

Mirror Finance: A trading and liquidity protocol

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Abstract

Mirror Finance is a trading and liquidity protocol that allows traders to replicate the returns of real-world tradable assets in a constraints-free and decentralised ecosystem. Existing cryptocurrency infrastructure does not provide a secure and trust-less way for crypto-investors to add real world traditional assets such as indices, stocks, and commodities to their portfolios. Mirror protocol bridges this gap for crypto-holders seeking to invest in traditional assets by mirroring the returns of underlying assets. The use cases of the trading protocol span from tactical and quantitative trading opportunities to long-term portfolio management, diversification and hedging, transfer and inheritance of crypto-denominated traditional assets in a decentralised manner, all with an added benefit of reduced cost of investment. Mirror trading protocol will enable investors, traders, wealth management advisors, hedge funds, and other institutional and endowments funds to seamlessly gain crypto and traditional asset exposure. Mirror liquidity protocol is self-sustaining, dynamic, and permissionless. Mirror token holders will be custodians of the protocol's master reserve pool and mirror token will serve as a governance token designed to keep the protocol community driven.

1. Introduction

In the world of traditional finance, cryptocurrency is considered an alternative asset class. The next phase in decentralised finance and cryptocurrency revolution is seamless integration of the traditional and alternative asset classes. Within traditional asset classes investing infrastructure, there are several instruments that track the returns of direct investments in listed stocks, indices, real estate such as ETFs, Mutual Funds, Index Funds, etc. However, none of these instruments are available to a crypto-investor who wants to keep his or her assets denominated in cryptocurrencies. Interaction of two asset classes is currently mired by several constraints. For example, constraints such as high transactional costs, unintuitive tax laws, limited on-ramp and off-ramp infrastructure, reduced capacity, and compromised security and privacy. In this paper, we present a protocol that eliminates some of these constraints completely and mitigates the impact of others.

Over the last several centuries, the definition of finance and money has continuously changed and continues to evolve to this day. The world we live in now - blockchain technology has enabled us to provide a new definition to finance and money. The full force of this revolution remains untapped but continues to grow at an exponential rate. We envision a world where blockchain technology will reach billions of people who are currently unbanked and are not able to participate in basic financial activities let alone investments and consequently do not have access to any reliable channel to grow their money. We are proponents of open finance. Open access and transparency are built into our protocol by design. Mirror protocol widens the accessibility of certain types of assets and is censorship resistant.

For those who do actively manage their portfolios, importance of holding a diversified portfolio cannot be undermined. In numerous studies conducted by well-known financial experts, it has been concluded that ‘asset-allocation’ drives majority of the portfolio returns and not ‘security-selection’. The empirical evidence suggests that as much as 80% of your portfolio returns are dependent on the ‘asset-allocation’. In an ever so globalised world – it is imperative for any astute investor to think of his or her portfolio holistically. For any individual or institutional investor, a multi-asset diversified portfolio typically achieves three objectives (in no particular order):

- Earn absolute positive inflation adjusted returns
- Earn excess returns (i.e. alpha) relative to popular indices
- Reduce volatility of returns and idiosyncratic risks associated with each asset class

Synthetic commodities, such as Bitcoin, have thus far demonstrated low correlation with stocks, currencies, and precious metals. Over the next few years and coming decades we expect

the adoption of cryptocurrencies to go exponentially higher. One of the direct implications of greater adoption will be higher demand to integrate traditional financial markets with cryptocurrencies. A significant percentage of traditional finance users are reluctant to invest in crypto-currencies because the process of converting their cryptocurrencies into fiat is cumbersome.

2. Mirror Protocol

Mirror protocol will allow traders to buy and sell assets which mirror the price movements of the underlying assets. The underlying assets will typically include indices, stocks, commodities, forex, and interest rates. Each asset will be represented by ‘asset-token’ available to be traded on Mirror platform. All asset-tokens will have the prices pegged to an underlier. Prices are confirmed in a decentralised way using Mirror oracles connected to leading brokerage houses and market data terminals. For example, if the underlying asset XYZ is quoted at \$100 at time *To* at most brokerage firms, Mirror traders should expect to see the exact price and be able to buy and sell at that price.

Mirror traders or users will enjoy the benefits of deep self-sustaining liquidity pools, fractional ownership, ability to maximize portfolio returns through exiting and entering different asset classes at their respective peaks and troughs in a permissionless manner without the need to convert crypto assets into their native currencies.

Mirror is a linear market making protocol that prioritizes orders on a first in first out basis. Since the prices are pegged, there is no competitive advantage to outbid another trader. While there may be times that the protocol will offer certain arbitrage opportunities with real world pricing, though we expect the profitability from these opportunities to be de minimis. The trade-matching engine is secure, fast, and scalable. In terms of scalability, the engine should be able to handle upto 10,000 transactions per second¹.

Mirror Architecture is built to be a self-sustaining ecosystem. There are two levels of liquidity pools - master reserve pool and each asset-token liquidity pool. The liquidity is de-coupled with the pegged-pricing mechanism. Mirror token holders are the custodians of the master reserve pool. See Section 6 Mirror Token for more details.

¹ Limited only by the speed of confirming transactions on Ethereum. Though with Ethereum v2 – we don’t expect this to be a limitation.

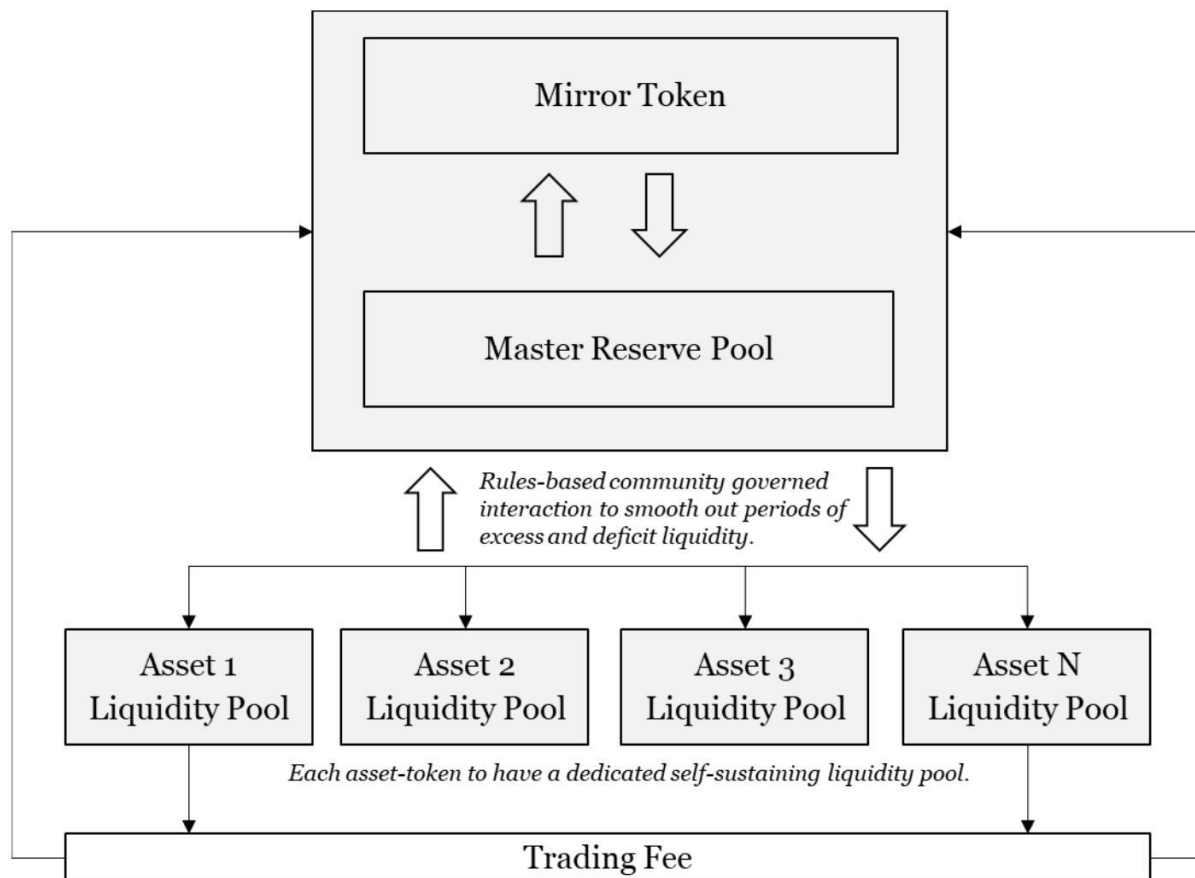


Figure 1: Mirror Architecture – Two Layers of Liquidity Pools

The interaction of master reserve pool and asset-token liquidity pool is rules-based:

- All funds from the sale of Mirror Token are deposited in the master reserve pool
- All transaction fees from trading pairs goes in the master reserve pool.
- Each asset-token is a liquidity pool has a dedicated self-sustaining liquidity pool
- For each asset-token pair, traders trade directly with the smart contract governed liquidity pool
- During periods of deficit in liquidity in the asset-token liquidity pool, the master reserve pool will fund the asset-token liquidity pool temporarily. When the master reserve pool is called for funding - an equivalent amount of Mirror tokens is burnt
- During periods of excess liquidity in the asset-token liquidity pool, all excess liquidity from the asset-token liquidity pool will flow to the master reserve pool. This step allows to keep sufficient liquidity in the individual asset-token pool allowing for price movements upto three standard deviations away from the closing price. Master reserve pool enables management of liquidity across multiple asset- token liquidity pools

Excess/Deficit liquidity is defined as follows:

$$aL - [(aQ \times aP) + 3\sigma]$$

where,

aL = Asset-Token Liquidity level

aQ = Asset-Token Quantity currently in circulation

aP = Asset-Token price

σ = Standard deviation of daily returns of the asset

3. Our Values and Vision

We believe financial markets should be universally accessible and open, a vision we know is shared by the crypto community, some industry leaders in traditional finance, and a few financial regulators globally. We see high cost of transactions as yet another hurdle towards open finance. And so early on, we decided to add one more component to our objectives - access to financial markets should be seamless and cheap.

We believe the regional laws and regulations in force for protecting consumers should be respected. However, we are at the forefront of technology that can allow us to build rules based smart contracts that can provide protection and which has the potential to minimise if not completely eliminate fraudulent activities. We understand some of these regulations were formed more than half a century ago and need an overhaul and we will actively participate in any future regulatory and compliance requirement. Keeping this ethos in mind, we have taken steps to ensure the protocol remains community-driven.

We built the protocol to reflect the following core properties:

- **Decentralized:** No one can control the pricing and liquidity protocol
- **Permission-less:** Anyone in world can use it *unconditionally*
- **Fractional:** Tiny amounts of the asset can be bought and sold
- **Self-regulated:** Listing of new assets and liquidity pools to be governed by community
- **Self-sustaining:** Liquidity protocol to be self-sustaining
- **Transparent:** All transactions are on chain and on public ledger
- **Anonymous:** No profile or background information of the users is required

4. Liquidity Pools

As described in [Figure 1] above, each asset-token pair will have its own individual liquidity pool. Trader's ability to buy or sell is heavily dependent on the size of the asset-token pool. The second challenge we faced were to reduce or completely eliminate the incidences of slippage and failed transactions. Considering that the prices of each asset-token are pegged, the slippage or failed transactions would have put the traders under a considerable disadvantage. To resolve this, two-layers of liquidity pools were added to smooth out periods of high vs low liquidity. During periods of deficit in liquidity in the asset-token liquidity pool, the master reserve pool will fund the asset-token liquidity pool. During periods of excess liquidity in the asset-token liquidity pool, all excess liquidity from the asset-token liquidity pool will flow to the master reserve pool. This allows to keep sufficient liquidity in the individual asset-token pools allowing for price movements upto three standard deviations away from the closing price.

As the protocol adoption grows, incidences of low liquidity should reduce to zero. We use a predictive model to balance liquidity levels and minimise events of low liquidity. Greater protocol adoption will give us access to trading data, allowing us to implement machine-based learning models to improve how we define excess or low liquidity.

This self-sustaining liquidity protocol eliminates the need for centralised management as the interaction between asset-token liquidity pool and master reserve pool is contractual and rules based². It allows us to balance the liquidity levels through ebbs and flow and enables decoupling of liquidity and price of the asset.

The existing two layered liquidity protocol will transition into a multi-layered liquidity pool gradually as the adoption of the platform grows. Additional layers will be added between master reserve pool and individual asset-token liquidity pool to further diversify away any asset-class related idiosyncratic risks to make the overall protocol more secure. See Figure 2.

² See Section 6. Mirror Token(MIF) to understand how community governs the interaction between the two layers of the pool.

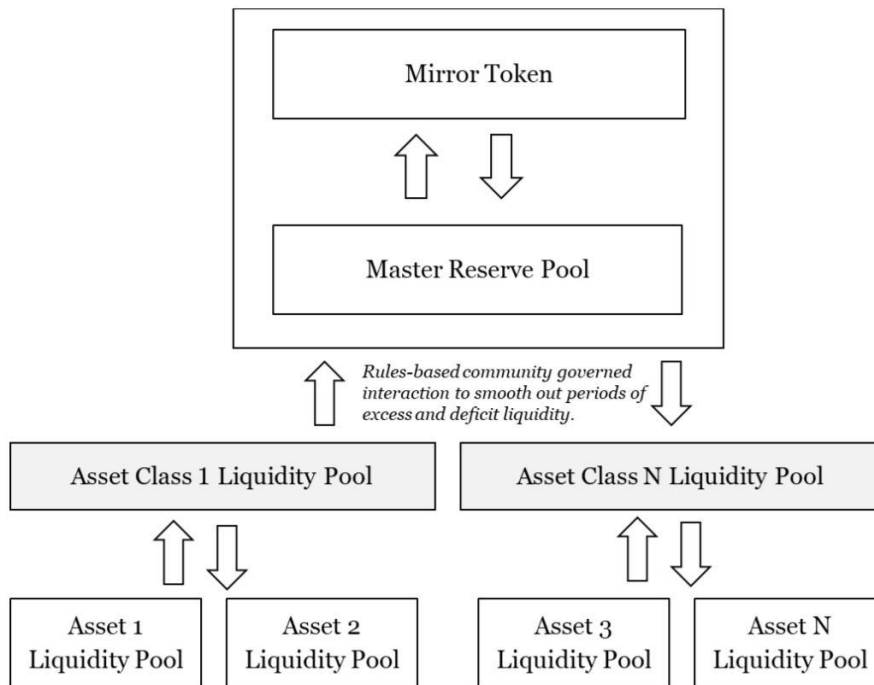


Figure 2: Mirror Architecture – Transition to Multi-layered Liquidity Pools

5. Asset-Tokens

As stated above, the asset-token prices are pegged to an underlying asset. The tracking mechanism uses oracles to confirm the prices. This limits the possibility of any arbitrage opportunities and eliminates a random actor’s ability to manipulate prices. Value of all mirror asset-tokens is currently determined and fixed by mirror oracles that push price feeds on-chain.

All asset-tokens are executed against a price that is supplied by mirror oracles using price feeds from various authorised, however, centralised brokerage firms and two separate market data terminals. As an added control, the price feed then goes through a secondary reconciliation with an error threshold of .002%. Price feed will be completely decentralised as the protocol grows. All asset-tokens will adhere to ERC-20 standard. Traders will be able to trade assets on a decentralised app with a user-friendly interface.

Transfer Rights

One of the features of Mirror asset-tokens is that traders are free to exchange or transfer coins to any other wallet or individual. Traders are free to list the coins in different decentralized exchanges for trading purposes. However, while we do follow a pegged price mechanism at Mirror platform, we cannot control the prices of asset- tokens if listed on other decentralized exchanges.

Trading during After-Hours

Trading will be allowed during off-market hours. During off-market hours, the price will reflect the closing market price of the day. The protocol will continue to match the potential buyers and sellers. This allows the protocol to offer a 24 hour, 7 days a week accessible market. However, traders should understand that the opening price on the following day may not be the same as in the off-market hours. Additionally, after-hours trading offers some opportunities of information arbitrage. We recommend that any trading activity during this time be done with extreme caution.

Stock Events

In case when the underlying assets are stocks, there are a number of stock events and stock related features that need to be taken into consideration. In the initial phase, Mirror tokens are limited to tracking the returns generated from price action only.

In case of stocks or bonds, buying an asset on Mirror doesn't give users the voting or collateral rights over the asset of the underlying company. Mirror replicates the price returns of the underlying asset only – and does not give users the right to dividend or voting.

In case of a stock-split event, Mirror traders will be issued Mirror asset-tokens in proportion to the split ratio, such that their underlying capital remains constant. Timing and ratio of the split will be mirrored from the underlying asset. The protocol is built to mint additional asset tokens in the event of stock-split.

In case of mergers and takeovers, the token will reflect the exact price of the underlying till the date of consolidation. Post consolidation – the asset token holders will be issued the tokens of the parent company and tokens of the subsidiary will be decommissioned.

Decommissioning/De-listing an asset-token: Mirror token holders can vote to decommission or de-list an asset token. In case of decommissioning or delisting an asset token, the asset-token holders will be compensated by one of the following means

- a) Receive equivalent amount of the parent company asset-token (in the event of takeover),
or
- b) Receive equivalent amount of ETH / USDT / DAI /USDC as per the closing price of the underlying asset at the time of de-listing.

Transaction Fees

During the initial phase, transaction fees are expected to be between 0.05% to 0.25% per trade. Our objective is to reduce the cost of managing investments and reduce the friction that currently exists for traders attempting to channel their money between traditional finance and new finance. As the protocol adoption grows, transaction fees are expected to decline to near zero.

6. Mirror Token(MIF)

Mirror token(MIF) is a native token for Mirror Protocol and mirror token holders play the central role in running the protocol. Mirror token holders are -

- **Governing members** of the protocol - providing token holders the ability to vote on key decisions to sustain the protocol e.g., new asset-tokens to be listed, de-listing of existing asset-tokens, listing of multi-asset synthetic products, upgrade or downgrade insurance contracts, and initiate audit of code and balances
- **Custodian of the master reserve pool** - dial up or down funding of an individual asset-token liquidity pool; increase or decrease the token burn rate (within a range) when the master liquidity pool is called
- **Principal liquidity provider** of the master reserve pool - earn share of all fees and staking returns from the master reserve pool

Note that when we say that mirror token holders are custodians of the master reserve pool, that doesn't imply that they can revoke a wallet's ownership of any asset-token. Asset-tokens are and will always remain non-custodial in nature. Similarly, mirror-token holders cannot deny redemption to any asset-token holder.

Mirror token burn rate is expected to be high during the first few quarters of the protocol. The protocol expects that token burn rate to be high during periods of high volatility and high volumes in the underlying asset. Mirror token is not required for the traders or institutions to trade in the Mirror Protocol. Holding a mirror token does not result in a trading fee advantage. However, holding mirror tokens qualifies traders for retrospective token distribution.

Staking

Each buyer of Mirror token is in effect entering into a contract of staking. The funds collected from mirror token holders go directly to the master reserve liquidity pool, which helps in funding the asset-tokens. We have eliminated an additional step where traders are required to

commit the Mirror tokens back to us. Staking starts from the moment users purchase the token however real gains can only be seen after holding the token for a long period of time.

Staking Rewards

Staking rewards will be distributed in two forms. During the first 6 months after the platform is live, staking rewards will be distributed in the form of Mirror token. After the first 6 months, staking rewards will be distributed denominated in ETH or DAI, or any other stable coin. Staking Rewards are funded from master reserve pool and have a direct correlation with the adoption of the platform.

Underlying value of the token

Master reserve pool balance is indicative of the underlying value of the mirror token, which may differ from its market price. In a future stable state, when the total supply is equal to the circulating supply, we expect the market cap of the Mirror token to track the master reserve pool balance. However, the market value of the Mirror token may still be significantly different than the book value of the token until that point. Market price of the mirror token may price in the present value of the future transaction fees, excess liquidity earned from individual asset-token pools, growth in the number of assets, and adoption of the protocol.

Mirror protocol is designed to reward all participants who actively engage in building the protocol as an early adopter. Similarly, the token-economics is also designed to reward participants who help sustain the protocol for multiple years. For Master reserve pool - liquidity providers are a valuable asset to the protocol and are expected to be awarded through retroactive token distribution. This promotional distribution to be based on length of the holding period and value of the tokens at the time purchase price per wallet. The promotion incentivizes long term holding of the Mirror token.

At the time of the launch of the decentralised app - the initial buyers of asset-tokens, the early adopters, are critical to the success of the protocol. In the first 3 months, all investors of asset-tokens are considered de facto liquidity providers and expected to be awarded through the retroactive token distribution as well. The criteria of distribution are to be based on three factors - number of unique wallets that traded on Mirror platform in the first 3 months, net volume of the wallets that traded with mirror platform i.e., buy trades get higher weightage than sell trades), and average age of net buy vs net sell.

By considering Mirror token holders and early asset-token holders as de facto liquidity providers, traders are no longer required to stake their coins with us.

Governance

Any address with more than 10,000 Mirror tokens, with a minimum average holding period of 30 days, may propose governance actions, which are executable code. When a proposal is created, the community can submit their votes during a pre-specified voting period. If the proposal achieves a majority, the proposal is sealed for development. Development team evaluates the proposal and comes back with an expected timeline for implementation.

7. Roadmap & Future Enhancements

A majority of the enhancements will be decided by the community. Hence, the roadmap is kept flexible. All future enhancements will be put to vote before implementation.

Q4 2020	Launch Site.Start Staking
Q4 2020	Mirror Token(MIF) Listing on a decentralised exchange such as Uniswap
Q1 2021	Complete Audit and Insurance Contracts
Q1 2021	Launch Mirror Platform dapp
Q1 2021	Launch Community Voting
Q2 2021	Expand listed asset-tokens to 500 pairs
Q2 2021	Launch Macro-tokens tracking global GDP, inflation rates, interest rates, etc.
Q3 2021	Launch Leverage Trading
Q3 2021	Expand Mirror Token listings
Q4 2021	Price feeds fully decentralized
Q4 2021	Partnerships with other liquidity protocols

Future enhancements

- Listing of non-tradable underlying assets or difficult to price assets as long as there is an underlying model and a decentralised source governing the underlier's price
- Expand the framework described above to include parameters for an interest rate protocol - with an objective to estimate crypto -economy's overnight lending rate similar to LIBOR or SOFR
- Include returns from dividends from the underlying stock. We are conceptualising a mechanism that transfers the dividend payments to crypto-investors in a decentralised way
- Track aggregated indices across assets such as asset-tokens that track prices of basket of underlying assets e.g., a typical basket of assets can include MSCI World Index, BTC,

ETH, WTI Crude Oil, and NCREIF Index capturing price action and capital appreciation across equities, cryptocurrencies, commodities and real estate.

8. Conclusion

We have proposed a multi-layered liquidity protocol solution to allow crypto-owners to gain exposure to traditional assets without the need to convert their crypto-currencies into any other native currency. The protocol is decentralised, permission-less, fractional, self-sustaining, and community-led. The solution eliminates several constraints that currently exist in traditional financial market infrastructure and allows for investing that is open, fast, safe, and cheap. The use cases of the trading protocol span from tactical and quantitative trading opportunities to long-term portfolio management, diversification and hedging, transfer and inheritance of crypto-denominated traditional assets in a decentralised manner, all with an added benefit of reduced cost of investment.
