PAR

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Abstract

The Mimo protocol is a decentralized stablecoin issuance protocol on the Ethereum blockchain. The PAR token is a decentralized, collateral-backed synthetic asset pegged to the Eurocurrency. The tokens are kept stable by collateral locked in smart contract Vaults. Over time, the Mimo protocol will progressively decentralize itself, handing over control to a diverse community of people holding its governance token.

Why a new stablecoin?

Crypto has undergone multiple cycles of adoption (“bubbles”) over the last 11 years since Bitcoin’s inception in 2009. The early days were primarily dominated by technically sophisticated users (“Innovators”) as the industry was immature and required strong tech skills. This culminated in the bubble of Jan 2014. Over the next 3 years, crypto companies improved usability and product offerings, which subsequently allowed a new group of users to enter our industry (“Early Adopters”). These early adopters were strong risk takers and were attracted by the early-stage investment opportunities in the form of ICOs. During the ICO bubble, the funding shaped the way for new companies to emerge and further improve on usability and products.

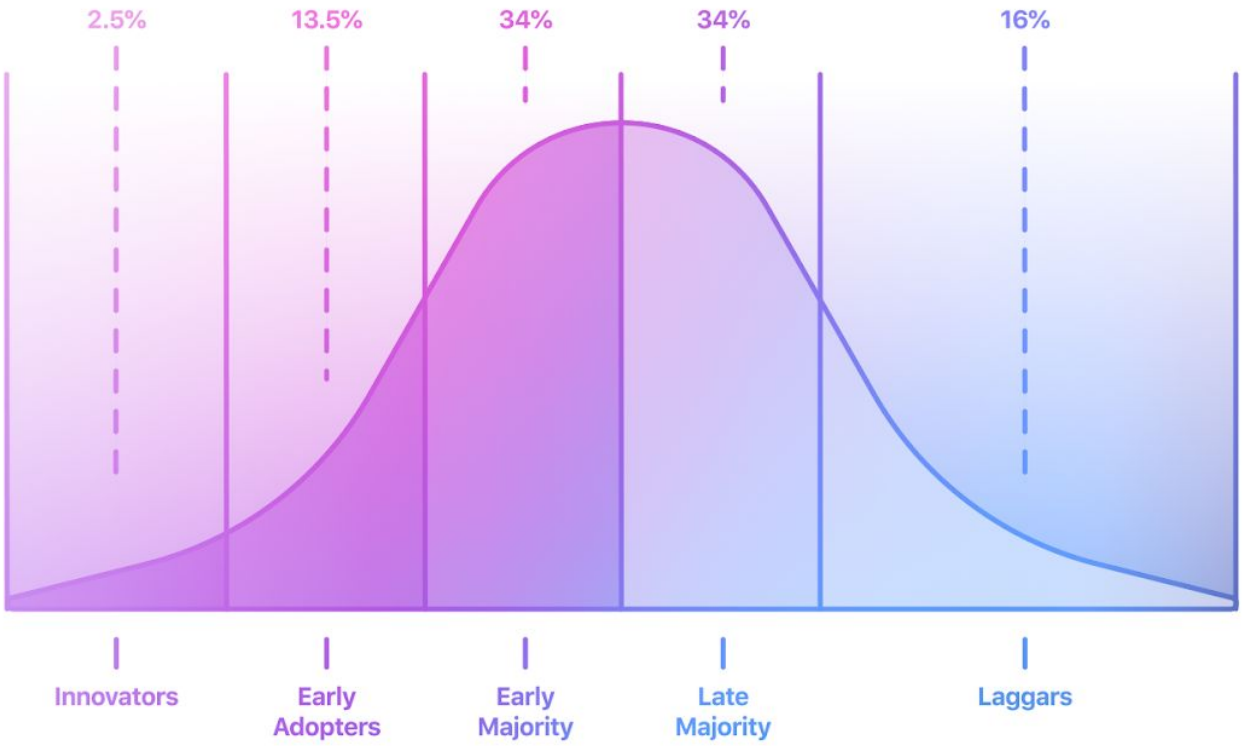


Figure 1: Technology adoption curve

Today we are at the brink of a new group of users coming into our industry (“Early Majority”). Their expectations are again different from the previous user group. Early adopters were very comfortable with high risk and wanted to “own” a piece of this new industry. These users established cryptocurrencies and tokens as its own asset class over the last 4 years. The new

users coming into our industry today have a lower risk tolerance, which can be seen by the increasing stablecoin usage for transfers compared to using volatile cryptocurrencies for transfers. At the same time, these new users are not looking for high-risk high-return; instead, they are looking for returns denominated in their own currency. In a sense, we are witnessing a change of mindset from ‘owning crypto as an asset class’ for its high-risk-high returns towards ‘make crypto work for me’ with returns denominated in fiat.

The crypto industry has matured to offer products to these new users in the form of savings & loans. While loans are still heavily used by the previous user group to facilitate leveraged trading and hedging in both the trusted world of centralized service providers and increasingly by using decentralized finance (“DeFi”) offerings; the new user group is very strongly attracted to the savings rates of 5-15% APY and higher.

Mimo has a unique opportunity to bridge the existing chasm between the DeFi world and the trusted world of regulated financial institutions by offering a fully decentralized stablecoin platform with savings loans. This will allow us to both move fast and leverage the existing trends in DeFi and offer a highly competitive product to our crypto-curious (“Early Majority”) user group.

How is PAR different?

PAR combines multiple yield-earning opportunities into a single product offering. Here are the features that make the Mimo protocol different from the competition.

The first decentralized EURO stablecoin

Today’s stablecoin market is dominated exclusively by USD-denominated stablecoins (e.g., Tether, Circle, Maker, and Paxos). Trusted stablecoin issuers are facing negative interest rates in Europe, which is undermining the viability of their business model of interest rate arbitrage. So far, no decentralized EURO stablecoin exists, which opens up a big opportunity to win the entire EURO stablecoin market. PAR will be the first decentralized EURO stablecoin.

Growing liquidity

A proportion of the fees collected from borrowers are used to incentivize liquidity in a handful of PAR Automated Market Maker (AMM) pools. This incentive will attract more liquidity to PAR pools, facilitating low-slippage trades between PAR and other crypto assets given the deeper market depth.

Optimizing yield

Liquidity providers can earn attractive rates by adding their liquidity (e.g., PAR and ETH) to a PAR AMM pool. Liquidity providers will continuously receive the pool's trading fees. In addition, liquidity providers will also receive additional income collected Mimo protocol fees such as loan origination and borrowing fees.

Protocol Specifications

Overview of Mimo protocol

The core of the Mimo protocol is Vaults. Users mint PAR by depositing collateral such as Ether (ETH) into the Vault's smart contract. The steps involved in minting new PAR tokens are as follows:

- A Borrower opens a Vault and deposits collateral.
- Based on the Vault's collateral balance, a Borrower can borrow up to a certain amount of PAR. The vault must have collateralized more than a Minimum Collateralization Ratio (MCR)%. The MCR can be configured differently for each collateral type and is initially set to 130% for ETH.
- The PAR smart contracts mint the borrowed amount of PAR to the Borrower. An Origination Fee is applied to each borrow. Initially this is set to 0%.
- The PAR token is a ERC20 token that you can transfer and use normally, pegged to the EURO fiat currency.
- A Borrowing Fee accrues over time on all active Vaults, which has to be fully repaid

before the Borrower can withdraw their deposited collateral.

- A Health Factor is the ratio between a vault's collateralization ratio and the MCR. If a Vault's health factor goes below 1 due to market changes, profit-seeking Liquidators can liquidate the undercollateralized Vault to receive its collateral at a discount.
- Borrowers need to retain enough collateral in their Vaults to avoid being liquidated.
- Borrowers can close their vault and withdraw their collateral by fully repaying their debt and any accrued fees.

There are no counterparties involved in this exchange, as actors in the network transact directly with the PAR smart contracts. Vaults are non-custodial, with each Borrower having full control over their collateral and borrow balances, provided it meets the minimum health factor.

Smart Contract Architecture

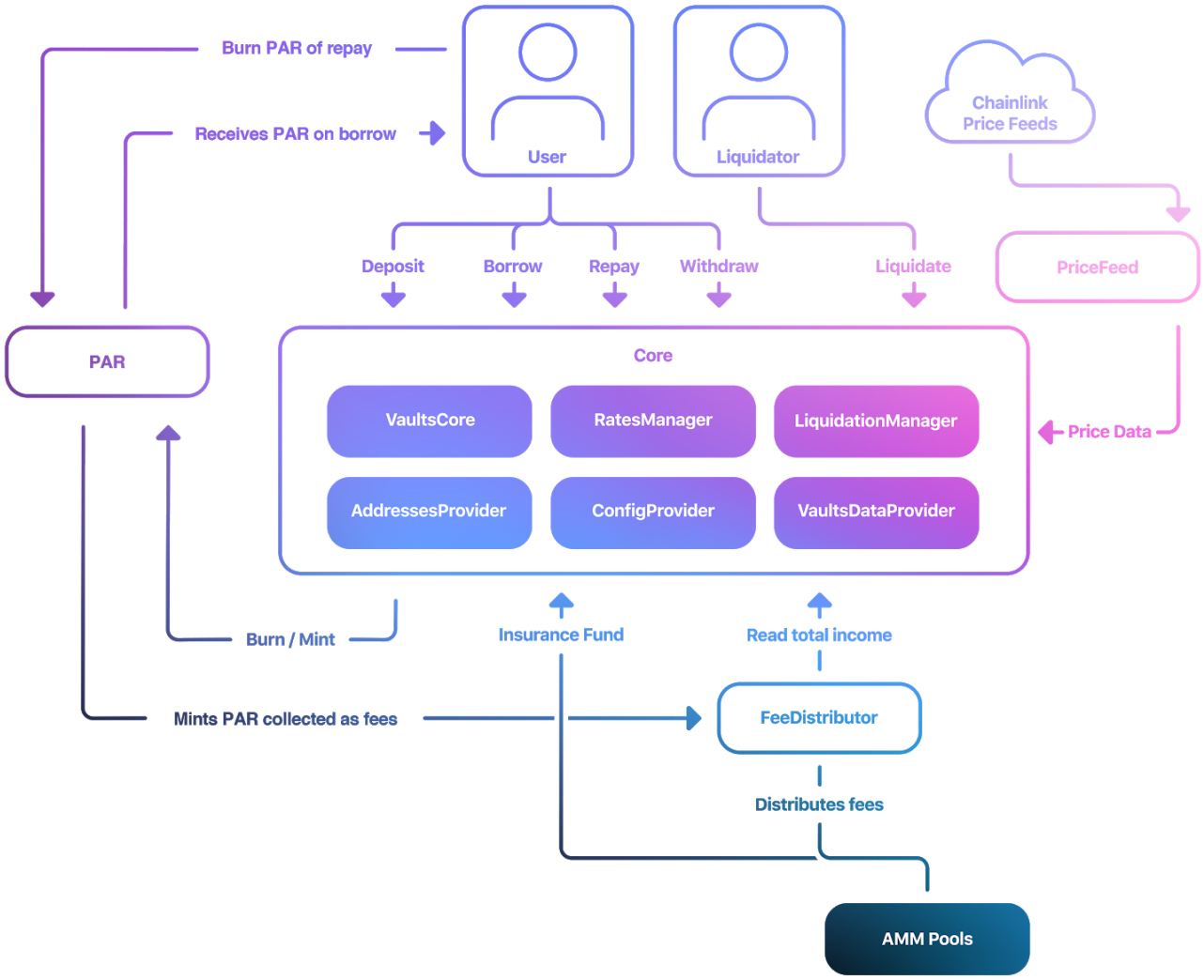


Figure 2: PAR architecture

The Mimo protocol is split into the following contracts:

- **Vaults Core:** Owns all global state (other than vault, user token balances state) and vault interactions. All state updates calculations happen here.
- **PAR:** PAR tokens are standard ERC20 tokens whose value is pegged to a fiat currency.

- **Rates Manager:** Stateless. Calculates debt and fees for each Vault.
- **Liquidation Manager:** Stateless. Calculates health factors and liquidation variables.
- **PriceFeed:** Responsible for retrieving collateral prices in fiat, for calculating Vault health factors.
- **FeeDistributor:** Responsible for collecting and distributing protocol fees.
- **AddressProvider:** Owns all PAR module addresses read by other modules.
- **ConfigProvider:** Responsible for updating protocol config parameters.
- **VaultsDataProvider:** Owns vault state, base debt, and vault related read functions. We will examine each of the above modules in detail.

Vaults Core

The Vaults Core contract is responsible for keeping track of the global Vault state. It also serves as the primary interface for all vault interactions such as depositing, borrowing, repaying, and liquidating.

The Vaults Core contract has the following interface:

```
interface IVaultsCore {
  function deposit (address _collateralType, uint256 _amount) external;
  function withdraw (uint256 _vaultId, uint256 _amount) external;
  function withdrawAll (uint256 _vaultId) external;
  function borrow (uint256 _vaultId, uint256 _amount) external;
  function repayAll (uint256 _vaultId) external;
  function repay (uint256 _vaultId, uint256 _amount) external;
  function liquidate (uint256 _vaultId) external;

  ...
}
```

Let’s look at each Vault interaction in detail.

Opening and Depositing

Opening a vault and depositing collateral increases the amount of PAR you can borrow.

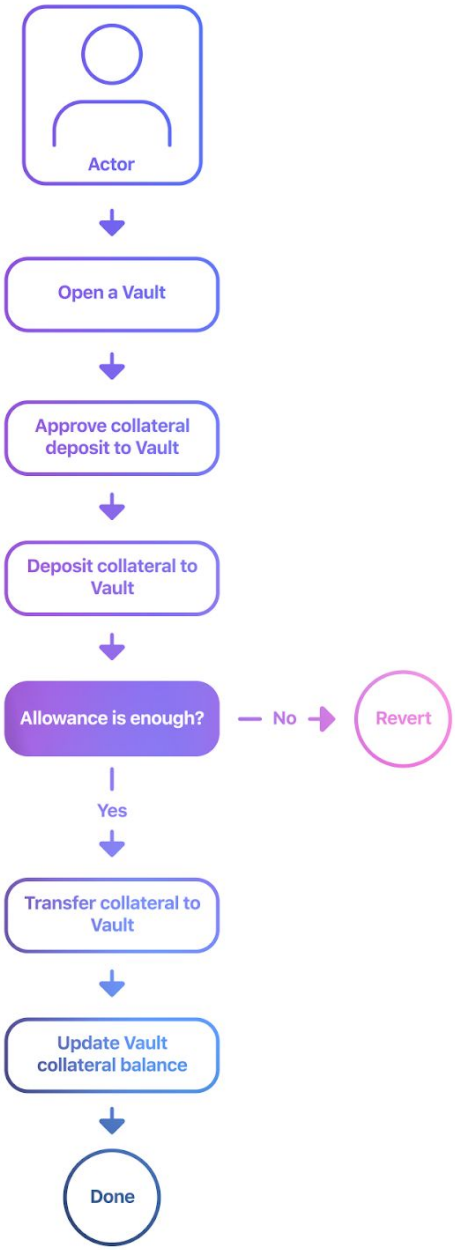


Figure 3: Opening a vault and Depositing collateral

Borrowing

Borrowing alters the total supply of outstanding PAR. When you borrow, the Vaults contract mints new PAR tokens for the Borrower. This function is limited to the Vault's owner.

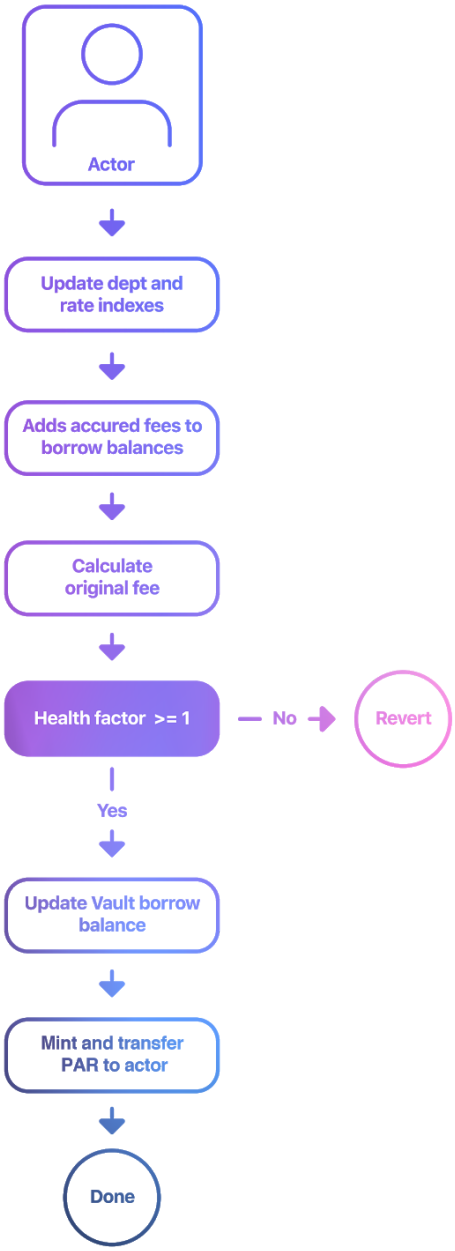


Figure 4: Borrowing PAR

Borrowers can continue to mint PAR as long as they deposit a greater value of collateral in their vault. This guarantees that all outstanding PAR tokens are fully backed by collateral.

Withdrawing

Users can withdraw their collateral as long as it does not decrease the Vault's health factor below 1. This function is limited to the Vault's owner.

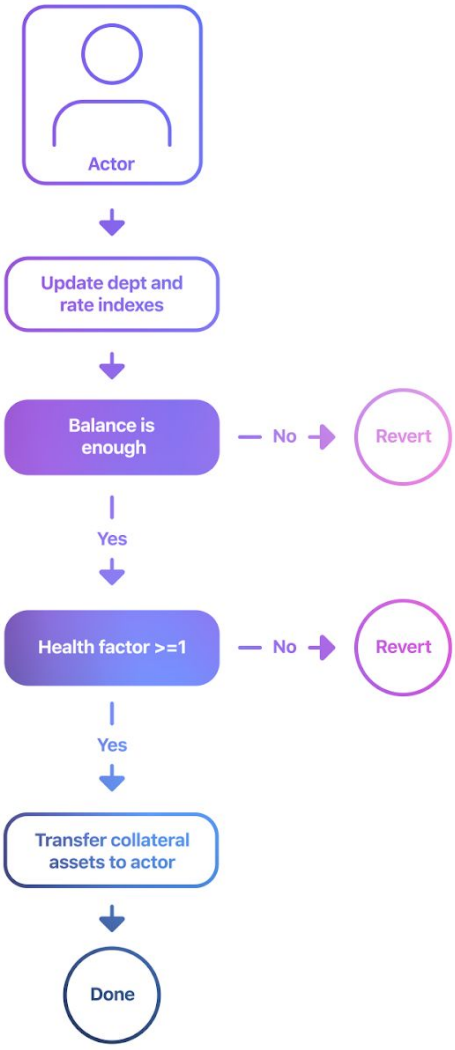


Figure 5: Withdrawing collateral

Repaying

Users can repay their debt partially or fully. PAR tokens are burned when a loan is repaid.

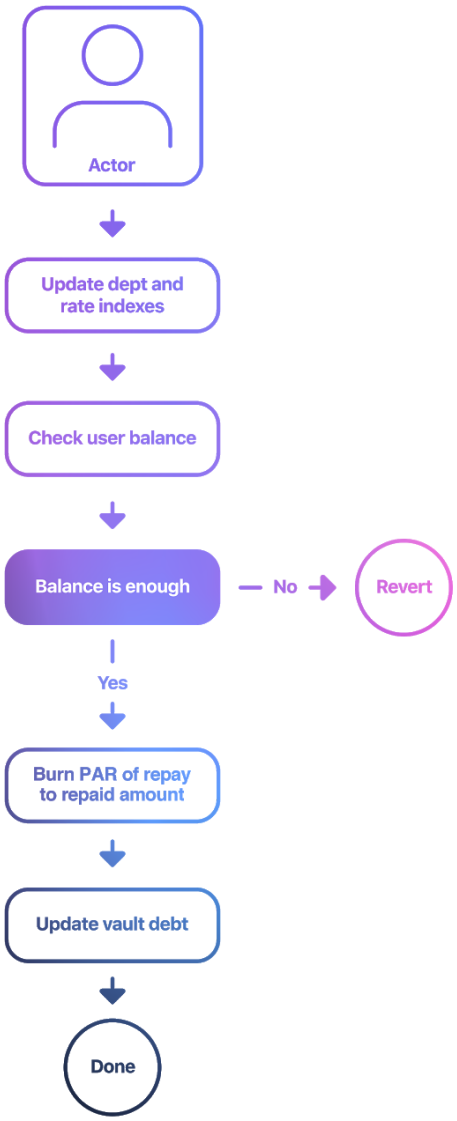


Figure 6: Repaying a vault

Liquidation

Liquidation ensures that there is always sufficient collateral to cover all PAR tokens. Vaults below a specified health factor are subject to liquidation by profit-seeking actors in the network. Platform fees fund a safety reserve to guarantee liquidations even when the value of the collateral drops below the level of outstanding vault debt. The MCR ratio acts as a buffer to avoid unnecessary use of the safety reserve.

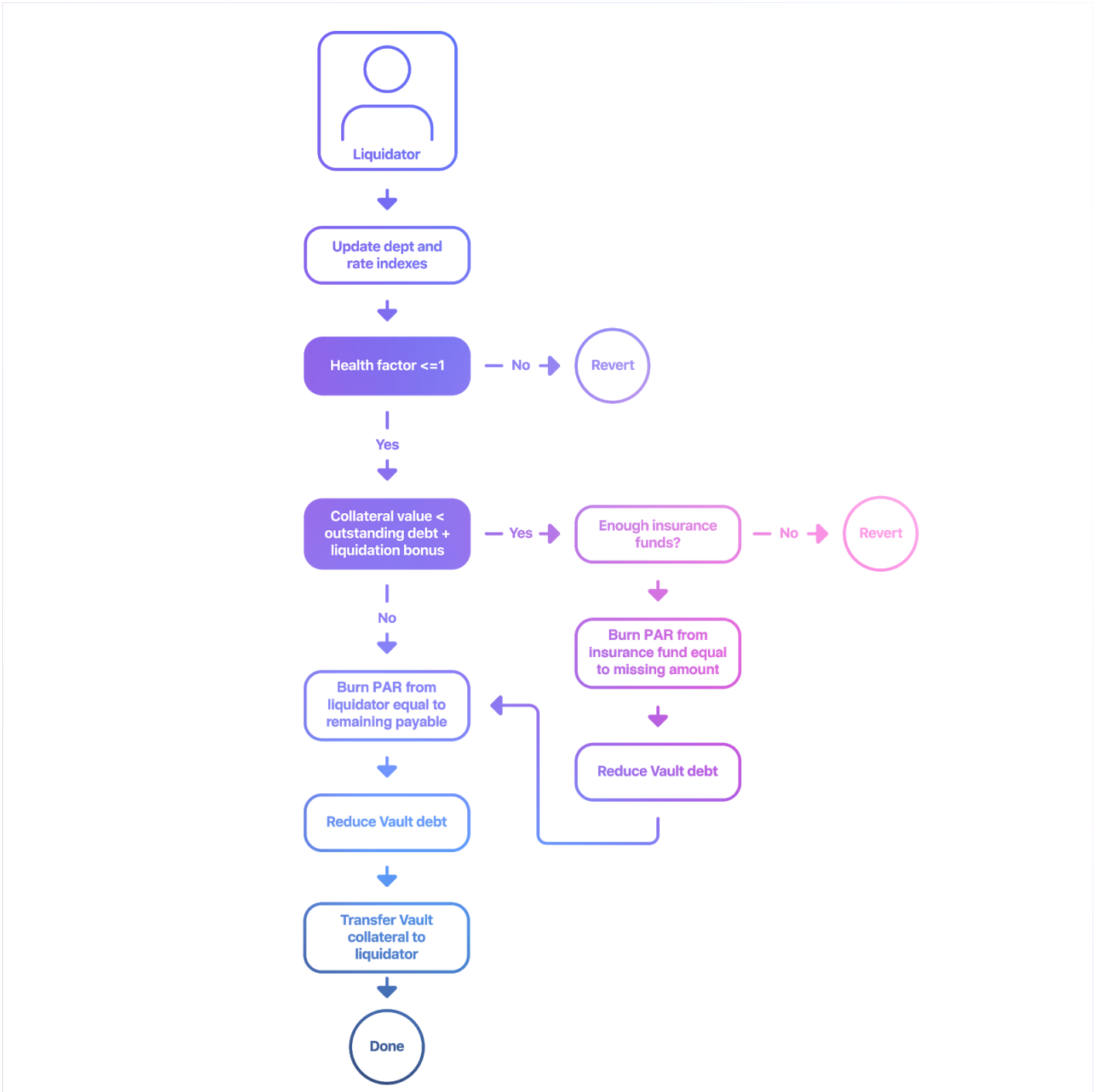


Figure 7: Liquidating a vault

Rates Manager

The Rates module is responsible for calculating the outstanding debt and fees for each Vault. Vaults accrue fees over time. The Mimo protocol uses the following formula to to calculate the debt and accrued fees of all Vaults efficiently:

$$vaultTotalDebt = vaultBaseDebt \times cumulativeRate \quad (1)$$

A vault's total debt is the amount that borrowers will have to fully repay before the vault's collateral can be fully withdrawn. This includes both the principal amount deposited and fees accrued over the length of the loan. This value is not stored anywhere and is calculated dynamically based on Vault Base Debt and Cumulative Rate.

Vault Base Debt

Vault Base Debt is a variable unique to each Vault. It's a partial representation of a vault's debt. Vault Base Debt is updated whenever a vault's debt is added/removed, and is calculated as:

$$NewVaultBaseDebt = OldVaultBaseDebt \pm \frac{\Delta VaultTotalDebt}{CumulativeRate} \quad (2)$$

Note that the resulting change in Vault Base Debt does not equal the change in the Vault's Total Debt. The change in Vault Base Debt is a function of both Total Vault Debt and the Collateral Cumulative Rate.

Cumulative Rate

Collateral Cumulative Rate is a variable unique to each Collateral type (e.g., ETH.) It's a representation of the aggregate borrowing fees over time. It's calculated with a 1-sec precision based on the block-time.

Cumulative Rate is updated whenever the '`VaultsCore.refreshCollateral()`' function is called, which will update the value to the current time. Contracts that rely on the Cumulative Rate will call this function at the start of their transaction.

Cumulative Rate is calculated as:

$$NewCumulativeRate = OldCumulativeRate \times (1 + BorrowRate)^{TimeSinceLastUpdate} \quad (3)$$

When new collateral is added, its Cumulative Rate is set to 1. A positive borrowing fee will increase the Cumulative Rate over time.

Liquidation Manager

The LiquidationManager is responsible for calculating health factors used to determine if a Vault is open for liquidation. It also calculates liquidation bonuses and discounts.

Fee Distributor

Whenever PAR tokens are borrowed and repaid, fees are collected at the protocol level. Fees include the origination fee and the borrowing fee, both of which are collected from borrowers. Income payable is calculated using the same formulas as borrowing fees. Fees collected are distributed to a safety reserve and incentivized liquidity pools.

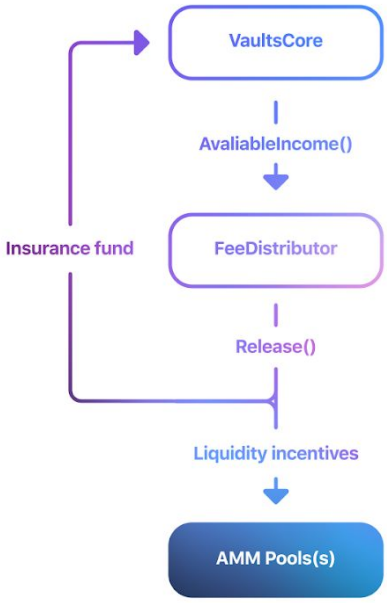
New income is always equal to the total debt outstanding minus the total supply of the stablecoin.

$$NewIncome = TotalDebt - PAR.totalSupply() \quad (4)$$

At launch, fees are distributed as follows:

- 10% of the fees collected go to the safety reserve used to cover severely unhealthy vaults.
- 90% of the fees collected are used to incentivize PAR AMM pools to encourage liquidity for PAR tokens.

The FeeDistributor module is responsible for collecting and distributing fees.



Safety Reserve

All vaults in the Mimo protocol are covered by insurance. The safety reserve comes into use when a vault that faces liquidation does not have enough collateral to pay for the entire outstanding debt. The safety reserve will cover the difference in those cases.

Liquidation will simply fail if the safety reserve can not cover it. Once enough fees have been

collected, liquidation can proceed. During this time, the safety reserve will take on the volatility risk of the collateral.

Incentivized Liquidity Pools

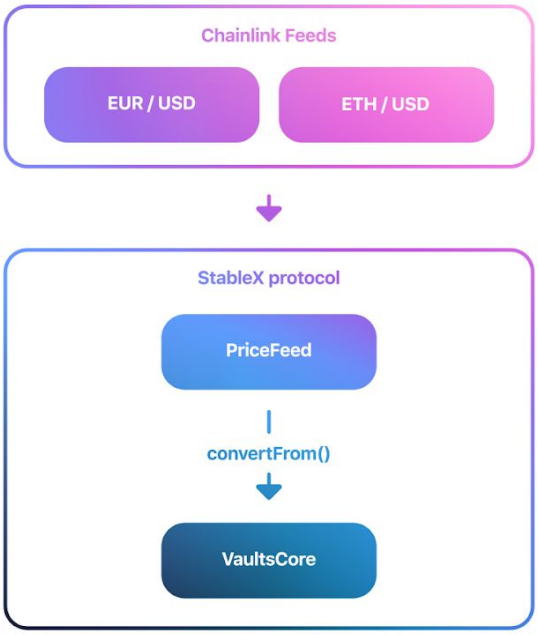
The Mimo protocol incentivizes its users to act in the best interest of the network as it grows. The protocol distributes a percentage of all fees collected from borrowers to PAR AMM pools' liquidity providers. This ensures that there's always sufficient liquidity for PAR tokens.

These AMM pools offer a savings product that earns optimized yield based on both the swap fees and the vault fees collected from borrowers.

Price Feed

The Mimo protocol requires up-to-date information about the Vaults' collateral assets' price to calculate the health factors of vaults. Real-time price data lets you find out if a vault is open for liquidation.

For this purpose, the Mimo protocol uses Chainlink's Price Reference Data feeds to get prices of assets in fiat (USD) and fiat exchange rates (EUR / USD).


Chainlink Feeds
EUR / USD
ETH / USD
StableX protocol
PriceFeed
convertFrom()
VaultsCore

Summary

In this paper, we've introduced the Mimo protocol.

Following a mainnet launch, PAR will progressively decentralize to a community governance model. Holders of the future governance token will be able to vote on-chain on the ongoing operations and upgrades to the Mimo protocol.

To get the latest project updates, please visit our website at https://mimo.capital.

Vision and Mission

Vision

To accelerate the world into the future of sound money, where people truly own their money and are empowered to make financial decisions safely and simply.

Mission

To be the safest way for people to access decentralized finance.

In 2020, it is still difficult for people to own their funds in their own hands. Your computing power is in your pocket; your photos are in your pocket, your personal data is yours, but your money still needs to be in a bank, which may or may not give you access to it when you need it.

At Mimo, we believe this isn't sound. We envision a world where people are free to make their financial decisions while still being protected from accidents. Today, the technology exists to offer more safety than hiding cash under your mattress, without relying on third-party institutions like a bank. The same technology allows people to get returns on their holdings and investments, still without any third-party intervention, because it is peer-to-peer, like the internet. This technology is none other than blockchain.

Our mission at Mimo is to be the safest way for you to access the blockchain. We are starting with a wallet that brings you advanced functionality without sacrificing simplicity and safety. We will then provide a bridge to connect with the current world so you can eventually skip the need for a traditional bank account altogether. We believe that decentralized finance is the answer to bringing people into a world of sound money, which is what Mimo is about.

Security Audit

The Mimo protocol has been audited to be secure by Quantstamp, the Y-Combinator backed leader in blockchain security.

Overall, the code is well-written, well-documented, and well-tested. There are neither high risk issues nor medium risk issues.

You may view the full Security Assessment Certificate.

About Quantstamp

To date, Quantstamp has protected $5B in digital asset risk from hackers and assisted dozens of blockchain projects globally through its white glove security assessment services. As an evangelist of the blockchain ecosystem, Quantstamp assists core infrastructure projects and leading community initiatives such as the Ethereum Community Fund to expedite the adoption of blockchain technology.

Glossary

- **Automated Market Maker:** Smart contract with a price-adjustment model in which an asset's spot price deterministically responds to market forces and market participants on either side of the market trade with the AMM rather than with each other.
- **Borrow rate:** The interest rate paid over time by borrowers (e.g., 2%.) Each collateral has its own borrow rate.
- **Borrow fee:** The amount of fees accrued in a vault. Calculated based on the cumulative borrow rate and the amount and length of the loan.
- **Cumulative rate:** The time-adjusted cumulative borrow rate for collateral. Accounts for rate changes.
- **ERC20:** A technical standard used for smart contracts on the Ethereum blockchain for implementing tokens.
- **Health factor:** A number that represents the collateralization level of a vault. Vaults with a health factor less than 1 are open for liquidation.
- **Origination fee:** Fee applied when borrowing/opening a loan.
- **Vault Base Debt:** A number unique to each vault that partially represents a vault's debt.
- **Vault Total Debt:** The amount that borrowers will have to repay fully before the vault's collateral can be fully withdrawn.
- **Stablecoins:** Cryptocurrencies designed to minimize the effects of price volatility. They seek to function as a store of value and a unit of account.

References

[1] MakerDAO, *Dai*
https://makerdao.com/dai/