

# PhutureDAO

## Whitepaper V1

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## **Abstract**

This whitepaper will show insight into how the PhutureDAO protocol functions on a technical level while introducing new features unique to the Phuture protocol. We aim to showcase the Phuture protocol, its design function and calculus used. We introduce new concepts and incentive layers for both investors and liquidity providers (LP's).

## **Disclaimer**

All of the information presented in this whitepaper is tentative and is subject to change at any time. None of the information herein should be construed as legal, accounting, or investment advice of any kind. This document does not represent a solicitation for investment, nor does it represent an offering or sale, public or private, of any kind of financial instrument, security or otherwise, in any jurisdiction. This whitepaper is provided as-is, for informational purposes only, with the intention to describe a prospective protocol, PhutureDAO.

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## Introduction

PhutureDAO is a decentralised platform on the Ethereum blockchain supporting the creation of crypto assets that track a range of benchmark index type portfolios. These crypto assets are ERC-20 tokens (“smart tokens” or “mTokens” for short) that are minted by the Phuture protocol and can be bought, sold, traded on exchanges or redeemed for their market value. The Phuture protocol’s core functionality is similar to a real world index fund. All mTokens are backed by tokens locked as collateral in the vault and have real value. To facilitate index creation and minimise rebalancing slippage Phuture protocol utilises its own liquidity pools. The Phuture protocol’s automated market-maker system maintains liquidity pools in a manner similar to Uniswap and Balancer. Liquidity providers and index creators gain profits from trading related fees that accrue as indexes are minted and token swaps are executed.

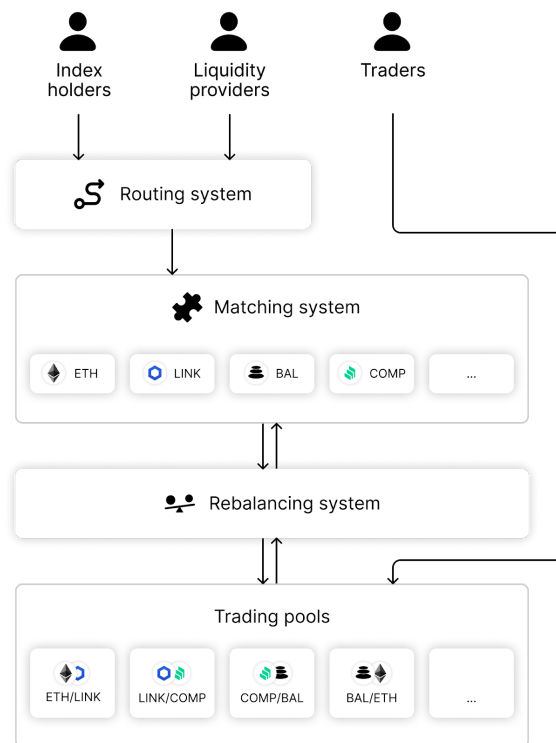
Indexes and other synthetic assets also became popular with the rise of the decentralised finance (DeFi) market’s capitalisation. Similar instruments are broadly traded on real world exchanges and are commonly used in different investment strategies. Indexes typically are bought and sold via index funds. An index fund is a type of fund with a portfolio constructed to match or track the components of a financial market index, such as the Standard & Poor's 500 Index (S&P 500) or the Financial Times Stock Exchange 100 Index (FTSE 100). An index fund is said to provide broad market exposure, low operating expenses, and low portfolio turnover. These funds follow their benchmark index regardless of the state of the markets. Empirical research finds index investing tends to outperform active management over a long time frame.

## Overview

The PhutureDAO ecosystem is a blockchain protocol for digital asset management on the Ethereum blockchain. It enables participants to set up, manage and invest in digital asset management strategies in an open, competitive and decentralised manner.

PhutureDAO is a decentralised index token issuance protocol, with highly flexible ERC-20 mTokens that track the price of the underlying assets within the index. They allow holders to gain exposure to various asset classes without holding the underlying assets themselves or trusting a custodian. These smart tokens are collateralised with the real assets placed in the trading pools.

### ***Overview on the system components***



One can describe the Phuture protocol as a set of Uniswap-like liquidity pools that interact with users indirectly through liquidity buffers. Liquidity buffers allow users to create their own indexes with arbitrarily chosen weights on top of Uniswap-like CPMM mechanics.

Phuture protocol doesn't separate index pools from general liquidity pools. All index assets are held in tradable pools alongside tokens from general liquidity providers.

Thus PhutureDAO presents a unique solution by combining the best of class projects (Balancer, Uniswap, etc.) into one product. All system components are driven by smart contracts making the system fully on-chain and composable with external smart contracts.

## Theory

In this section, we explain what market indexes are, how they work and what opportunities they can provide.

A market index is a hypothetical portfolio of investment holdings (or instruments) that represents a segment of the financial market. The calculation of the index value comes from the prices of the underlying assets. Some indexes have values based on market-cap weighting, revenue-weighting, float-weighting, and fundamental-weighting. Weighting is a method of adjusting the individual impact of items in an index.

Complete index investing involves purchasing all of an index's components (different tokens) at their given portfolio weights from the market, while less-intensive strategies involve only owning the largest index weights or a sampling of important components.

Decentralised finance has become a trending topic in the blockchain community because of the new opportunities it has created. The decentralised nature of new technologies allows users to create, trade and manage assets, bypassing banks, exchanges or brokerage accounts. Anyone in the world can subscribe to automated portfolio strategies without the need for trusted third parties, escrows, etc.

Automated trading strategies managed by smart contracts are one of the most exciting developments in decentralised finance. The PhutureDAO protocol allows users to create custom indexes by choosing components (tokens) and their weights. The protocol will also suggest tokens and weights to compose indexes for better performance.

DeFi is an umbrella term for decentralised permissionless financial infrastructure, thus a variety of customer-facing applications can be found. Among the most interesting fields currently, are borrowing/lending and exchange protocols. With that being said, the PhutureDAO protocol is extensible to a myriad of different sectors outside of decentralised finance.

### Index investment in theory

Modern portfolio theory gives theoretical instruments to measure index performance and to find optimal portfolios. In short, its main idea is to construct a minimal risk portfolio with a given expected return. Let's assume that one has a portfolio of  $n$  assets. Each asset  $i$  has the price  $p_i$  and the quantity  $Q_i$ . Total portfolio market value  $V$  at the given moment can be calculated:

$$V = \sum_{i=1}^n Q_i p_i \quad (1)$$

Now let's assume that asset prices  $p_i$  is changed due to market movements. The total portfolio's market value will be different every time price shifts happen. This difference,  $\Delta V$  estimates returns  $R$  of the given portfolio:

$$\Delta V = V' - V = \sum_{i=1}^n Q_i \Delta p_i = \sum_{i=1}^n Q_i p_i \frac{\Delta p_i}{p_i} \quad (2)$$

$$R = \frac{\Delta V}{V} = \sum_{i=1}^n \frac{Q_i p_i}{V} \cdot \frac{\Delta p_i}{p_i} = \sum_{i=1}^n \beta_i r_i \quad (3)$$

Thus total return (or ROI) can be calculated with the formula:

$$R = \sum_{i=1}^n \beta_i r_i \quad (4)$$

The formula's components represent total return  $R$ , individual asset's return  $r_i$  and weights  $\beta_i$ :

$$R = \frac{V' - V}{V} \quad r_i = \frac{p'_i - p_i}{p_i} \quad \beta_i = \frac{Q_i p_i}{V} \quad (5)$$

Weights are dimensionless and under constraint condition:

$$\sum_{i=1}^n \beta_i = 1 \quad (6)$$

Modern portfolio theory assumes that asset prices have stochastic behavior and thus have all properties of random values such as mean, variances and correlations.

The total expected return's mean value  $MR$  is equal to the weighted sum of return's mean values  $Mr$ :

$$\sum_{i=1}^n \beta_i Mr_i = MR \quad (7)$$

The portfolio's risk is measured by the return's variance and is a function of the variances of each asset's returns and the correlations  $\sigma_{ij}$  of each pair  $(i,j)$  of assets. Because of these correlations, the total portfolio risk is lower than what would be calculated by a weighted sum.

Total return's variance  $DR$ :

$$\sum_{i=1}^n \beta_i \beta_j \sigma_{ij}^2 = DR \quad (8)$$

Equations (6), (7) and (8) form a closed system one can calculate weights from. Equations (6) and (7) are constraints and (8), which represents a risk, should tend to a minimum.

This optimisation problem is easily solved using a Lagrange function  $F$ :

$$F = DR + \lambda \left( \sum_{i=1}^n \beta_i Mr_i - MR \right) + \mu \left( \sum_{i=1}^n \beta_i - 1 \right) \quad (9)$$

The extremum value of  $F$  can be calculated using partial derivatives over  $\lambda, \mu$  and  $\beta_k$  variables:

$$\frac{\partial F}{\partial \lambda} = 0 \quad \frac{\partial F}{\partial \mu} = 0 \quad \frac{\partial F}{\partial \beta_k} = 0, k = \overline{1, n} \quad (10)$$



Which leads to the following linear system of  $(n + 2)$  equations:

$$\sum_{i=1}^n \beta_i = 1 \quad (11a)$$

$$\sum_{i=1}^n \beta_i \mathbf{M}r_i = \mathbf{M}R \quad (11b)$$

$$\mu + \lambda \mathbf{M}r_j + 2 \sum_{i=1}^n \beta_i \sigma_{ij}^2 = 0 \quad (11c)$$

Optimal weights  $\beta_i$  protocol calculates using estimates of mean values, deviation of returns and pair correlations between assets. They can be efficiently tracked with recurrent formulas.

### Index valuation

Phuture core smart contract allows for the creation of indexes and issuance of mTokens, which represents the index's intrinsic value. This process can be reverted—one can burn all mTokens and redeem its value.

Index price  $p_I$  can be calculated using the formula:

$$p_I = \frac{1}{Q_I} \sum_{i=1}^n p_i Q_i \quad (12)$$

Here  $Q_I$  is the quantity of all created mTokens of an index. Naturally, this formula cannot be used for price evaluation when the index is created because  $Q_I$  is equal to zero. In this case, the price of mToken is arbitrarily set to 100 USDC for a token and the minimal amount of tokens created is equal to 1 (one).

Every time new mTokens are issued or burned the index portfolio components need to be adjusted according to the formula:

$$\Delta Q_k = \frac{\beta_k}{p_k} (V' - V) \quad (13)$$

Here  $\beta_k$  are index weights,  $p_k$  - component prices,  $V$  and  $V'$  - are the total values of index's vaults before and after changes in mToken supply and can be calculated with formula (14). All aforementioned calculations are performed automatically and effectively by smart contracts fully on-chain.

### Rebalancing

Index rebalancing is the process of realigning its weights, which involves periodically purchasing and selling components to maintain a certain allocation. mToken holders do not need to rebalance their portfolios manually by reviewing their portfolio, calculating the optimal allocation, and then trading their excess tokens for the missing tokens needed to create the new portfolio. All this is done automatically for them by protocol's smart contracts because PhutureDAO algorithmically emulates to some extent a fund manager's job.

The rebalancing process consists of several steps executed by smart contracts:

1. Calculate actual weights of tokens that are continuously changing during trade and compare with desirable weights.
2. Calculate exact amounts of tokens that should be added or removed with (13) formula.
3. Add or remove calculated amounts by shifting proportion of index assets and general liquidity inside the swap.

The exact amount of tokens for rebalancing:

$$\Delta Q_k = \beta_k \left( \frac{V'}{p'_k} - \frac{V}{p_k} \right) \quad (13)$$

Here  $V$  and  $V'$  are:

$$V = \sum_{i=1}^n Q_i p_i, V' = \sum_{i=1}^n Q_i p'_i \quad (14)$$

Like in the previous section,  $\beta_k$  are index weights,  $p_k$  - component prices,  $V$  and  $V'$  - are the total values of the index's vaults before and after changes in mToken supply.

Rebalancing is a tedious procedure that requires all tokens in each pair to be rebalanced simultaneously. Naturally, it cannot be done frequently enough to be up to date with token prices. Thus one suggests using token swaps initiated by traders to move token weights towards their target values. It can be implemented into smart contract business logic.

Approximate list of steps:

1. Trader initiates swap;
2. Protocol calculates new total values of all indexes  $V'_i$ ;
3. Protocol calculates token weights  $\beta_j$ ;
4. Protocol calculates the amount of tokens  $\Delta Q_j$  that should be bought or sold in order to correct actual weight to desirable values;
5. Depending on previous calculation protocol calculates the amount of fee  $\gamma$  and side to apply it;
6. The Protocol updates the total value of all indexes  $V_i$ .

The Phuture protocol promotes rebalancing in two ways:

1. *Variable Fee*
2. *Dynamic index shares*

Variable fees are discussed in the sources of income section so let's focus on dynamic index shares and how they bring about rebalancing.

The quote side of each liquidity pool is split between general liquidity and index liquidity. When the swap is at the perfect price a move up or down will shift the value of the index assets away from the perfect price. Whilst we can reduce the fee on either side of the swap to incentivise buying or selling, this will have limited efficacy since whenever the swap price on PhutureDAO differs materially from other external exchanges, arbitrage will bring these prices back in line. This will prevent the system from rebalancing effectively. Thus, we propose an additional system to enforce rebalancing using dynamic index shares. Each trade that is made will shift the proportion of index liquidity and general liquidity inside the base and quote side of the swap. For example, if the index assets are overweight, each trade will move a small amount of general liquidity into the index side, increasing the amount of tokens and thus reducing the value of index assets.

Let's now explore the relationship between the two rebalancing mechanisms. To do this, let's take the swap ETH/LINK and assume that the price of the swap is low enough to cause the LINK index assets to be underweight.

The rebalancing system has the following goals:

1. *Reduce fee to buy LINK*
2. *Assign all generated fees to the ETH side*
3. *Increase share size of LINK index assets*

Goal 1 incentivises traders to buy LINK which reduces the price of the swap, causing LINK to appreciate. Goal 2 funnels all generated fees into the ETH reserve which increases the reserve and lowers the price of the swap, causing LINK to appreciate.

If external markets are continuing to push the price of ETH/LINK higher then the fee that is being charged in ETH will continue to grow greater. This will act as a drag on the swap price and lead to more arbitrage opportunities.

Until now we have ignored the effect of dynamic index shares in order to demonstrate the variable fee mechanism in a vacuum. Including dynamic index shares means that each time ETH/LINK swaps are made a small percentage of index liquidity is moving into the general liquidity share. Over time the index share will resize to the optimal balance even if the price of ETH/LINK does not revert back. The more trades that occur the faster the index assets will resize. This is aided by the drag caused by the variable fee that increases arbitrage opportunity and thus increases the number of trades taken on the liquidity pool.

## **Implementation**

This section explains how index investment theory is implemented in Phuture protocol smart contracts.

### **Base and quote assets**

Phuture protocol supports all ERC-20 standard tokens that exist on the Ethereum blockchain but internally it distinguishes two types of tokens that are called base and quote assets. Base assets are ETH (wETH) and USDC. All other tokens (LINK, COMP, MKR, etc.) are called quote assets. Phuture protocol allows users to create custom trading pairs with some restrictions. The main restriction is that all trading pairs should trade one of the base assets on one of the sides. Thus, the creation of ETH/LINK, USDC/COMP or ETH/USDC pairs are allowed, but LINK/COMP or LINK/MKR - are not, because they consist of quote assets only.

There are two kinds of participants that contribute their assets to Phuture protocol. They are liquidity providers and index holders. The key difference between them is the asset composition they are allowed to add to the liquidity pools. Index holders are restricted to deposit only base assets (e.g. ETH or USDC), but for liquidity providers, there is no such restriction. Liquidity providers are allowed to deposit all supported tokens to the liquidity pools. This comes with its

price, because at a low level, liquidity can be added or removed to the trading pools with two assets of equal value with respect to the current price.

However, liquidity providers that add tokens just to one side of the trading pool have to pay an implicit matching fee in the form of a time delay in the matching pool before the assets move into the trading pools and can start generating fees. Details of this process are described in the diagram “The flow of matching system” in the section “Liquidity management”.

Internally for accounting and performance reasons Phuture protocol uses its own accounting units (uTokens) and prices of all supported tokens are represented and calculated using this unit. This allows the protocol to handle situations when index holders want to create and deposit assets (ETH and USDC) to indexes that have one of the base assets or both in their composition (e.g. index with 10% ETH, 20% USDC, 70% LINK). In such cases index holders ETH and USDC would be added to ETH/USDC trading pool. The protocol would account for the value of ETH and USDC in uTokens and store it in the memory. Thus the ETH/USDC trading pool contains assets that on both sides belong to index holders, liquidity providers and accrued fees. Trading fees as a reward would be divided between all pool participants according to the time period of deposit and user’s share of the pool.

Scaling the amount of liquidity affects the proportion between liquidity providers and index holders assets. The index holder’s assets can be driven out to the general liquidity portion of the swap or vice versa. The matching system that operates with two matching and trading pools is the key component of the rebalancing mechanism. The diagram “The flow of rebalancing system” illustrates the role of matching pools in rebalancing index weights. The whole process takes 5 stages:

1. Initial state. Matching pools contain 900 LINK and 900 COMP ready from liquidity providers ready to be added to the trading pools.
2. Index holder deposits 100 ETH to COMP and LINK index (50% : 50%).
3. The matching system notes that the index holder’s ETH can be matched with COMP and LINK in matching pools and adds corresponding token amounts to the trading pools. This action of the system doesn’t affect prices in the trading pools.
4. Trader buys 35 LINK with 10.1 ETH. The total charged fee equals 0.1 ETH.
5. System calculates new weights and notices that weights of index holder’s LINK and COMP are (53% : 47%). Thus actual weights do not coincide with desirable (50% : 50%). Next, the system “spills” 3.5 ETH in each trading pool without actual token swap shifting actual weights to desirable.

This is the main rebalancing mechanism that utilises the ability to shift total index holders and total liquidity providers share in the trading pools. The value of tokens that belong to both sides does not change but the composition does. One can say that the system transfers liquidity from one side of the trading pair to another without actual trading events occurring. The best word to describe this virtual swap is the word “spill”.

There are situations when such a spill is not enough to move actual weight to desirable. In such cases, the system tries to manipulate with fees and the sides on which fees are charged. Thus,

if for example, the actual weight of a LINK token goes up then the system continues charging fees in LINK in order to increase the reserve of LINK and reduce its weight. On the other hand, if the actual weight of LINK goes down, the system would charge fees in the base asset (ETH or USDC), increasing the reserve of the base asset and increasing the weight of LINK.

### Liquidity Management

PhutureDAO has an on-chain liquidity protocol that enables automated, decentralised exchange on Ethereum to efficiently rebalance pools. One can prove that whenever external market prices are different from those offered by a Phuture 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 Phuture Liquidity Pool move in lockstep with the rest of the market.

At a low level Phuture protocol uses a two-stage system of token pools, to be precise:

1. *Matching pools*
2. *Trading pools*

Matching pools are used by smart contracts to passively store all the index's components that aren't used in trading. These contracts also contain mappings to track ownership of assets. Matching pools accounting interfaces are only available to core Phuture protocol smart contracts. The diagram "The flow of matching system" illustrates the role of matching pools in managing matching pools.

The whole process takes six stages:

1. Initial state with an excessive amount of ETH in the matching pool.
2. Liquidity providers add 100 LINK to the system. This fills the system's LINK matching pool. The system notices that it has tokens of equal value on the both sides of the matching pools and transfers them to the trading pool.
3. Traders sell 50 LINK and 8 ETH instead. To simplify calculations trading fees are omitted from the diagram.
4. The system calculates the new ETH/LINK pool's price.
5. Liquidity providers ask the system to take back his liquidity. The matching system takes from the trading pool equal amounts of tokens -- 125 LINK and 16 ETH.
6. The trader receives 125 LINK and 16 ETH transfers to the ETH matching pool.

Protocol tracks all profits that are gained from liquidity pools and keeps a record of how much any given liquidity pool is responsible for. Liquidity providers can remove all their liquidity tokens from the pools together with accumulated profits at any time.

Users can mint index tokens using either ETH or USDC (base asset) and their base asset is swapped for each quote asset of the index. At this point, the index assets are held in a queue until they are matched with an equivalent amount of base asset. Since all index assets are held within liquidity pools they must be deposited with an equal amount of base asset to ensure that

the deposit doesn't unnecessarily skew the swap price, and create a free arbitrage opportunity at the expense of the liquidity providers. Given this mechanic, the protocol has a constant need for both balanced and unbalanced liquidity providers. This method of matching one side liquidity does not incur slippage from trading half of the asset for the required token. It relies on the provision of unbalanced liquidity or index redemptions to create liquidity to match with.

It is important to define the two types of liquidity that are held within Phuture Pools:

1. *General liquidity* - provided by pure play liquidity providers.
2. *Index liquidity* - provided by index minters.

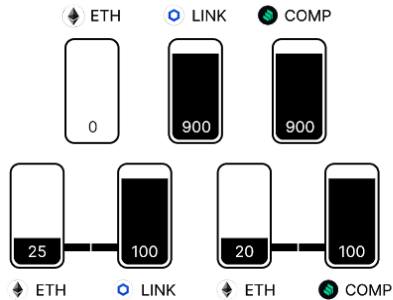
The architecture of the Phuture liquidity pools differs slightly from traditional Uniswap pools due to the fact that it holds index assets that must remain at a constant amount. Therefore, we must limit changes made by swaps to the index assets held in each pool. Therefore, all swaps that are executed on Phuture pools are facilitated by general liquidity rather than index liquidity. As long as general liquidity exists swaps can be made, although more liquidity will result in less slippage.

The protocol may enforce a threshold ratio of index liquidity to total quote liquidity to ensure the liveness of the platform. For example, if index liquidity accounts for 75% of total quote liquidity then the protocol will stop adding more index assets to the pool until the ratio decreases due to either indexes being redeemed or more general liquidity is added. This is to ensure that swaps can always be made on the liquidity pools.

# The flow of rebalancing system

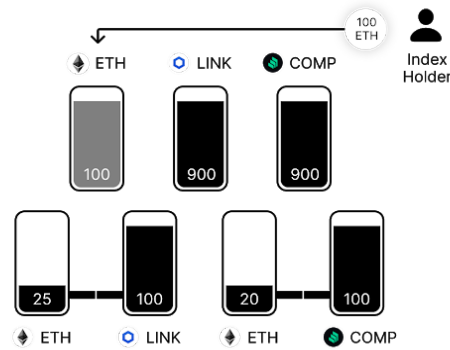
## 1. Initial state \*

The matching system waits for users to deposit their assets.



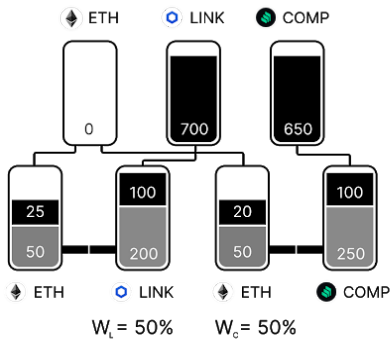
## 2. Index holder deposits his asset for COMP LINK index (50% LINK, 50% COMP)

ETH matching pool receives tokens from Index holder



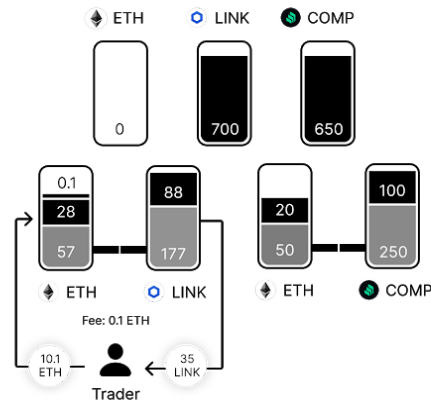
## 3. Matching system transfers assets to the trading pools

The matching system adds tokens of equal value to the trading pools



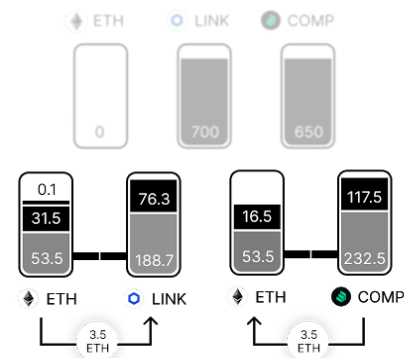
## 4. Traders change pools' balances \*\*

Trader changes index's weights



## 5. Matching system calculates actual weights and "spills" excess tokens

The weights of index are changed by shifting the shares between index holders and liquidity providers in the trading pools



$$* P_L = \frac{(25 + 50) \text{ ETH}}{(100 + 200) \text{ LINK}} = 0.25 \text{ ETH/LINK}$$

$$P_C = \frac{(20 + 50) \text{ ETH}}{(100 + 250) \text{ COMP}} = 0.2 \text{ ETH/COMP}$$

$$** W_L = \frac{57 \text{ ETH}}{(57 + 50) \text{ ETH}} * 100\% = 53\% > W_L = 50\%$$

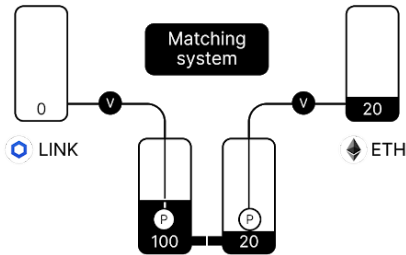
$$W_C = \frac{50 \text{ ETH}}{(57 + 50) \text{ ETH}} * 100\% = 47\% < W_C = 50\%$$



# The flow of matching system

## 1. Initial state

Matching system waits for the liquidity providers

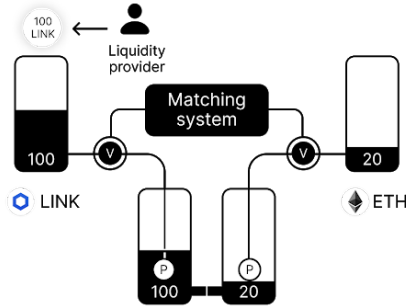


$$P = \frac{100 \text{ LINK}}{20 \text{ ETH}} = 5 \text{ LINK/ETH}$$

$$K^2 = 100 \text{ LINK} * 20 \text{ ETH} = 2000 \text{ LINK*ETH}$$

## 2. User adds liquidity

LINK/ETH pool receives new LINK liquidity

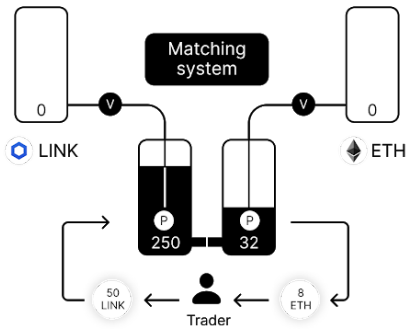


$$P = \frac{(100+100) \text{ LINK}}{(20+20) \text{ ETH}} = 5 \text{ LINK/ETH}$$

$$K^2 = 200 \text{ LINK} * 40 \text{ ETH} = 8000 \text{ LINK*ETH}$$

## 3. Trader buys ETH

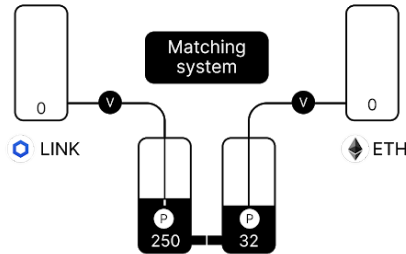
Matching system adds LINK of equal value to the trading pools



$$\frac{200 \text{ LINK} * 40 \text{ ETH}}{(200 + 50) \text{ LINK}} = 32 \text{ ETH*}$$

## 4. State update

New price would be set after each trade

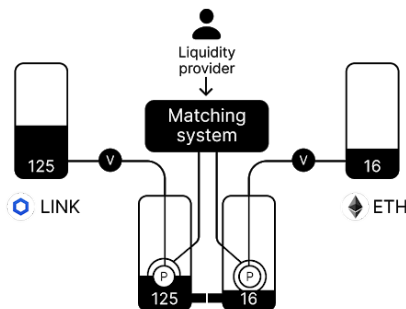


$$P = \frac{250 \text{ LINK}}{32 \text{ ETH}} = 7.8 \text{ LINK/ETH}$$

$$K^2 = 200 \text{ LINK} * 40 \text{ ETH} = 8000 \text{ LINK*ETH}$$

## 5. User asks for liquidity

Liquidity proportionally removed from the trading pools and get's transferred to the matching system

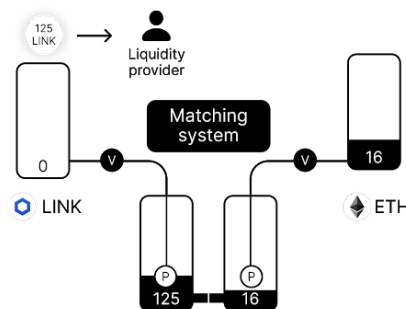


$$P = \frac{125 \text{ LINK}}{16 \text{ ETH}} = 7.8 \text{ LINK/ETH}$$

$$K^2 = 125 \text{ LINK} * 16 \text{ ETH} = 2000 \text{ LINK*ETH}$$

## 6. User takes liquidity

Liquidity provider gets their share of LINK while ETH would wait for a match in the matching system



$$P = \frac{125 \text{ LINK}}{16 \text{ ETH}} = 7.8 \text{ LINK/ETH}$$

$$K^2 = 125 \text{ LINK} * 16 \text{ ETH} = 2000 \text{ LINK*ETH}$$

\* Formula does not include trading fee

## Sources of Income

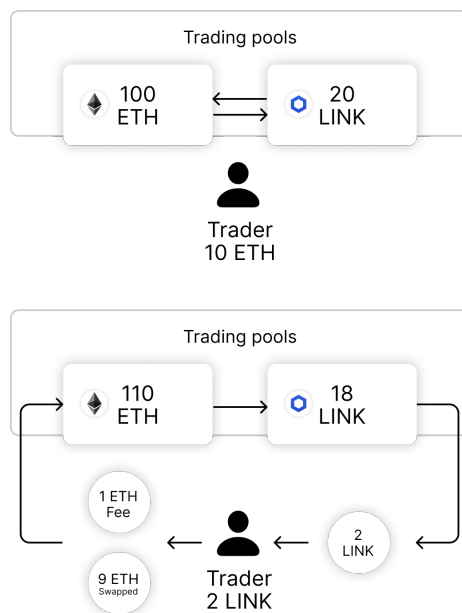
The platform's overall income is built from two sources: swap fees and minting fees.

1. Minting fees are generated through the minting of indexes.
2. Swap fees are generated through swaps occurring on PhutureDAO's liquidity pools either through informed arbitrage or uniformed token swaps.

Default liquidity pool fees are set to 0.3% for both buying and selling. However, Phuture pools feature dynamic fees that adjust the default fee for each side of the market. This depends on the perfect balance for that asset across all indexes that include it. When the index reserve amount of a token is greater than the calculated perfect balance, the platform incentivises buying by reducing the fee on the buy-side of the market and simultaneously increasing the fee on the sell side, making it cheaper to purchase. When the index reserve balance is lower than the perfect balance, the platform incentivises selling by making the sell-side of the market cheaper and simultaneously increasing the fee on the buy-side.

One feature that separates the Phuture protocol is the ability to charge fees to either side of the swap. Typically, swap fees are charged in the asset being sold to the swap. However, Phuture pools also allow for the fee to be charged on the asset being bought in order to bring the price of the swap more in balance. At launch, the maximum fee that a liquidity pool can charge is 1% and the minimum is 0.05%. The further away the index reserve is from the perfect balance the larger the delta on the fee.

### **Trading fees**

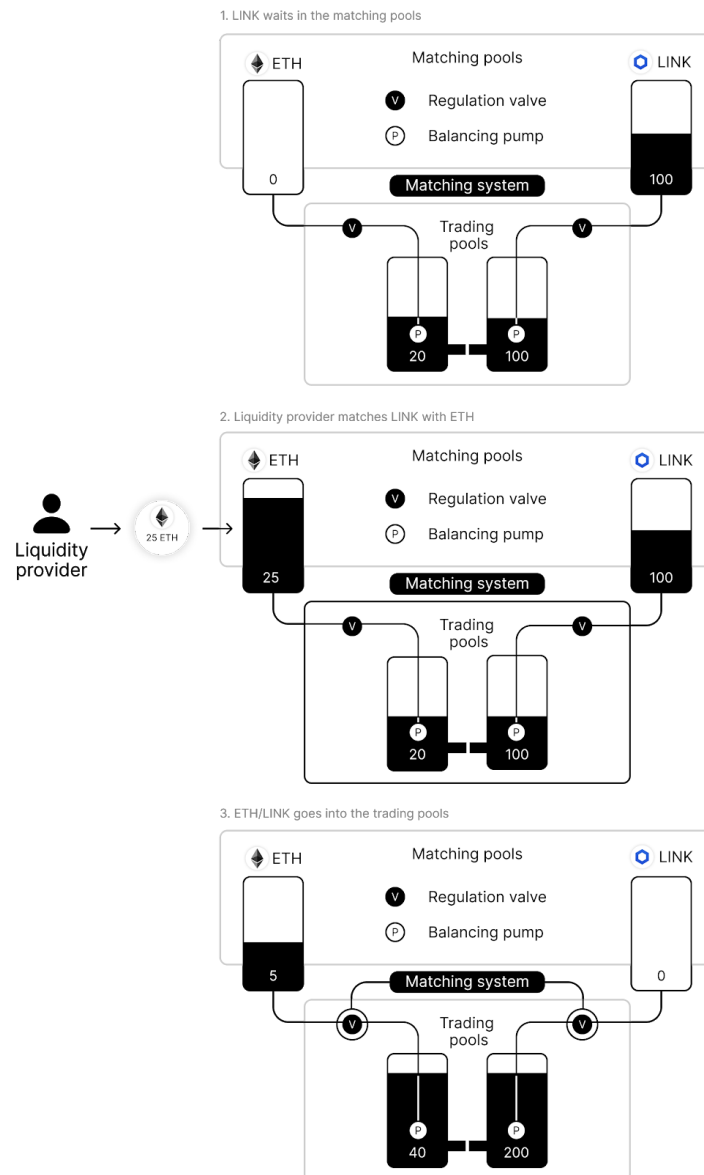


At launch, 90% of the swap fee will be distributed to the liquidity providers and 10% to PhutureDAO.

Minting fees are generated when a new index token is minted. These fees are charged as a spread on the price of each swap that is involved in the minting of that particular index token.

Note that when an index is minted the user does not also pay swap fees on top of minting fees. At launch, this fee will be 0.5% and will be distributed 90% to liquidity providers, 5% to index creator and 5% to PhutureDAO.

### ***Interactions between different pools in the system***



Fees that accrue to liquidity pools, whether through swaps or minting, are distributed to liquidity providers on a prorated basis.

## **Participants**

Participants benefitting from using Phuture protocol are traders, liquidity providers and index holders. There is also a developer team that directly affects smart contracts. Overall, interactions between these users create a positive feedback loop, fueling digital economies by defining a common marketplace through which tokens can be pooled, traded and earned.

### **Liquidity Providers**

Liquidity providers benefit from traders exchanging assets in the token market represented by token pools.

One may differentiate traders into two distinct categories, with different roles and goals:

1. Informed: These traders are typically arbitrageurs and their goal is to profit from the price difference between the PhutureDAO token pools and exogenous markets (other DEXs, exchanges, etc). It has been proven that CPMM prices tend to closely follow global prices. This is possible due to arbitrage opportunities that incentivise profit seeking arbitrageurs to move price in the right direction. These traders are deemed to be informed flow.
2. Uninformed: Consists of common traders making swaps with no immediate profit potential.

When discussing informed and uninformed traders it is important to delineate that this categorisation is determined in a very short time frame, such as one block. Liquidity providers will always prefer to make markets for uninformed traders but this separation is not possible via automated market makers.

Liquidity providers can take three forms:

1. One sided providers: Supplying only base assets (100% ETH / 0% LINK).
2. Balanced two sided providers: Supplying equivalent amounts of base and quote assets (50% ETH / 50% LINK).
3. Unbalanced two sided providers: Supplying unequal amounts of base and quote assets (80% ETH / 20% LINK).

Liquidity providers receive tokens called liquidity shares that represent their ownership in a given liquidity pool. Liquidity shares are split into quote shares and base shares. Splitting the shares allows the system to effectively handle one side liquidity provision.

Let's use an example to demonstrate how the accounting system works. If a liquidity provider deposits 10 ETH of one sided liquidity into the ETH/LINK swap; where the swap has a total of 25 liquidity base shares and a total of 100 ETH in the reserve. The liquidity provider will instantly receive base liquidity shares. This is calculated by multiplying the ETH added (10) by the ratio of base liquidity shares to ETH currently in the reserve ( $25/100 = 0.25$ ) to get the new amount of shares issued ( $10 * 0.25 = 2.5$  base liquidity shares).

If the liquidity provider deposits two sided liquidity then they will receive liquidity shares for both the base side and the quote side.

### Index holders

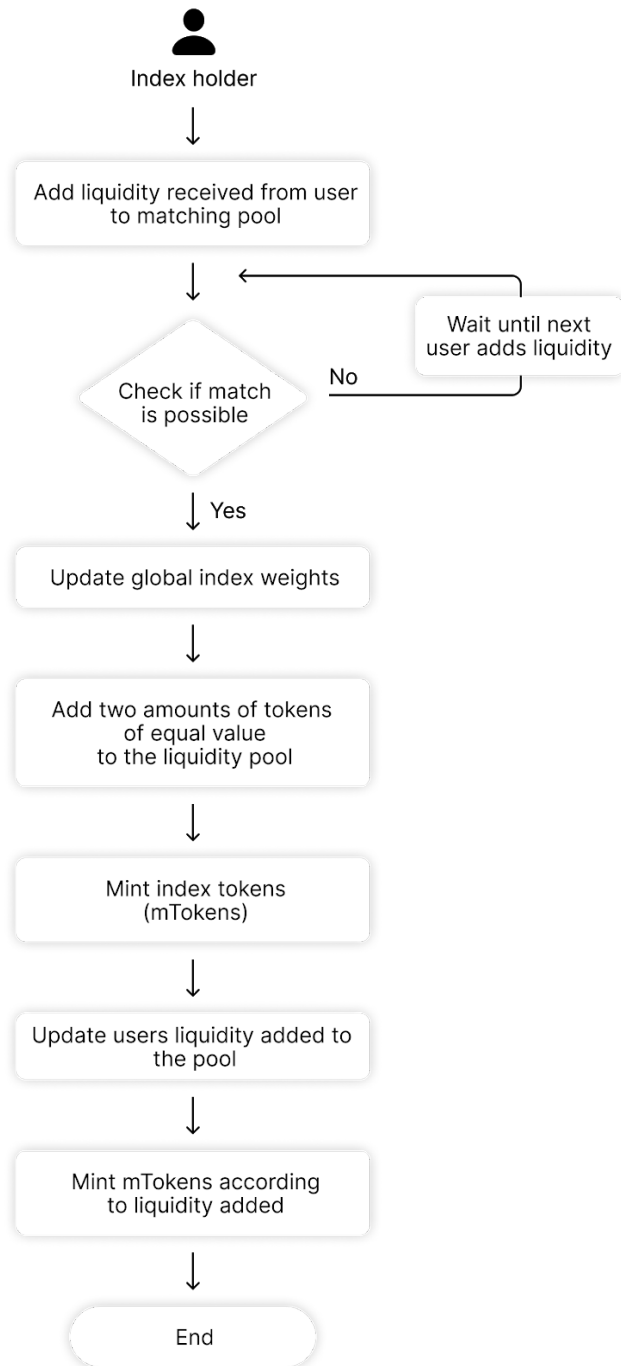
Index holders can acquire index tokens in two ways:

1. Directly through the platform by minting a new index token.
2. Through the use of a centralised or decentralised exchange.

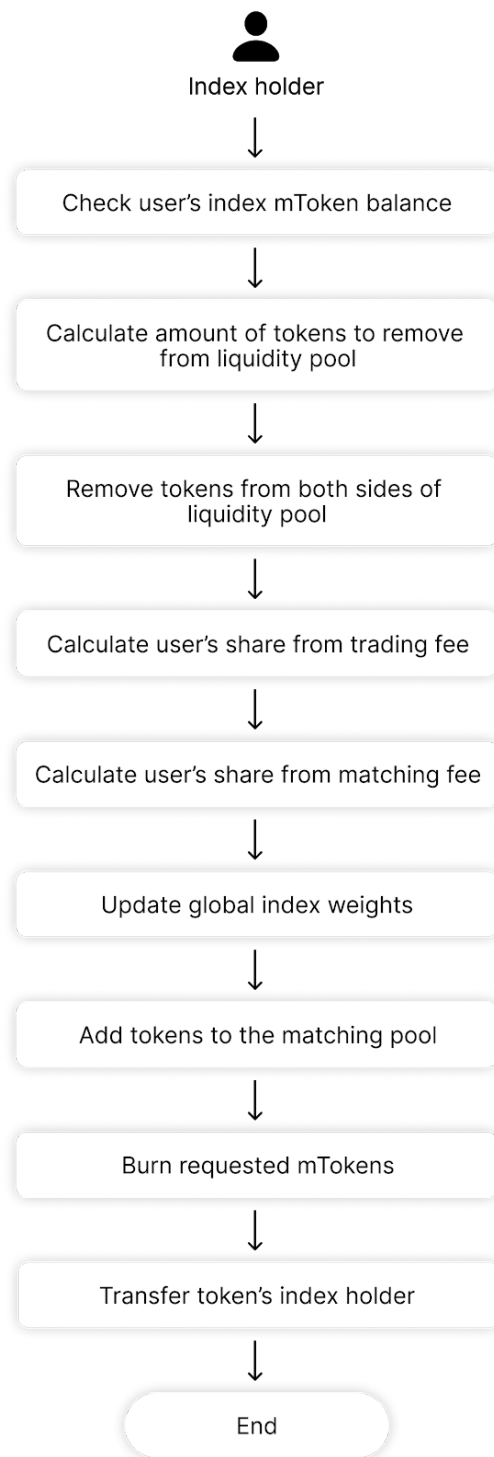
Index holders are motivated to buy indexes to obtain exposure to a sector or market. Investing via an index enables the investor to gain instant diversification through one token, reducing the individual risk of any one asset. Index holders can mint new index tokens with ETH, USDC or, with all components of an index.

Indexes can be redeemed at any time by the index holder through the Phuture Protocol in the same form that was used to deposit.

## ***Index holder deposits assets***



## ***Index holder withdraws assets***



## Traders

Phuture protocol's pools are a dealers market meaning that traders do not directly interact with each other. They interact with the liquidity pools filled with tokens.

## Governance

Phuture protocol will begin with partially centralised control of the protocol's functions and parameters, and over time, will transition to complete community governance. This function will take place in future updates to the protocol, in V2 we expect to showcase what we see as the perfect solution to on-chain governance.

## Conclusion

Phuture protocol is designed to simplify access to crypto assets for inexperienced users and non-crypto natives. It introduces a new asset to the Ethereum blockchain: mTokens. It simplifies the creation of index tokens and leverages its own liquidity pools to enable rebalancing across all index assets.

The concept of a decentralised index that gives investors access to a basket of crypto assets via one token we believe has a key role in an ever-changing Web 3.0 environment. We don't know what the top projects by market cap of different sectors of the crypto ecosystem will be in 10 years, however, if you buy an index you will own those assets (depending on the index structure/weighting). That's special.

PhutureDAO is a platform that allows investors, users and the community to build and create their own auto-adjusting and auto-rebalancing indexes. The use cases of these indexes, we see being in Decentralised Finance, Non-Fungible tokens, Decentralised exchanges, Insurance and other exciting sectors within the crypto eco-system.

The truth is, we don't know all the future applications that can be built upon the Phuture protocol, we believe in creating a platform, abstracting the complexities from users, and seeing their creativity and imagination buildout into the Phuture protocol. The crypto ecosystem is constantly innovating, disrupting new industries. To be a part of the constant innovation, create an index.



We believe in an active system that will run itself with the correct incentives for liquidity providers and investors. Opening up indexes for all and incentivising our community and users to create their own indexes that anyone can join and invest in, rewarding those who can compile and create forward-thinking futuristic indexes for all.

We see PhutureDAO as a benchmark for indexing for the ever-changing Web 3.0 token economy.

***“Don’t look for the needle in the haystack. Just buy the haystack!” - John C. Bogle***