

Axolotl Finance

White Paper

AMM and Decentralized Self-Balancing Index protocol



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Contents

[Introduction](#)

[Problem Axolotl is solving](#)

[How Axolotl Finance works](#)

[How does Pool Rebalancing work?](#)

[Advantages of Axolotl Protocol](#)

[Liquidity Providers](#)

[Liquidity Pools](#)

[Trading](#)

[Tokenomics](#)

[Roadmap](#)

Introduction

Axolotl Finance is an automated market maker protocol (AMM) that also allows users to swap tokens and provide liquidity to existing pools or create new ones.

Axolotl Finance protocol is governed by the Axol (AXOL) token, which can be earned via liquidity mining.

Axolotl Finance is a protocol inspired by Balancer & Uniswap [1], designed to be adapted to the Solana Blockchain [2].

Index funds are one of the most traded instruments in the world. Index funds have been outperforming actively managed funds 92 percent of the time, over the last fifteen years. The secret to index funds successes are; low-cost index funds, Dollar cost averaging and Asset allocation and rebalancing. We want to use those same strategies and transfer them to the crypto ecosystem.

No one can reliably time the market. No one can reliably pick individual stocks over time. No one can reliably pick winning financial managers. Once you drop these pipe dreams, you can adopt a simple and effective strategy for accruing wealth. - J.L Collins

We are convinced that decentralized finance is the future of FinTech. Axolotl finance protocol takes what has worked for many investors to create wealth and mixes them with the power of DeFi.

Axolotl - AMM and Decentralized Self-Balancing Index protocol

Problem Axolotl is solving

There are multiple AMM and protocols that are well known in the DeFi sector and its benefits are well proven. There are some issues still to be improved such as the gas fee and transaction speed. The gas fees are high in the ethereum network.

Another issue we address is the diversification of the pool, to have more stability of our investment we need to increase the number of tokens that can be added to the pools and maintain risk and reward ratios.

Axolotl finance protocol runs on the Solana network and its written in Rust, which makes it extremely fast and the average cost per transaction is very low.

Axolotl increases the maximum token number that can be added to a pool, up to 20 tokens. Axolotl pools work the same as an index fund, but instead of paying fees to a fund manager that manually balances your assets, we have liquidity pools that are rebalanced automatically every time a trade is made. Axolotl trading fees are paid to the liquidity providers.

“Index funds are a common financial instrument. The first index fund became effective in 1972. Ever since, investors rely heavily on different portfolio strategies to hedge risk and achieve diversification. Index funds guarantee investors a constant and controlled exposure to a portfolio. If one of its assets out- or under- performs, it is respectively sold or bought to keep its value share of the total portfolio constant.

Both in the conventional financial system as well as in the blockchain context, index funds and other types of investment portfolios charge investors fees for managing and holding their funds. These fees are necessary to pay for the costs of actively rebalancing the index funds, be it by manual traders or automatic bots.

There are many centralized solutions for portfolio management and for investing in index funds. These all share some form of custodial risk.” Balancer [1]

How Axolotl Works

Axolotl index protocol uses a set of algorithms that manage and incentivize interactions between liquidity providers, liquidity pools, and traders with the purpose to rebalance pools and find the best price of the asset across pools.

An example of how rebalancing works on Axolotl: There is an Axolotl crypto pool that is set to maintain 80% of its value in wETH, and 20% of its value in wBTC. If slippage occurs, the protocol will adjust token prices to maintain the 80/20 ratio. Over on the Axolotl DEX, when a trader wants to buy wBTC for wETH, the protocol will scan its thousands of pools for the best price. By design, the pools with the best wBTC per wETH prices will also be the pools that most need to be rebalanced. The liquidity pool and the trading platform are locked in a perpetual algorithmic interchange for equilibrium that makes the protocol functions possible.

How does Pool Rebalancing work?

Rebalancing is one of the most important features of Axolotl protocol. Without rebalancing the more volatile assets start taking higher and higher portion of an index making it riskier over time. Axolotl pools function as a weighted index fund for Crypto. Instead of manually rebalancing liquidity pools like a traditional index fund, Axolotl uses its constant mean market maker equation to automatically rebalance assets within pools via algorithm every its need it.

The idea behind this protocol is based on a particular N-dimensional surface which defines a cost function for the exchange of any pair of tokens held in a Liquidity Pool. This approach was first described by V. Buterin[3] and proven viable for market making by Uniswap[5]. Balancer [2] arrived at the same definition, by starting with the requirement that any trade must maintain a constant proportion of value in each asset of the portfolio. Balancer is different from Uniswap because they applied an invariant-based modeling approach described by Zargham et al[6].

Advantages of Axolotl protocol

You can create your own crypto index fund or add liquidity to an existing one. Select all the assets you want to include in your fund as well as their own weights. Take advantage of the Solana network and its lowest fees across different blockchain networks.

Definitions [1]

Value Function

Value function is a function of the pool's weights and balances to a constant, no matter what exchanges are carried out, the share of value of each token in the pool remains constant.

The value function V is defined as:

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

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 token, such that the sum of all normalized weights is 1.

Spot Price

Each pair of tokens in a pool has a spot price defined entirely by the weights and balances of just that pair of tokens. The spot price between any two tokens, "SpotPrice", or in short "SP", is the the ratio of the token balances normalized by their weights

$$SP_i^o = \frac{\frac{B_i}{W_i}}{\frac{B_o}{W_o}}$$

Where:

- B_i is the balance of token i , the token being sold by the trader which is going into the pool.
- B_o is the balance of token o , the token being bought by the trader which is going out of the pool.
- W_i is the weight of token i
- W_o is the weight of token o

From this definition it is easy to see that if weights are held constant, the spot prices offered by the Liquidity Pools only change with changing token balances. If the pool owner 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 (token o) to increase and price of tokens being sold by the trader (token l) to decrease. One can prove that whenever external market prices are different from those offered by a Liquidity Pool, an arbitrageur will make the most profit by trading with that pool until its prices equal those on the external market. When this happens there is no more arbitrage opportunity. These arbitrage opportunities guarantee that, in a rational market, prices offered by any Liquidity Pool move in lockstep with the rest of the market.[1]

Constant Value Distribution Proof[1]

We will now prove that:

1. Balancer Pools maintain a constant share of value across all tokens in the pool and;
2. These shares of value are equal to the weights associated with each token.

Let's calculate V_t , the total pool value in terms of an arbitrary token from the pool. Since we already know that the pool has B_t tokens t , let's calculate how many tokens t all the other remaining tokens are worth. It does not make sense to use their Effective Price relative to token t since we are not going to do any actual trade. Instead, to calculate the theoretical value we use their Spot Price relative to token t .

From Eq.2 we can calculate, i.e how many tokens (t) the balance of each token (n) is worth:

$$V_n^t = \frac{B_n}{SP_n^t} = B_n \cdot \frac{\frac{B_t}{W_t}}{\frac{B_n}{W_n}} = B_t \cdot \frac{W_n}{W_t} \quad (8)$$

We know that the total pool value in terms of tokens t is the sum of the values of each token in terms of tokens t :

$$V^t = \sum_k V_k^t = B_t + \sum_{k \neq t} V_k^t = B_t + \frac{B_t}{W_t} \cdot \sum_{k \neq t} W_n = \frac{B_t}{W_t} \cdot (W_t + \sum_{k \neq t} W_n) = \frac{B_t}{W_t} \quad (9)$$

Now to calculate S_n , the share of value each token n represents in the pool, all we have to do is divide the value of each token n , V_n^t , by the total pool value, V^t :

$$S_n = \frac{V_n^t}{V^t} = W_n \quad (10)$$

which proves both that the share each token represents of the total pool value is constant and also that it is equal to the weight of that token.

Liquidity Providers

Axolotl allows liquidity providers to execute their own strategies, customizing their own ratios and weights of their assets.

Axolotl allows a user to add different ratios of tokens, for example; 20% BTC to 80% ETH and have 8 BTC to spend, you would need to provide the 8 BTC to the pool. The 1.6 BTC is deposited to the pool, and the 6.4 BTC converted to the equivalent in ETH.

Axolotl protocol searches for the best price across all the pools containing BTC and ETH to execute this trade. 6.4 worth of ETH is deposited to the pool. The last step is the user receives Axolotl pool tokens representing your share of the pool. These Axolotl tokens will be redeemable for 20% BTC and 80% ETH. After that trade the Axolotl pool has more ETH than BTC compared to before this transaction was made. To maintain the 20/80 value ratio, the price of BTC decreases relative to ETH.

By providing only BTC to a pool containing BTC and ETH, you have increased the amount of BTC relative to ETH. By increasing the relative quantity of BTC, the relative price of BTC must decrease in order to maintain the constant value ratio of Balancer's liquidity pools.

Liquidity Pools

There are two types of pools in Axolotl finance protocol: native and smart pools.

Native pools are divided in two forms: private form, meaning the pool owner is the only actor who can manage the pool's parameters and add or remove liquidity. Private pools are dynamic where the weights, ratios, fees and tokens can be altered by the pool creator.

However, a core pool can be finalized or made 'public' or 'shared', meaning that its parameters are set in stone, but anyone is able to add liquidity and trade. A finalized Balancer core pool with 80% ETH, 20% BTC, and a 0.1% fee will always remain that way, ensured by a permanently fixed smart contract code on Ethereum. Public pools are better suited as passive investment strategies that you can set and forget, and anyone can join in on the strategy at any time.

Smart pools are private pools controlled by automated smart contracts that function as a gateway for anyone to provide liquidity. Therefore smart pools can be seen as a hybrid of private and shared pools. Smart pools can execute dynamic fees and liquidity caps.

Specs:

When someone *initialize* a pool P, they define this:

What address A1 controls the assets in P

If you leave this blank, *nothing* can use those assets other than creations/redemptions

Otherwise the address has full control over the assets in the basket

What function A2 specifies the *creation* basket

It takes as an argument the number N of Pool Tokens T you're creating

It outputs the assets and quantities you need to create N T

You can instead just directly enter a fixed creation basket per T if you want

If you leave this blank, it defaults to $[N / (\text{total number of T})] *$ (full contents of basket)

Note that the function can also do other things before returning the basket -- e.g. returning assets to the pool

What function A3 specifies the *redemption* basket

It takes as an argument the number N of Pool Tokens T you're redeeming

It outputs the assets and quantities you receive for redeem N T

If you leave this blank, it defaults to $[N / (\text{total number of T})] *$ (full contents of basket)

Note that the function can also do other things before returning the basket -- e.g. returning assets to the pool

A string called *name*

This has no function

A string called *description*

This has no function

When you *create* N of T:

P takes the creation basket for N, and mints you N of T

If you don't have the creation basket it fails

Note that A2 can also run arbitrary code during a creation, and can run code conditional on the creation being successful

When you *redeem* N of T:

P burns N of T

P returns the redemption basket for N of T to you

Note that A3 can also run arbitrary code during a redemption, and can run code conditional on the redemption being successful

All-Asset Deposit/Withdrawal [1] (Using Multipools)

An “all-asset” deposit has to follow the distribution of existing assets in the pool. If the deposit contains 10% of each of the assets already in the pool, then the Value Function will increase by 10% and the depositor will be minted 10% of the current outstanding pool token supply. [1]

Single-Asset Deposit/Withdrawal [1] (Using Multipools)

When a user wants to provide liquidity to a pool because they find its distribution of assets interesting, they may likely not have all of the assets in the right proportions required for a weighted-asset deposit.

Balancer allows anyone to get pool tokens from a shared pool by depositing a single asset to it, provided that the pool contains that asset. Depositing a single asset A to a shared pool is equivalent to depositing all pool assets proportionally and then selling more of asset A to get back all the other tokens deposited. [1]

Trading

Axolotl Finance is an automated market maker protocol (AMM) that also allows users to swap tokens and provide liquidity to existing pools or create new ones. Axolotl checks thousands of liquidity pools with different tokens and ratios and finds the best price to exchange tokens.

Founders Team

An experienced team of blockchain engineers and business development entrepreneurs. We are passionate about improving and adding value to the DeFi ecosystem.

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Tokenomics

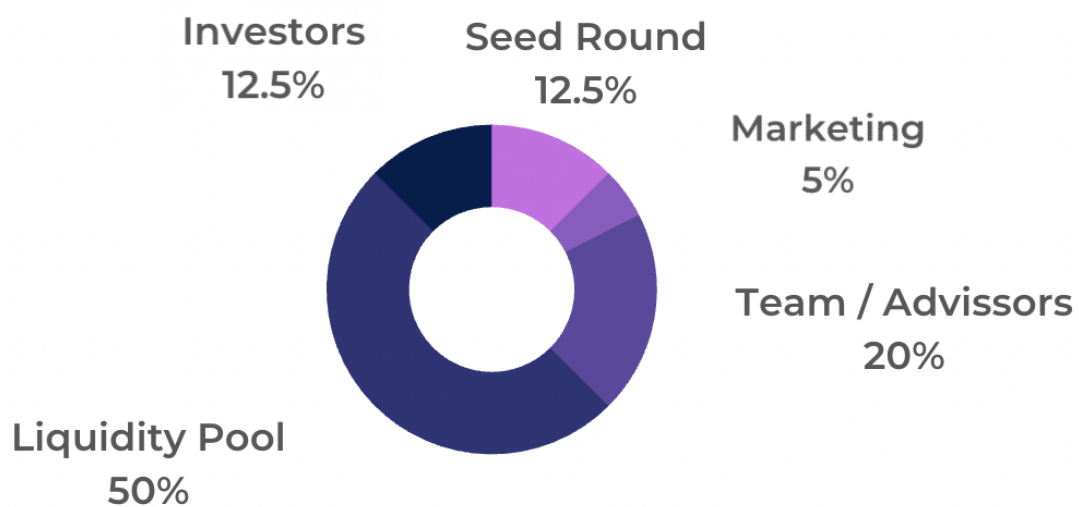
\$AXOL is an BEP20 token launched on the Binance Smart Chain on June 15, 2021. The max supply is fixed [by contract \[7\]](#), **200 Trillion** in total.

Token Details

- Token Name: Axolotl
- Chain: Solana Network
- Token Symbol: AXOL
- Contract Address: 0x8b8c48a7900b423115d74FE04Ff2545944F3A4Ec
- Chain: Binance Smart Chain (BEP20)
- Max Available Supply: 200 Trillions

Token Distribution

- 12.5% Seed round sale
- 20% Axol Team / Advisor
- 5% Marketing
- 50% Liquidity Pool
- 12.5% Angel Investors



Axolotl (AXOL) Token

Like most of the DeFi projects, Axolotl has its own governance token, used to incentivize protocol usage and bring more liquidity.

Roadmap

Phase 1 - Launch (May - Aug) 2021

- Axolotl.Finance Token ✓
- Axolotl DEX Launch ✓
- First 100 Holders ✓
- CoinGecko Listing (in Progress)
- Community Building (Twitter, Telegram, Reddit) ✓
- White Paper ✓
- CoinMarketCap Listing (In Progress)
- Massive burning of Tokens (80%) ✓

Phase 2 - Growth (Sep - Dec) 2021

- Liquidity Mining Begins
- Liquidity Staking
- Audit Verification
- Marketing Campaign
- Beta Version of the Axolotl Protocol
- 10k Twitter followers
- Coin Telegraph Articles

Phase 3 - Expansion 2022

- CEX Listings (Hotbit, Probit)
- 100,000 Telegram Members
- +50,000 Holders
- 100k Twitter followers
- Influencers Campaign
- Axolotl Army
- Youtube Channel

Use of the Marketing Funds

Funds contributed by our community will go towards three things: Marketing, partnerships and product development.

Stop thinking about what your money can buy. Start thinking about what your money can earn. And then think about what the money it earns can earn. J.L. Collins

References

[1] <https://balancer.fi/whitepaper.pdf> Balancer Protocol

[2] <https://solana.com/solana-whitepaper.pdf> Solana Blockchain

[3] https://www.reddit.com/r/ethereum/comments/55m04x/lets_run_onchain_decentralized_exchanges_the_way/

[4] <https://blog.gnosis.pm/building-a-decentralized-exchange-in-ethereum-eea4e7452d6e>
Gnosis

[5] <https://uniswap.org/whitepaper.pdf> Uniswap

[6] <https://arxiv.org/pdf/1807.00955.pdf> A State-Space Modeling Framework for Engineering Blockchain-Enabled Economic Systems

[7] Axolotl Token Code

<https://etherscan.io/address/0xCae93FbbdbC389fb459F8825eF9ff30C3f9fFeF2#code>

[8] Proof of Burn

<https://bscscan.com/token/0x8b8c48a7900b423115d74fe04ff2545944f3a4ec#balances>



Thanks, AXOL Team