}$$

Y is the total cost of P12 buying $\Delta x = x_2 - x_1$ amount of GameCoin.

This same technique can be used to calculate the amount of P12 they would receive by selling $\Delta x = x_2 - x_1$ amount of GameCoin to the bonding curve:

$$Y = \int_{x_2}^{x_1} y dx = \int_{x_2}^{x_1} (kx + b) dx = \frac{1}{2} k x^2 \Big|_{x_2}^{x_1} = \frac{1}{2} k (x_1^2 - x_2^2) \tag{3.33}$$

In this case, Y is the amount of P12 received when selling $\Delta x = x_2 - x_1$ amount of GameCoin.

3.3.3 LBP Offering

Liquidity Bootstrapping Pools (LBPs) are pools that can dynamically change token weighting (e.g 1/99 to 99/1 for P12/GameCoin). LBPs use Weighted Math with time-dependent weights. The starting and end weights and times are selected by the developer, who also has the power to pause swaps.

Through the LBP method, there is the possibility to launch GameCoin with low capital requirements. To do this, the developer creates a pool of two tokens with a GameCoin and a ecosystem token, and the weights are set in favor of the GameCoin distribution. In this way, over time, there is a gradual shift, with GameCoin gaining favor at the end of the sale.

One of the main advantages of this method is that developers can set up LBP parameters to maintain price stability. In addition, when using LBP, the developer can pause the exchange whenever they deem necessary.

LBPs often start with intentionally high prices. This strongly disincentivizes whales and bots from snatching up much of the pool liquidity at the get-go. When LBPs are used for GameCoin, this can help increase how widespread the token distribution is.

Developers who use LBPs to kickstart the liquidity of a GameCoin that has not been well distributed yet can do so with minimal starting capital. For a developer running an LBP with their GameCoin and P12, starting with 10% or 20% P12, as opposed to 50% P12 like they might need on another token issuance method, significantly reduces their starting capital requirements. Shifting from 80/20 $GameCoin/P12$ to 20/80 would look like this:

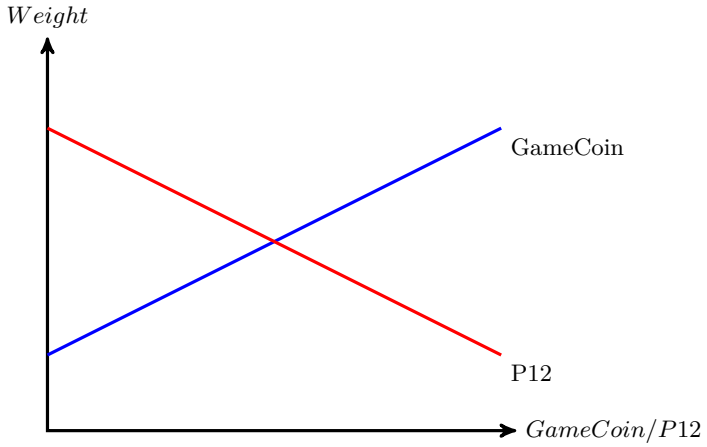

Figure 6. $GameCoin/P12$ Weight Change in an LBP

and would ultimately result in the developer holding far more P12 at the end of the LBP while reducing the price volatility that GameCoin would experience when launching a CPMM 50/50 pool.

3.4 Genesis Liquidity Provision

3.4.1 Mechanism Explained

One of the advantages of using P12 Swap to acquire GameCoin is that it has higher liquidity than the other swaps, which allows for less slippage and an adequate supply of tokens.

This is because in P12 Swap, the game developers provide the initial liquidity of GameCoin at the time of issuing the tokens, called Genesis Liquidity Provision (GLP). This mechanism is designed to issue each GameCoin and add liquidity to the Swap. Such explanation here is based on CPMM but can also be applied to other models.

If a game developer wants to design a game and issue a specific GameCoin for use in it, they can use P12 to issue the tokens and establish the liquidity pool between P12 and GameCoin.

Suppose the amount of P12 and GameCoin is x and y, and the liquidity of the pool could be defined as:

$$L = \sqrt{xy} \tag{3.34}$$

The value of liquidity of pool is:

$$V_L = px + p_{GC}y \tag{3.35}$$

where p represents the dollar value of P12 and p_{GC} is dollar value of GameCoin.

This clarifies the detail of how developers mint GameCoin and add initial liquidity.

Whereby, if y_0 amount of GameCoin are issued, and x amount of P12 are provided as initial liquidity when the developer decide to issue GameCoin through Factory Contract, u percentage of GameCoin and x amount of P12 would establish a liquidity pool, and the remaining $1-u$ percentage of GameCoin would be invoked freely by the developer. The developer can use these available GameCoin for the economic construction and mechanism design of the Game World he/she develops.

In the first stage, $u = 50\%$. This could be changed or increased by different options based on the resolution vote.

Therefore, let $y = uy_0$, then the amount of P12 and GameCoin are x, y. Suppose the price of P12 is p, and the initial cost of GameCoin could be set as the liquidity pool is established:

$$p_{GC} = \frac{px}{y} = \frac{px}{uy_0} \tag{3.36}$$

Hence, the liquidity value of the pool would then be:

$$V_L = px + p_{GC}y = 2px \tag{3.37}$$

The value of developers' assets is obtained from the pool liquidity and the value of the remaining GameCoin :

$$V = V_L + p_{GC}(1-u)y_0 = px(1 + \frac{1}{u}) > px \tag{3.38}$$

Therefore, the total value of developers' assets increases in this process, and the developers are obliged to provide initial liquidity and stake their GameCoin-P12 LP tokens. In this case, even though they can remove liquidity, they must announce it first. (See Section 4.2 Withdraw Liquidity).

After the developers mint GameCoin and establish the liquidity pool, users can exchange between P12 and GameCoin in the corresponding pool. It is essential to consider that although there is initial liquidity, it is provided by the developers. But, after the pool is established, any user can provide liquidity and earn commissions for each transaction. Simultaneously, liquidity providers can stake their LP tokens seamlessly to earn P12 rewards.

To better understand the GLP mechanism, you can watch this video: How developer mint a GameCoin and provide initial liquidity with P12.

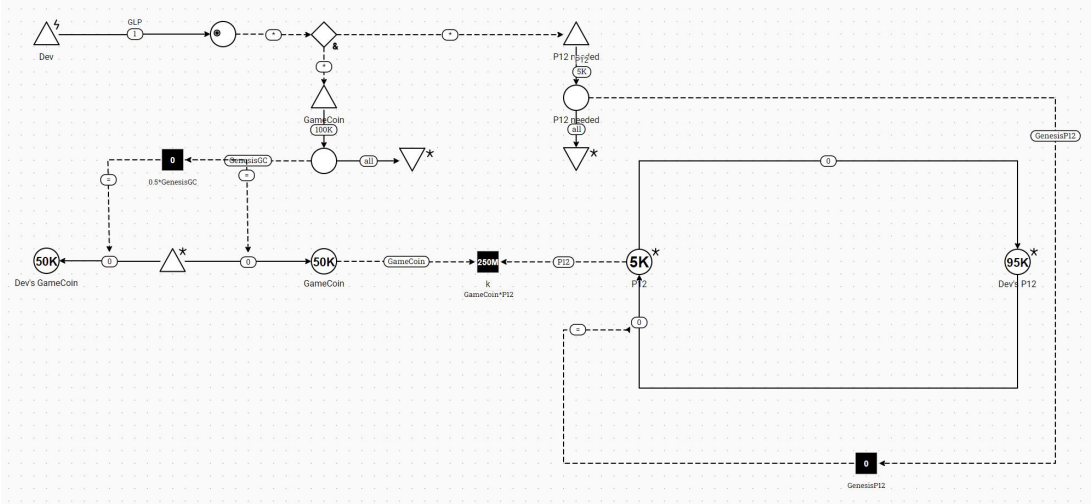

Figure 7. GLP Mechanism

3.4.2 GameCoin Tokenomics Scenarios

GameCoin Rise

The moment a game gains popularity, players flock to that pool to buy more GameCoin. For that reason, the amount of P12 increases, and the amount of GameCoin decreases, resulting in the amount of P12 corresponding to each LP token increasing and the GameCoin decreasing.

If developers act as initial liquidity providers, the number of P12 they hold increases. They can sell a portion of P12 to make a profit in exchange for their contributions to the ecosystem. As the amount of GameCoin in the pool decreases, the price increases due to the AMM algorithm.

For example, if the developer contributes 100 P12 and 200 GameCoin and each P12 has a value of \$2 and each GameCoin has a value of \$1, the total value contributed would be equivalent to \$400 ($100P12 \times \$2 + 200GameCoin \times \$1 = \$400$). Therefore, the trading curve is created according to:

$$K = xy = 200 \times 100 = 20,000. \tag{3.39}$$

Then a player wants to buy 100 GameCoin. They need to provide 100 P12 because of $k = 200 \times 100 = 100 \times 200$. The trading cost is

$$\$1 \times 100 - \$2 \times 100 - fee = -(100 + fee) \tag{3.40}$$

After trading, the price of GameCoin is \$4, and the value of the developer's liquidity is

$$\$4 \times 100 + \$2 \times 200 = \$800 \tag{3.41}$$

Thus, the developer gets paid through the rise of GameCoin, which motivates they to build in the P12 ecosystem actively.

Let this part of the logic become dynamic, we can see in this video that as players use P12 to buy GameCoin, the price of GameCoin gradually increases, and the developer's wealth also increases: How P12 Genesis Liquidity Provision Works.

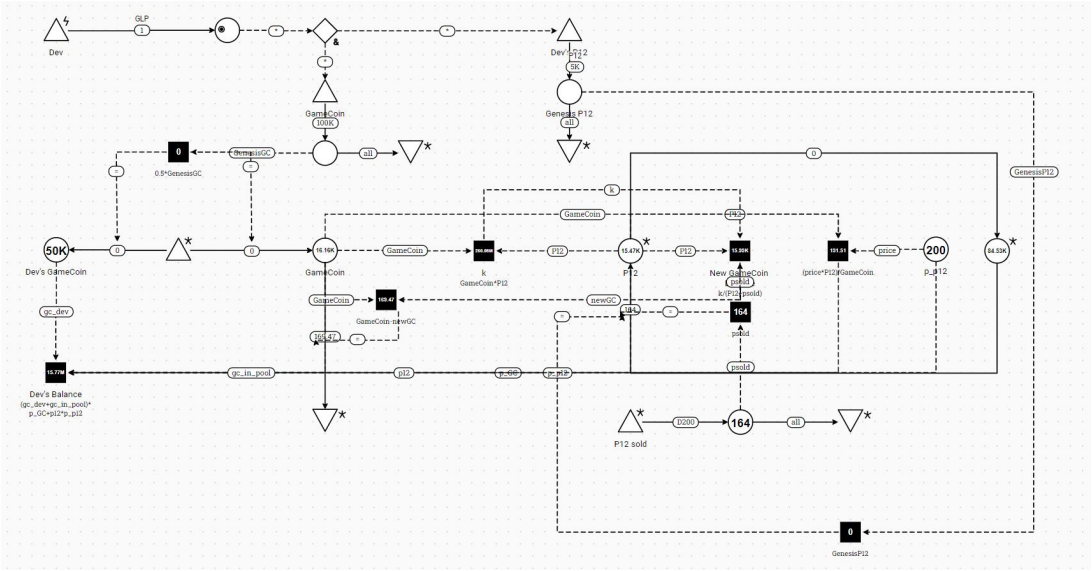

Figure 8. GLP - GameCoin Rise

GameCoin Crash

GameCoin can fall if the corresponding game does not have a sustainable economic model or if the game is boring, because of which players may leave the game.

Knowing what happens if players lay off the GameCoin they earn in the game is essential. Therefore, here we show you an example:

Suppose the developer mints 1000 GameCoin and creates a liquidity pool with half of them and 500 P12. The initial price of P12 and GameCoin is \$1. Then we can calculate the initial value of the pool, which is as follows:

$$V_0 = p_{GC} \cdot x + p_{p12} \cdot y = \$1000 \tag{3.42}$$

In the case that players earn 500 GameCoin through the game, which is the maximum bid out of the liquidity pool, and decide to sell the GameCoin to the liquidity pool, then the amount of P12 left in the pool would be as follows:

$$y = \frac{xy}{x + \Delta x} = \frac{500 \times 500}{500 + 500} = 250 \tag{3.43}$$

And therefore, the remaining value in the pool is

$$V_1 = p'_{GC} \cdot x' + p'_{p12} \cdot y' = \$500 \tag{3.44}$$

Therefore, this means that the developer is losing money if their game is not popular.

Arbitrage Opportunity

One of the questions that players have is whether it is possible that in case the game is not very playable, the developer can sell GameCoin for arbitrage. Such a concern is based on the fact that verified developers can mint GameCoin when launching a game and only need to provide P12 for liquidity provision.

For example, if a developer provides 100 P12 and mints 1000 GameCoin, half of the GameCoin is used to provide liquidity in a CPMM Swap, and the other part is available for the developer to allocate. Therefore, the liquidity pool would at that time have 100 P12 and 500 GameCoin, so the initial GameCoin price is:

$$1 \quad GameCoin = 0.2 \quad P12 \tag{3.45}$$

Therefore, if the game does not generate real value, the developer will only want to sell the GameCoin to make a profit. Thus, the developer can sell the other 500 GameCoin available to them to call and withdraw all the liquidity in the liquidity pool. To carry out this process, the developer has to fulfill the following steps:

STEP 1. Allocate 500 GameCoin to themself and sell them in Swap.

The developer will receive 50 P12, and the tokens left in the liquidity pool are 50 P12 and 1000 GameCoin, which means that the GameCoin price becomes:

$$1 \quad GameCoin = 0.05 \quad P12 \tag{3.46}$$

STEP 2. Withdrawal of liquidity from the pool.

The developer must withdraw liquidity from the pool to realize the asset. However, due to the limitations of the CastDelay mechanism, the developer needs liquidity, and the action will be delayed. For example, if the developer need a delay of 7 days to be able to withdraw all the liquidity, several scenarios can occur:

- Pre-withdrawal purchase: if no user has bought GameCoin before, the developer will get 50 P12 and 1000 GameCoin after the delay. Thus, the developer will have 1000 GameCoin more than in the initial state, but it will have no value.
- Post-withdrawal purchase: if a user buys GameCoin after the game developer has sold GameCoin and considers the value undervalued. When they learn that the developer wants to withdraw liquidity, they will be able to sell it before the developer's LP tokens are unlocked. In this way, the P12 in the pool first increases and then decreases, and finally, there are 50 P12 and 1,000 GameCoin left in the pool. These are the assets that the developer can finally obtain by extracting liquidity.

According to the above, the developer would not have an arbitrage opportunity in both cases. In addition, the P12 team would check the GameCoin insurance claim to ensure a real game backs it.

3.4.3 LP Staking Rewards

To incentivize liquidity provision, those who stake LP Tokens will be rewarded with P12 Tokens. The amount of P12 received will be directly related to the time length of liquidity provision, how large your position is relative to the size of the entire pool and which pool you provide liquidity to.

In a GLP mechanism, developers inject the initial liquidity to the trading pair and automatically get their LP tokens staked. Thus, they will get P12 rewards as long as they keep their LP tokens staked.

4 CastDelay

In the Game World, the central bank is the developer. Therefore, the central bank has the right to set policies to ensure the stability and economic sustainability of the game.

To ensure that the game operates stably, the country's monetary policy must be disseminated and taken care of in advance, especially in cases related to the currency circulation. That is, in cases related to the expected inflation rate and the depth and liquidity in the liquidity pool.

It should be noted that staking or unstaking a large proportion of tokens could be controversial because of its excessive influence on the GameCoin price. Timelock[1] [2] is a lock controlled by a clock to prevent it from opening before the given time, which is set as CastDelay in the P12 ecosystem. Thus, CastDelay delays a transaction for a period that is proportional to the size of the transaction.

Suppose S_T is the total amount of LP tokens staked, and T can be representative of both GameCoin and P12. ΔS_x is the change in stake caused by x users. The change of time delays ΔD is proportional to $\frac{\Delta S_x}{S_T}$, which is equivalent to:

$$\Delta D \propto \frac{\Delta S_x}{S_T} \tag{4.1}$$

The delay is used to inform the players of the expected monetary policy, which will be implemented later. The Blockchain technology can allow the Game World's "central bank communication" expectation to be 100% realized.

The Delay operations include, but are not limited to, increasing the amount of GameCoin issuance in circulation; and removing liquidity.

The game economy, as in the real world, is constrained by the Mundell-Fleming trilemma, in which it is impossible to have all three of the following simultaneously: free movement of capital, fixed exchange rate system, and independent monetary policy. The Game World economic system prioritizes the free movement of capital and independent monetary policy and leaves the exchange rate between P12 and GameCoin to the market through a floating rate. In this way, developers can decide the amount of currency in circulation and the liquidity of the markets. Therefore, permission-less exchange and liquidity are provided in the ecosystem.

[1] https://github.com/OpenZeppelin/openzeppelin-contracts/blob/master/contracts/governance/TimelockController.sol
[2] https://github.com/compound-finance/compound-protocol/blob/master/contracts/Timelock.sol

4.1 Mint Additional GameCoin

The more GameCoin the game developers issue, the longer it takes for a delay to occur. This occurs because it stacks linearly, so there is no incentive to split the minting into multiple shares.

During the Delay process, game players know the additional supply of GameCoin that increases and can prepare perfectly for the increase. For game players, minting GameCoin is not necessarily bad because it may even represent an increase in the production of this Game World, the need to avoid deflation or even an easy monetary policy.

Suppose the current total supply of GameCoin in circulation is S_G, and the amount of additional GameCoin issued is ΔS_G. Then the ratio of additional GameCoin is as follows:

$$A_1 = \frac{\Delta S_G}{S_G} \tag{4.2}$$

The engineering implementation of the CastDelay mechanism is set to the number of blocks. However, for the convenience of explanation, we explained according to the D days of delay. D_0 is the minimum number of days of the delay, and D is cumulative, which timed from the time of the last Delay was completed.

With some constant K_{mint}, it holds that

$$\begin{aligned} D &= D_0 + K_{mint} A_1 \\ &= D_0 + K_{mint} \frac{\Delta S_G}{S_G} \end{aligned} \tag{4.3}$$

For example, we can assume that if the current total supply of GameCoin in circulation is 100,000, the developer wants to mint an additional 10,000 GameCoin to incentivize players. We assume that $D_0 = 3Days$ and $K_{mint} = 20Days$. The delay is

$$D = 3 + 20 \times \frac{10,000}{100,000} = 5Days \tag{4.4}$$

In this case, the 5-day delay allows the developer to communicate with the Game World community to give them the necessary time for players to decide whether they want to keep the GameCoin or sell it. Therefore, this delay mechanism is essential to ensure that game developers' seigniorage is not abused. Players always have the opportunity to react before the developer does.

4.2 Withdraw Liquidity

The Genesis liquidity provision mechanism allows developers to provide initial liquidity from the P12 GameCoin pool, but their LP tokens will be automatically staked.

If developers want to remove liquidity, they are required to unstaked their LP tokens and remove liquidity. This way, a delay is applied to the unstaking process as a time-lock mechanism.

The purpose of this mechanism is to prevent developers from suddenly withdrawing liquidity. The developer's LP token is automatically staked when the initial liquidity is created; thus, the unstaking step is delayed, allowing everyone to know before the developer withdraws the liquidity.

It is essential to consider that the CastDelay mechanism only affects the unstaking operation of LP tokens. Therefore, if a person acts as a pool liquidity provider, they can freely enter and exit the pool and add or remove liquidity. However, if the person use their LP tokens for yield farming, which consists of staking their LP tokens, the unstaking step will also be affected by CastDelay.

The length of the delay will depend on the amount of unstaking. Therefore, the higher the ratio of the unstaking amount to the total amount of LP tokens in reserve, the longer the delay duration time will increase.

In the case where the amount of unstaking amount is ΔL, and the total amount of LP tokens is L. Then

$$A_2 = \frac{\Delta L}{L} \tag{4.5}$$

where A_2 is the ratio of the unstaking amount to the total amount of LP tokens and the number of delay days in D, D_0 is the minimum number of Delay days. With some constant $K_{unstake}$, it is satisfactory that

$$\begin{aligned} D &= D_0 + K_{unstake} A_2 \\ &= D_0 + K_{unstake} \frac{\Delta L}{L} \end{aligned} \tag{4.6}$$

D is calculated and timed from the last delay period completed.

For example, if a developer wants to remove some of the liquidity in the swap and the liquidity pool has 10,000 GameCoin and 400 P12, $\sqrt{400 \times 10,000} = 2,000$ LP tokens. The amount of LP tokens owned and staked by the developer is 1,500. If the developer wants to unstake 100 LP tokens. We assume $D_0 = 3Days$ and $K_{unstake} = 20Days$. Then the delay is

$$D = 3 + 20 \times \frac{100}{2,000} = 4Days \tag{4.7}$$

Generally, a small amount of unstake and subsequent withdrawal of liquidity is tolerable because the P12 ecosystem encourages making money by creating a good game. However, we consider the behavior of withdrawing a considerable proportion of liquidity reprehensible because it causes the liquidity pool to be almost dry. In the case above, if the developer withdraws all of its liquidity, then the delay would be

$$D = 3 + 20 \times \frac{1,500}{2,000} = 18 Days \tag{4.8}$$

The players have a normal reaction of getting angry with the developer and have the opportunity to sell the GameCoin back to the liquidity pool. So that the price of the GameCoin plummets, as well as the value of the liquidity pool.

This mechanism is essential because it ensures the safety of players' assets and limits the withdrawal of liquidity with a delay, making it unlikely that players will encounter a shortage of liquidity by developers.

5 Meritocracy

Meritocracy is an unique mechanism designed to safeguard meritocracy in P12 ecosystem and only reward developers from sustainable growth of their game and community. Among all P12 tokens, 60% is distributed among the games to ensure quality content and the development of booming economic activities.

Good quality content promotes a boost in overall platform performance. Otherwise, according to Gresham's law, bad money would drive good money, as evidenced in traditional gaming ecosystems. The reward can be distributed based on three categories: usage statistics, economic activities, and Keynesian controls.

$$Meritocracy = m_0 + m_1 U(D_i) + m_2 E(D_i) + m_3 K(D_i) \tag{5.1}$$

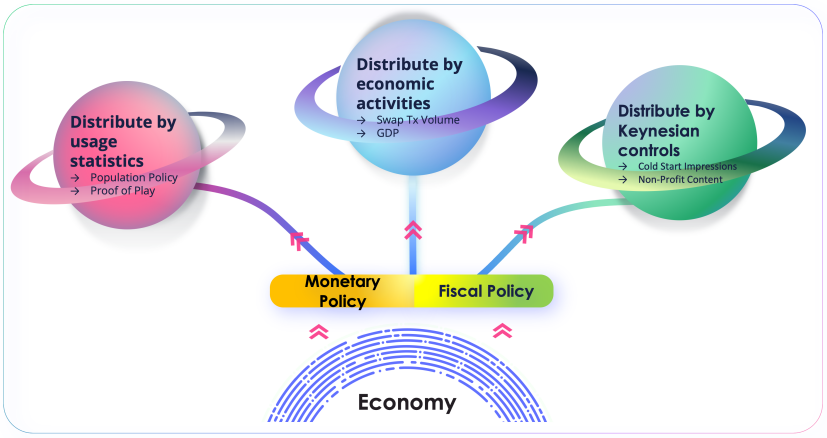

Figure 9. P12 Economic Activities

5.1 Usage Stats

The reward is distributed according to the population policy and the proof of play. The P12 ecosystem uses a set of usage statistics in each Game World to determine the game's popularity. All ranking criteria used are fair and resistant to brushing.

5.2 Economic Activities

P12 will reward P12 games according to their economic activities in the ecosystem. Rewards are distributed based on P12 Swap and NFT (the SecretShop) trading volumes as well as liquidity provision in P12 Swap.

If a specific GameCoin has a very high trading/swap volume, or a game-related NFT is frequently traded in the SecretShop (the NFT Marketplace), then this can be a concrete evidence of economic contribution brought by a specific game, who therefore gets rewarded based on such contribution.

Of course, if rewards are based on these activities, we have to make sure that the activities are true. So P12's reward to the game must be less than the transaction cost of those transactions. Here's the relation between the rewards and the cost of trading.

Suppose the T_0 is the amount of trading volume, and the transaction fee is f_0. The total transaction fees could be:

$$T_f = T_0 f_0 \tag{5.2}$$

Suppose the average gas cost is g_0, and the number of transactions is y_0. So the total gas fees of all the transactions is

$$g = g_0 y_0 \tag{5.3}$$

Therefore, the total transaction cost is made up of transaction fees and gas fees, which equal to

$$T_f + g \tag{5.4}$$

Because the value of awarded P12 is less than the total cost, the meritocracy limit is represented as:

$$R < T_f + g \tag{5.5}$$

R is the economic actvities-based Meritocracy reward according to trading volumes.

5.3 Keynesian controls

The economist Keynes advocated increasing public spending and reducing taxes to stimulate demand and free the world economy from depression.[8] For this reason, Keynesian controls are used in the P12 ecosystem to suggest that achieving optimal economic performance and avoiding economic recessions is possible. This can be achieved by influencing aggregate demand through active stabilization policies and government economic intervention.

The multiplier effect is considered one of the characteristic components of Keynesian countercyclical fiscal policy.[9] According to Keynes' theory of fiscal stimulus, the injection of public spending results in increased business activities and even higher spending.

Moreover, this theory proposes that spending boosts aggregate output and generates more income. Thus, if the developers and players are willing to spend their additional income, the growth they will obtain in the gross domestic product may even exceed the amount of the initial stimulus.

Suppose that the T_1 amount of P12 tokens are granted; in this case, the multiplier provided by the stimulus is g_1, and the growth of the whole set of P12 will be greater than T1.

$$T_g = T_1(1 + g_1) \tag{5.6}$$

Besides that, in the Game World, the reward is distributed according to two mechanisms: cold start impressions and non-profit content.

Cold Start Impressions has become the TMC support provided by the game's initial launch. In addition, we provide various support and assistance for newly released games and individual independent developers, including TMC and promotion. We also support games created on a non-profit basis that do not make money but have a public welfare value. Examples of these cases are independent games that deal with topics such as art, war, and culture or about the history of the Internet and video games. For which specific incentives are granted to avoid economic downturns.

6 GameMaster

6.1 P12 Governance

The term GameMaster refers to the player who is the master of the game. In traditional centralized games, players have no real governance rights. On the other hand, the Decentralized Autonomous Organization (DAO) is a new Web 3.0 organizational structure that allows players in the P12 ecosystem to have absolute governance rights.

P12 DAO consists of multiple smart contracts connected by Aragon. As for vote weight, standard Aragon's 1 token = 1 vote method is replaced with the voting weight proportional to locktime similar to Curve Finance[7] .

Instead of voting with amounts of tokens, P12 tokens are lockable in a $VotingEscrow$ for a selectable lock time t_l, where $t_l < t_{max}$, and t_{max} is the maximum length of time to stake. After staking, the time left to unlock is $t \leq t_l$. The voting weight is equal to:

$$w = a\frac{t}{t_{max}} \tag{6.1}$$

where a stands for the amount of P12 staked.

Amounts and time weight voting are determined by how long the tokens cannot be moved in the future. The weight of the vote decreases linearly with time, and to get more veP12; there are only two ways:

- Increase the amount of P12 staked;
- Extend the P12 staking time: if the same amount of P12 is staked, the longer the staking time, the higher the number of veP12 obtained by staking.

If P12 is staked as veP12, the user loses liquidity because veP12 is not negotiable, and the user cannot break the tie in advance. Therefore, as compensation, veP12 holders receive the following incentives:

1. P12 DAO governance: In addition to voting on proposals related to the healthy and sustainable development of the P12 ecosystem, a forfeiture mechanism was incorporated. When game developers act maliciously against players, players will have all the tools to protect their interests. Thus, players can request penalties for developers through standard confiscations proposals, and the penalty assets will be forfeited to the P12 Treasury.
2. Weight voting for gauges: In P12, inflation is going towards users who use it. For liquidity providers, the usage is measured with Gauges. Each LP gets inflation proportional to their LP tokens locked. Gauges are per pool (each pool has an individual gauge). Instead of simply voting for weight change in Aragon, users can allocate their vote-locked tokens towards one or other Gauge (pool). That pool will be getting a fraction of P12 tokens minted proportional to how much vote-locked tokens are allocated to it. Each user with tokens in VotingEscrow can change their preference at any time. When a user applies a new weight vote, it gets applied only in the beginning of the next whole week (this is done for scalability reasons). The weight vote for the same gauge can be changed not more often than once in 10 days.
3. Receive revenue-sharing rewards from the P12 ecosystem: This includes the share of Swap and SecretShop transaction fees.
4. More incentives: We provide incentives to all developers and players participating in the P12 ecosystem to do veP12 work. As such, we believe that P12 is a sustainable and thriving gaming ecosystem that benefits everyone who bets on the platform.

6.2 Examples of GameMaster Governance Scenarios

We reward good content based on usage statistics, economic statistics, and Keynesian policies under meritocracy. For example, in the quantitative metric of Usage Statistics, the value of the specific game can be calculated based on various factors such as the number of registered players, number of token holders, and monthly active users, among others.

Games with a higher value will be rewarded with more P12 tokens. In addition, we regulate the behaviors of game developers by introducing a Slashing mechanism.

If game players consider developers malicious, veP12 holders can initiate a proposal to confiscate P12-GameCoin LP tokens from game developers. Such a confiscation mechanism is also done through Aragon. Suppose the initiators propose to confiscate X P12 tokens, then

$$X \leq X_{max} \tag{6.2}$$

X_{max} is the number of P12-GameCoin LP tokens staked by the developer during the proposal and not in the withdrawal Liquidity Delay. From the start of voting, X amount of the developer's P12 tokens is blocked for t days. Whereby T represents the period in which the proposal voting is done. Thus we have:

$$t = T \tag{6.3}$$

The decision is made according to the number of votes cast by veP12. The proposal is only approved if more than two-thirds of the votes are in favor and implemented. The LP tokens corresponding to these X tokens of P12 are distributed to P12 and GameCoin. After $WithdrawLiquidity$ calculated a few days delay. Finally, P12 will be returned to the P12 Treasury, and GameCoin would be returned to the address of the game developers.

7 Economic Growth

7.1 Solow Growth Model

Solow's model tries to show that the economy tends to a stable growth path in which full employment is ensured by the functioning of the market since, in his opinion, prices and wages are sufficiently flexible in the long run, which is the one to be considered in these models.

Based on this, the P12 economic system has been created to achieve price stability and high commitment of players, similar to that achieved in the traditional economic system. In addition, it aims to obtain economic growth, financial market stability, interest rate stability, and currency market stability through the stable exchange between in-game assets and the ecosystem tokens.

Therefore, the main economic source of the P12 ecosystem is the value created by games, which is the total output Y. Based on the Solow growth model [3]:

$$Y = AF(K, L) \tag{7.1}$$

We explain this formula below:

- A is the rate of technological progress

[3] https://academic.oup.com/oep/article-abstract/54/3/369/2361839?login=false

- K is the capital stock
- L is labor input

The platform's main objective is to maximize output Y. Therefore, the P12 infrastructure is used as a support to achieve the technological progress of the GameFi ecosystem. In this way, it is possible to incentivize capital inflow and increase the number of game players through monetary policy and fiscal policy, which is equivalent to an increase in labor input.

In addition, the Solow model is a theoretical framework that seeks to explain why there are differences in profitability between each game through a production model. This model is defined mathematically using the Cobb Douglas production function, which is expressed as follows:

$$Y = A \cdot K^{\alpha} \cdot L^{1-\alpha} \tag{7.2}$$

In this formula, A represents the parameter that measures productivity, K is the capital a game uses, and L is the amount of players. The exponents indicate the importance of each of the factors. Thus, approximately α corresponds to capital and $1-\alpha$ to labor (number of players). In this way, developers can increase the economic output of their games by increasing capital investment and attracting more players to play the game.

7.2 Fiscal Policy

The fiscal policy encompasses fiscal revenue policy and fiscal expenditure policy. The bulk of fiscal revenue policy comprises tax policy, and expenditure policy contains a meritocracy-based transfer payment policy and a treasury purchase policy.

In a traditional economy, fiscal policy is considered a discipline of economic policy focused on managing state resources and their administration. Therefore, it is in the hands of the country's government, which controls the levels of spending and income through the variables of taxes and public spending to maintain stability in the country.

Therefore, through fiscal policy in P12 ecosystem, we seek to significantly impact aggregate demand by controlling spending and income to give a equitable institutional environment, thus effectively promoting economic activities and engagement in P12 games.

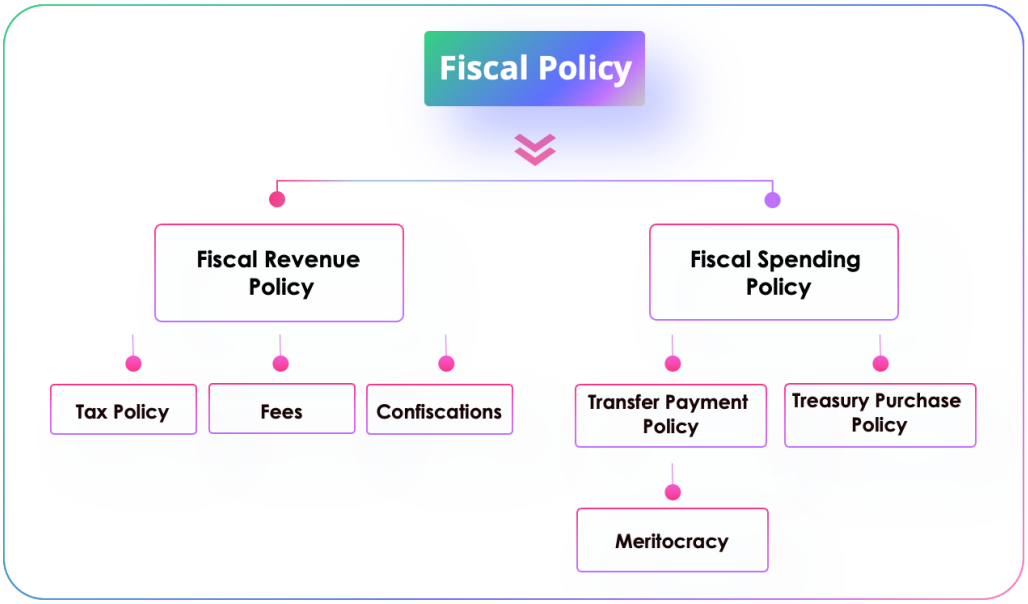

Figure 10. Fiscal Policy

7.2.1 Fiscal Revenue Policy

In the P12 ecosystem, the fiscal policy includes taxes, fees, and confiscations. In the following, we explain what each of these aspects encompasses.

- **Taxes:** Swap charges the trader a fee of f_0 for each transaction. As a result, the trader's experience will be excellent when the liquidity of the pool is high or when the amount of tokens within the pool is more elevated.

  For example, 83.3% of f_0 is given to liquidity providers (LPs), 16.6% of f_0 goes to the protocol fee in the Uniswap,[2] and the specific cash-out percentage is reflected through LP tokens.

- **Fees:** A specific amount is required to be met to list a game, especially in cases where developers expect the game to be advertised in a prominent position on the platform.
- **Confiscations:** If initiators confiscate x tokens of P12, the Treasury also earns C_0 percentage tokens of x.

7.2.2 Fiscal Spending Policy

The fiscal spending policy mainly contemplates a transfer payment policy and a treasury purchase policy.

In the P12 ecosystem, we mainly use Meritocracy as a form of transfer policy (See Section 5 Meritocracy). This method corresponds to tax subsidies in the traditional economic system. Thus, the P12 Treasury provides financial subsidies as incentives to users who contribute to the platform, such as by providing high-quality content and consuming or investing in the total value of the output. This is similar to government financial subsidies for high-tech industries and preferential policies for companies investing in the traditional economic system.

The P12 Treasury has an economic development process that allows it to purchase P12, GameCoin, or other tokens to control inflation or invest, much like government purchases in a traditional economic model. The P12 DAO would make the purchase decision.

7.3 Monetary Policy

The terms "inflation" and "deflation" are commonly referred to in a traditional economic system. This is because the government uses the policy tools at its disposal to adjust the supply of currency and the interest rate through the central bank, which affects the level of macroeconomic activities.

Monetary policy in the P12 ecosystem is implemented through a code to avoid credit problems, such as the management of expectations by the central bank in traditional economic methods. In this way, by using a code to interpret monetary policy, it is expected that a financial system with excellent development will be built on the platform. The main concerns of monetary policy are inflation and the economic model.

7.3.1 Inflation

P12 tokens will have a linear release of X years first, and after X years, there will be a hard cap to reduce inflation and stabilize the token's price. And there will be no more token be issued after the maximum supply because the code limits the possibility of additional P12 issuance.

The distribution of P12 tokens will be an appropriate release to ensure sustainable economic growth. Therefore, a considerable proportion of tokens will be released into the ecosystem in the form of Meritocracy rewards.

7.3.2 veP12

Due to the governance of P12 GameMaster, P12 holders can stake their tokens to obtain veP12, which is the voting weight in our governance system. veP12 is a non-standard ERC20 implementation, used within the Snapshot to determine each account's voting power. The longer you stake the more accurate amount of P12 will be generated.

veP12 cannot be transferred. The only way to obtain veP12 is by locking P12.

A user's veP12 balance decays linearly as the remaining time until the P12 unlock decreases. For example, a balance of 4000 P12 locked for one year provides the same amount of veP12 as 2000 P12 locked for two years, or 1000 P12 locked for four years.

The max. Lockup period is 4 years. The formula is outlined below.

$$MAXTIME = 4 * 365 * 86400 \tag{7.3}$$

$$unlock_{time} < (block_{time} + MAXTIME) \tag{7.4}$$

$$veP12_{amount} = \frac{P12_{locked_{amount}}}{MAXTIME} * (unlock_{time} - block_{time}) \tag{7.5}$$

It is worth noting that the economic model proposed by Curve Finance has positive incentives for its projects' liquidity providers (LPs). Thus, liquidity providers own CRV and can stake on veCRV, which can increase the reward of liquidity providers. In addition, 50% of the transaction revenues will proceed to be fairly distributed among veCRV holders in the form of 3CRV.

Therefore, an economic model similar to Curve Finance is implemented by creating incentives for game developers and players in the P12 ecosystem, including weight voting for gauges, revenue sharing from the business and other holder benefits.

- Gauge Votes: To boost Liquidity Provider who provides liquidity for the swap between P12 and various GameCoin to participate in the governance of P12, weight voting for gauges is introduced into P12 GameMaster Mechanism. In order to implement weight voting, *GaugeController* has to include parameters handling linear character of voting power each user has, and the P12 rewards weights for each liquidity pool. *GaugeController* is one of the most central pieces to the system, so it must be controlled by the DAO. No centralized admin should control it, to not give anyone powers to change type weights unilaterally.

- Holder Benefits: To incentivize players to stake their P12 to participate in platform governance, some holder benefits are provided to players who lock their P12. For example, veP12 holders get discounts for their transactions or are even offered some privilege in certain aspects of the Game World.
- Revenue Sharing: veP12 holders can obtain a certain proportion of tax revenues within the P12 economic system as a pledge benefit. Included in the tax revenue are transaction fees in the Swap and SecretShop (NFT Marketplace).

8 Conclusion

In conclusion, this paper defines economic and governmental rules and mechanisms for Project Twelve. It goes to show how the P12 economic mechanisms facilitate and guarantee the design goals of true ownership, transparent price discovery, guaranteed liquidity, verifiable scarcity, and lastly enforceable governance. Overall, this paper aims to lay the foundation for the P12 ecosystem and establish the sustainability and viability of P12 economy.

The paper also touches on the general topic of virtual assets and virtual world economy in general. By deduction or by evidence, it is demonstrated that virtual asset as an asset class is growing and will continue to grow. We are witnessing but the very beginning of the 1000x for virtual assets, which will one day take up 10% of the world's value and beyond. *The future doesn't belong to the fainthearted; it belongs to the brave.* A new dawn of virtual assets is on the horizon.

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