Rugsafe: A Protocol for Protecting Digital Assets from Rug Pulls

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Abstract

Rugsafe introduces a novel protocol designed to mitigate the risks associated with rug pulls in decentralized finance (DeFi). By leveraging cryptographic primitives and economic incentives, Rugsafe provides a framework that ensures the security and recoverability of assets when fraudulent activities are detected. The protocol is built around the concept of vaults for rugged tokens, issuance of anticoin tokens, and an incentive mechanism that penalizes and rewards users based on their interaction with the system. Rugsafe integrates seamlessly with existing DeFi platforms, offering an additional layer of security without compromising the decentralization principles.

1 Overview

The Rugsafe protocol enables users who hold rugged tokens, denoted as C_r, to deposit these tokens into a specialized vault V_c and receive an equal amount of anticoin tokens, C_a, which are pegged to the inverse price movement of C_r.

1.1 Vault Creation and Anticoin Issuance

When a vault V_c is created for a rugged token C_r, users can deposit C_r into this vault. Upon deposit, the protocol mints an equal amount of C_a, which is credited to the user's balance.

$$C_a = C_r \tag{1}$$

The vaults are held in a central vault registry, ensuring that all interactions with rugged tokens are tracked and managed within the system.

1.2 Withdrawal Penalty Mechanism

If a user decides to withdraw their original rugged tokens C_r by depositing back their C_a, a penalty is incurred. A portion of the C_a tokens are deducted from the

user's balance, and these penalized tokens are distributed among the remaining C_a holders.

$$C_{r,\text{withdrawn}} = C_{r,\text{deposited}} - P(C_a) \tag{2}$$

Where $P(C_a)$ represents the penalty, which scales according to the amount of C_r originally deposited. The penalty mechanism incentivizes holding C_a longer, as the remaining holders benefit from these penalties.

1.3 Anticoin Pricing and Pegging Mechanism

At the time of vault creation, the protocol records the current price of the underlying rugged token C_r. This price is used as a reference for all future transactions involving C_a.

$$\text{Price}_{C_a} \propto \frac{1}{\text{Price}_{C_r}} \tag{3}$$

As the price of C_r fluctuates, the value of C_a adjusts inversely, similar to an algorithmic stablecoin mechanism. This ensures that C_a holders are protected against the devaluation of C_r.
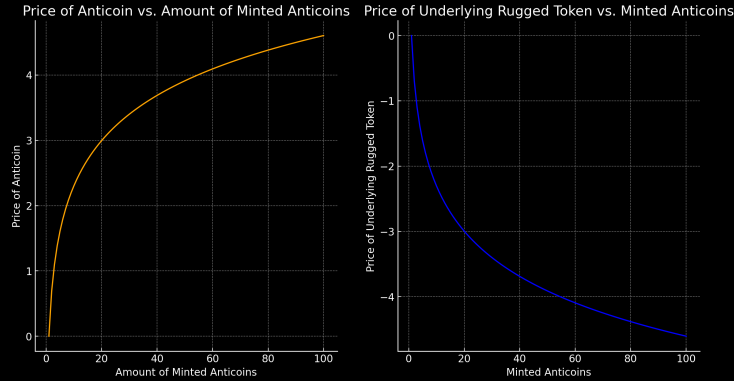

Figure 1: The inverse logarithmic relationship between the price of the underlying rugged token C_r and the amount of minted anticoins C_a. As the price of C_r decreases, the amount of minted C_a increases, providing stability and protection for holders.

1.4 User Commitment and Signal to the Ecosystem

Depositing C_r into a vault V_c and receiving C_a signals the user's belief that C_r is a rugged token. To further reinforce this belief, users can burn their C_a tokens, effectively removing them from circulation and indicating their strong commitment to the protocol's mission.

$$\text{Signal} = \text{Burn}(C_a) \tag{4}$$

This burning mechanism enhances the credibility of the user's claim that C_r is a rugged token and provides additional confidence to other participants in the ecosystem.

1.5   Opportunities for New Developments

The Rugsafe protocol's structure opens up opportunities for developers to build applications that cater to the needs of rug pull victims. By establishing a market for anticoin tokens C_a, new financial products and services can be developed to support users who have suffered losses from rug pulls.

1.6   Whale Penalty Mechanism

To prevent large holders (whales) from gaming the system, the penalty for withdrawing C_r scales with the amount of C_a held. Inspired by quadratic voting schemes, the penalty increases progressively as the whale's holdings increase, ensuring fairness and preventing manipulation.

$$P(C_a) \propto (\text{Holdings})^{\lambda} \tag{5}$$

Where $\lambda > 1$ is a scaling factor that ensures the penalty increases non-linearly with the amount of C_a held. This scaling penalty ensures that the system remains equitable and prevents disproportionate influence by large holders.

2   Closing Remarks

Rugsafe presents a robust mathematical framework designed to protect against rug pulls in the DeFi space. By combining vault mechanisms, anticoin issuance, and incentive structures, it ensures a secure environment for digital asset management. The protocol's design not only protects users but also opens up new avenues for development and innovation in the DeFi ecosystem.