Revnets

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Abstract

Smart contracts have enabled new models for organization and governance, but have in some ways failed to deliver on the promise of truly decentralized coordination. Among other causes, this is often due to the challenge of bootstrapping an organization while creating a product. The centralized nature of this process often leaves the founding team or core developers with little incentive to distribute power by the time a community has been formed. This leaves both parties worse-off: founders must contend with the day-to-day overhead of running a DAO or a governance system which has little to do with their end product, and participants must contend with the risk of misalignment, rugpulls, and scams. **Revnets** are a new model for creating, scaling, and operating decentralized networks according to pre-defined economic incentives which align participants and remove the need for governance, freeing founders from day-to-day management and making rugpulls impossible.

1 Mechanism

Each Revnet accepts a specific currency, chosen when the network is created. Anyone can pay a Revnet with its currency to issue the Revnet's tokens, or they can destroy tokens to reclaim currency from the Revnet. For illustrative purposes, this section describes a network which accepts ETH and issues a $token.[1]

Under the Revnet's initial conditions, payers receive 1 $token per ETH. $token issuance evolves over generations which last a pre-defined length of time (1 day, for example). Three mechanisms determine how $tokens behave:

- The **Price Ceiling** is the ETH price to create new $tokens, expanding the $token supply. The price ceiling increases at a fixed rate each generation, making network expansion more expensive over time.
- The **Price Floor** is the ETH value that can be reclaimed from the network by destroying $tokens, contracting the $token supply. The price floor increases dynamically as the network contracts or expands.
- The **Price Window**. Liquidity can be added to a $token↔ETH market[2] at any time. While the $token's market price is between the price ceiling and price floor, $tokens are purchased and sold on the market. Otherwise, purchases and sales are fulfilled at the price ceiling or price floor, expanding or contracting the $token supply in response to demand.

In practice, Revnets issue $tokens at the price ceiling until a $token↔ETH market forms. From that point onwards, $tokens are purchased and sold on the market until the price reaches the price ceiling or price floor, at which point the $token supply will expand or contract to meet market demand. This stabilizes token prices, minimizing risk for participants.

When somebody pays a Revnet, they have the option to immediately sell or destroy their tokens for a partial refund. Revnets which route ongoing payments from customers to the network allow buyers to choose between receiving a rebate for part of their purchase, or to participate in the future growth of the network.

[1] In practice, Revnets can accept and denominate prices in other currencies. For a clearer understanding of USD-based accounting, see Section 3.1.

[2] Our initial implementation uses a Uniswap v3 liquidity pool.

Revnets can specify a **boost** which routes a percentage of purchased $tokens to a specific address called the **boost operator** for a pre-determined length of time after the network's creation. While the boost is active, the boost operator can route percentages of it to the addresses and Revnets of their choosing, but only up to the pre-defined boost percentage (the operator cannot increase the percentage of tokens being routed to the boost). Revnets also have the option to pre-mint an arbitrary number of $tokens to the boost operator upon the network's creation. The boost operator could be a core team or developer multisig, but it could also be a staking rewards contract, an airdrop stockpile, or something else.

Once a Revnet is deployed, all of its parameters are locked in place.

1.1 Price Ceiling

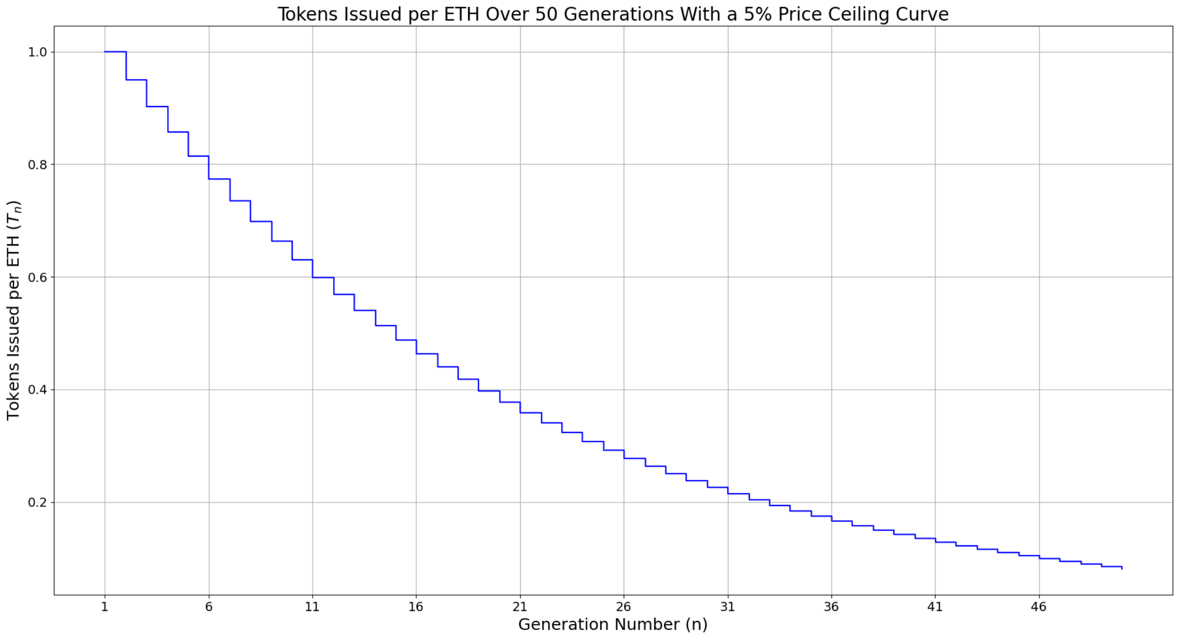

Figure 1: This figure shows how T_n (the number of $tokens issued per ETH in the n^{th} generation) varies across 50 generations with a 5% price ceiling curve ($r_c = 0.05$). Note that T_n decreases rapidly at first, then more gradually as T_n tends towards 0 over many generations.

The cost to expand the $token supply increases over time. This is done by reducing the number of $tokens issued per ETH with each passing generation. This reduction is dictated by a price ceiling function, which compounds at a rate r_c set by the network's creator. The price ceiling function[3] can be expressed as:

$$T_n = T_1 \cdot (1 - r_c)^{(n-1)} \tag{1}$$

where:

- T_n is the number of tokens issued per ETH in the n^{th} generation,
- T_1 is the number of tokens issued per ETH in the first generation,
- r_c is the price ceiling curve, or rate of decrease per generation (expressed as a decimal), and
- n is the generation number, which increments sequentially starting from 1.

[3] Also see the interactive price ceiling function on Desmos.

Since Revnets have a T_1 (initial price) of 1 \$token per ETH, this can be simplified to:

$$T_n = (1 - r_c)^{(n-1)} \tag{2}$$

The price ceiling encourages participants to join the network early. The earlier a participant joins, the more \$tokens they receive for their ETH.

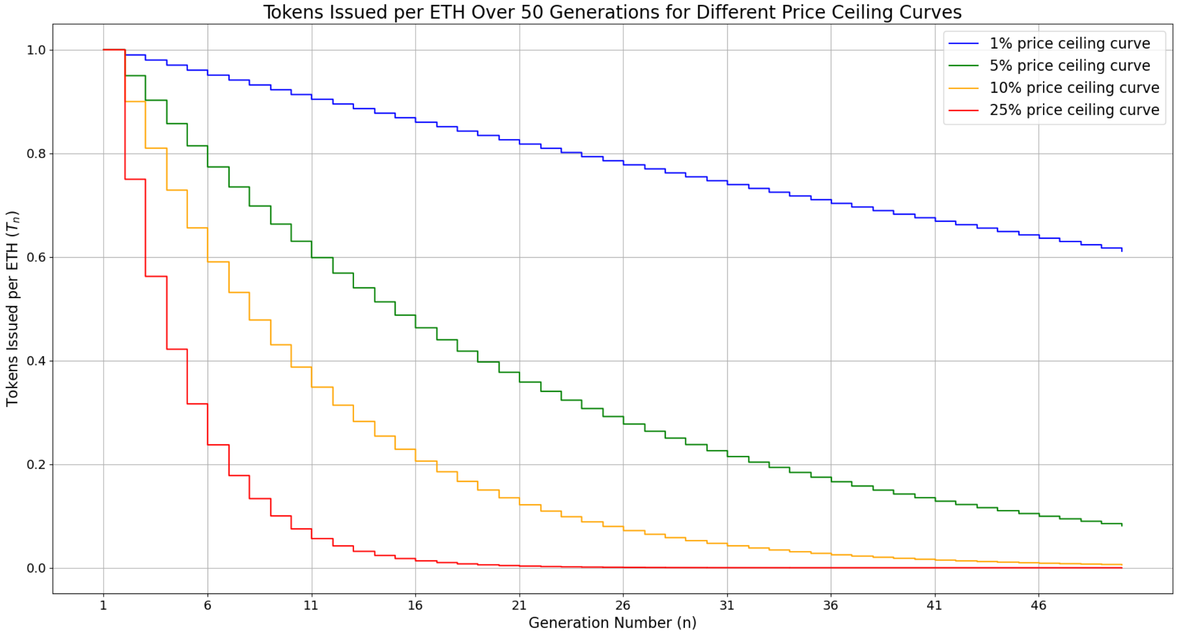

Figure 2: This figure shows how T_n varies over 50 generations with 1%, 5%, 10%, and 25% price ceiling curves ($r_c = 0.01, 0.05, 0.1, 0.25$). Note that for greater entry curves, T_n tends towards 0 more quickly.

1.2 Price Floor

Anyone can destroy their \$tokens to reclaim ETH from the network. The amount of ETH they can reclaim is determined by the price floor function, which is dynamically calculated based on a price floor curve r_f set by the network's creator, the total \$token supply, and the amount of ETH in the network.

The price floor function[4] can be expressed as:

$$V_r = \frac{V_t \cdot x}{s}\left((1 - r_f) + \frac{r_f \cdot x}{s}\right) \tag{3}$$

where:

- V_r is the amount of ETH which gets reclaimed,
- V_t is the total amount of ETH in the network,
- s is the total \$token supply,
- r_f is the price floor curve (expressed as a decimal), and
- x is the number of \$tokens being burned.

[4] Also see the interactive price floor function on Desmos.

Unless r_f is 0, this function ensures that as more $tokens are destroyed (i.e., the larger x is), the more ETH is reclaimed per token.[5] This means the first participants to destroy their $tokens get less ETH per $token than participants who destroy their $tokens later. This incentivizes participants to stay in the network longer than other participants in order to increase the amount of ETH they can reclaim.

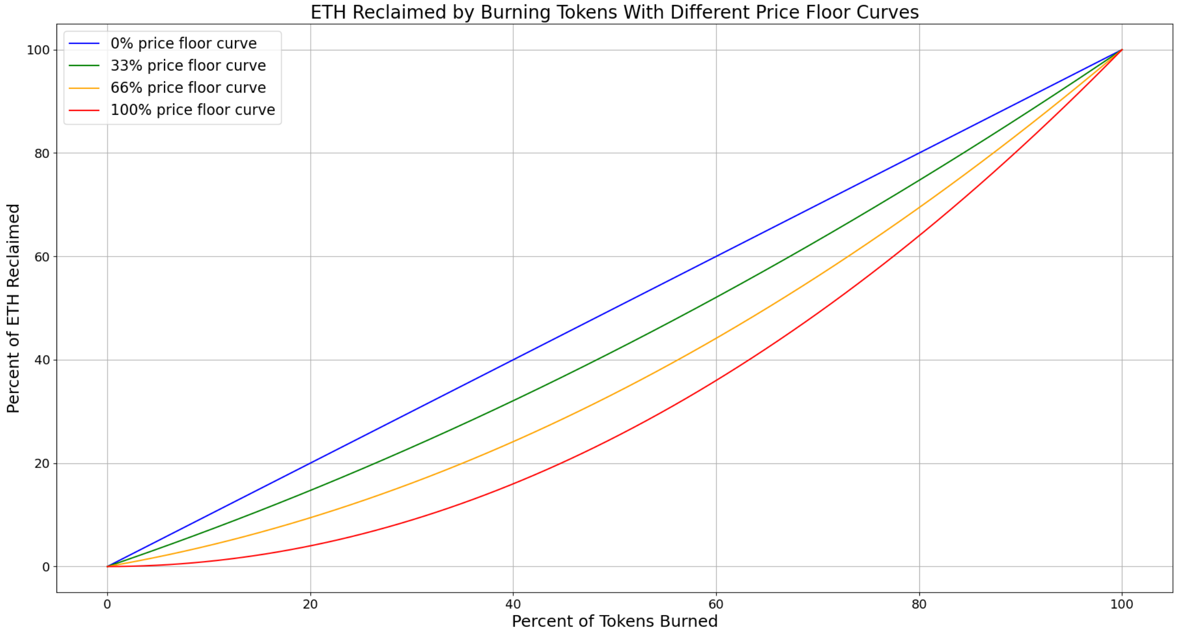

Figure 3: This figure shows price floor functions with price floor curves of 0%, 33%, 66%, and 100% ($r_f = 0, 0.33, 0.66, 1$). The x axis represents the percentage of the total $token supply being destroyed, and the y axis represents the percentage of the network's ETH which is reclaimed. Note that with a 0% price floor curve ($r_f = 0$), reclaim amounts are linear with respect to the number of tokens being destroyed—a network participant which destroys *e.g.* 10% of the total token supply can reclaim 10% of the network's ETH. The larger the price floor curve, the less ETH earlier reclaimers receive.

2 Applications

Revnets are particularly beneficial for applications which gain value from network effects, where the value of the service or product increases as more people participate. Revnets are most capable of accomplishing complex coordinated tasks while the boost is active and can be strategically deployed by the boost operator, placing an inherent limitation on the duration and scale of centrally coordinated efforts within a Revnet.

Revnets excel in scenarios where individual contributions, even when isolated, can contribute to the overall project. An anonymous individual can meaningfully contribute to an online encyclopedia or provide reviews for local businesses, making it feasible to coordinate hundreds or thousands of contributors to a project. Revnets are not well-suited to endeavors which require ongoing support from a centralized, hierarchical structure. For instance, a Revnet would struggle to compete with a large-scale manufacturing company or to orchestrate the construction of complex infrastructure projects.

2.1 Overcoming Existing Network Effects

Google Maps is popular, but comes with several downsides: it is proprietary, its API is expensive, it has limited offline support, and it lacks data privacy. OpenStreetMap, an open-source alternative, addresses

[5] If r_f is 0, each $token will yield the same amount of ETH when destroyed.

many (if not all) of these concerns, but lacks user-generated reviews and addresses labels. If OpenStreetMap or a project like it were to use a Revnet model with a price ceiling to reward early participants, it might build enough momentum to become viable and eventually compete with proprietary options.

Similarly, alternative social media platforms, such as Mastodon, and protocols like XMPP or Gemini could effectively generate early momentum as Revnets. These Revnets wouldn't necessarily have to monetize the primary product—in line with existing corporate models, they could derive revenue from advertising or the sale of premium services and products, such as web hosting or educational resources.

Currently, network effects are often overcome by using investor funding to subsidize a product, undercutting competition. Once these products secure a dominant market position, prices are increased, trapping users in a more expensive ecosystem. Revnets provide an alternative to this model, driving the cost per consumer down as the network achieves scale.

2.2 Governance

Revnet tokens adhere to the `ERC20Votes` standard, meaning they can be used in conjunction with governance tools like Snapshot and Governor Bravo for offchain or onchain token voting governance. Importantly, Revnet governance cannot control the allocation of the network's funds, as funds only leave the network according to the Revnet's pre-defined rules. This means Revnets are not subject to a wide range of governance attacks, hostile takeovers, and misaligned incentives which affect DAOs and other governance structures. Revnets are a strong fit for foundations and governing bodies which steward DeFi protocols, software projects, or any other coordinated effort from a distributed community. Revnet mechanisms encourage long-term orientation and distribute tokens accordingly, leading to favorable token distributions and governance outcomes.

2.3 Gated Networks

Ethereum wallets offer straightforward sign-in support for web applications, making Revnets a strong fit for token-gated content. A content creator can deploy a Revnet and allow token holders to access exclusive material, and can use token voting to guide the direction of future projects.

This can also be advantageous for token-gated platforms—since participants will have access to the growth of a network, they're more likely to participate in that growth. This is a major advantage for platforms which derive value from their users:

Category	**Examples**
Traditional social media.	Twitter, Instagram, and Facebook.
Forums and real-time chat services.	Reddit, Discord, and IRC.
Content creation and streaming services.	YouTube, Soundcloud, and Twitch.
Review and rating platforms.	Yelp, TripAdvisor, and Rotten Tomatoes.
News and Blogging platforms.	Medium, Mirror, and Tumblr.
Open or volunteer research and science.	Folding@home, BOINC, and LHC@home.
DeFi platforms which rely on user liquidity.	Uniswap, Compound, and Stargate.

All else being equal, users are more likely to put value into a platform which allows them to receive a portion of future growth over one which doesn't. Community ownership also prevents the platform from switching to a more extractive business model once it achieves scale, which is a frequent misalignment between users and platforms.

3 Contract Implementation

Revnets are implemented as Solidity smart contracts, and are intended for use on Ethereum and L2s. Revnets extend the Juicebox[6] protocol, leveraging its discount rate logic for price ceiling calculations, its redemption logic for price floor calculations, and its reserved rate logic for boost calculations.

[6] See the Juicebox Docs.

While a Revnet's token price is between its price ceiling and price floor, payments are routed to a Uniswap v3 liquidity pool by a Buyback Delegate[7] contract if possible. The Buyback Delegate contract routes incoming payments to the Uniswap pool if doing so would yield more tokens than a payment into the network would create.

Each Revnet is a Juicebox project, which is deployed, owned, and administered by a deployer contract. Our initial implementation includes a basic deployer, a deployer which adds pay delegates[8] to be called when the Revnet is paid, and a deployer which allows the Revnet to mint tiered ERC-721 NFTs when people pay it. These deployers are available on GitHub.

3.1 Accounting Types

Revnets have the option to use USD-based accounting based on a Chainlink ETH↔USD price oracle. With USD-based accounting, payers receive 1 network token per USD worth of ETH under the network's intial conditions. For instance, if the ETH price is 1,000 USD, paying 1 ETH into the network will yield 1,000 tokens. Revnets can manage accounting with any price feed available on the `JBPrices` contract.[9]

3.2 L2s

Revnets communities will be able to utilize a collection of contracts to route funds between and coordinate across Ethereum mainnet and Ethereum L2s. These contracts are currently under development and are available on GitHub.

[7] See the Buyback Delegate contracts on GitHub.

[8] See the delegate documentation.

[9] See the `JBPrices` documentation.