Exploring Ultraround Money: A Novel Automated Deflationary Asset Model

Circle -> Ultraround Money I CCTP -> Chaos Engine

Mar 7, 2024 / David Lim, cryptoAVtech, Dingo Bronson

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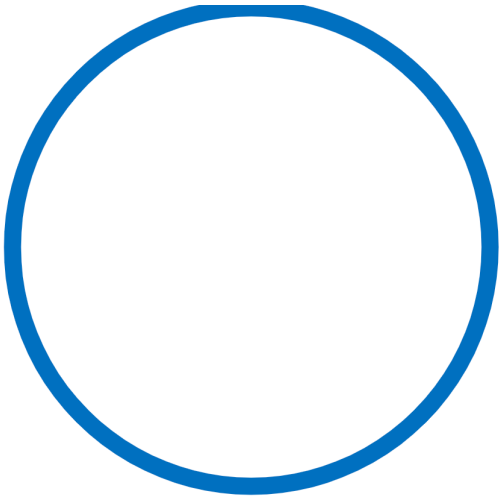


Figure 1: Burning Circle

Overview

In this paper, we present an in-depth exploration on **Ultraround Money**[1] — a pioneering project that redefines the concept of deflationary token systems through its implementation of dynamic burn mechanisms.

The defining idea behind Ultraround Money lies in its implementation of a dynamic burn protocol, the **Chaos Engine (CE).** Designed to react adaptively to Circle's market performance, the CE modulates its burn rate to ensure optimized responses for volatile market conditions.

Unlike conventional deflationary token systems, Circle does not rely on buy/sell taxes to fuel token burns. Instead, it harnesses rewards claimed through the Circular Burn Loop, generated via the Uniswap v3 LP. This is only possible due to the discounted transaction fees on Base, Coinbase's designated Ethereum Layer 2 that allow it to affordably facilitate and sustain tax-free burns.

These methodological innovations create an efficient and innovative model that distinctly sets Circle apart from previous deflationary systems. This analysis, aims to highlight the unique features of Circle's architecture and assess broader implications for the future of token models.

Deflationary Mechanisms

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Traditionally, deflationary tokens have relied on a transaction or buy/sell tax — typically ranging from 5-10% — to achieve two main goals:

- Covering expenses incurred from conducting token burns (Gas Fees)
- Funding the purchase of tokens (Buyback Initiatives)

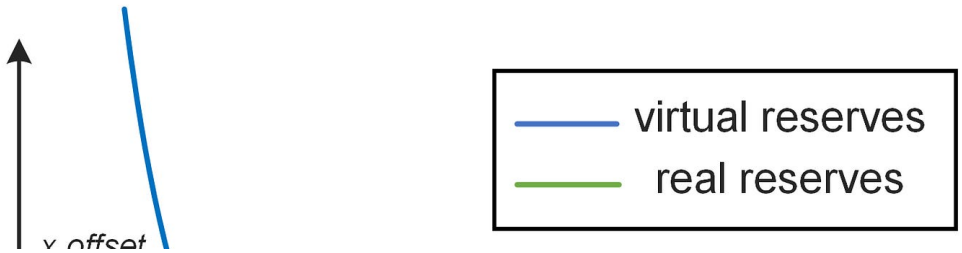
These strategies, while successful in diminishing the token supply, deliberately transfer the financial burden and constraints to market participants through the following mechanisms:

- **Expensive Transaction Costs**: A transaction or buy/sell tax, typically ranging from 5-10%, directly impacts the costs associated with purchasing, selling, or transferring tokens. This significant increase places a heavy financial burden directly on users, who lose 5-10% of their value per transaction before accounting for any additional expenses such as the chain's own gas fees.
- **Reduction in Market Volume/Liquidity**: Higher transaction costs also deter potential buyers and sellers from participating in the market, thus imposing heavy restrictions on trading. This results in decreased liquidity within the token's market (it is noteworthy that certain projects have attempted to mitigate this effect by reallocating a portion of the tax back into their liquidity pool, but not at the rate necessary to negate this entirely).

Circle addresses both of these issues directly through its implementation of the Circular Burn Loop (CBL).

Circular Burn Loop

In order to properly understand the Circular Burn Loop (CBL), it is essential to first review the operational dynamics of Uniswap v3.



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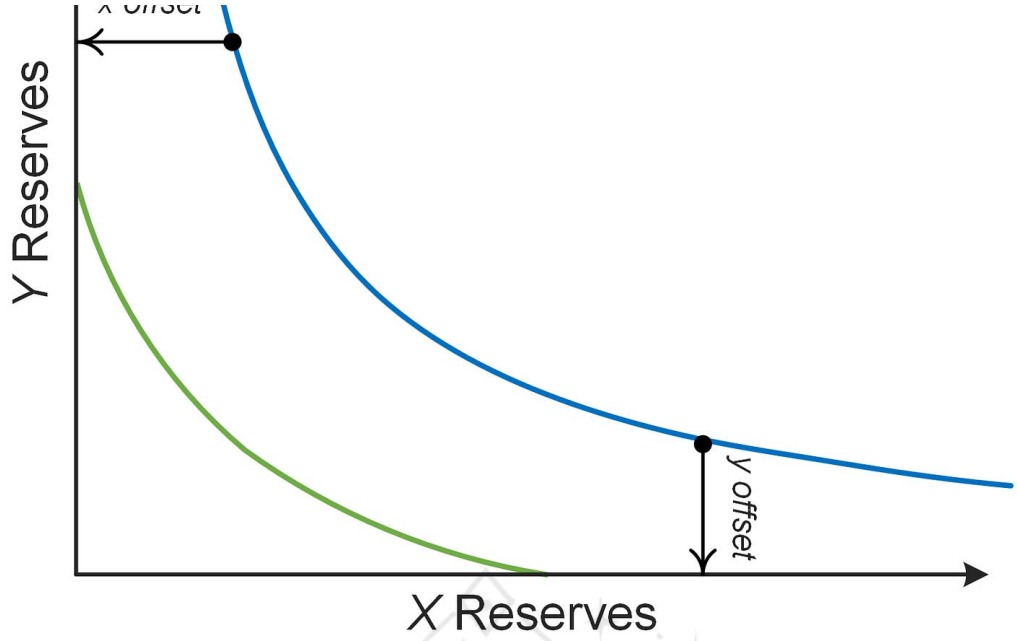
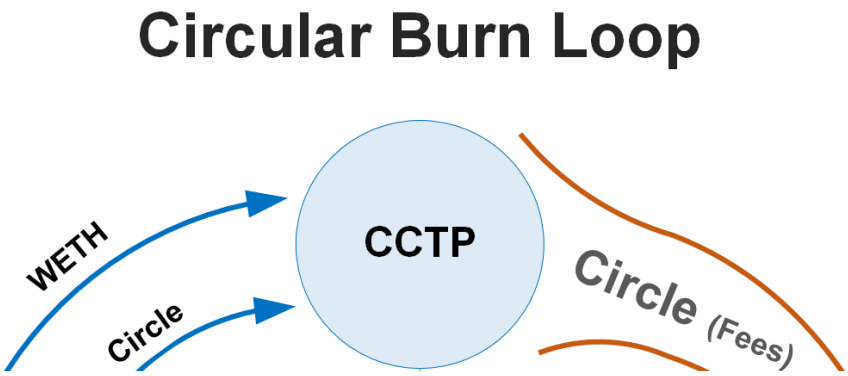


Figure 2: Uniswap v3 reserves in a single position

Uniswap v3's defining innovation was the introduction of concentrated liquidity[2]. Concentrated liquidity allows liquidity providers (LPs) to allocate their capital to specified price ranges within a trading pair, a notable departure from the Uniswap v2 framework, which necessitated capital distribution across the full price spectrum. In this evolved model, the capital allocation within a chosen price range is symbolized by a non-fungible token (NFT), representing the LP's specific position within that range.

Transaction fees within Uniswap v3 are generated exclusively from trades executed within their designated price bands, where active liquidity positions are maintained. The fees directly accrue to the LP's position, or more precisely, to the NFT that represents the banded liquidity position. The LPs can then claim these accumulated fees from their v3 NFTs at any time.



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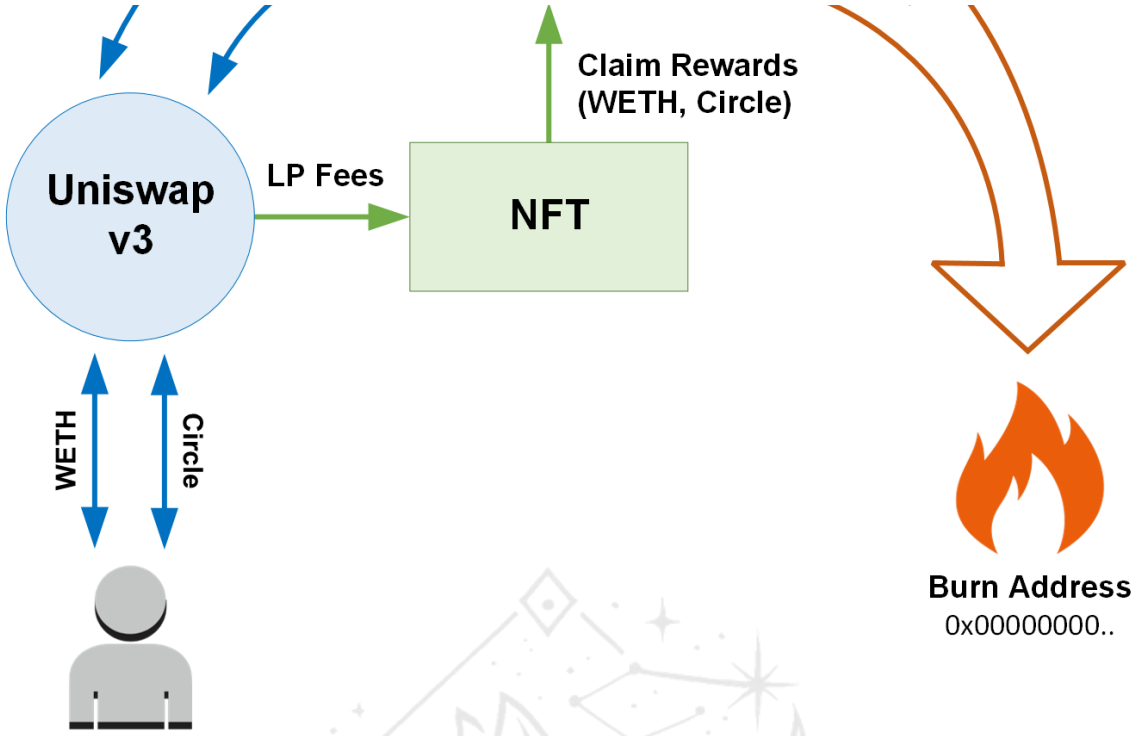


Figure 3: Illustration of the Circular Burn Loop

In the context of Circle, the Chaos Engine (CE) assumes the role of a liquidity provider. As depicted in Figure 3, the CE continues to swap both WETH & CIRCLE with the Uniswap v3. The primary distinction lies in how it manages the LP fees that accrue on the NFT. While the CE still claims rewards attributed to the NFT, 90% of the accrued WETH is recycled as liquidity within the position. The remaining 10% WETH is directed to a deployer wallet to cover gas fees, also known as the Chaos Controller (None of these funds ever leave the contract). All of the claimed CIRCLE tokens are immediately transferred to the burn address.

This is the underlying mechanism that distinguishes the Circular Burn Loop from previous burn designs, effectively executing a Dollar-Cost Averaged (DCA) reduction of the Circle supply.

Most importantly, this is what allows address the first issue presented by previous deflationary models: Expensive Transaction Costs. The Circular Burn Loop ultimately enables Circle to burn its own supply in a self-sustainable manner, ***without any transaction or buy/sell tax.***

The feasibility of this model is only possible due to the cost-efficiency of

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transaction fees on Base, the designated Ethereum Optimistic Layer 2 for Coinbase. These reduced transaction fees ensure that the financial returns from LP fees are substantial enough to sustain the burn process in its entirety. Circle's strategic utilization of Base's low transaction costs plays a pivotal role in the operational success and efficiency of the CBL.

Note that the Optimism stack also currently lacks a public mempool, which prevents the execution of more traditional MEV strategies.

LP Incentivization

One of the more surprising effects of the CBL are its effects in both incentivizing and increasing liquidity.

Historically, token emissions have served as the primary mechanism to motivate and incentivize liquidity provision within the DeFi ecosystem. By rewarding liquidity providers with tokens, protocols have coaxed millions of users to deposit assets into their pools, significantly building and bolstering longterm liquidity [3].

Circle's implementation of the CBL represents a novel departure from reliance on direct token issuance to stimulate liquidity.

As highlighted earlier, Uniswap v3 enables LPs to set the specified price ranges in which they allocate their liquidity. The CE actively participates by providing and recycling liquidity within a designated price band, including the reinvestment of WETH accrued from LP fees. This designated price band is also the same range in which the CE conducts exchanges of WETH and CIRCLE with the Uniswap v3.



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Figure 4: A collection of stacked LP positions

For external LPs, this means an opportunity to engage in a symbiotic relationship with the CE by aligning their liquidity contributions within the same price band. As they do so, they benefit from the CBL, accruing additional fees and thereby amplifying their LP fee earnings.

In essence, the CE leverages the reward structure of Uniswap v3 to indirectly disburse fees to LPs that are operating within its price band. This approach not only yields compelling Annual Percentage Rates (APR) for those LPs, but also addresses the second issue presented by previous deflationary models: Reduction in Market Participation/Liquidity. This ultimately means the CBL incentivizes ***sustained and bolstered liquidity for the Circle liquidity pool.***

It could also be argued that the transaction-based token burns serve as an additional incentive for liquidity provisioning from existing token holders. However, the extent to which this incentivizes participation becomes significantly impacted when we closely examine the dynamic burn mechanisms employed by the CE.

Chaos Engine

The main purpose of the Chaos Engine (CE) is to **dynamically regulate the rate of burn.** This means making active adjustments to Circle token's burn rate in real-time, ensuring it adapts responsively to market fluctuations.

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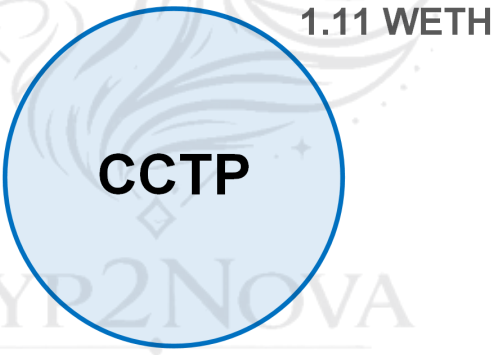
Though the exact details of the algorithm are yet to be released, we can understand its functionality based on the general principles outlined by the project. We will examine the key mechanisms that enable it to operate, using the information currently available from the project and smart contract.

CE Mechanisms

The CE system relies on three key mechanisms that allow it to operate dynamically.

Capacity

In order for the CE to be able to facilitate any increase in burn rate, it must first establish a reserve of funds (WETH) that can be utilized for this purpose. This reserve of funds is called capacity and is used to store the surplus WETH that is accrued from fees generated through the Circular Burn Loop. There are limitations to how much WETH can be stored at any given time, but unlike a fixed balance, this flexible capacity system is variable and phase-dependent.



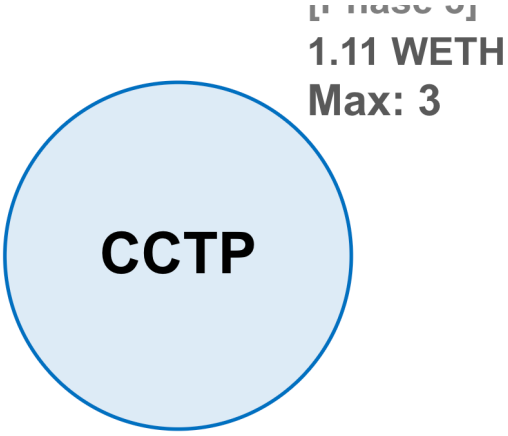
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Phase

The capacity parameter is ruled by phases, a progression system tied to the amount of supply burned that dictates the reserve capacity limit. Certain phases delineate specific increases in the WETH reserve capacity. For example, in Phase 1, a maximum capacity of 1 WETH is allocated to the reserve. Whereas in Phase 3, this amount is bumped up to 3 WETH (Phases will be revisited more in-depth later on in the paper).

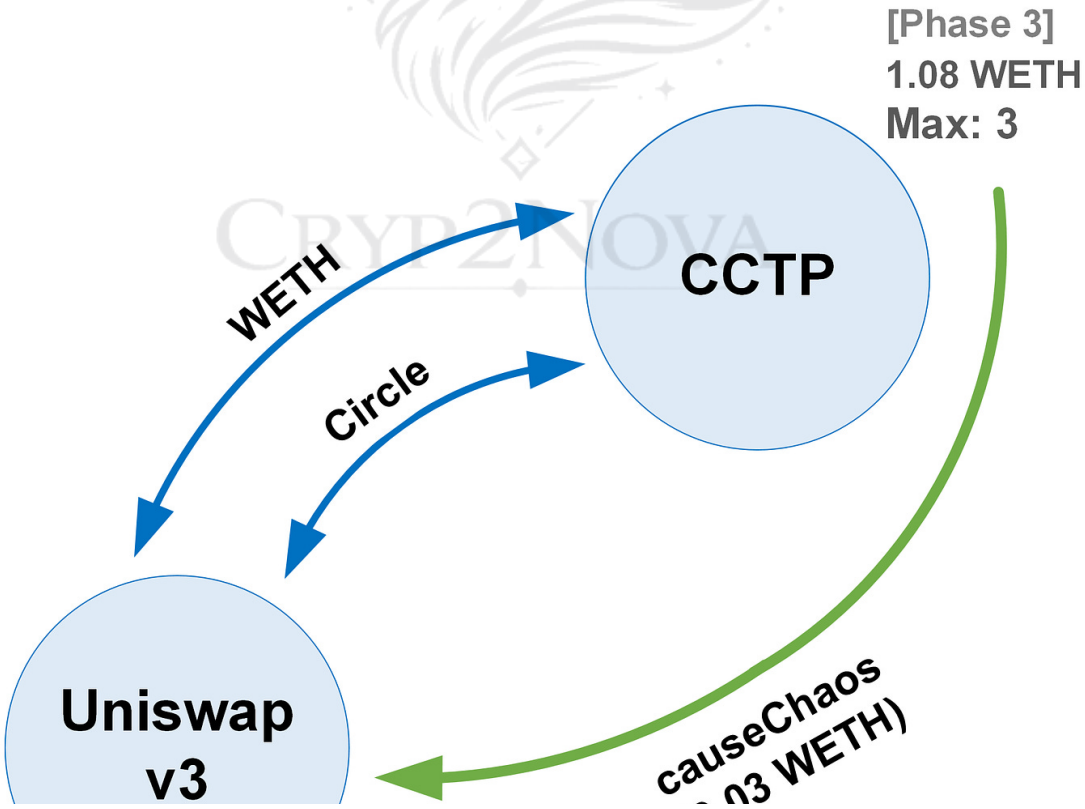
[Phase 3]

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‘causeChaos’

The most important feature of the Chaos Control Transfer Protocol (CE) is the 'causeChaos' function, which enables an increased burn rate of Circle tokens. When the function is called, the CE deploys the stored WETH reserves, accelerating the frequency of transactions with the Uniswap v3 pool. This in turn catalyzes the increased rate of fees generated by Circular Burn Loop (CBL), resulting in more Circle burned at a faster rate. Ultimately, the CE leverages 'causeChaos' to adjust the burn rate dynamically, applying deflationary pressure onto Circle's supply.



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Figure 5: 'causeChaos' function in action

Together, these forge a responsive framework that empowers the CE to adeptly manage the burn rate of the Circle supply.

Dynamic Burn Strategy

The primary objective of the CE is to maintain flexibility and adaptability in response to market conditions, tailoring its operations based on the performance of Circle. To achieve this, the protocol constantly monitors the Uniswap v3 pool ticks, a method that facilitates real-time tracking of price movements.

We will overview the theory behind the protocol's adaptive response mechanisms to to varying market conditions.

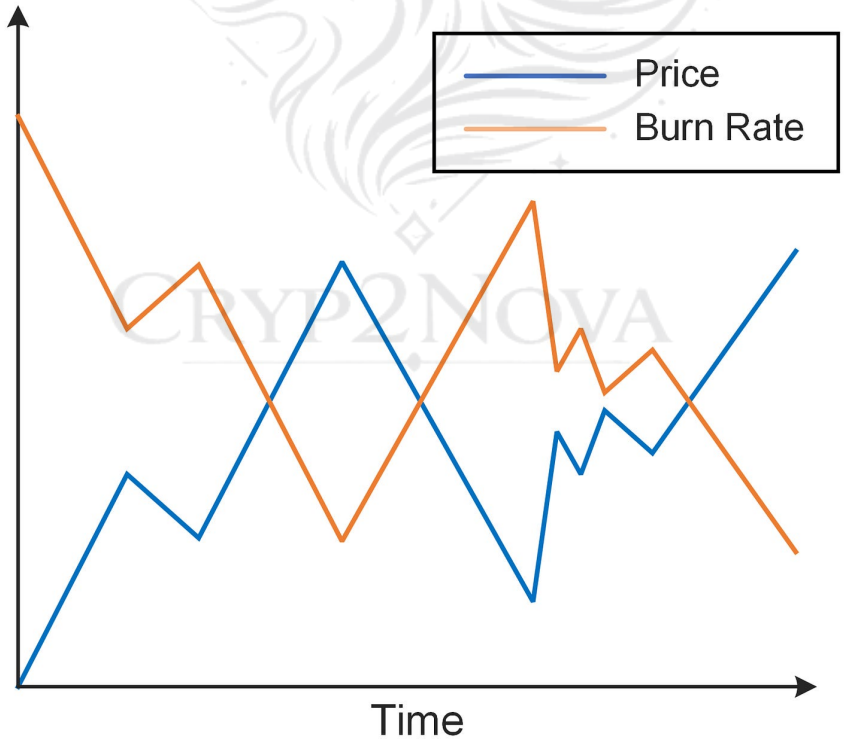


Figure 6: Price dynamics & Burn Rate correlation

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When the price of Circle is **rising**, the CE **slows down** the burn process. This period is characterized by a favorable market environment, prompting the CE to focus its efforts towards maximizing WETH accumulation (within its operational capacity). While transactions continue to facilitate a gradual burning of the token supply through DCA, the rate at which this occurs is significantly reduced.

Conversely, when the price of Circle is **falling**, the CE **speeds up** the burn process. This is achieved through the activation of the 'causeChaos' function, strategically deploying the accumulated WETH reserves to intensify the burning process. This strategic maneuver aims to exert a deflationary impact on the market by methodically reducing the supply of Circle, thereby finding an equilibrium with the loss of demand.

To compensate for the absence of specific algorithmic details, we can infer these metrics from available on-chain data.

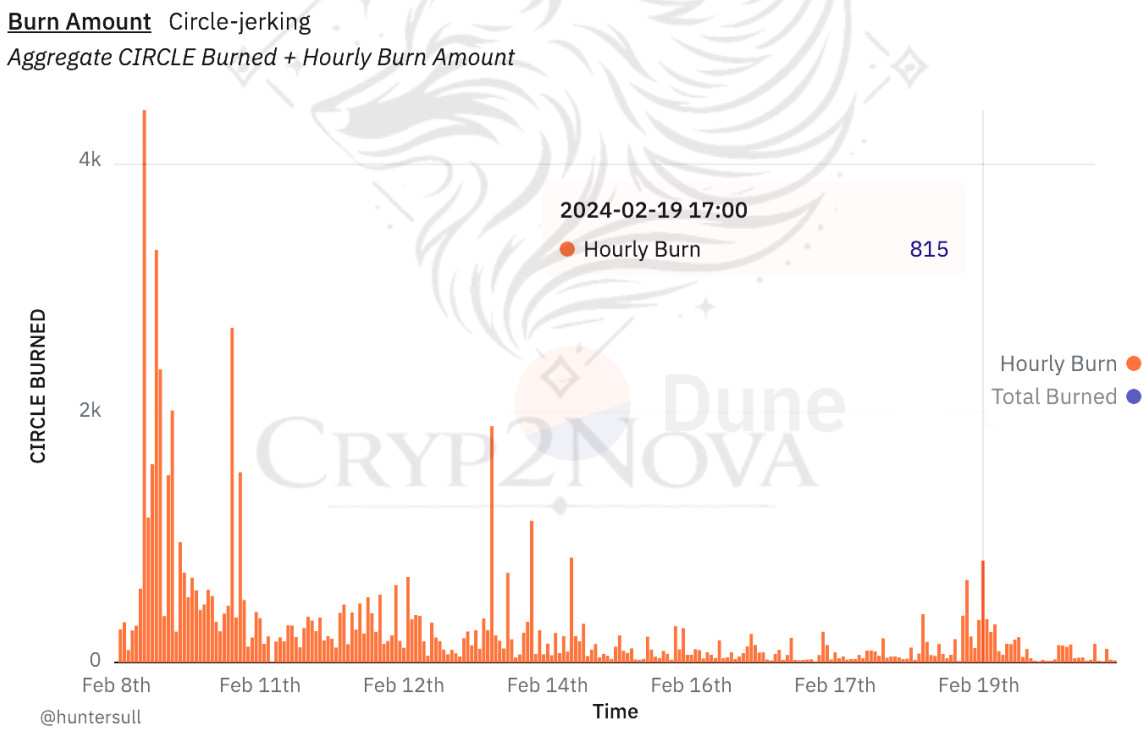


Figure 7: Aggregate CIRCLE burned & Hourly Burn Amount

On the 19th of February, Circle experienced a substantial price correction, resulting in a 75% price correction. This significant downturn triggered the 'causeChaos' function within the protocol, leading to a marked enhancement

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of the Circle token burn mechanism.

Upon reaching a pivotal market price point (around 25% of its previous peak), the CE token burn rate intensified significantly, increasing around 1000%. In parallel, the CE initiated a substantial rise in trading activity, conducting approximately 300% more transactions than its standard operational level. This orchestrated strategy led to an aggregate increase of 3000% in token burn rate, roughly a 30-fold enhancement relative to its peak level. This scenario illustrates the protocol's dynamic response to market conditions and its aggressive approach to force deflationary pressure.

To estimate a rough baseline burn rate from the CE, we can calculate the fees generated through daily trading volume. Note that this figure is not exact and is based on several assumptions for the sake of approximation.

Uniswap v3 introduces a variable fee structure that varies between 0.1% and 1% per transaction. Circle's liquidity pool fee is set to 1%. Adopting an average fee rate of 0.3%—a figure extrapolated from the percentage of all fee accrued—we build a rudimentary approximation of the fees accumulated from trading activities. It is critical to acknowledge that these fees are collected in both WETH and Circle pairs, so this percentage is a variable that represents the percentage of all fees that are paid in circle.

We can mathematically express this burn rate in an equation, which we will name the CE Burn Rate Model (CBRM).

Given:

- x represents the total trading volume in thousands of dollars,
- y denotes the price of the Circle token in dollars,
- F is the average transaction fee rate, here assumed to be 0.3% (or 0.003),
- B signifies the baseline tokens burned, calculated as a function of x, y, and F.

$$CBRM(x, y) = \frac{F \cdot x}{y} \cdot 10^4$$

Where:

- $x \in [1000, 8000]$, representing the trading volume range from \$1 million to \$8 million.
- $y \in [8, 300]$, encapsulating the token price range from \$8 to \$300.
- 10^4 is employed to normalize the data for graphical representation

Based on this model, we can visualize the relationship through a graphical

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representation.

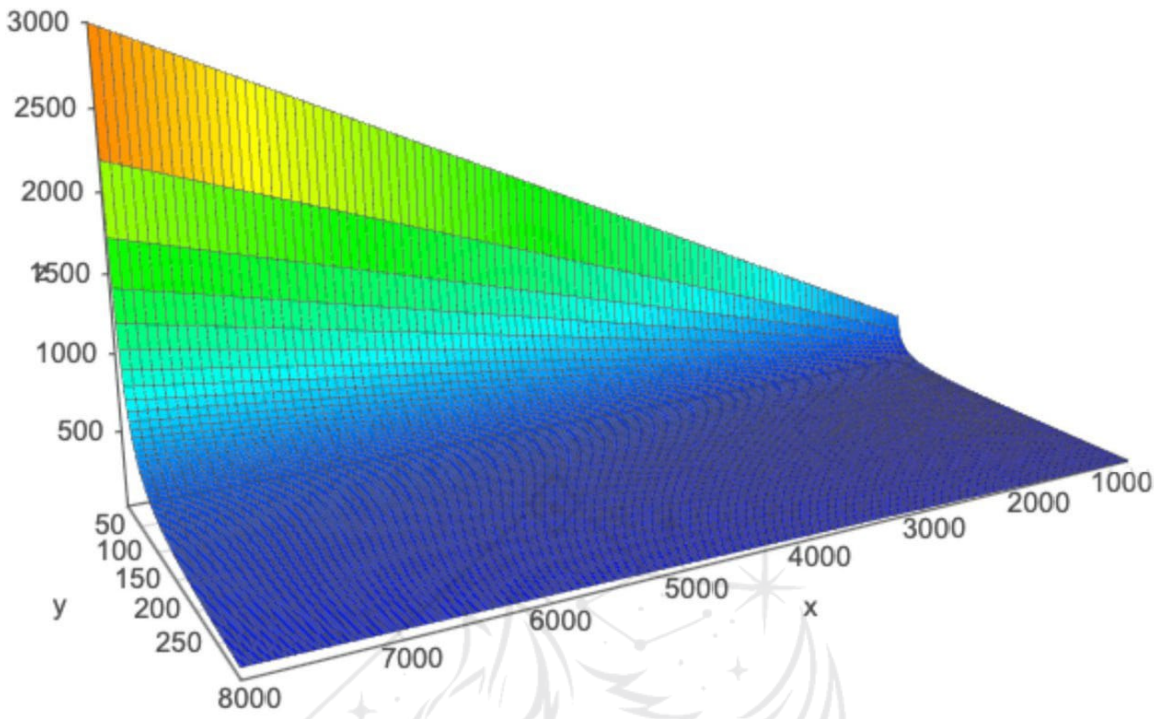


Figure 8: Estimated daily burn rate by total volume (x) and price (y)

It is crucial to emphasize again that the depicted CIRCLE token burn rates are calculated without considering the dynamic interventions of the CE to market conditions.

Deflationary Dynamics

Let us revisit the concept of deflation as articulated by Ludwig von Mises, a principal figure in the Austrian School of Economics:

“Deflation (or restriction, or contraction) signifies a diminution of the quantity of money (in the broader sense) which is not offset by a corresponding diminution of the demand for money (in the broader sense), so that an increase in the objective exchange value of money must occur (1981).”[4]

While Mises' definition doesn't precisely map onto our context, it provides a solid foundation for understanding the deflationary forces at play.

In the case of the Circle, deflationary pressure is exerted in two principal

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ways:

- Within the Uniswap v3 AMM Pool, where the mechanics of liquidity provision and price adjustment inherently apply a form of deflationary pressure onto the pool's assets.
- Across the entire supply of CIRCLE, where the CBL's systematic burning process is incrementally decreasing the total quantity of tokens in circulation.

We will examine in further detail these two vectors of deflationary pressure.

Deflationary Dynamics in AMM Pools

The CBL consistently exerts a dynamic and pronounced deflationary pressure on the Uniswap v3 AMM curve.

To properly illustrate the effects of dynamic burn, we will apply the infamous Constant Product formula that was first introduced in Uniswap v2, where LPs covered the entire price range of the pool. Although Uniswap v3 introduced additional layered and concentrated LP positions, we can still utilize the same formula to understand the contract's behavior between two adjacent ticks along the curve.

The Constant Product formula is given by:

$$x \times y = k$$

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Here, *x* and *y* represent the two assets in the liquidity pool. For this case, those assets would be CIRCLE and WETH respectively.

k however, denotes a constant value. This means that it does not change and functions to ensure the balance of the pool.

To walk-through how this works, let us consider a sample scenario:

$$x = 100 \text{ CIRCLE}$$
$$y = 1 \text{ WETH}$$

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The initial pool starts off with an initial supply of 100 CIRCLE to 1 WETH.

With these values, we can find the constant *k* and calculate the cost of 1 CIRCLE in terms of WETH:

$$100 \times 1 = 100$$
$$k = 100$$

$$100 \text{ CIRCLE} = 1 \text{ WETH}$$
$$1 \text{ CIRCLE} = .01 \text{ WETH}$$

Now, imagine that overnight, a whopping 50 Circle tokens have been burned from the pool by the CBL. To compensate for this reduction and keep the constant *k* intact, the pool must undergo a rebalancing, thereby affecting the value of *y*.

We can solve for this using simple algebra:

$$x = 50$$
$$50 \times y = 100$$
$$50 \times 2 = 100$$
$$y = 2$$

This means that the value has changed due to the CIRCLE burned from the supply. With these new values, we can now calculate the new ratio of assets in the pool and their subsequent value:

$$50 \text{ CIRCLE} = 2 \text{ WETH}$$
$$1 \text{ CIRCLE} = .04 \text{ WETH}$$

The final pool results in a ratio of 50 CIRCLE & 1 WETH, where 1 CIRCLE is approximately equal to 0.04 WETH. This is a 400% increase in CIRCLE's WETH value from a 50% reduction on one side of the pool.

This demonstrates that as the supply of CIRCLE is systematically burned

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from the pool, CIRCLE is continually pushed higher up the curve. Note that the current price at any given time does not always reflect the movement up the curve, but is continuously supported by it.

To calculate this more accurately, we can utilize a Dynamic Burn-Adjusted Constant Product Formula:

Given:

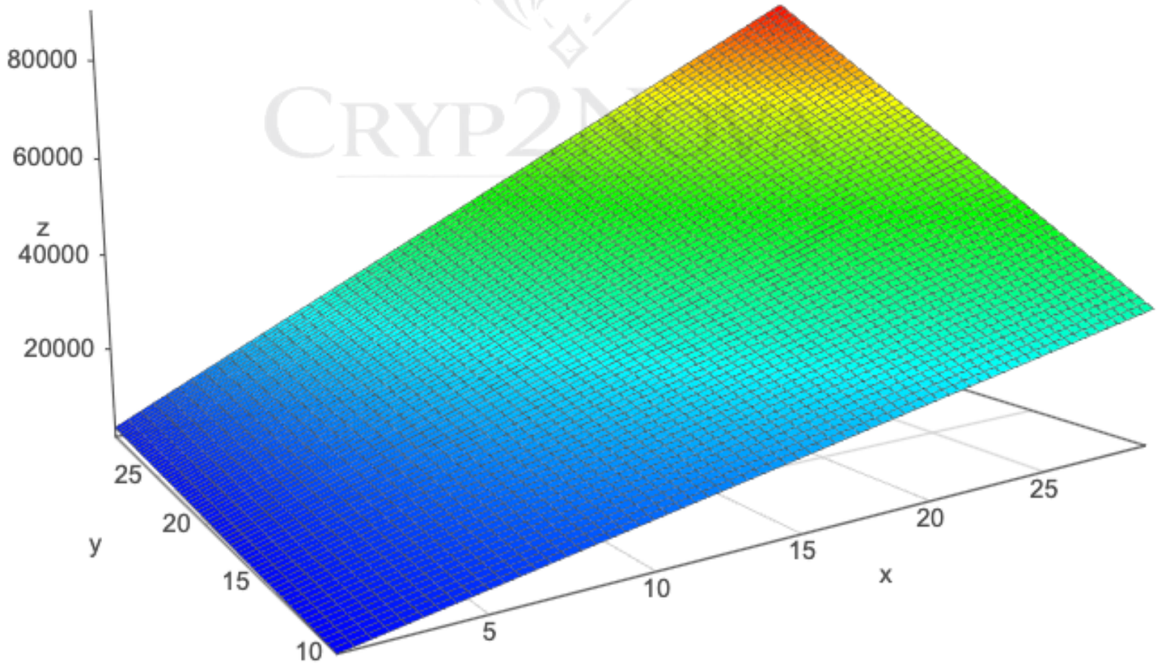
- x_{initial} is the initial quantity of asset x in the liquidity pool.
- y represents the quantity of the second asset in the liquidity pool.
- k stands for the constant product value, which the formula aims to keep unchanged.
- D signifies the total number of days over which the burning occurs.
- R_i is the burn rate of asset x on day i, for each day from 1 to D.

The Dynamic Burn-Adjusted Constant Product Formula can be articulated as:

$$(x_{\text{initial}} - \sum_{i=1}^{D} R_i) \times y = k$$

Here, $\sum_{i=1}^{D} R_i$ denotes the cumulative reduction in x over D days, calculated by summing the burn rates R_i for each day i.

It is important to keep in mind that this formula makes assumptions that do not take into account several other dynamic factors, such as buyers and sellers interacting with the pool, as well as variance in LP from external liquidity providers.



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Figure 9: Projected cumulative burn rate over 30 days (x) with averaged daily burn rate between 1000-3000 circles (y)

Deflationary Dynamics for Total Supply

As the supply of CIRCLE is slowly reduced through the process of burning, it results in an appreciable increase in the proportional ownership of CIRCLE for each token holder. This mechanism effectively elevates each holder's stake by reducing the total available supply.

The initial total supply of CIRCLE is set at 1,000,000 CIRCLE. Holders can determine their increased share of the total supply using the following equation:

$$P_{\text{final}} = \left(\frac{H_{\text{initial}}}{S_{\text{initial}} - S_{\text{burned}}} \right) \times 100\%$$

Where:

- P_{final} denotes the holder's final percentage ownership of CIRCLE following the burn process.
- H_{initial} indicates the initial quantity of CIRCLE held by the user.
- S_{initial} represents the initial total supply of CIRCLE.
- S_{burned} refers to the quantity of CIRCLE removed from the total supply due to burning.

The brilliance of this deflationary strategy lies in its straightforward method of enhancing holder value without resorting to complex mechanisms such as reflection tokens or market buybacks.

By methodically diminishing the token supply, it ensures that the share of tokens held by each owner increases proportionally. This approach not only redistributes the token's value by enhancing its scarcity but also fosters equitable value growth among holders. Furthermore, it incentivizes and rewards long-term commitment to the token, strengthening the community and promoting a healthy ecosystem for value growth.

Phases

Phases within the CE serve as milestones that reflect the cumulative amount

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of the CIRCLE token supply that has been burned. It is important to note that these phases are not explicitly delineated, and experience certain degrees of overlap.

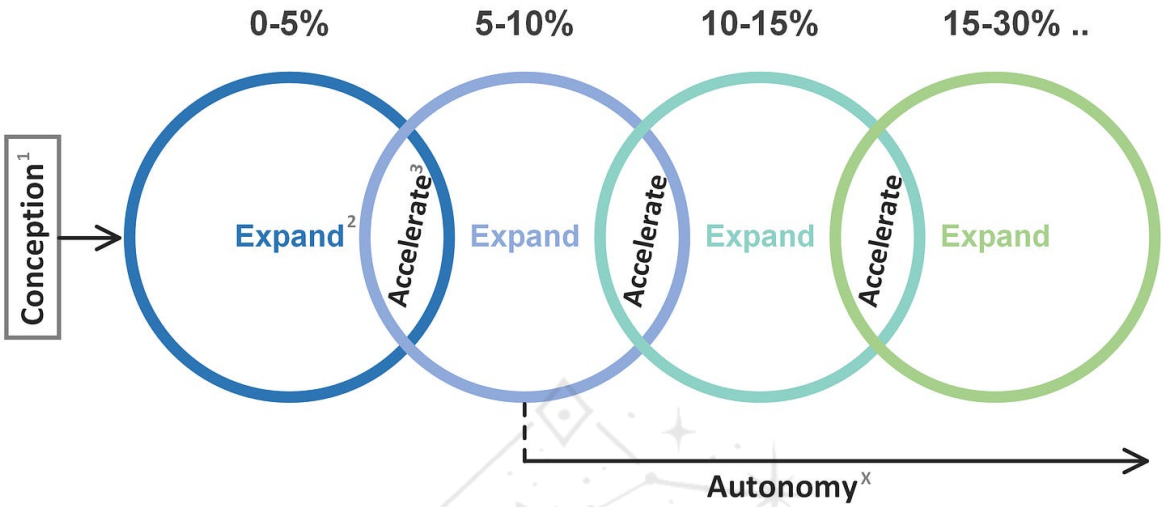


Figure 10: Illustration of CCTP Phase progression

Phase 1: Conception (0%)

This phase marks the inception of the Circle and the initial activation of the CE. Here, the primary focus is initiating the CBL and facilitating distribution to active market participants who play a pivotal role in generating volume.

Phase 2: Expansion (0-5%)

The Expansion phase is initiated with the objective of burning a specific percentage of the CIRCLE supply (0-5%). At the start of this process, the CE's capacity is expanded, allowing it to accumulate up to 1 WETH. This increased capacity enables the protocol to build up more resources, in order to execute burns more dynamically. Essentially, this phase reinforce the protocol's ability to 'causeChaos' more effectively.

Phase 3: Acceleration (5%~)

During the Acceleration phase, the CE capitalizes on the enhanced capacity provided by the acquisition of 1 WETH to amplify the burn rate, ensuring a consistent and heightened volume of CIRCLE burn. This strategic move

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accelerates the deflationary process, leveraging the use of the protocol's accumulated assets from the previous phase to expedite deflationary mechanics.

Rather than being a distinct phase that follows Expansion, Acceleration is embedded within the Expansion phase. Each tier of asset accumulation and burn (e.g., reaching the 5% burn threshold) employs both phases.

The strategic overlap of Expansion and Acceleration phases means that as the protocol expands its capacity (through asset accumulation), it also accelerates the burn process. With each successive Expansion phase, the protocol also increases its capacity to ‘causeChaos’ or significantly impact the market, thereby accelerating the deflationary process.

Future Phases

We speculate that future phases chase a cyclical pattern characterized by phases of increased capacity (Expansion) that are then followed by phases of increased resource utilization for burn rate escalation (Acceleration). This is reflective of the dynamic strategy necessary to optimize the protocol's impact on the market, where the CE has a more controlled and impactful deflationary mechanism by alternating between building up resources and executing high-volume burns.

Phase X: Autonomy

The ‘Autonomy" phase, an unreleased phase planned for the CE, aims to significantly advance the protocol's decentralization and autonomy. This marks a key progression for the CE, enhancing its ability to operate independently without manual oversight. Details are yet to be fully revealed, but the move is intended to push Circle to become a completely decentralized and self-sustained project.

Conclusion

In conclusion, Circle is a highly ambitious, egalitarian project that represents a pioneering advancement in the domain of deflationary cryptocurrencies by

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instituting a revolutionary, tax-free burn through the CBL. This structure allows for a higher APR to incentivize external LPs, a significant departure from traditional token emissions.

Circle's modular framework also offers remarkable flexibility, enabling the integration of any AMM strategy in lieu of the CE. This adaptability signals that future projects should seriously consider incorporating similar architecture to achieve comparable benefits.

Moreover, the CE's implementation introduces one of the first dynamic and responsive systems adept at adjusting burn rate in response to market conditions, where volume and burn rate fluctuate relative to price. This sort of responsive deflationary design not only opens a new frontier in demand stabilization, but underscores the potential of Circle's technology to serve as a foundational model for future highly adaptive and dynamic deflationary structures.

Special thanks to J.J. for their much needed critical review and feedback. Immense gratitude to the Circle developer for crafting such a rare and truly singular project for the Crypto space.

Circle: Telegram | Twitter | Farcaster | Website

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