Aquo v1

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Abstract

We propose an extensible liquidity DeFi protocol called Aquo. Aquo is for RWAs using principles of flatcoins which are pegged to a basket of RWA prices. This protocol, is extensible to allow in later versions DeFi Composition, AMM Composition, and integration of DeFi protocols (such as lending) into Aquo's protocol.

Keywords: Real World Assets (RWA), Flatcoins, Decentralized Finance (DeFi), Automated Market Maker (AMM), Liquidity Model, Aquo Protocol, DeFi Composition, AMM Composition, Lending Protocols

1 Introduction

Aquo introduces novel and new reward models for liquidity provision in real-world asset markets (RWAs). These reward models are based on liquidity demand, and rebalancing within Automated Market Makers (AMMs).

We greatly extend existing ideas about AMMs, many of which are very limited for example to requiring an asset pair in the AMM from the liquidity provider (LP).

In the Aquo protocol, we introduce flatcoins, RWA mining, LP mining, feedback loops, composable AMMs [10] [20], and bonding curves into the liquidity model.

We propose in this document v1 for Aquo, but later versions are planned which would involved integration of DeFi protocols via composition [17], and improving feedback loops via reinforcement learning networks.

2 Problem Definition

The fundamental problem is to write an in-demand use case for blockchain technology taking into account costs, stability, useability, and one which solves real-world problems.

We focus on financial models and decentralized finance (DeFi). DeFi has grown very dramatically from it early roots in 2017 and 2018 but today is affected by high swap fees, price slippage and capital inefficiency.

Liquidity

Within the broad DeFi spectrum, we focus on a market segment related to liquidity in real-world assets (RWAs). A long-standing problem with RWAs is they are illiquid. Illiquid assets cannot easily be converted into cash [15]. This illiquidity stems from the fact the underlying RWA (e.g. a house) is illiquid by its nature. It cannot be sold easily due to the high cost of a RWA and the sale usually involve extensive legal work including registrations with state regulators.

Various models developed for RWA tokenization but tokenization in itself will not create liquidity. It simply provides a digital representation of the RWA and the token itself has to be saleable.

3 Solution Approaches

We propose a solution based on several key components:

- RWA Tokenization
- Aggregation
- Token Bonding Curve (Flatcoin)
- Automated Market Marker (AMM)
- Concentrated Liquidity

These will be explained more fully in this document. As an introduction, we can introduce these components as follows.

RWA Tokenization

RWA tokenization we process of tokenizing an RWA which usually involves defining shares in a RWA and the shares are then tokenized. We propose using existing platforms for RWA tokenization and not to directly produce new systems to tokenize RWAs.

Aggregation

Aggregation of RWAs is under a general branch of protocol technology called composition. This is the process of taking a lot of RWAs to create a single pool or reserve of RWAs in a basket type philosophy (similar to concepts in a basket of commodities) which have been widely debated for decades [8].

Token Bonding Curve

A bonding curve defines an asset and its price [6]. Hence we can define an asset its price is determined by a bonding curve. We propose using bonding curves to an emerging type of coin called the flatcoin [7]. A flatcoin has its value pegged to the cost of goods and it represents purchasing power. We propose a new angle of a flatcoin which is to peg its value to a basket of RWAs. This is a fundamental component to the Aquo liquidity solution.

RWA Mining

We propose RWA mining, a reward in the AQUO token to RWA token providers to the flatcoin pool. This is akin to Liquidity Mining already used in DeFi which rewards liquidity providers for contributing to liquidity pools [11].

Automated Market Makers

Automated Market Makers (AMMs) have existed in blockchain architectures since 2017 and 2018 (when Bancor and Uniswap launched respectively). AMMs swap a pair of assets based on an invariant curve (e.g. a product invariant curve). Curve v1 launched with an AMM called Stableswap. We propose using a variation on Curve v1 with Uniswap v4 so that a RWA flatcoin can be swapped with a stablecoin (e.g. USDC). This will create liquidity.

Concentrated liquidity

Concentrated liquidity was implemented in Uniswap v3 and this is liquidity constrained within a price range. We propose in using concentrated liquidity bounded by the trading range for the flatcoin against the stablecoin.

4 Aquo Protocol's Architecture

Aquo consists of various key components, already described, and we can draw these in figure 1.

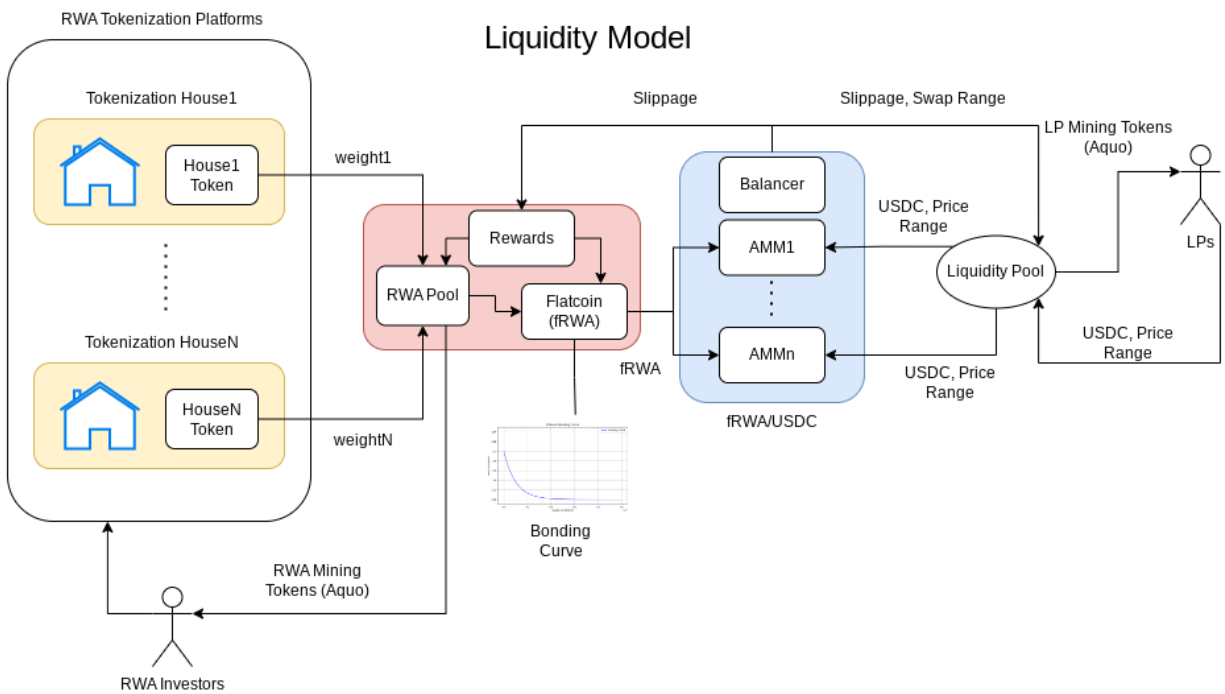

Figure 1: Design

4.1 RWA Tokenization

RWA tokenization has been a solved problem since the early tokenization models in 2017 and today platforms for RWA tokenization. In Aquo's design, the RWA tokenization is done via third parties and Aquo's systems will take already tokenized assets.

An RWA platform could do due diligence using RICS [19] and the values provided by the tokenization platforms can be accepted. That part of the infrastructure is labour intensive with low returns, Aquo does not propose building tokenization platforms for RWAs but using existing ones.

4.2 RWA Pool

Liquidity can only be found via a certain volume of RWA tokens. This amount is dependent on the trading activity via the AMMs. Therefore a feedback loop is engineered for slippage into the RWA pool.

As the slippage is high then that implies more liquidity is needed so the reward is increased for RWA token holders.

The rewards takes two forms:

- Minting Flatcoins above the face value of the RWA token
- Minting RWA Mining tokens for the RWA token holders

The flatcoin minting is done via a bonding curve. The rewards are vested to stop a cycle of transfers in and out for rewards. So once the RWA token holder transfers into the RWA pool to make it deeper, their tokens are vested for a period with withdrawal penalties (i.e. loss of rewards).

Similarly Aquo tokens are minted for rewards and these are also vested. The period of vesting depends on the demand for liquidity from the AMMs.

If the demand is high, then the price of the liquidity is raised and the rewards raised too.

4.3 Token Bonding Curve/Flatcoin

The underlying theories of linking a price to a basket of commodities is well established [14] [5] and has been widely debated.

We extend the idea to RWAs and a basket of RWAs in a pool. We mint a flatcoin when RWA tokens are added to the RWA pool. The issue is then the price for the flatcoin. The price is controlled via a bonding curve which is dynamic. It will depend on the demand for liquidity. When a pool starts the demand will be higher than for a more mature pool. Therefore earlier investors will be rewarded by getting more flatcoins for an RWA token.

To take a static example to show the principle, we can consider a curve as shown below.

$$\text{Price} = 1.0 + 0.1 \cdot e^{-\frac{\text{Supply}}{1000000}}$$

The precise value of the parameter will vary (e.g. 1000000) so that the curve fits the use case. Figure 2 has an example curve.

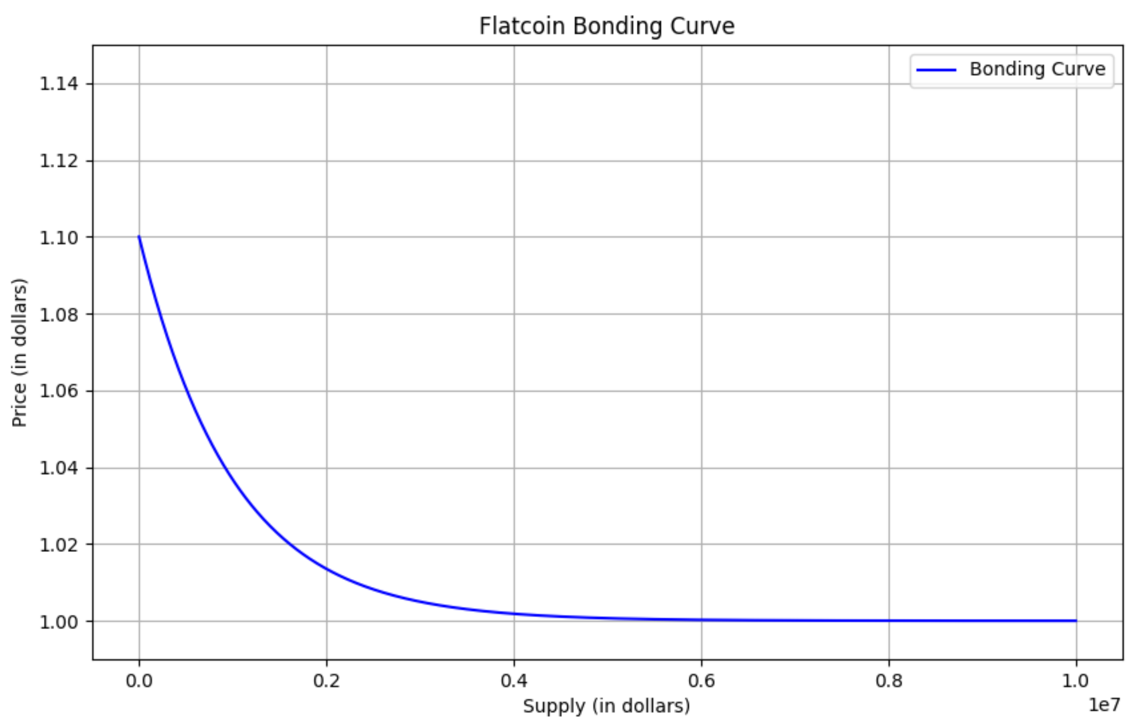

Figure 2: Bonding Curve

In this example the parameter is static but the real system will be dynamic so that finally a balance (equilibrium is reached) between liquidity demand and supply for RWA tokens.

4.4 Slippage Feedback

The principles of feedback are well known in control systems [18] and we use this same concept. As the AMM trades there is slippage and this will be reduced by more liquidity.

Hence we can say:

Slippage (σ) is calculated when flatcoins are swapped:

$$\sigma = \left| \frac{\Delta USDC_{\text{expected}} - \Delta USDC_{\text{actual}}}{\Delta USDC_{\text{expected}}} \right|$$

The AMMs will use different invariants (e.g. product) and therefore the Reward module is just taking the final slippage value, and not calculating the slippage. Hence this is empirically obtained, and later an AI (reinforcement learning network [16]) could be used (in later versions of Aquo).

4.5 AMMs

The concepts and designs of AMMs were pioneered by Chen et al. and others [4] who worked on the theoretical aspects of AMMs and convex optimization.

In the blockchain sector, Bancor and Uniswap were early adopters of AMMs concepts to create DEXs. DEXs today are widely used. They suffer from price slippage and capital efficiency; and impermanent loss.

We propose in Aquo of extending Curve v1 (known originally as Stableswap) so that the flatcoin can be swapped for a stablecoin (eg USDT).

Also Aquo can integrate using AMM composition so that a transaction for liquidity can be split across AMMs.

4.6 Concentrated Liquidity

Concentrated liquidity was implemented in Uniswap v3 and improved capital efficiency. We propose using concentrated liquidity limiting the price range to the price movements in the flatcoin which allows for far greater efficiency than a passive LP model (across all prices).

5 RWA Tokenization

The underlying concepts of real-world asset tokenization come from merging two ideas of real assets (as used in financial systems) and tokenization (as widely used in blockchain systems).

Real assets are parts of the economy which generate income (usually), e.g. factories, land, workers, machines, and knowledge. This is contrasted to financial assets which are claims on the income generated by real assets (e.g. dividends) [2].

Blockchain ideas extended the TradFi's perspective on real assets to form a real-world asset (RWA) which means a real asset in a tokenized form. Hence we talk of RWA tokenization.

Tokenization has existed for a number of years and we do not need to dwell in-depth on tokenization principles. As a summary, we link in a tokenized model a reference asset to a digital or crypto asset [3]. Tokenized models have been widely applied from stablecoins to future earnings via someone's labour.

We focus on RWA tokenization [1] which a form of tokenization which links RWAs to a tokenized asset and then DeFi protocols can be used with the tokens.

6 Flatcoins

An emerging concept in DeFi and blockchains is the flatcoin [7] [9]. The original design of flatcoins was to allow for inflation by pegging a flatcoin to a basket of commodities. But the concept can be used to peg the value of a flatcoin to a RWA [13].

We propose a new flatcoin for a basket of RWAs which maintains value for the RWAs. This allows a tradeable coin to be created which provides liquidity and stability.

7 Concentrated Liquidity

Under a concentrated liquidity model, liquidity is provided within a price range [12].

8 Tokenomics & Aquonomics

A number of token models exists for Uniswap, Balancer, Curve and more. We propose in following these models and enhancing them. We devise a new form of tokenomics linked into liquidity and mining (RWA mining and LP mining) and we call this Aquonomics.

The development of Aquonomics is evolutionary by its nature. When the original system is launched there is limited liquidity and limited RWAs. Therefore initially the tokens for RWA miners and LP miners will be smaller than other allocations.

But this changes as the Aquo protocol is more widely used and the community aspect will dominate the governance as the estimates show.

We consider some key concepts to drive growth within the Aquo protocol.

Also we propose the Community to be the token holders as follows:

- RWA Miners
- LP Miners
- Stakers (locked Aquo tokens)

8.1 Initial Token Allocations

The Aquo tokenization model has several key components as follows. The cost of capital varies and hence we introduce an LP premium to reflect that 1 liquid dollar has more value in the Aquo protocol than a dollar in an RWA (which is illiquid with a cost to make liquid).

This is balanced also by the expectation that the liquidity pool value will be far smaller than the RWA value. This is because RWAs are infrequently traded and their moves are small. Hence we can use concentrated liquidity methods over a small price range, and composable AMM methods to share LP capital and this will increase capital efficiency and reduce the amount of LP liquidity needed.

We consider a formula to reflect these assumptions. We can calculate the token distribution among miners as follows (these are not blockchain miners but RWA and LP miners).

Let:

- r: Total RWA value in dollars
- l: Total LP dollars
- c: Concentrated liquidity value as a fraction of RWA value (e.g., 1/10 or 0.1)

- p: Premium factor for liquidity supply
- s: Total percentage of Aquo tokens (in relation to the entire supply)

Total mining token percentage equation $s = aquo(r + p \times c \times r)$ since $l = c \times r$ and we scale by p for the premium.

The values for concentrated liquidity and premium are dynamic and this is only an example calculation. The real system will dynamically adjust the value of p and c based on the AMM performance.

Example Calculation

Assume:

- Total mining token percentage (s): 40
- Premium factor for LP mining (p): 4
- Concentrated liquidity value (c): 0.1
- LP supply (r): 50 Million USD
- LP supply (l): 5 Million USD

Then the effective liquidity is 20 million USD, so we have 70 million USD in mining distributed across 40 % of the tokenized share, this equates to 18.57 % and 11.43 % for the token allocations for RWA and LP mining.

Therefore 1 Aquo token = 5.714 dollars if the total supply is 1,000,000,000 AQUO in the initial period (set by the RWA value of 50 million dollars over 2 years).

Therefore table 1 applies.

Allocation	**Amount (AQUO)**	**Percentage**
Team Allocations	150,000,000	15%
Investors	150,000,000	15%
Liquidity Providers (LP Mining)	114,300,000	11.43%
RWA Mining	285,700,000	28.57%
Staking	100,000,000	10%
Marketing and Partnerships	100,000,000	10%
Governance and Reserves	100,000,000	10%
Total	**1,000,000,000**	**100%**

Table 1: Initial AQUO Token Allocation

Allocation	Percentage	Details
Team Allocations	15%	• Vesting schedule: 25% after one year, then monthly vesting over one year. • Lock-up period for initial allocation to ensure long-term commitment.
Investors	15%	• Early-stage investors: 5% with a one-year vesting period and monthly vesting over 2 years. • Public sale: 10% available at launch for broader community involvement.
Liquidity Providers (LP Mining)	11.43%	• Initial distribution over 2 years. • Rewards distributed proportional to the liquidity provided to the AMMs.
RWA Mining	28.57%	• Initial rewards for placing RWA tokens into pools, distributed over 2 years.
Staking	10%	• Staked AQUO token holders get a share of AMM fees.
Marketing and Partnerships	10%	• Used for marketing campaigns, partnerships, and ecosystem development. • Vesting over 1 year to ensure sustained promotional activities.
Governance and Reserves	10%	• 5% for governance activities, such as funding community proposals, grants, and development. • 5% held in reserve for future strategic needs, emergencies, or additional incentives.

Table 2: Initial AQUO Token Allocation

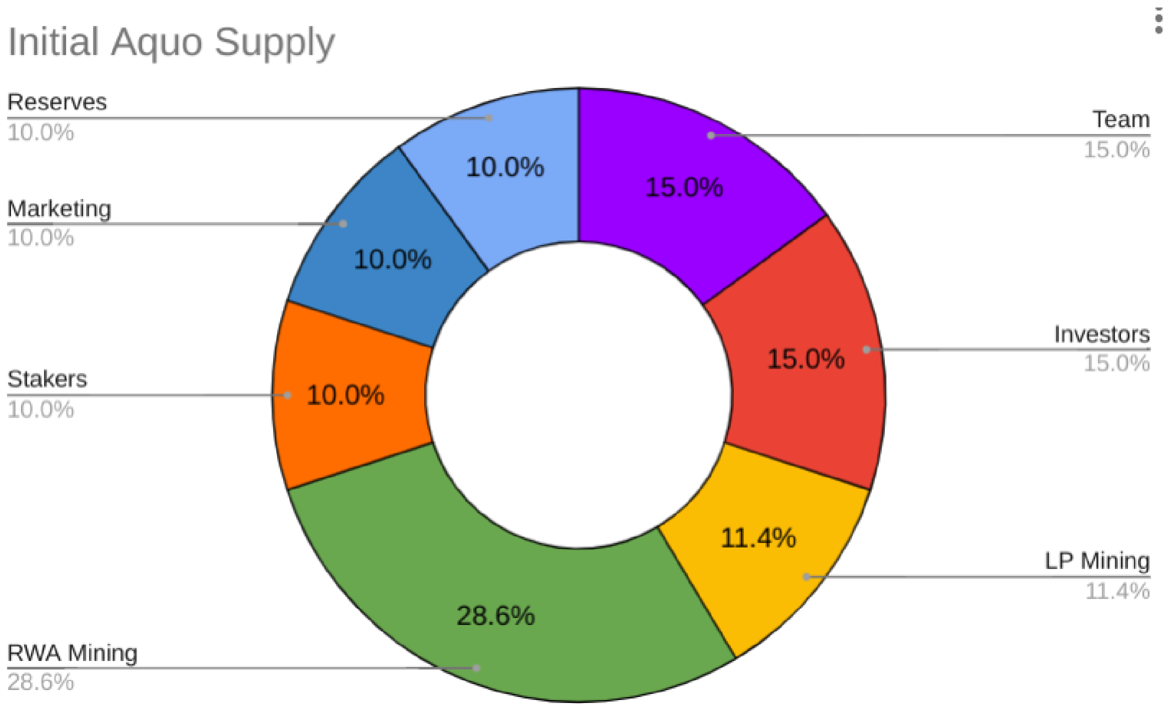

Figure 3: Initial Supply

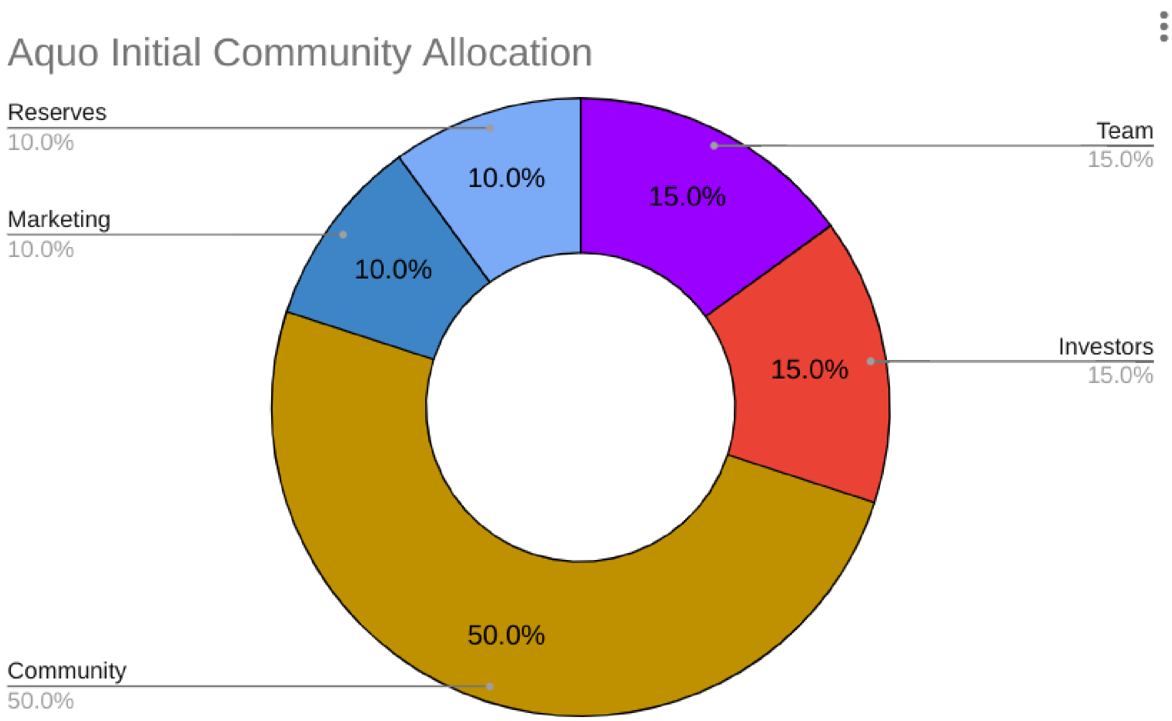

Figure 4: Community

8.2 Post Initial Allocations

We now consider in the post-initial period the value of RWAs increases to 300 million dollars (e.g. over the following 3 years). This is reasonable due to the size of the RWA market (300+ trillion dollars).

Then we have:

- Premium factor for LP mining (p): 4
- Concentrated liquidity value (c): 0.1
- LP supply (r): 300 Million USD
- LP supply (l): 30 Million USD

This then provides that 420 million USD in mining based assets exists, then at the same token dollar price, we estimate 5.714*420 = 2399.88 million Aquo tokens (due to minting as mining is done).

Considering the supply initially, we have then 800 + 2399.88 million tokens in total. The 800 million is derived from the 1000 minting minus the tokens for the original mining.

Hence we have (2399.88/420)*300 for the RWA mining tokens, and (2399.88/420)*120 for the LP mining ones.

The calculations are done in the preceding sections. As the Aquonomics system matures the mining dominates. The principal way to earn tokens is by locking RWAs into Aquo. These token rewards are subject to vesting periods to stop continual transfers into and out of the pools with the same assets.

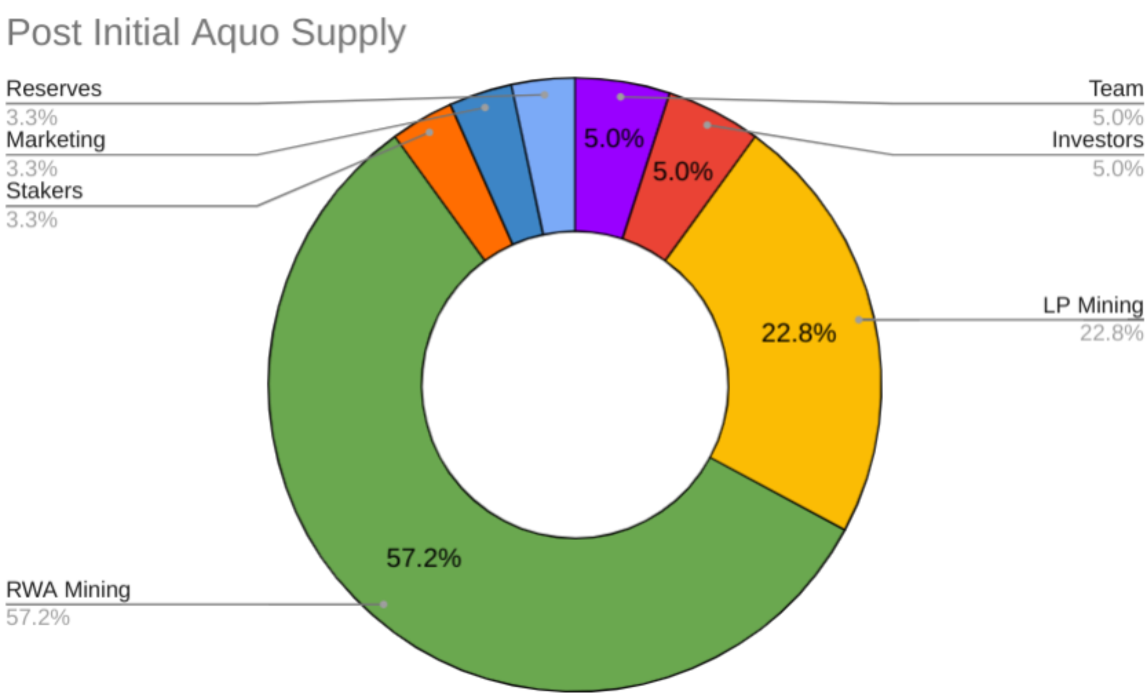

Figure 5: Post Initial Allocation

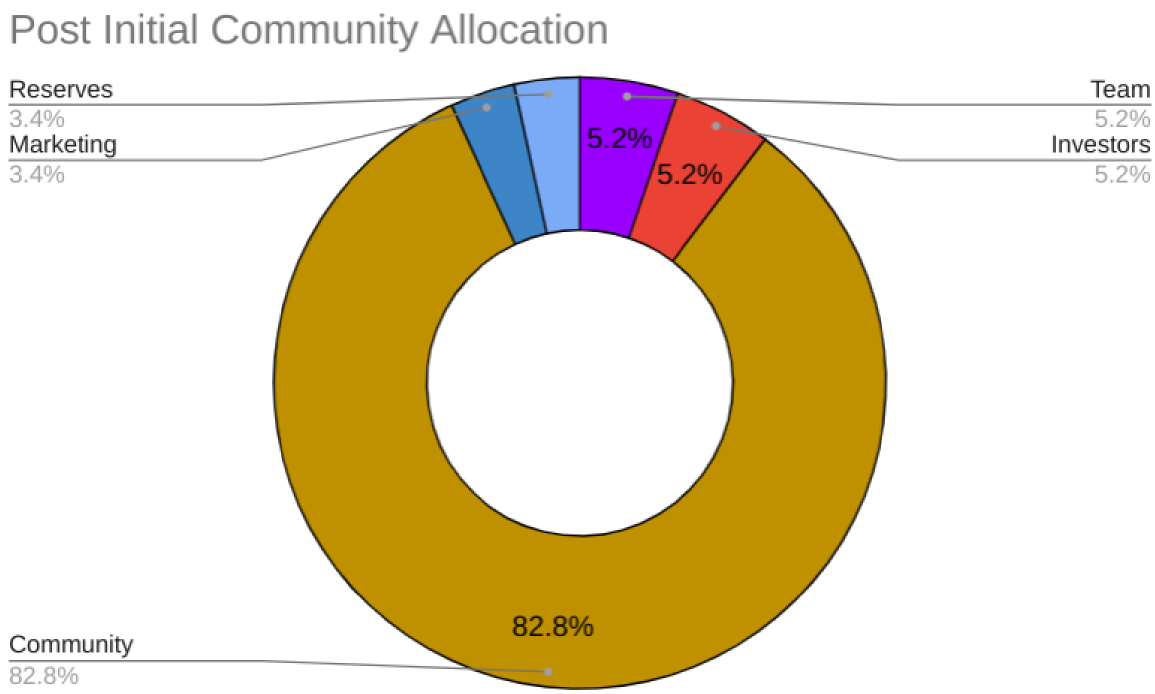

Figure 6: Post Community Allocation

Then we have a visual as follows showing how the miners gradually get more tokens and hence more governance control.

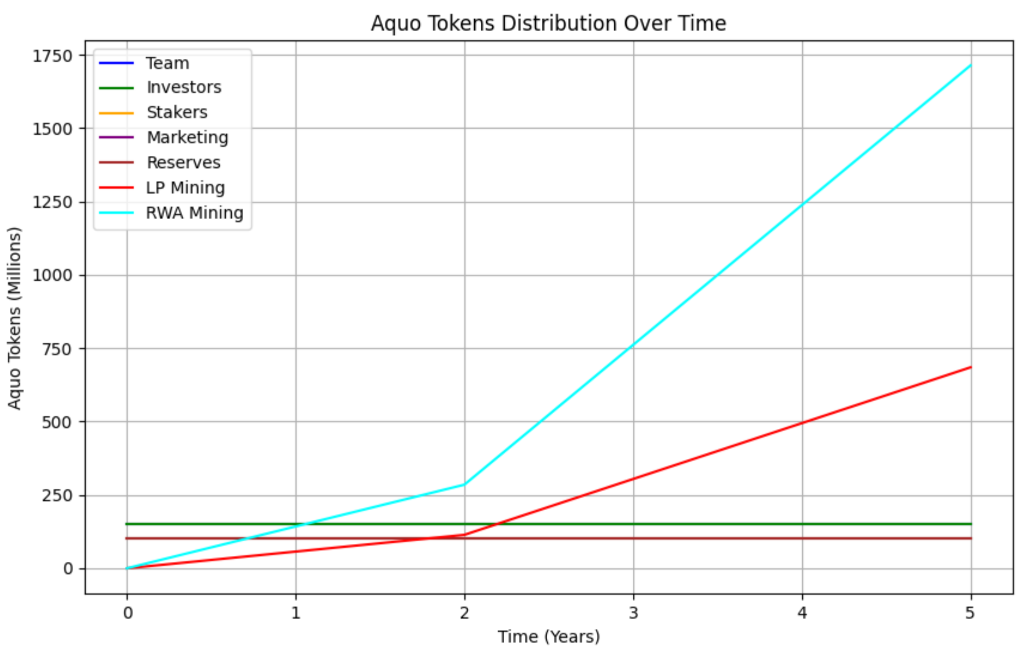

Figure 7: Token Evolutionary Curve

8.3 Token Utility

Aquo Token (AQUO)

- **Governance:**
  - Token holders can vote on protocol upgrades, fee structures, and other key decisions.
  - Voting power proportional to AQUO holdings.
- **Staking:**
  - Staking AQUO earns additional AQUO or other benefits such as reduced fees.
  - Locked AQUO for governance proposals to incentivize active participation.
- **Incentives:**
  - LP Mining: Providing liquidity to AMMs rewards AQUO.
  - RWA Mining: Depositing RWA tokens into pools mints flatcoins and rewards AQUO.
- **Fee Discounts:**
  - AQUO holders receive discounts on trading fees within the platform.

8.4 Unlimited Token Supply for Rewards

Rationale for Unlimited Supply

- **Incentivizing Growth:**
  - As more RWAs are deposited, the demand for AQUO rewards will grow. An unlimited supply ensures continuous incentives without artificial scarcity.
- **Flexibility:**
  - This model allows the protocol to adapt to the growing size of the RWA sector, potentially reaching trillions of dollars.

8.5 Emission Schedule and Inflation Control

Controlled Emission

- **Initial Phase (First 2 years):**
  - A predefined emission rate to distribute the initial supply for LP mining, RWA mining, and other incentives.
- **Dynamic Adjustment:**
  - Post-initial phase, the emission rate can be adjusted based on the growth of RWAs and the overall ecosystem needs. This adjustment can be governed by the DAO to ensure community-driven decisions.

8.6 Governance and Sustainability

DAO Governance

- **Community Decisions:**
  - The DAO will have the authority to adjust emission rates, allocation for incentives, and other key parameters.
- **Stakeholder Involvement:**
  - Regular governance votes to ensure all stakeholders, including LPs, RWA depositors, and token holders, have a say in the protocol's evolution.

Reserve Mechanism

- **Emergency Fund:**
  - A portion of transaction fees and newly minted tokens can be allocated to a reserve fund for unforeseen circumstances or strategic opportunities.
- **Burn Mechanism:**
  - Implement a token burn mechanism where a small percentage of transaction fees are burned to counteract inflation and stabilize the token value.

8.7 Continuous Monitoring and Adjustments

Regular Audits

- Conduct regular audits of smart contracts and the overall tokenomics model to ensure security and efficiency.

Community Feedback

- Regularly engage with the community to gather feedback and make necessary adjustments to the tokenomics model.

9 Conclusion

By adopting an unlimited token supply for AQUO with controlled emissions and robust governance mechanisms, the protocol can effectively incentivize participation, adapt to the growing RWA market, and maintain sustainability. This flexible model ensures continuous rewards for users while providing mechanisms to manage inflation and align incentives across the ecosystem.

10 Summary

Aquo proposes a new model which focuses on the following:

- Rewarding RWA investors and liquidity providers
- Implementing a dynamic pricing and liquidity price mechanism to incentize and reduce slippage and capital efficiency
- To issue a new Aquo token for rewards

- To issue a new flatcoin pegged to a basket of RWA tokens
- A tokenomics model to sustain rewards and future development

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