# Elevado Derivatives

**Elevado Research**[1]

**Abstract** In this paper, we introduce Elevado Derivatives, a novel class of derivatives constructed on top of Elevado's asset primitives – ETHTW, CIP, ESA, EGA, and ESTR. Elevado Derivatives proposes first-order derivatives (eETHTW, eCIP, eESA, eEGA, and eESTR) and second-order derivatives (eeETHTW, eeCIP, eeESA, eeEGA, and eeESTR). First-order derivatives are minted through the deposit of primary assets at an initial 1:1 ratio, while second-order derivatives are minted through the deposit of first-order derivatives also at an initial 1:1 ratio. Built upon the ERC-20E standard, Elevado Derivatives impose a fixed 1% fee on deposits and redemptions, with all fees compounded directly into the respective collateral pools, ensuring that the net asset value (NAV) of each derivative is non-decreasing and monotonic over time, while preserving full collateralization and deterministic, protocol-native yield accretion. As a result, Elevado Derivatives establish a fully collateralized, multi-layer framework for recursive capital deployment, enabling deterministic, protocol-native yield accretion across successive derivative tiers while preserving monotonic asset backing and structural financial integrity. We formalize the underlying economic framework, describe the recursive accretion mechanics, and demonstrate the financial and economic plausibility of the system.

## 1. Introduction

Elevado Derivatives are a novel class of on-chain derivatives constructed on top of Elevado's primary reserve assets – Ethertower (ETHTW), Cipoal (CIP), ESA (ESA), EGA (EGA), and Elevastrat (ESTR) – within a unified, deterministic asset framework, built upon the ERC-20E standard.

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Elevado Derivatives introduces both first-order derivatives (eETHTW, eCIP, eESA, eEGA, and eESTR) and second-order derivatives (eeETHTW, eeCIP, eeESA, eeEGA, and eeESTR), enabling structured, multi-layer capital deployment while preserving full collateralization at every layer.

First-order derivatives are minted by depositing primary assets into derivative contracts at an initial 1:1 ratio. Second-order derivatives are minted by depositing first-order derivatives under the same framework. Each derivative layer operates as an independent reserve asset, maintaining its own collateral pool, supply accounting, and net asset value (NAV).

All minting and redemption activity is subject to a fixed 1% fee, which is compounded directly into the derivative's collateral pool, generating deterministic, protocol-native yield. This design ensures that accretion arises solely from protocol mechanics rather than external yield sources, leverage, or discretionary management, guaranteeing that the net asset value (NAV) of each derivative is monotonic and non-decreasing over time while maintaining full collateralization and predictable, layer-specific yield generation.

The recursive nature of the Elevado Derivatives' framework allows derivatives to serve as collateral for subsequent derivatives, producing a layered structure of accreting assets in which yield compounds across successive tiers. Despite this recursion, exposure remains linear and fully backed at all times, and net asset value is monotonically non-decreasing by construction. No derivative layer introduces maturity transformation, counterparty risk, or insolvency risk, as all assets remain fully collateralized and redeemable according to deterministic rules enforced at the protocol level.

As a result, Elevado Derivatives establish a fully collateralized, multi-layer framework for recursive capital deployment, enabling deterministic yield accretion across successive derivative tiers while preserving monotonic asset backing and structural financial integrity.

In this paper, we formalize the economic framework governing Elevado Derivatives, specify the mechanics of first- and second-order accretion, and demonstrate the financial and economic plausibility of recursive derivatives as a coherent and scalable class of on-chain financial instruments.

## 2. Primary Reserve Assets

Primary reserve assets – ETHTW, CIP, ESA, EGA, and ESTR – serve as the foundation of the Elevado asset ecosystem, where each asset is fully collateralized, deterministic in NAV growth, and yield-bearing through protocol-native mechanisms (i.e., fee compounding accrual).

Formally, for a primary reserve asset $P$:

$$\mathrm{NAV}_t^P = \frac{C_t^P}{A_t^P}, \quad C_t^P = \text{collateral pool}, \quad A_t^P = \text{total supply}$$

NAV monotonicity is guaranteed by protocol-enforced fee reinvestment and non-dilutive minting and redemption mechanics, ensuring that collateral per unit cannot decrease over time:

$$\mathrm{NAV}_{t+1}^P \geq \mathrm{NAV}_t^P$$

User interaction:

(using ETHTW as an example)

1. Deposit collateral (ETH)
2. Mint native asset (ETHTW) at a 1:N ratio (where N is the current protocol-defined ratio)
3. Native asset accrues primary yield according to the underlying mechanism defined by the ERC-20E standard.
4. Redeem ETHTW for underlying ETH at a 1:N ratio (where N is the current protocol-defined ratio)

## 3. First-Order Derivatives (eAssets)

First-order derivatives, or "eAssets" (eETHTW, eCIP, eESA, eEGA, and eESTR), allow users to deploy primary reserve assets (ETHTW, CIP, ESA, EGA, or ESTR) into first-order derivative contracts.

First-order derivatives (e.g., eETHTW) allows primary reserve assets (e.g., ETHTW) to earn layered deterministic yield while maintaining linear exposure to the underlying asset (e.g., ETH).

Users deposit primary reserve assets to mint first-order derivatives at an initial 1:1 ratio.

Fees on mint $(\phi_m^e)$ and redemption $(\phi_r^e)$ accrue into the eAssets collateral pool.

Formally:

$$A_{t+1}^e = A_t^e + \Delta A_{\text{mint}}^e - \Delta A_{\text{redeem}}^e$$

$$C^e_{t+1} = C^e_t + \phi^e_m \Delta A^e_{\text{mint}} + \phi^e_r \Delta A^e_{\text{redeem}}$$

$$\text{NAV}t + 1^e = \frac{Ct + 1^e}{A^e_{t+1}}$$

User interaction:

(using ETHTW as an example)

1. Deposit ETHTW
2. Mint eETHTW at a 1:N ratio (where N is the current protocol-defined ratio)
3. In addition to its yield, eETHTW accrues secondary yield on top of ETHTW's yield
4. Redeem eETHTW for underlying ETHTW at a 1:N ratio (where N is the current protocol-defined ratio)

## 4. Second-Order Derivatives (eeAssets)

Second-order derivatives, or "eeAssets" (eeETHTW, eeCIP, eeESA, eeEGA, and eeESTR), enable users to deposit first-order derivatives to mint a "derivative of a derivative," thereby introducing an additional layer of deterministic, protocol-native yield. This introduces recursive, multi-layer deterministic yield, where each layer compounds the underlying and previous derivative yields.

Users deposit first-order derivatives to mint second-order derivatives at an initial 1:1 ratio.

As a result, eeAssets allows yield-on-yield stacking while maintaining full collateralization and deterministic NAV growth. There is no leverage or credit risk, only recursive deterministic accretion.

Mechanics:

$$A^{ee}_{t+1} = A^{ee}_t + \Delta A^{ee}_{\text{mint}} - \Delta A^{ee}_{\text{redeem}}$$

$$C^{ee}_{t+1} = C^{ee}_t + \phi^{ee}_m \Delta A^{ee}_{\text{mint}} + \phi^{ee}_r \Delta A^{ee}_{\text{redeem}}$$

$$\text{NAV}t + 1^{ee} = \frac{Ct + 1^{ee}}{A^{ee}_{t+1}}$$

Recursive accretion:

$$\mathrm{NAV}t+1^{ee}-\mathrm{NAV}0^{ee}=(\mathrm{NAV}t+1^{e}-\mathrm{NAV}0^{e})+(\phi_m^{ee}\Delta A\mathrm{mint}^{ee}+\phi_r^{ee}\Delta A\mathrm{redeem}^{ee})$$

End-to-end user interaction:

(using ETHTW as an example)

1. Deposit ETH
2. Mint ETHTW (primary asset) at a 1:N ratio (where N is the current protocol-defined ratio)
3. Deposit ETHTW to mint eETHTW (first-order derivative) at a 1:N ratio (where N is the current protocol-defined ratio)
4. Deposit eETHTW to mint eeETHTW (second-order derivative) at a 1:N ratio (where N is the current protocol-defined ratio)
5. Each layer accrues yield:
    - ETHTW: primary yield
    - eETHTW: secondary yield
    - eeETHTW: tertiary yield
6. Redeem recursively from top layer down to underlying ETH

## 5. Recursive Multi-Layer Framework

The Elevado Derivatives framework generalizes to an arbitrary number of derivative layers, allowing each derivative to serve as collateral for the next.

We denote derivatives of order $n$ as:

$$e^{(0)}=P,\quad e^{(1)}=eP,\quad e^{(2)}=eeP,\ldots,e^{(n)}=e^{n}P$$

Where $P$ represents a primary asset (ETHTW, CIP, ESA, EGA, or ESTR). First-order derivatives $(e^{(1)})$ are minted directly from primary assets, second-order derivatives $(e^{(2)})$ are minted from first-order derivatives, and this pattern extends recursively for $n\geq 1$.

For each derivative layer, the dynamics of supply and collateral are captured by:

$$A_{t+1}^{e^{(n)}}=A_t^{e^{(n)}}+\Delta A_{\mathrm{mint}}^{e^{(n)}}-\Delta A_{\mathrm{redeem}}^{e^{(n)}},\quad C_{t+1}^{e^{(n)}}=C_t^{e^{(n)}}+\phi_m^{e^{(n)}}DeltaA_{\mathrm{mint}}^{e^{(n)}}+\phi_r^{e^{(n)}}\Delta A_{\mathrm{redeem}}^{e^{(n)}}$$

Where $A_t^{e(n)}$ and $C_t^{e(n)}$ denote total outstanding derivative units and collateral at time $t$, respectively, and $\phi_m^{e(n)}$, $\phi_r^{e(n)}$ represent the fraction of fees accrued from minting and redemption. The net asset value (NAV) of each derivative layer is then defined as:

$$\mathrm{NAV}t + 1^{e(n)} = \frac{Ct + 1^{e(n)}}{A_{t+1}^{e(n)}} \geq \mathrm{NAV}_t^{e(n)}$$

This recursive structure ensures monotonic, deterministic NAV growth across all derivative layers, enabling predictable yield accumulation while maintaining full collateralization and structural financial integrity. The framework is inherently scalable, supporting higher-order derivatives without introducing leverage or exposure beyond the underlying asset.

## 6. Financial Plausibility

Elevado Derivatives are envisioned to be fully collateralized. Each derivative layer operates within a self-contained, protocol-enforced economic framework, ensuring both capital preservation and predictable yield.

Formally, first-order derivatives, such as eETHTW, can be conceptualized as closed-end funds with deterministic net asset value (NAV). The NAV of a first-order derivative $eA$ at time $t$ is expressed as:

$$\mathrm{NAV}_t^e = \frac{\text{Total Holdings of } P \text{ in the collateral pool}}{A_t^e}$$

Where $A_t^e$ denotes the circulating supply of the derivative. Minting and redemption fees are automatically reinvested into the collateral pool, generating endogenous, protocol-native yield that compounds over time. This produces structural secondary accretion, providing holders with incremental return beyond the underlying primary asset.

Second-order derivatives, such as eeETHTW, extend this principle by recursively layering accretion. Each layer compounds both the yield of the underlying derivative and its own protocol-generated fees, resulting in a deterministic “yield-on-yield” structure. Importantly, this mechanism introduces no market risk, leverage, or credit exposure, as every derivative is fully backed by its underlying assets.

This recursive structure generalizes naturally to an $n$-th order derivative, $e^{(n)}$, defined as:

$$e^{(n)} \text{ is the accreting derivative of order } n$$

Where $n = 0$ corresponds to the primary asset, $n = 1$ corresponds to the first-order derivative, and $n > 1$ represents higher-order derivatives. Each layer maintains full collateralization, deterministic NAV, and monotonic yield growth, establishing a hierarchical, multi-layered accretion system.

## 7. Conclusion

Elevado Derivatives formalize a framework for constructing multi-layer, fully collateralized on-chain derivatives within a unified asset system. By extending Elevado's primary reserve assets into first- and second-order derivatives, the framework enables recursive capital deployment while preserving deterministic accounting, monotonic net asset value, and full collateral backing at every layer. The use of fixed, protocol-enforced fees compounded directly into collateral pools ensures that yield generation is endogenous, predictable, and structurally insulated from external market dependencies.

Beyond its immediate utility as a yield-optimizing vehicle, the Elevado framework establishes a foundation for n-th order recursive derivatives, supporting theoretically unlimited layering of accretion without introducing leverage or credit risk. Each derivative layer remains independently solvent and auditable, with exposure remaining linear to the underlying asset despite compounded accretion across tiers. As a result, Elevado Derivatives constitute a distinct class of financial instruments, offering a scalable and mathematically well-defined approach to deterministic yield generation and capital efficiency in on-chain systems.

### 7.1 Yield Fractal

The ultimate expression of the Elevado Derivatives framework is a "yield fractal" – a theoretically unbounded recursive hierarchy of accreting derivatives.

Let $e^{(0)} = \mathrm{ETHTW}$ denote the primary reserve asset. Successive derivative layers are recursively defined as:

$$e^{(n)} = \mathrm{Deposit}\big(e^{(n-1)}\big); \rightarrow; \mathrm{Mint}\ e^{(n)}, \quad n \geq 1$$

In explicit notation, the first several layers are:

$$\mathrm{ETHTW} = e^{(0)}, \quad \mathrm{eETHTW} = e^{(1)}, \quad \mathrm{eeETHTW} = e^{(2)}, \quad \mathrm{eeeETHTW} = e^{(3)}, \quad \ldots$$

$$e^{(4)} = \mathrm{eeeeETHTW}, \quad e^{(5)} = \mathrm{eeeeeETHTW}, \quad e^{(6)} = \mathrm{eeeeeeETHTW}, \quad e^{(7)} = \mathrm{eeeeeeeETHTW}, \ldots$$

Each layer $e^{(n)}$ inherits the collateral, NAV, and deterministic yield of its predecessor while adding its own layer of protocol-native accretion. Formally, the NAV of the $n$-th derivative layer at time $t$ can be expressed recursively as:

$$\mathrm{NAV}t^{e^{(n)}} = \mathrm{NAV}t^{e^{(n-1)}} + \phi_m^{(n)} \Delta A\mathrm{mint}^{e^{(n)}} + \phi_r^{(n)} \Delta A\mathrm{redeem}^{e^{(n)}}$$

Where $\phi_m^{(n)}$ and $\phi_r^{(n)}$ denote minting and redemption fees for layer $n$, which are reinvested into the collateral pool, producing deterministic, compounding yield.

This recursive structure naturally generalizes to arbitrary depth, forming a fractal lattice of deterministic yield. Conceptually, the yield fractal concept represents an infinite-dimensional, composable architecture in which each layer magnifies the accretion of its predecessors while maintaining full collateralization, auditable NAV growth, and predictable returns.

As $n \to \infty$, the structure remains mathematically consistent.

## A. Primary asset collateral dynamics

Each primary reserve asset $P$ (ETHTW, CIP, ESA, EGA, ESTR) is fully collateralized.

Let $A_t^P$ denote supply and $C_t^P$ collateral at time $t$. Collateral evolves as:

$$C_{t+1}^P = C_t^P + \phi_m^P \Delta A_{\text{mint}}^P + \phi_r^P \Delta A_{\text{redeem}}^P$$

Where $\phi_m^P$ and $\phi_r^P$ are mint and redemption fees. This deterministic framework ensures:

$$\text{NAV}t + 1^P = \frac{Ct + 1^P}{A_{t+1}^P} \geq \text{NAV}_t^P$$

Guaranteeing monotonic collateral-backed growth. Primary asset collateral is the bedrock for all derivative layers.

## B. Primary asset yield accrual

Primary assets generate yield exclusively from protocol-native fees.

If $\Delta A_{\text{mint}}^P$ new tokens are minted:

$$\text{Yield}t^P = \phi_m^P \Delta A\text{mint}^P + \phi_r^P \Delta A_{\text{redeem}}^P$$

This yield is automatically reinvested into the collateral pool, producing deterministic accretion that forms the base layer for first-order derivatives.

## C. First-order derivative supply dynamics

For first-order derivative $eA$:

$$A_{t+1}^e = A_t^e + \Delta A_{\text{mint}}^e - \Delta A_{\text{redeem}}^e$$

Users mint $eA$ by depositing primary assets $P$ at an initial 1:1 ratio. Redemption removes supply while proportionally returning collateral:

$$\Delta P_{\text{returned}} = \text{NAV}t^e \cdot \Delta A\text{redeem}^e$$

Supply dynamics maintain linear exposure to underlying assets.

## D. First-order derivative collateral accretion

Collateral evolves with mint and redemption fees:

$$C_{t+1}^e = C_t^e + \phi_m^e \Delta A_{\text{mint}}^e + \phi_r^e \Delta A_{\text{redeem}}^e$$

The derivative's net asset value:

$$\text{NAV}t + 1^e = \frac{Ct + 1^e}{A_{t+1}^e}$$

Is guaranteed to grow monotonically, compounding secondary deterministic yield on top of the underlying primary asset's NAV.

## E. Recursive accretion definition

Second-order derivatives $eeA$ derive from first-order derivatives:

$$C_{t+1}^{ee} = C_t^{ee} + \phi_m^{ee} \Delta A_{\text{mint}}^{ee} + \phi_r^{ee} \Delta A_{\text{redeem}}^{ee}$$

$$A_{t+1}^{ee} = A_t^{ee} + \Delta A_{\text{mint}}^{ee} - \Delta A_{\text{redeem}}^{ee}$$

Yield is compounded recursively:

$$\text{NAV}t + 1^{ee} - \text{NAV}0^{ee} = (\text{NAV}t + 1^e - \text{NAV}0^e) + (\phi_m^{ee} \Delta A\text{mint}^{ee} + \phi_r^{ee} \Delta A\text{redeem}^{ee})$$

## F. Deterministic NAV growth proof

For any layer $n$:

$$\text{NAV}t + 1^{e^{(n)}} = \frac{Ct + 1^{e^{(n)}}}{A_{t+1}^{e^{(n)}}} \geq \text{NAV}_t^{e^{(n)}}$$

Proof relies on non-negative mint/redemption fees $(\phi_m, \phi_r \geq 0)$ and full collateralization. This ensures monotonic growth.

## G. Fee compounding mechanics

All fees are automatically reinvested into derivative collateral pools.

For first-order derivative:

$$\Delta C^e = \phi_m^e \Delta A_{\text{mint}}^e + \phi_r^e \Delta A_{\text{redeem}}^e$$

For second-order derivative:

$$\Delta C^{ee} = \phi_m^{ee} \Delta A_{\text{mint}}^{ee} + \phi_r^{ee} \Delta A_{\text{redeem}}^{ee}$$

Recursive fee compounding guarantees structural, protocol-native yield without external dependencies.

## H. Multi-layer exposure

Generalizing $n$ layers:

$$e^{(0)} = P, \quad e^{(1)} = eP, \quad e^{(2)} = eeP, \ldots e^{(n)}$$

Total NAV contribution of each layer:

$$\mathrm{NAV}^{e(n)} = \mathrm{NAV}^{e(n-1)} + \mathrm{Fees}_{e(n)}$$

Each layer inherits exposure from all underlying assets while adding incremental deterministic yield.

## I. Recursive supply collateralization

At layer $n$:

$$A_{t+1}^{e(n)} = A_t^{e(n)} + \Delta A_{\text{mint}}^{e(n)} - \Delta A_{\text{redeem}}^{e(n)}$$

$$C_{t+1}^{e(n)} = C_t^{e(n)} + \phi_m^{e(n)} \Delta A_{\text{mint}}^{e(n)} + \phi_r^{e(n)} \Delta A_{\text{redeem}}^{e(n)}$$

Ensures full collateral coverage at all layers. No leverage is introduced; linear exposure remains intact.

## J. Secondary yield calculation

First-order derivative secondary yield:

$$\mathrm{Yield}t^e = \mathrm{NAV}t^P + \phi_m^e \Delta A_{\text{mint}}^e + \phi_r^e \Delta A_{\text{redeem}}^e$$

Second-order derivative yield:

$$\mathrm{Yield}t^{ee} = \mathrm{NAV}t^e + \phi_m^{ee} \Delta A\mathrm{mint}^{ee} + \phi_r^{ee} \Delta A\mathrm{redeem}^{ee}$$

Recursive yield ensures deterministic, layered accretion.

## K. Deterministic redemption

Redemption formulas:

$$\text{Redeem } eA: \quad P_{\text{returned}} = \text{NAV}_t^e \cdot \Delta A^e (1 - \phi_r^e)$$

$$\text{Redeem } eeA: \quad eP_{\text{returned}} = \text{NAV}_t^{ee} \cdot \Delta A^{ee} (1 - \phi_r^{ee})$$

Ensures full collateral return minus protocol fees, preserving monotonic NAV for remaining holders.

## L. NAV monotonicity proof

Given $\phi_m, \phi_r \geq 0$, supply non-negative:

$$C_{t+1} \geq C_t, \quad A_{t+1} \geq 0$$

$$\Rightarrow \text{NAV}t + 1 = \frac{Ct + 1}{A_{t+1}} \geq \text{NAV}_t$$

Monotonicity is mathematically guaranteed for all derivative layers.

## M. Recursive accretion formula

For derivative of order $n$:

$$\text{NAV}t + 1^{e^{(n)}} - \text{NAV}0^{e^{(n)}} = \sum i = 1^n (\phi_m^{e^{(i)}} \Delta A\text{mint}^{e^{(i)}} + \phi_r^{e^{(i)}} \Delta A_{\text{redeem}}^{e^{(i)}})$$

Defines layered accumulation of deterministic yield from all underlying assets.

## N. Generalization to n-th order

Define $n$-th order derivative recursively:

$$e^{(0)} = P, \quad e^{(n)} = \text{Deposit}(e^{(n-1)}) \to \text{Mint } e^{(n)}$$

$$C_{t+1}^{e^{(n)}} = C_t^{e^{(n)}} + \phi_m^{e^{(n)}} \Delta A_{\text{mint}}^{e^{(n)}} + \phi_r^{e^{(n)}} \Delta A_{\text{redeem}}^{e^{(n)}}$$

$$\text{NAV}t + 1^{e^{(n)}} = \frac{Ct + 1^{e^{(n)}}}{A_{t+1}^{e^{(n)}}} \geq \text{NAV}_t^{e^{(n)}}$$

This provides a formal, recursive definition for derivatives of any order, allowing theoretically infinite, deterministic, multi-layer yield compounding – fully auditable and structurally sound.