VaultX Whitepaper

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Abstract

Decentralized finance (DeFi) requires tools for efficient asset management. "CryptoVaults" tackles this need by marrying traditional staking with the versatility of Non-Fungible Tokens (NFTs). Users benefit from a multiple-reward system: Native Asset staking returns and VaultX's tokenomics, further boosted by a "Duration Bonus Rate" for long-term commitments. Additionally, the NFT aspect of CryptoVaults unlocks trading and lending, enriching its DeFi utility. Token holders also receive valuable analytics into Native Asset Staking. This paper delves into the inner workings and potential of CryptoVaults in reshaping DeFi asset management and it’s novel staking approach.

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1. Introduction

The decentralized finance (DeFi) landscape is brimming with potential, but even amidst its advancements, certain complexities remain. One such challenge is the tracking of individual staked assets. Take the popular platform, Lido, for instance: if a user stakes Ether multiple times and later sells a portion, determining the original value of each staked Ether becomes a maze. The aggregated nature of such staking platforms dilutes the visibility into individual stake performance.

The VaultX Platform for Liquid Staking Insights and CryptoVaults is the solution to this predicament. With CryptoVaults, every staking action gets its individual 'vault,' allowing users to monitor performance on a stake-by-stake basis. This approach not only streamlines asset tracking but also promises greater transparency and efficiency in DeFi asset management. This whitepaper unfolds the mechanics and potential of the VaultX Platform, laying out its features designed to empower DeFi users.

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2. Problem Statement

In the decentralized finance (DeFi) realm, users face the following challenges:

- Lack of Stake History Visibility: Traditional staking mechanisms merge all transactions into a singular balance, obscuring individual stake performance.
- Inflexible Monetization: Most staking methods force users to liquidate to realize gains, incurring fees and potentially missing out on future rewards.
- Analytics Deficiency: The DeFi space, though rich in opportunity, needs more in-depth analytical tools to empower informed decision-making.

Proposed Solutions with CryptoVaults:

Granular Stake Tracking: Unlike traditional methods that provide a consolidated view, CryptoVaults introduce discrete NFT stakes for each buy. This ensures users can track individual stakes' performance while maintaining an overview of their entire portfolio.

Flexible Monetization: By representing each staking event as a unique NFT, CryptoVaults allow users multiple avenues to monetize, such as trading or lending, without liquidating their primary assets.

Enhanced Analytics: Token holders get exclusive access to a sophisticated native staking analytics dashboard. This tool offers not just raw data but deep insights into Lido's staking and broader market trends, enabling users to navigate the DeFi space with clarity and assurance.

3. CryptoVaults

The solution begins with the way CryptoVautlts require you to structure your portfolio. Each is a portfolio in itself. CryptoVaults records initial staking data on-chain. This data includes two primary components: the amount staked and the intended duration of the stake. By doing so, users are reminded of their original exit strategy, although they aren't obliged to stick to it. This mechanism provides clarity while maintaining flexibility.

With the integration of NFTs, each stake in CryptoVaults becomes a distinct non-fungible token with its own set of attributes. This allows each stake to be traded, lent, or leveraged in various ways, offering users a more versatile staking experience.

Additionally, CryptoVaults are your key to exclusive access to the Lido analytics dashboard. This dashboard offers in-depth insights into Lido and Stader's MaticX staking, enabling users to make more informed investment decisions.

CryptoVaults enhance traditional staking methods by leveraging the capabilities of NFTs, while also providing users access to valuable analytics tools.

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4. Tokenomics: Interplay Dynamics

VX tokens are integral to the functionality of the CryptoVaults system. To create a CryptoVault, a user needs VX tokens, as these tokens are staked within the vaults to yield further rewards. With each creation of a CryptoVault, Matic is converted into different assets, but a minimum of 50% is required to be converted into VX tokens. This requirement underpins VX's role as the primary driver of the VaultX system.

One primary benefit of using VX tokens is the derived demand it creates for itself. By requiring Vx to stake LSDs that consistently earn fees, the value of the CryptoVaults NFT continuously accumulates the staking rewards. This results in an ever-growing demand for VX tokens to support the constantly expanding ecosystem.

In the transactional aspect of creating a CryptoVault, a 0.3% convenience fee, which is lower than the individual gas fees for users executing multiple swaps, is incurred only when zapping in with Matic (POL). These fees are directed back into the protocol for its upkeep and maintenance.

In essence, VX token acts both as a utility and a value accrual mechanism within the VaultX system. Its design ensures that as more users engage with CryptoVaults, there is a self-sustaining loop of demand, reward, and maintenance, solidifying the VX token's place in the system's infrastructure. Similar to how mining resources are expended to add gold to circulation, the VX tokens are actively utilized to ensure the smooth operation and growth of the CryptoVaults ecosystem.

5. Technological Overview

Contracts:

- ERC-20 Token Contract:
  Used to track the total supply and balance of each user's Vx tokens, and issue rewards via a mint function accessible only to the CryptoVault contract. Based on Standard OpenZepplin[2] ERC-20 + mint contracts with a modification to track the number of token holders
- ERC-721 Contract:
  Used to track the total supply and balance of each user's CryptoVaults.
  Tracks the history, stakes, and penalties for each CryptoVault. Based on OpenZepplin[3] ERC-721 Standard token contract with custom staking and rewards system and token burn
- Rewards Contract:
  The Lucky Rewards System which is funded from early unstake penalty fees
- Zap Contract:
  Used to collect conversion fees and execute multiple transactions at once to save gas.

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6. Network Effects and Ecosystem Growth

Flywheels within Flywheels:

The Flywheels in VaultX are simple compared to other protocols, simplicity is strength in this case as a paced-out race condition is created in the CryptoVault's rewards system. CryptoVaults with an ID ending in 7,77, or 777 get a Lucky Bonus, as well as a Bonus CryptoVault from the rewards contract. Normally protocols use random number oracles and multiple block execution to add randomness to their protocol, but with CryptoVaults, the rewards are produced like clockwork on a first come first serve basis. This is similar to block rewards in Bitcoin, where the fastest performer gets the reward. This will cause a tremendous surge in demand for the token whenever the stakers see the counter getting closer to a number ending with 777. By ensuring a race condition, the blockchain activity will increase further exposing VaultX as the top number 1 used protocol on Polygon PoS, which will drive new users to see and learn about VaultX's Platform thus increasing awareness and adoption. The rewards system is tapered and influenced by the available rewards from the penalty fees from unstaking, as well as how much Vx Token someone has committed in the "LuckyVault" A small commitment in the staker will result in a diminished reward, whereas a larger stake is worth the maximum amount of reward. When people come to the system trying to learn about why so many people are tripping over themselves to enter, they will also learn about the benefits of our powerful analytics system independent of the Lucky system and that value works for user retention as they track their portfolio from the VaultX Dapp. *See Table Below

Prize Table

Token IDs Ending With:	Can Claim up to % of Prize Pool
7	1%
77	5%
777	20%

Fig. 1 Prize Amount Depends on the amount of Vx in the LuckyVault

*Prize amount is weighted to the duration of the CryptoVault.

7. Interoperability: Trading and Lending with CryptoVaults

NFT lending replicates the classic model of a lending marketplace: matching lenders with borrowers.[4] Thanks to the interoperability of DeFi and NFTs you can choose a marketplace instead of un-staking if time is not of the essence. The current marketplaces allow you to buy, sell, swap, borrow and lend NFTs. In time other new possibilities may open up to use the CryptoVault NFTs for as they function governed by a decentralized smart contract following the ERC-721 standard, the most widely used standard for interacting with non-fungible assets on chain.

9. Incentives

By convention, the rewards by definition should trigger a response that creates a feeling of gratitude in the user, and by delaying gratification the response is amplified. Creating a system of rewards that incentivize good behavior such as holding and not selling, while conversely punishing bad behaviors such as not sticking to a commitment results in more optimal outcomes for all users involved. In contrast to protocols that reward users too quickly; just as quickly retrace as users race for the door. These “run on the bank” type scenarios are not desirable. The employed strategy here is an algorithm that is responsive to all the user’s behavior as a whole and adjusts reward rates automatically. This creates more buy demand than sell demand. In turn, this results in net higher user token retention for longer, creating a token engineered with the most powerful attraction mechanisms for adoption.

Delving deeper into the calculations from a high level you will see how the adaptive rewards system adjusts to the rhythms of the humans that use it. People naturally plan ahead to maximize their own personal best outcome and the system state in the contract adjusts subsequent rewards for all new stakes entering the system. This creates an urgency incentive to get in, and be happy to be in to see other’s rewards not as high. In other words, it creates cycles of competitive entries and exits. This is a feeling of superiority in the current stakers and desire in the minds of others. It’s like being a miner in the early days of Bitcoin, with a big difference however as the protocol creates cycles of opportunity due to stake expiry. Once expired, a CryptoVault no longer earns any more rewards, and the user must leave the system and re-enter at the new current rate.

The functionality is broken up into the functions outlined below.

Base Interest Rate:

The base interest rate calculation plays a key role in determining the returns from staking. This rate changes based on the number of tokens in circulation to ensure a dynamic and adaptive staking model.

The calculation involves these steps:

Total Supply and Locked Supply
First, take the total supply of tokens and compare it to the amount that is currently locked to derive a ratio.

Circulating Ratio
This value represents the proportion of tokens currently in circulation relative to the total supply. It is expressed in basis points (bps), where 1 basis point is equal to 0.01%. For example, if 50% of the total tokens are in circulation,
then the circulating ratio is 5000 bps.

Base Interest Rate Calculation :

Lower Limit: The base interest rate calculation will go no lower than the lowest base interest rate defined by the system.

Upper Limit: If the circulating ratio is above the minimum but below or equal to 100% (i.e., all tokens are in circulation), a decrease factor is calculated. This factor is the product of the base interest rate and the difference between the maximum basis points (10000) and the circulating ratio. This product is then divided by the difference between the maximum basis points (10000) and the minimum circulating ratio. The base interest rate is then decreased by this factor.

Stake Duration: The base interest rate is then multiplied by the stake duration in seconds and divided by the total seconds in a year (31,536,000 seconds for a non-leap year). This annualizes the interest rate, providing a yearly return rate based on the staking period.

The final result is the base interest rate for the stake. It adapts to the circulating supply of VaultX tokens and the duration of the stake, promoting a dynamic, market-responsive model for staking returns.

By tying the base interest rate to the circulating supply, the system incentivizes users to stake their tokens, as more circulating tokens mean lower base interest rates. Similarly, the dependence on stake duration motivates longer-term staking, as users gain more by staking for longer periods.

Duration formula

(Longer stakes = higher the reward rate)

DBR: Duration Bonus Rate

The formula used to calculate the bonus interest rate considers the staking duration (length of the commitment) and applies a power function and multiplication to yield the bonus rate.

The '**Duration Ratio**' is computed first with this formula:

Duration Ratio = **Stake Duration** / **Maximum Duration**

- **Stake Duration**: The duration for which the user commits to stake their tokens.
- **Maximum Duration**: The maximum staking duration permitted by the protocol.

This ratio describes how long a given stake is relative to the maximum possible duration.

Calculation of the Bonus Interest Rate:

The bonus interest rate is then calculated with this duration ratio using the formula:

Bonus Rate = (**Duration Ratio**)^(**Bonus Rate Exponent**) * **Maximum Bonus Rate**

- **Duration Ratio**: Computed previously.
- **Bonus Rate Exponent**: A parameter set within the system to adjust the curve of bonus interest rates as they relate to stake duration.
  (bonusRateExponent = `ud(1.8e18)`
- **Maximum Bonus Rate**: The highest possible bonus interest rate available within the protocol.

$$f(x) = x^{1.8} \{0 < x < 1.0001\}$$

x	$f(x)$	$(f(x) \cdot 150)$	$\frac{((x \cdot 1)1080)}{360}$
0.0833	0.011406726	1.7110089	0.2499
.16	0.036933118	5.5399676	0.48
.32	0.12860859	19.291288	0.96
.5	0.28717459	43.076188	1.5
.64	0.44784111	67.176166	1.92
.96	0.92915511	139.37327	2.88
1	1	150	3

Fig. 2 The DBR Calculation Equation

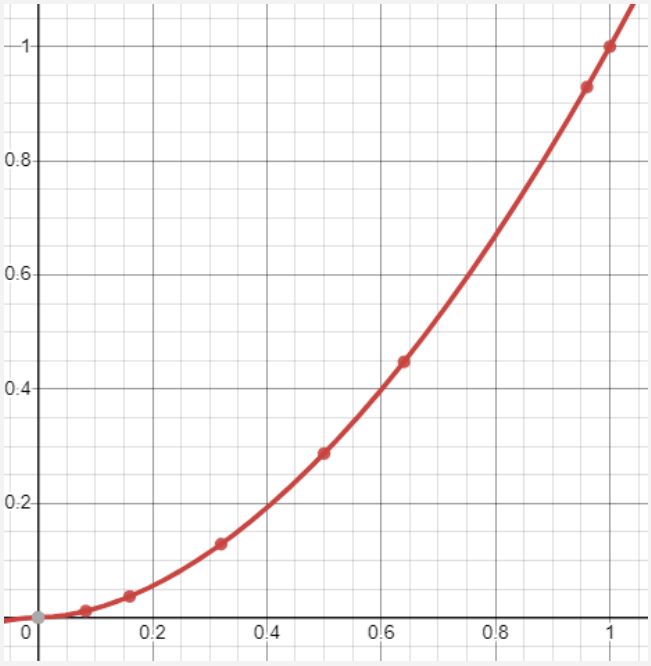

Fig. 3 The DBR Duration Slope Visualized [5]
https://www.desmos.com/calculator/gatpm4nh6p

This formula has an exponential relationship between the stake duration and the bonus interest rate. As the duration ratio increases, the bonus interest rate grows exponentially up to the maximum bonus interest rate. The degree of this exponential growth is regulated by the Bonus Rate Exponent.
Overall, this method of calculating the bonus interest rate encourages long-term staking within the platform. It rewards users who are invested in the long-term success of the token economy, enhancing stability by locking up tokens and reducing circulating supply.

10. Conclusion

This system introduces a unique approach to addressing challenges in the current DeFi landscape, such as maximizing staking rewards and ensuring trading flexibility. Combining these elements with exclusive analytics access provides users with practical solutions to common issues in the space. As with any technological advancement, the real-world utility of CryptoVaults will be determined by its adoption and integration into the broader DeFi ecosystem. VaultX offers a robust and scalable system that contributes meaningfully to the future evolution of decentralized finance.

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11. References

- [1] Adam Hayes, Cierra Murry and Pete Rathburn “Dollar-Cost Averaging (DCA) Explained”, https://www.investopedia.com/terms/d/dollarcostaveraging.asp
- [2][3] OpenZeppelin “Standard Token Contracts”, https://github.com/OpenZeppelin/openzeppelin-contracts/tree/master/contracts/token
- [4] Ekin Genç“What is NFT Lending?”, https://www.coindesk.com/learn/what-is-nft-lending/
- [5] DBR Bonus, “Desmos”, https://www.desmos.com/calculator/gatpm4nh6p
- [6] Satoshi Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System” Oct 31st, Arweave