Ztabilize Protocol: Yellowpaper

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Abstract

This document presents the Ztabilize protocol, a decentralized system for the issuance and redemption of the stable token UVA. The mechanisms of minting, redemption, liquidation, and maintaining the peg of the UVA token are described. The goal of this protocol is to maintain the stability of UVA's value in relation to a reference asset using collateral and price oracles.

1 Introduction

Ztabilize is a decentralized protocol designed to create and maintain a stable token called UVA. The protocol leverages collateral and price oracles to ensure that the value of UVA remains stable and close to a reference asset, such as the US Dollar (USD).

The Ztabilize protocol aims to provide users with a reliable flatcoin that can be used for a variety of financial activities, including trading, lending, and as a medium of exchange. By maintaining a stable value, UVA helps mitigate the volatility often associated with cryptocurrencies, making it a valuable tool for both individuals and businesses.

The primary components of the Ztabilize protocol include:

- **Minting**: The process by which users can create new UVA tokens by depositing collateral into the system.
- **Redemption**: The process by which users can exchange their UVA tokens back for collateral.
- **Liquidation**: The mechanism that ensures the system remains solvent by enforcing minimum collateralization ratios.
- **Maintaining the Peg**: Strategies and mechanisms used to keep the value of UVA stable relative to the reference asset.

The Ztabilize protocol is built on the principles of transparency, security, and decentralization. By utilizing smart contracts and decentralized oracles,

the protocol ensures that all processes are automated, secure, and resistant to tampering. Users can trust that their assets are managed fairly and transparently, without the need for intermediaries.

This document provides an in-depth look at the Ztabilize protocol, detailing the mechanisms and formulas used to achieve stability. Whether you are a developer, investor, or simply interested in the future of stablecoins, this yellowpaper will provide valuable insights into the innovative workings of Ztabilize.

2 Calculation of the UVA Index

The UVA (Unidad de Valor Adquisitivo) index is a critical component of the Ztabilize protocol, ensuring that collateral positions are adequately secured. The UVA index is updated daily and reflects the inflation in Argentina, allowing for adjustments to collateralization requirements based on current economic conditions.

2.1 Calculation of the CER

The Reference Stabilization Coefficient (CER) is a daily indicator calculated by the Central Bank of Argentina (BCRA) based on the monthly variation of the Consumer Price Index (IPC) published by the National Institute of Statistics and Censuses (INDEC). The CER methodology was established by Law 25.713. This indicator reflects the daily distribution of the monthly IPC variation.

The CER is a base 02/02/2002=1 index. From the 16th to the last day of each month, the CER is constructed based on the geometric mean rate calculated on the IPC variation of the previous month. During this period, the CER is updated according to the daily factor "Ft" determined as follows:

$$Ft = \sqrt[k]{\frac{IPC_{j-1}}{IPC_{j-2}}} \tag{1}$$

For the construction of the CER for the days between the first day of each month and the 15th, the geometric mean rate calculated on the IPC variation between the second and third month before the current month is used. During this period, the CER is updated according to the daily factor "Ft" determined as follows:

$$Ft = \sqrt[k]{\frac{IPC_{j-2}}{IPC_{j-3}}} \tag{2}$$

Where:

- Ft = Daily adjustment factor of the CER.
- k = Number of days in the current month.
- j = Current month.

- IPC_{j-1} = IPC value in the month preceding the CER determination.
- IPC_{j-2} = IPC value two months before the CER determination.
- IPC_{j-3} = IPC value three months before the CER determination.

Thus, the CER is constructed using the following calculation:

$$CER_t = Ft \times CER_{t-1} \tag{3}$$

2.2 Calculation of the UVA Index

The initial value of the UVA on 31/03/2016 represents the cost of constructing one-thousandth of a square meter of housing at that date. This value was obtained from the simple average of the latest available cost data for housing construction in various cities. The value of the UVA in each period is given by:

$$UVA_t = \$14.05 \times \frac{CER_{t-1}}{CER_0} \tag{4}$$

Where:

- \$14.05 = Initial value of the UVA on 31/03/2016.
- CER_0 = CER value on 31/03/2016.
- CER_{t-1} = CER value on the banking day preceding the date of the calculated UVA.

3 Minting of UVA

The minting process allows users to create new UVA tokens by depositing collateral into the Collateral Hub (CHUB).

3.1 Minting Process

- The user deposits an amount of collateral into the CHUB.
- The amount of UVA tokens that can be minted is calculated based on the value of the deposited collateral and the minting fees.
- The CHUB mints the UVA tokens to the user, applying the relevant minting fees.

3.2 Formula for Minting UVA

$$\text{UVA}_{\text{minted}} = \left(\frac{\text{collateral}_{\text{deposited}} \times \text{price}_{\text{collateral}}}{\text{price}_{\text{peg}}} \right) \times \left(1 - \frac{\text{minting fee}}{100} \right) \tag{5}$$

3.3 Minting Example

- **Collateral**: USDT (1 USDT = 1 USD)
- **Amount of collateral deposited**: 1000 USDT
- **Collateralization ratio**: 1:1 (100%)
- **Minting fee**: 1%

Calculation

$$\text{collateral value} = 1000\,\text{USDT} \times 1\,\frac{\text{USD}}{\text{USDT}} = 1000\,\text{USD}$$

$$\text{UVA}_{\text{minted, without fees}} = \frac{1000\,\text{USD}}{1\,\frac{\text{USD}}{\text{UVA}}} = 1000\,\text{UVA}$$

$$\text{UVA}_{\text{minted}} = 1000\,\text{UVA} \times \left(1 - \frac{1}{100}\right) = 1000\,\text{UVA} \times 0.99 = 990\,\text{UVA}$$

Thus, by depositing 1000 USDT as collateral, the user can mint 990 UVA tokens after applying a 1% minting fee.

4 Redemption of UVA

The redemption process allows users to exchange their UVA tokens for collateral.

4.1 Redemption Process

- The user sends UVA tokens to the CHUB.
- The amount of collateral to be returned to the user is calculated based on the amount of UVA tokens sent and the redemption fees.
- The CHUB returns the collateral to the user, applying the relevant redemption fees.

4.2 Formula for Redeeming Collateral

$$\text{collateral}_{\text{returned}} = \left(\frac{\text{UVA}_{\text{redeemed}} \times \text{price}_{\text{peg}}}{\text{price}_{\text{collateral}}}\right) \times \left(1 - \frac{\text{redemption fee}}{100}\right) \quad (6)$$

4.3 Redemption Example

- **Collateral**: USDT (1 USDT = 1 USD)
- **Amount of UVA redeemed**: 1000 UVA
- **Collateralization ratio**: 1:1 (100%)
- **Redemption fee**: 1%

Calculation

$$\text{UVA value} = 1000\,\text{UVA} \times 1\,\frac{\text{USD}}{\text{UVA}} = 1000\,\text{USD}$$

$$\text{collateral}_{\text{returned, without fees}} = \frac{1000\,\text{USD}}{1\,\frac{\text{USD}}{\text{USDT}}} = 1000\,\text{USDT}$$

$$\text{collateral}_{\text{returned}} = 1000\,\text{USDT} \times \left(1 - \frac{1}{100}\right) = 1000\,\text{USDT} \times 0.99 = 990\,\text{USDT}$$

Thus, by redeeming 1000 UVA tokens, the user receives 990 USDT after applying a 1% redemption fee.

5 Liquidation

Liquidation occurs when a user's position does not meet the minimum collateralization requirements, protecting the system from the risk of insolvency.

5.1 Liquidation Process

- Users' positions are monitored to ensure they maintain the minimum collateralization ratio.
- If a position falls below the required collateralization ratio, liquidation is triggered.
- The user's collateral is sold to cover the UVA debt, and any excess is returned to the user.

5.2 Formula for Collateralization Ratio

$$\text{collateralization ratio} = \frac{\text{collateral value}}{\text{UVA}_{\text{minted}} \times \text{price}_{\text{peg}}} \tag{7}$$

5.3 Liquidation Example

- **Collateral**: USDT (1 USDT = 1 USD)
- **Initial collateral amount**: 1500 USDT
- **Amount of UVA minted**: 1000 UVA
- **UVA price**: 1 USD
- **Minimum collateralization ratio**: 1.2 (120%)

Initial Calculation

$$\text{collateral value} = 1500\,\text{USDT} \times 1\,\frac{\text{USD}}{\text{USDT}} = 1500\,\text{USD}$$

$$\text{collateralization ratio} = \frac{1500\,\text{USD}}{1000\,\text{UVA} \times 1\,\frac{\text{USD}}{\text{UVA}}} = 1.5$$

Scenario of Liquidation If the price of UVA rises and the collateral value remains the same, the collateralization ratio can decrease. Suppose the price of UVA rises to 1.5 USD:

$$\text{UVA value} = 1000\,\text{UVA} \times 1.5\,\frac{\text{USD}}{\text{UVA}} = 1500\,\text{USD}$$

$$\text{new collateralization ratio} = \frac{1500\,\text{USD}}{1500\,\text{USD}} = 1.0$$

Since the new collateralization ratio (1.0) is below the minimum required ratio (1.2), the user's position will be liquidated. The collateral will be sold to cover the UVA debt, and any excess will be returned to the user.

6 Maintaining the Peg

Maintaining the peg is crucial to ensure that the value of UVA remains close to the reference asset.

6.1 Mechanisms for Maintaining the Peg

- Use of price oracles to obtain the current value of the collateral and the reference price.
- Dynamic adjustment of minting and redemption fees based on the deviation from the peg.
- Implementation of a collateralization ratio that adjusts according to market conditions.

6.2 Calculation of Peg Deviation

$$\text{peg deviation} = \frac{\text{price}_{\text{UVA}} - \text{price}_{\text{peg}}}{\text{price}_{\text{peg}}} \tag{8}$$

6.3 Adjustment of Fees

$$\text{adjusted fee} = \text{base fee} \times (1 + \text{adjustment factor} \times \text{peg deviation}) \tag{9}$$

7 Oracle

7.1 Introduction

In Ztabilize, the UVA (Unidad de Valor Adquisitivo) index is a crucial component that ensures collateral positions are adequately secured. The UVA index is updated daily and reflects inflation in Argentina, allowing for adjustments to collateralization requirements based on current economic conditions.

7.2 Oracle Functioning

The UVA index is obtained from the official website of the Central Bank of Argentina (BCRA), which publishes a file with the monthly UVA index. Our API reads this file, parses it, and exposes it publicly. A Chainlink oracle accesses this API, retrieves the UVA index data, and publishes it on the blockchain. Our controller can read this index to determine if liquidation is necessary, adjust collateral requirements, or allow users to mint more UVA.

7.3 Detailed Process

1. **Obtaining the UVA Index**:
   - The Central Bank of Argentina publishes the UVA index daily on its official website.
   - Our API accesses this information, reads the relevant file, and extracts the UVA index value.
2. **Public Exposure of the UVA Index**:
   - The API exposes the UVA index on a public and secure endpoint.
   - The Chainlink oracle regularly queries this endpoint to obtain the updated UVA index value.
3. **Publication on Blockchain**:
   - The Chainlink oracle publishes the UVA index on the blockchain, ensuring the availability and transparency of this information for all system participants.
4. **Controller Reading**:
   - The Ztabilize controller reads the UVA index from the blockchain.
   - Based on the index value, the controller adjusts the collateralization requirements of user positions.
   - If the UVA index increases, users must increase their USDT collateral to avoid liquidation.
   - If the UVA index decreases, users can mint more UVA with the same amount of collateral.

7.4 Collateralization Adjustment Example

Assumptions:

- **Initial UVA Index**: 100
- **Initial Collateral**: 1000 USDT
- **Initial UVA Minted**: 1000 UVA
- **Initial Collateralization Ratio**: 1:1

Case 1: Increase in UVA Index

- **New UVA Index**: 110 (10% increase)
- **New Collateral Requirement**: 1100 USDT
- **Required Action**: The user must add an additional 100 USDT to meet the new collateral requirement and avoid liquidation.

$$\text{Required collateral} = \text{UVA minted} \times \text{New collateralization ratio}$$

$$\text{Required collateral} = 1000\,\text{UVA} \times 1.1 = 1100\,\text{USDT}$$

Case 2: Decrease in UVA Index

- **New UVA Index**: 90 (10% decrease)
- **New Collateral Requirement**: 900 USDT
- **Allowed Action**: The user can mint an additional 100 UVA while maintaining the same collateral, as the index has decreased.

$$\text{Required collateral} = \text{UVA minted} \times \text{New collateralization ratio}$$

$$\text{Required collateral} = 1000\,\text{UVA} \times 0.9 = 900\,\text{USDT}$$

7.5 Benefits of the Oracle System

- **Transparency**: Publishing the UVA index on the blockchain ensures that all participants can verify and trust the data used to adjust collateral requirements.
- **Adaptability**: The system automatically adjusts to current economic conditions, protecting both users and the protocol.
- **Security**: Using Chainlink, a decentralized and secure oracle, minimizes the risk of data manipulation and ensures data integrity.

8 Conclusion

The Ztabilize protocol provides a robust mechanism for the issuance and redemption of stable tokens UVA, using collateral and price oracles to maintain system stability. Through well-defined processes and dynamic adjustments, the protocol ensures that the value of UVA remains stable and adequately backed.