# DeFi Options Landscape Report 2025

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**Abstract**

This report provides a comprehensive analysis of the landscape of options for decentralized finance (DeFi) in 2025. It surveys key protocols, evaluates market structure, compares adoption and liquidity trends, and offers strategic insights for institutional investors and retail participants alike.

# Contents

# 1 Scope of This Report

This report provides an overview of the state of the DeFi options ecosystem as of 2025. Our aim is not to replicate the exhaustive annual surveys published by different research firms, but rather to deliver an institutional-grade perspective focused on:

1. **Market Overview:** Adoption, liquidity, and volume trends relative to centralized options markets.
2. **Key Protocols:** In-depth architectural and comparative analysis of leading on-chain options protocols examining their design paradigms, liquidity structures, and trade-offs across AMM, vault, and orderbook models.
3. **Strategic Implications:** How institutional players, DAO treasuries, and liquidity providers can integrate DeFi options into their strategies.
4. **Lessons:** The evolution of DeFi options has been defined by iterative experimentation; each success and failure contributing to a deeper understanding of liquidity design, risk management, and user behavior.
5. **Future Outlook:** Exploration of emerging trends shaping the next cycle of DeFi options, including cross-chain interoperability, collateral innovation through restaking and RWAs, and the gradual convergence with institutional-grade derivatives infrastructure.

By combining rigorous quantitative analysis with strategic commentary, we aim to provide a report that is accessible to a broad audience, from crypto-native traders to institutional investors exploring exposure to DeFi derivatives.

# 2 Introduction

## 2.1 Background and Motivation

Options are among the most fundamental derivatives in financial markets. In Traditional Finance (TradFi), they serve three primary functions: risk transfer (hedging), capital efficiency, and speculation. The existence of deep and liquid options markets has historically been a prerequisite for the maturation of any asset class: equities, commodities, interest rates, and foreign exchange.

Cryptographic assets are no exception. Over the past five years, centralized exchanges such as *Deribit* (currently the dominant cryptocurrency options exchange, capturing around **80%** of global crypto options trading volume [23]) have facilitated the growth of a **multi-trillion dollar** crypto derivatives market. As of 2023, crypto derivatives represented roughly **75%** of total crypto trading volume, amounting to over **$3 trillion** in notional turnover across centralized exchanges [25].

In 2024, Deribit alone processed approximately **$ 743 billion** in options notional volume [20]. By mid-2025, Bitcoin options open interest on Deribit reached an all-time high of **$ 42.5 billion**, with major monthly expiries exceeding **$ 14–15 billion** in notional value [21, 22]. Daily BTC and ETH options trading volumes on Deribit now regularly surpass **$ 3 billion**, making it the largest venue for crypto options globally. The implied volatility (IV) [24] surfaces derived from these contracts have become a widely referenced measure of sentiment and risk among institutional traders and hedge funds, analogous to volatility indices in traditional finance .

At the macro level, on the other hand, the decentralized finance (DeFi) ecosystem currently holds a total value locked (TVL) of approximately $150 billion (as of late 2025) [18], with daily decentralized exchange (DEX) volumes exceeding $12 billion and perpetual futures trading over $27 billion per day [18].

Within this broader landscape, the DeFi options market represents a smaller but highly specialized segment. It peaked at roughly **$600 million** in TVL during early 2022, reflecting the first wave of structured vaults and AMM-based option protocols [19]. As of late 2025, the aggregate TVL across all on-chain options protocols has stabilized between **$70 million** and **$100 million**. In fact, DeFi has developed rapidly by bringing core market infrastructure on-chain: spot trading through automated market makers (AMMs), perpetual futures, lending and borrowing protocols, and structured vault products. Yet, a comprehensive and liquid *on-chain options market* has remained elusive. In 2025 reflects a transition from experimental design toward more mature and composable market structures. Protocol architectures have diversified beyond traditional expiry-based models, leading to new paradigms in pricing, liquidity, and hedging mechanics.

### 2.2 Why DeFi Options Matter

On-chain options are not simply a replication of TradFi markets; they embody new design spaces enabled by blockchain infrastructure:

- **Composability:** Options in DeFi can be embedded into vaults, structured products, and DAO treasury strategies with seamless integration.
- **Transparency:** Collateralization, risk exposures, and payoffs are visible on-chain in real time.
- **Innovation in Design:** Protocols have moved beyond the vanilla call/put framework by introducing mechanisms like pooled liquidity, option vaults, and oracle-free perpetual options.
- **Capital Efficiency:** By re-using liquidity across multiple strikes, ranges, or expiries, DeFi protocols seek to solve the fragmentation problem that plagues centralized and on-chain venues alike.

### 2.3 Market Overview in DeFi Options

**Fragmented Liquidity:** Liquidity in crypto is fragmented across many applications and blockchains rather than pooled in a single venue, which weakens pricing and trade execution. Options are no exception. In DeFi, options liquidity remains highly fragmented across protocols, maturities, and strikes. This is one of the key bottlenecks preventing DeFi options markets from matching CeFi efficiency.

Vault-based systems such as *Stryke* and *Rysk Finance* aggregate capital into standardized, recurring strategies; most commonly covered calls and cash-secured puts; thereby concentrating liquidity around popular strikes and maturities [26, 27]. In contrast, marketplace-style frameworks such as *Premia* and hybrid AMM/orderbook models like *Derive* distribute liquidity thinly across custom parameters, thereby limiting depth and widening bid–ask spreads.

**Capital Concentration:** As of October 2025, the aggregate DeFi options TVL stands at approximately $82 million. As we can see in the table **??**, AMM-based architectures remain dominant, accounting for roughly 62% of total TVL, underscoring their capital efficiency and composability with decentralized exchanges. Hybrid frameworks [1] follow with around 24%, reflecting the growing convergence between automated liquidity provision and orderbook-style execution. Orderbook-based models represent approximately 7% of total value, supported by advances in auction mechanisms and multi-chain settlement design. Vault-based systems comprise about 6%, largely driven by demand for automated yield strategies and retail accessibility. Finally, RFQ-based protocols [2] constitute less than 2% of total TVL, representing the early institutionalization of structured product issuance within the DeFi options market.

[1] Hybrid frameworks blend automated market maker (AMM) mechanics such as Uniswap v3's concentrated liquidity model [1] with orderbook-like or vault-based execution layers, as in Panoptic's perpetual options architecture [2].

[2] RFQ (Request-for-Quote) systems are inspired by traditional OTC derivatives markets, where quotes are provided off-chain or semi-on-chain to optimize execution for large, structured orders; their on-chain adoption in DeFi remains in an early stage.

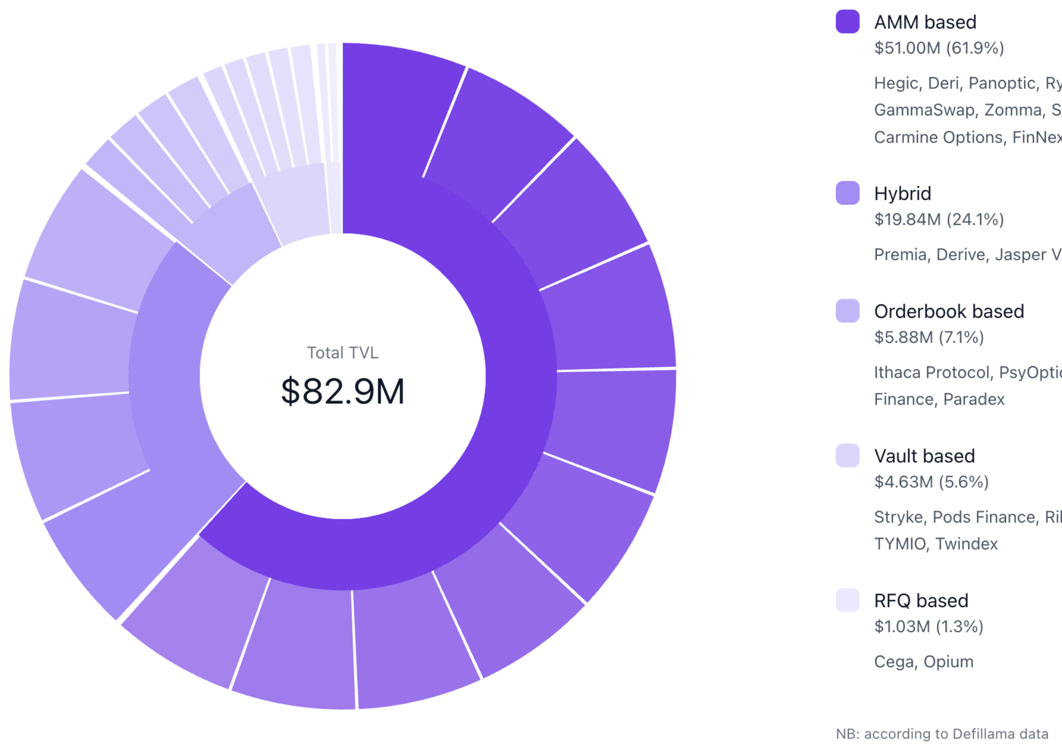


Figure 1: DeFi options TVL by design category (Late 2025, 24 protocols)

**Trading Volumes:** Aggregate daily volume across DeFi option protocols fluctuates between $50–100 million, occasionally tripling during volatility events such as ETH network upgrades or macro-driven volatility spikes (e.g., Bitcoin ETF approvals). Though still minor compared to perpetual futures markets ($20–30 billion per day), these volumes demonstrate growing user persistence despite structural frictions like higher spreads and limited margin efficiency.[3]

**Market Depth and Execution Quality:** Execution quality varies widely by design. AMM-based models such as *Lyra (Derive)* enable tighter quotes, with slippage near **1–1.5%** for $500k near-the-money ETH trades. This estimate follows from the standard price impact relation

$$\text{Slippage} \approx \frac{Q}{2L},$$

where $Q$ is the trade size and $L$ the effective liquidity depth at the quoted strike. For typical Uniswap v3 ETH/USDC 5bps pools, $L \approx 20-25$ million USD, yielding a slippage of roughly $1-1.5\%$ for $Q = 500{,}000$. These levels are consistent with observed depths on Derive's hybrid AMM and Panoptic's range-based option replication design.[4] Deep out-of-the-money strikes or thin expiries can experience slippage exceeding **5%**, as effective liquidity depth ($L$) at those regions often falls below $5 million. Given a trade size of $Q = \$500{,}000$, the standard impact relation Slippage $\approx Q/(2L)$ implies a 5% deviation.

## 2.4 User Adoption: Retail vs Institutional

User adoption of DeFi options has so far been primarily retail driven. Options vaults, which package strategies into deposit and forget products, have attracted thousands of wallets seeking yield enhancement without actively managing Greeks or execution. This behavior has positioned options less as hedging instruments and more as passive income tools in the current market cycle.

At the same time, early signs of institutional participation are beginning to emerge. Crypto native hedge funds and DAO treasuries are increasingly exploring DeFi options as instruments for portfolio

[3] Coindesk: Derive Protocol Crosses $100M TVL, 2024.

[4] See Derive Protocol Insights, 2024; Uniswap Pool Analytics, 2025.

hedging, treasury risk management, and structured yield generation. This shift suggests a gradual transition from speculative retail usage toward more deliberate, risk aware adoption, although institutional involvement remains limited relative to centralized derivatives markets.

Two dynamics are noteworthy:

- **Retail growth:** Vault protocols like Polynomial have demonstrated product-market fit, attracting capital by lowering complexity for end-users.
- **Institutional entry:** DAO treasuries and funds increasingly consider options as risk management tools, particularly for downside hedging of native token holdings. Panoptic's perpetual design, in particular, appeals to institutions seeking scalable hedging without liquidity fragmentation across expiries.

### 2.5 Comparison with CeFi Options

The contrast with centralized exchanges such as Deribit is stark. Deribit dominates the global crypto options market, clearing more than $20 billion in notional options volume daily, with BTC and ETH representing over 90% of activity. By comparison, DeFi options currently represent less than 1% of CeFi options volume.

Several structural factors explain this gap:

- **Depth and Liquidity:** Centralized exchanges (CeFi) such as *Deribit* concentrate liquidity into a small set of standardized option contracts, primarily on BTC and ETH, with common weekly or monthly expiries and tightly spaced strikes. This concentration supports deep order books, often reaching tens of millions of dollars in notional per strike, and enables highly efficient price discovery supported by professional market makers [20, 17].

  In contrast, liquidity in DeFi options markets remains fragmented across protocols, strikes, and expiries. Each protocol operates its own isolated liquidity pools or quoting mechanisms without shared margining or cross protocol clearing. As a result, depth is dispersed and limited at the individual strike level, execution quality deteriorates for moderate trade sizes, and effective transaction costs remain materially higher than in centralized venues.
- **Execution Quality:** Deribit and CME offer near-instant orderbook execution, while DeFi trades often incur slippage, gas costs, and confirmation delays.
- **Collateral Efficiency:** CeFi platforms allow cross-margining across instruments, whereas most DeFi protocols still silo collateral per strategy or pool.

Nevertheless, DeFi options offer *unique advantages* relative to CeFi: they are permissionless, transparent, and composable with the broader DeFi stack. As capital efficiency improves and protocols reduce fragmentation by removing expirations, the gap between DeFi and CeFi options is expected to narrow. Institutional adoption will likely accelerate once collateral efficiency and execution depth reach competitive levels.

# 3 Key Protocols and Designs

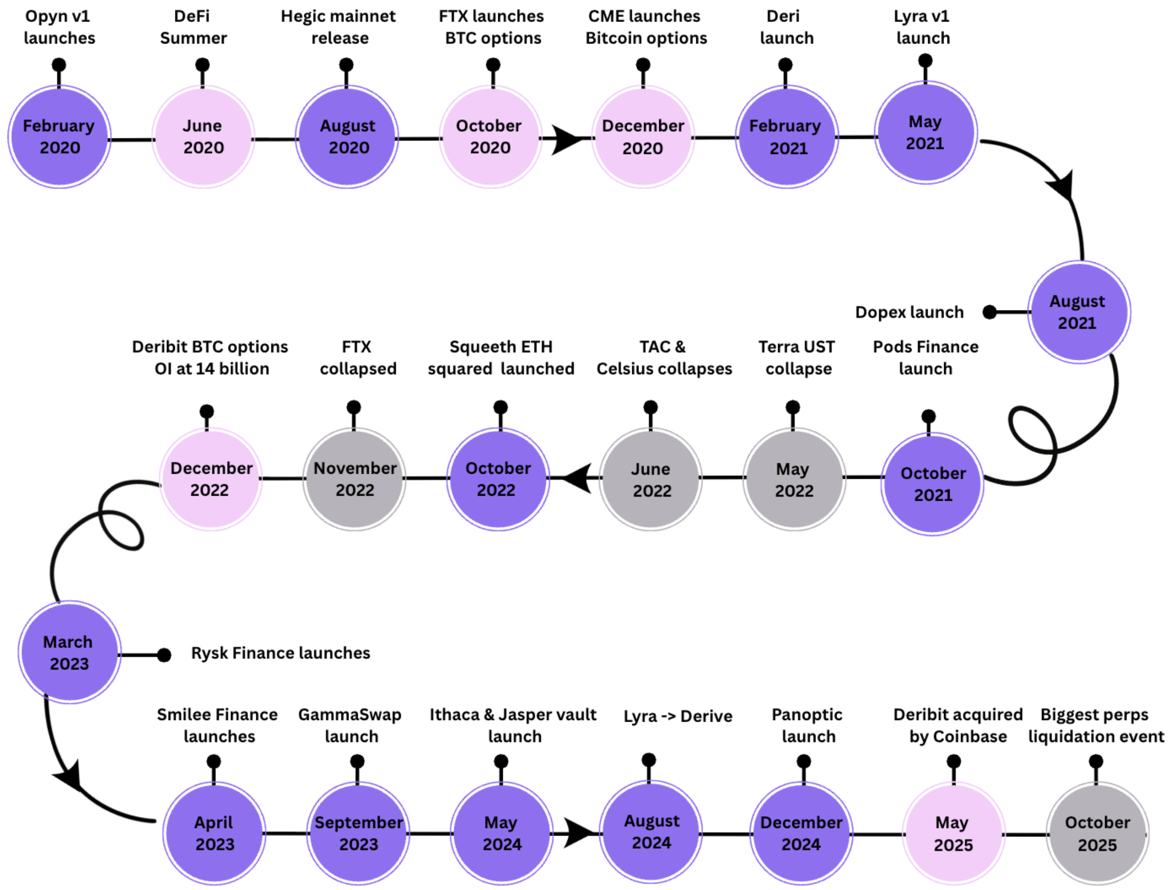


Figure 2: Chronology of Key Developments in On-Chain/Off-Chain Options (2020–2025)

To provide a rigorous yet non-redundant analysis of the decentralized options landscape, six protocols were selected for in-depth study based on their representativeness, technical distinctiveness, and market relevance. These include Rysk Finance, Derive, GammaSwap, Panoptic, Ithaca Protocol, and Cega Finance. Together, they account for the majority of on-chain options liquidity and encompass the full spectrum of design paradigms, ranging from oracle-free perpetual AMMs and automated vault strategies to hybrid margin systems, volatility-meta frameworks, auction-based clearing mechanisms, and RFQ-driven structured-product markets. This selection enables a comparative architectural analysis that captures both the evolutionary trajectory and the functional diversity of DeFi options protocols as of late 2025.

### 3.1 Rysk Finance: Vault-Based Covered Calls and Structured Yield Exposure

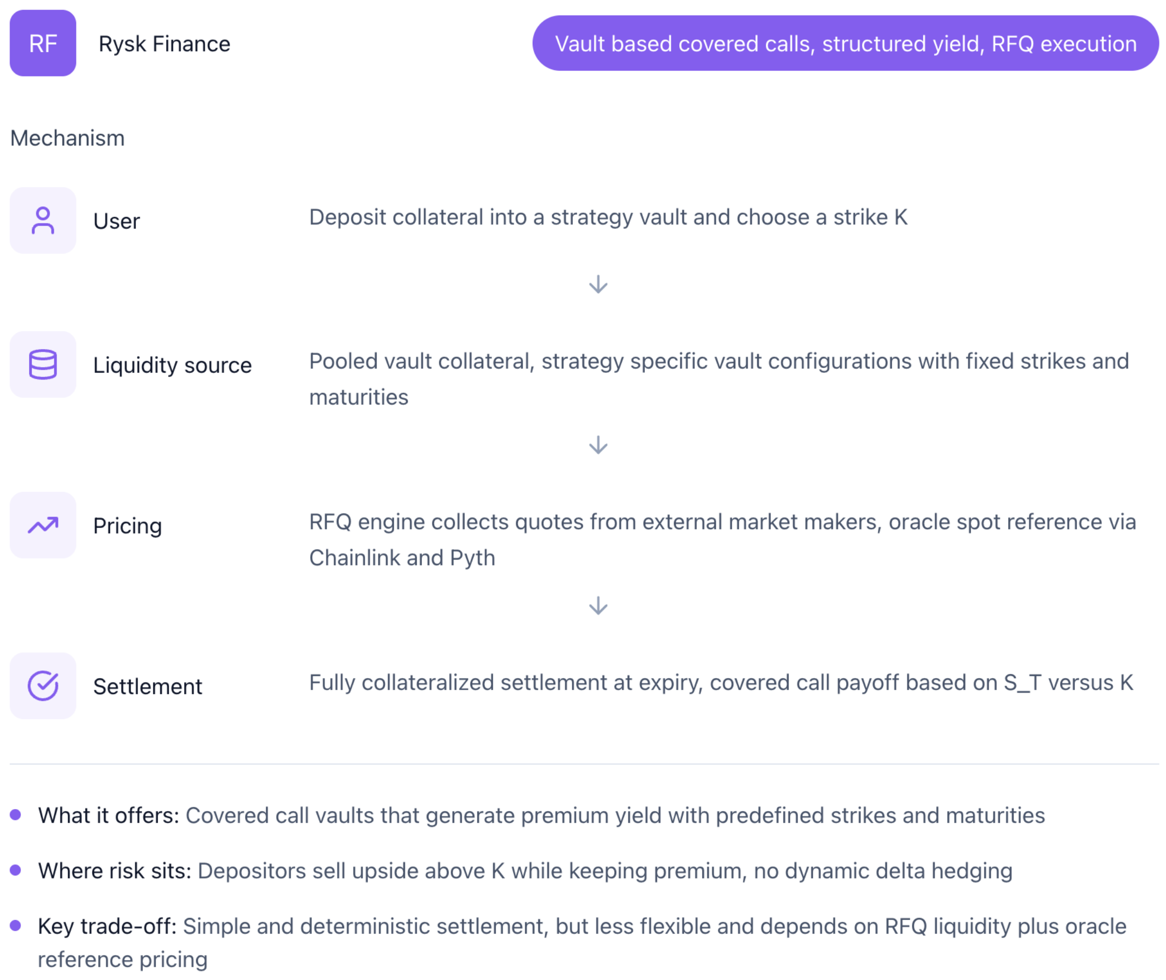


Figure 3: A little simple overview of Rysk Finance protocol.

Rysk Finance adapts traditional option selling strategies to DeFi through a vault based framework, with its primary product being the *HYPE* vault. Rather than offering generic asset agnostic vaults, Rysk focuses on covered call strategies deployed on HyperEVM, where collateral is denominated in chain native wrapped assets such as *UETH* for Ethereum exposure and *UBTC* for Bitcoin exposure. User deposits are aggregated into strategy specific vaults with predefined strikes and maturities, generating yield from call option premiums while maintaining full collateralization and deterministic on chain settlement

**Mechanism Overview.** Users deposit collateral and select a target strike price $K$ representing the level at which they are willing to sell the underlying. The vault then issues and sells corresponding covered call options via integrated liquidity providers using a request-for-quote (RFQ) mechanism. Depositors receive upfront premiums $\Pi_{\text{premium}}$ in stablecoins, which represent their share of option sale proceeds. At expiry, payoffs follow the standard covered call structure:

- If $S_T < K$: the option expires worthless, and depositors retain both their collateral and the premium.
- If $S_T \geq K$: the collateral is sold at $K$, and depositors keep the premium but forgo further upside.

The resulting portfolio value at expiry is:

$$V_T = S_T - \max(0, S_T - K) + \Pi_{\text{premium}},$$

where $S_T$ is the underlying price and $\Pi_{\text{premium}}$ is the received premium. This converts directional exposure into a yield-enhancing position, limiting upside beyond the strike but cushioning downside through income accrual.

**Pricing and Execution.** Option premiums are determined by volatility and market depth rather than arbitrary parameters. Rysk's RFQ engine collects quotes from external market makers and utilizes oracle price feeds (via Chainlink and Pyth) to determine reference spot levels and settlement prices. The pricing logic broadly aligns with Black–Scholes sensitivities:

- Higher volatility ($\sigma$) increases premium income,
- Longer maturities ($T$) enhance time value,
- Lower strikes ($K$) boost premium yield but raise the probability of assignment.

All positions are fully collateralized and settled automatically on-chain at vault expiry. Unlike AMM-based designs, Rysk does not perform dynamic delta-hedging; vault performance is path-independent until maturity.

**Structural Features and Use Cases.** Rysk implements covered call strategies through strategy specific vaults rather than a generalized yield overlay. Deposits are aggregated into predefined vault configurations with fixed strikes and maturities, and collateral is denominated in chain native wrapped assets such as UETH and UBTC. This design makes Rysk suitable for DAOs and treasuries seeking predictable, non emission based yield from option premia, with full collateralization and deterministic on chain settlement. In practice, Rysk represents a structured vault based approach that encodes traditional covered call strategies directly into transparent and auditable smart contracts.[5]

### 3.2 Derive: AMM-Based European Options with SVI Volatility Surfaces

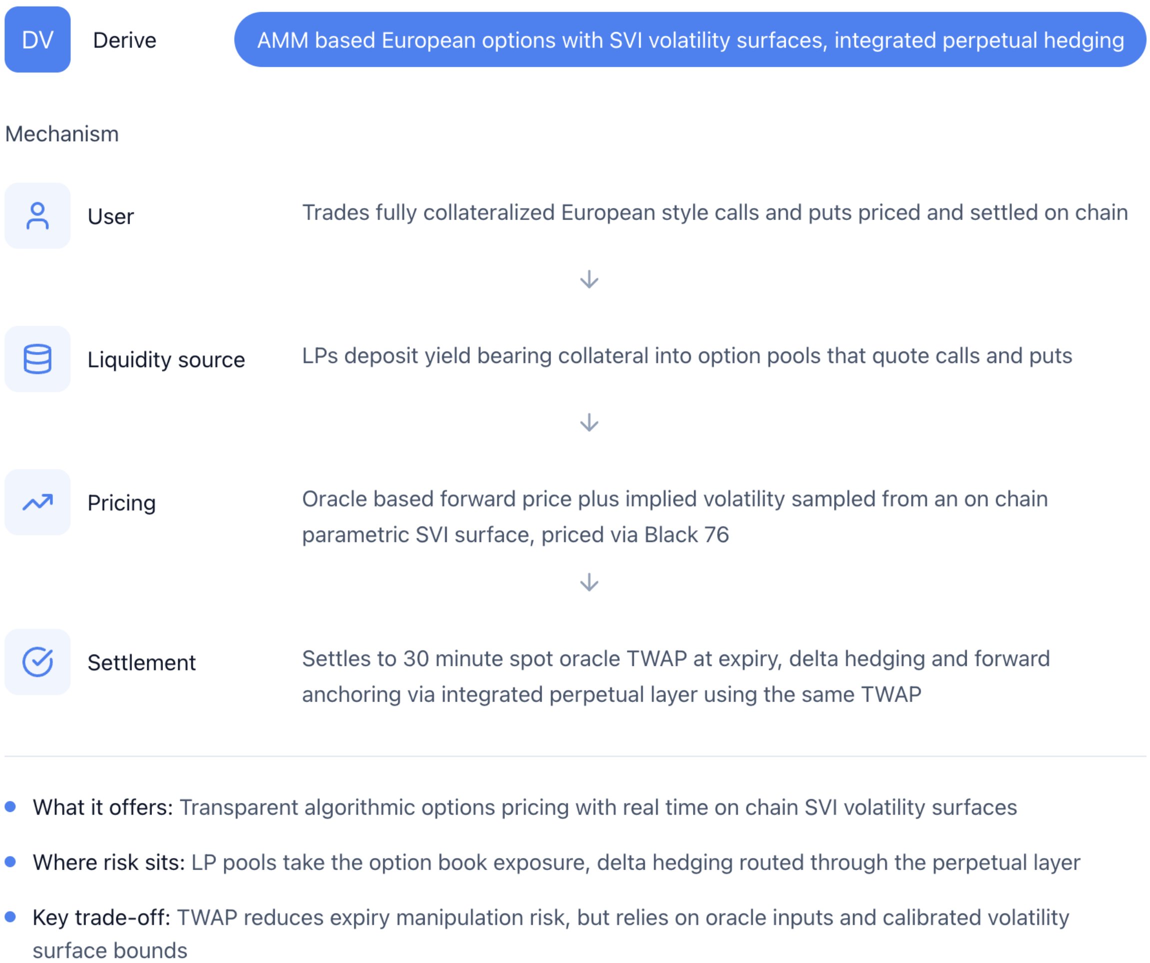


Figure 4: A little simple overview of Derive protocol.

[5] Rysk Finance Documentation, 2024.

Derive extends the on-chain automated market maker (AMM) architecture originally named Lyra, offering fully collateralized European-style options with dynamic volatility surfaces, TWAP-based settlement, and integrated perpetual hedging. Each options market is priced and settled directly on-chain using the *Black–76* [6] model, with implied volatilities derived from a parametric SVI (Stochastic Volatility Inspired) surface. This framework enables transparent, algorithmic option pricing that adjusts continuously to market conditions.

**Mechanism Overview.** Derive's AMM continuously quotes option prices by reading the oracle-based forward price of the underlying asset and sampling the appropriate implied volatility from the SVI surface. Liquidity providers (LPs) deposit yield-bearing collateral into option pools, which quote both calls and puts through a smart-contract pricing engine. Option valuation follows the *Black–76* forward-pricing formula:

$$C(F_t, K, \sigma, T) = e^{-rT}\left[F_t N(d_1) - K N(d_2)\right],$$

where:

- $F_t$ is the forward price of the underlying asset,
- $K$ is the strike price,
- $\sigma$ is the implied volatility drawn from the SVI curve,
- $T$ is the time to expiry,
- and $r = 0$ in Derive's on-chain configuration (no risk-free yield assumption).
- and $d_1, d_2$ are standardized variables representing how far the forward price is from the strike, adjusted for time and volatility. They define the probabilities (under the model) that the option will expire in the money.

The SVI model describes how implied volatility changes across different strike prices and maturities:

$$w(k) = a + b\Big[\rho(k - m) + \sqrt{(k - m)^2 + \sigma^2}\Big],$$

where $w(k) = \sigma_{\text{imp}}^2 T$ is total variance, and parameters $a, b, \rho, m, \sigma$ define the curve's shape. This ensures that volatility behaves smoothly across strikes and prevents arbitrage between options.

All options are settled to the 30-minute time-weighted average price (TWAP) of the spot oracle, reducing manipulation risk around expiry. Delta hedging and forward price synchronization are managed through Derive's perpetual layer, which references the same TWAP between spot and perpetual marks.

**Pricing Intuition.** Derive prices options using the same principles that traditional exchanges rely on, but executes them transparently through smart contracts. In simple terms, the model asks three key questions: (1) How far is the forward price $F_t$ from the strike $K$? (2) How much time $T$ is left until expiry? (3) How volatile is the asset expected to be ($\sigma$)? If there is more time or higher volatility, the option becomes more valuable, since the chance of the price moving beyond the strike increases.

The SVI surface used by Derive acts like a "map" of expected volatility across all strikes and maturities. It updates dynamically as market conditions change, allowing the AMM to quote realistic prices that reflect trader sentiment and demand for protection or exposure. To prevent extreme or unrealistic quotes, the surface is bounded within a controlled range and flattened beyond its limits, ensuring stability and arbitrage-free pricing.

By blending these elements: the forward price, time to expiry, and implied volatility, Derive's system computes an option's fair value at any given moment. Because all inputs and calculations occur on-chain, traders and liquidity providers can verify every price, hedge, and settlement outcome transparently. In effect, Derive automates the pricing logic of a traditional derivatives exchange while maintaining the trustless, programmatic nature of decentralized finance.

[6] The *Black–76* model, introduced by Fischer Black (1976), is a variation of the Black–Scholes model used for pricing European options on forward or futures contracts rather than spot assets. It replaces the spot price $S_t$ with the forward price.

**Institutional Relevance.** Derive's architecture bridges professional derivatives infrastructure and on-chain transparency:

- Implements the *Black–76* model with real-time, on-chain SVI volatility surfaces.
- Uses TWAP oracles (30-minute windows) to reduce manipulation risk at expiry.
- Integrates with perpetual markets for continuous delta hedging and forward-price anchoring.
- Supports yield-bearing collateral and margin-based leverage for LPs.

These mechanisms make Derive one of the most transparent and capital-efficient frameworks for on-chain options pricing, offering institutions a familiar yet fully decentralized environment to trade volatility and manage structured risk exposure.

### 3.3 GammaSwap: Perpetual Options via Borrowed AMM Liquidity

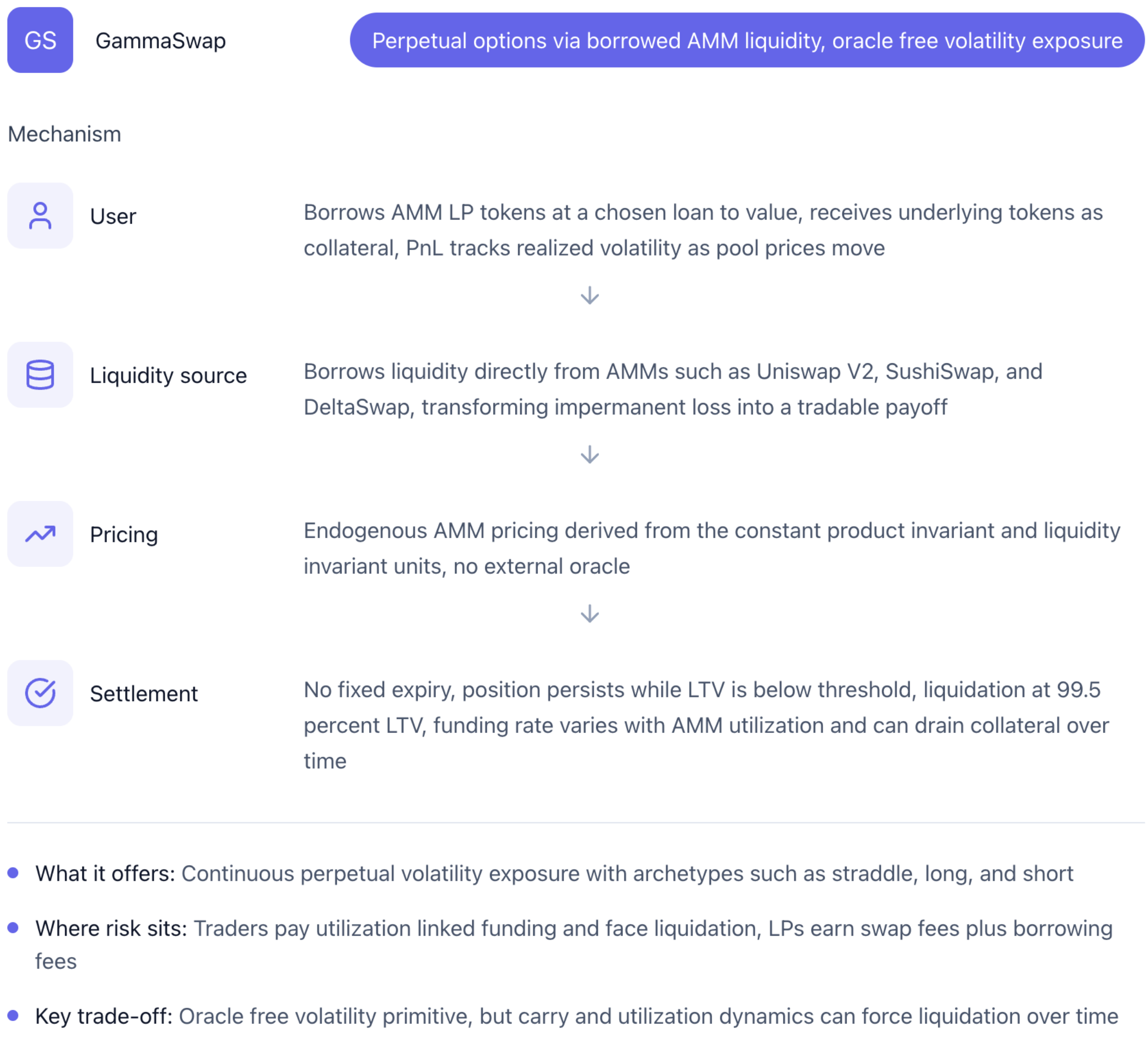


Figure 5: A little simple overview of Gammaswap protocol.

GammaSwap introduces a class of perpetual, non-synthetic options constructed directly from Automated Market Maker (AMM) liquidity. Unlike traditional DeFi options, which rely on oracle feeds or dated expiries, GammaSwap generates continuous volatility exposure by *borrowing liquidity* from AMMs such as Uniswap V2, SushiSwap, and DeltaSwap, effectively transforming impermanent loss into a tradable option payoff.

**Mechanism Overview.** A trader opens a position by borrowing LP tokens at a specified loan-to-value (LTV) ratio, receiving the underlying tokens as collateral. As pool prices fluctuate, the collateral value changes relative to the borrowed amount, generating a profit or loss proportional to realized volatility. The position is maintained as long as the LTV remains below the liquidation threshold:

$$LTV = \frac{D_t}{C_t}, \qquad \text{liquidation occurs when } LTV \geq 99.5\%.$$

Borrowers pay a dynamic funding rate linked to AMM utilization, with rate tiers that increase with volatility and pool usage:

$$r_t = \begin{cases} r_{\text{base}} + \frac{u_t}{u^*} \cdot s_1, & u_t \leq u^* \\ r_{\text{base}} + s_1 + \frac{u_t - u^*}{1-u^*} \cdot s_2, & u_t > u^* \end{cases}$$

where $u_t$ is the utilization rate, $u^*$ the optimal utilization, and $s_1, s_2$ represent slope coefficients calibrated to volatility. This dynamic interest model ensures bounded risk, capping borrowing rates at 1500% APY under extreme conditions.

**Option Structure.** GammaSwap supports three canonical position archetypes:

- **Straddle:** A delta-neutral configuration with balanced collateral (50:50), designed to capture pure volatility.
- **Long:** Collateral skewed toward the volatile asset, replicating a call-like payoff.
- **Short:** Collateral skewed toward the stable asset, mirroring a short volatility or put-like payoff.

Each position dynamically adjusts its delta exposure as AMM prices evolve, enabling continuous volatility capture without expiry.

**Mathematical Intuition.** At the core of GammaSwap lies the AMM invariant $x_t y_t = k$, which defines the pool's constant product curve. When a trader borrows LP tokens, their exposure is equivalent to a leveraged position on the AMM's *liquidity invariant units* (LIUs), defined as:

$$LIU_t = \sqrt{x_t y_t}.$$

The profit and loss of a GammaSwap position evolves as:

$$\text{PnL}_t = \text{Notional} \times (\Delta p_t - \text{Borrow Fees}),$$

where $\Delta p_t$ captures the relative change in AMM price. Unlike perpetual futures, where liquidation is price-triggered, GammaSwap positions are *time-limited*—liquidation occurs when cumulative funding drains collateral over time.

**Liquidity Provider Model.** Liquidity providers (LPs) earn both swap fees and borrowing fees, with the total yield expressed as:

$$r_{\text{LP}} = (1 - u_t) r_{\text{swap}} + u_t r_{\text{borrow}},$$

where $r_{\text{swap}}$ is the AMM fee yield and $r_{\text{borrow}}$ the rate charged to traders. This dual-yield structure aligns LP returns with volatility, as rising pool activity (and hence volatility) increases both utilization and borrowing demand.

**Institutional and Architectural Relevance.** GammaSwap introduces a novel intersection between liquidity provision and volatility trading by:

- Converting impermanent loss into an explicit, tradeable volatility instrument;
- Eliminating oracle dependencies via endogenous AMM pricing;
- Providing continuous, perpetual option exposure through liquidity borrowing;
- Offering LPs risk-adjusted returns that scale with volatility regimes.

Through this framework, GammaSwap establishes a new perpetual derivative primitive—*perpetual gamma exposure*—bridging spot AMMs and volatility markets in a self-contained, oracle-free architecture.[7]

[7] GammaSwap Protocol Documentation, 2024; DeFiLlama: GammaSwap Overview, 2025.

## 3.4 Ithaca Protocol: Auction-Based Options and Portfolio-Level Collateral Optimization

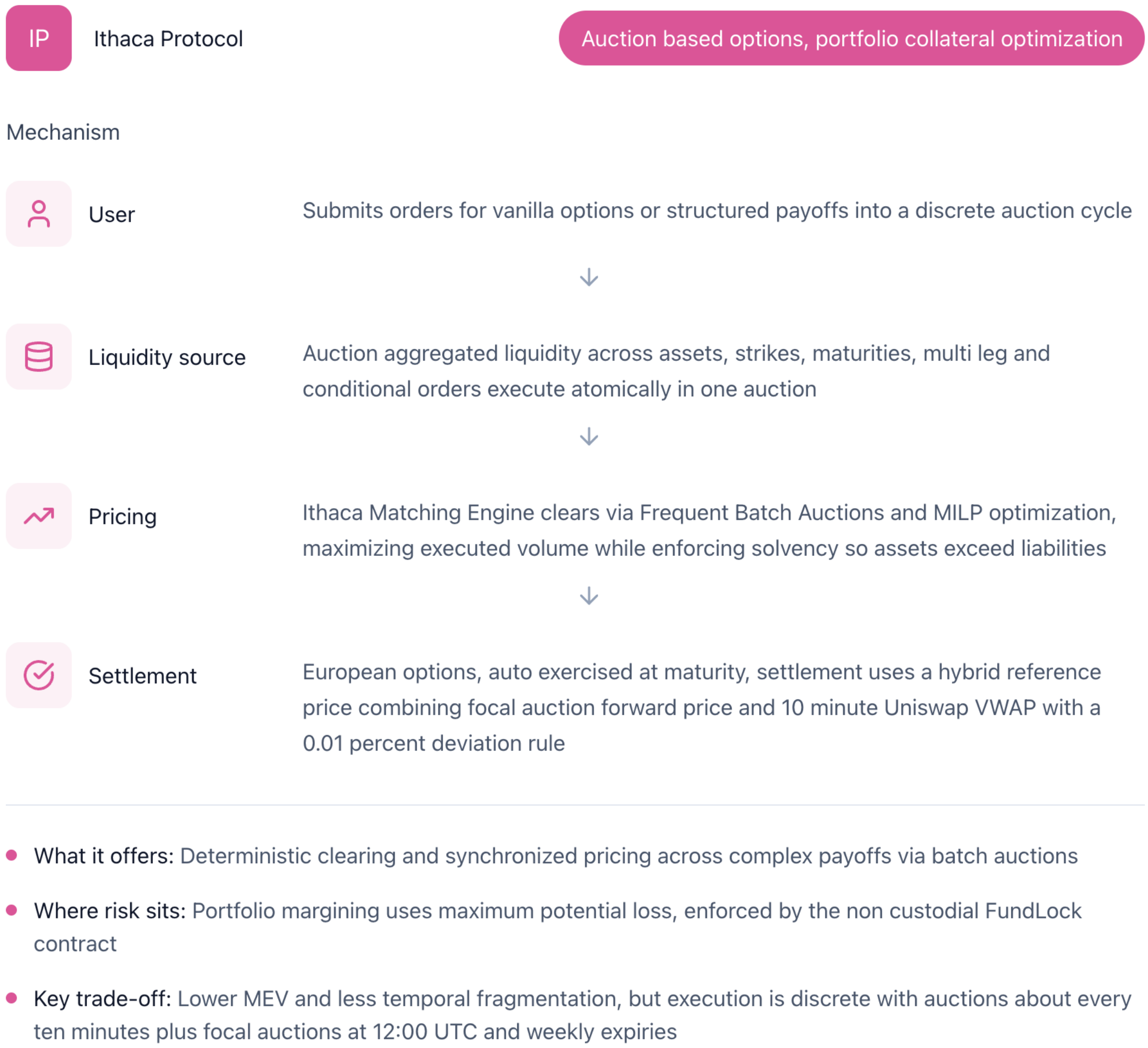


Figure 6: A little simple overview of Ithaca protocol.

Ithaca Protocol establishes a new framework for on-chain derivatives built around an **auction-based** and **portfolio-collateralized** architecture. Departing from continuous AMM or orderbook designs, Ithaca employs discrete-time clearing cycles to optimize execution and maintain systemic solvency. Its core innovation lies in combining *Frequent Batch Auctions (FBA)* with *Mixed Integer Linear Programming (MILP)* optimization, achieving provably riskless clearing across multiple assets, strikes, and maturities [28].

**Mechanism Overview.** At the center of the protocol is the **Ithaca Matching Engine (IME)**, which consolidates all submitted orders—ranging from vanilla options to structured payoffs—into a single optimization problem. During each auction, the IME determines clearing prices and allocations that maximize executed volume while satisfying risk and solvency constraints. This ensures that the total asset side always exceeds liabilities, preserving full collateralization.

Every derivative in Ithaca is decomposed into atomic *Risk Sharing Building Blocks (RSBBs)* such as forwards, European calls, and binaries. These primitives can be recombined to construct complex payoffs and structured products within the same clearing cycle. The MILP formulation maximizes filled volume subject to solvency:

$$\max_{\mathbf{q}} \sum_i q_i \quad \text{s.t.} \quad A\mathbf{q} \leq \mathbf{b}, \quad q_i \in \{0, 1\},$$

where $A$ encodes risk and collateral constraints and $\mathbf{b}$ represents available margin.

**Portfolio Collateral Optimization.** Ithaca's margining engine evaluates collateral at the **portfolio level**, computing exposure as the maximum potential loss across all user positions. This allows cross-offsetting of correlated payoffs and greater capital efficiency compared with per-position collateral models used in AMM-based protocols. Collateral and settlement are managed by the non-custodial *FundLock* contract, which escrows user balances and enforces margin requirements trustlessly.

**Auction and Execution.** Ithaca replaces continuous pricing with discrete **Frequent Batch Auctions**, running approximately every ten minutes, with focal auctions at 12:00 UTC and at weekly expiries. Each auction aggregates liquidity across products to determine a single clearing price per underlying, mitigating *MEV* risk and temporal fragmentation. Multi-leg and conditional orders—spreads, straddles, or structured payoffs—are executed atomically within a single auction, ensuring fair and synchronized pricing. Institutional market makers are incentivized to quote during focal auctions, enhancing depth and reducing bid–ask spreads.

**Settlement and Reference Pricing.** All Ithaca options are **European-style** and automatically exercised at maturity. Settlement references a hybrid price combining focal auction and AMM data:

$$P_{\text{ref}} = \begin{cases} P_{\text{auction}}, & \text{if } |P_{\text{auction}} - P_{\text{vwap}}| < 0.01\% \\ P_{\text{vwap}}, & \text{otherwise,} \end{cases}$$

where $P_{\text{auction}}$ is the focal auction forward price and $P_{\text{vwap}}$ is the 10-minute Uniswap VWAP. This hybrid system minimizes oracle manipulation while maintaining transparent on-chain price discovery.

**Institutional Relevance.** Ithaca integrates **auction-theoretic clearing**, **portfolio margining**, and **cross-chain interoperability** into a unified derivatives infrastructure. By concentrating liquidity in discrete auctions rather than continuous AMM pools, it achieves higher execution efficiency, lower oracle dependence, and deterministic clearing. This model positions Ithaca as a foundational layer for institutional and DAO treasuries seeking transparent, netted, and capital-efficient exposure to options and structured payoffs.[8]

[8] Ithaca Protocol Documentation, 2025; DeFiLlama: Ithaca Protocol Overview, 2025.

### 3.5 Cega Finance: On-Chain Exotic Structured Products and Fixed Coupon Notes


Figure 7: A little simple overview of Cega Finance protocol.

Cega Finance extends DeFi options beyond standard calls and puts by introducing tokenized, path-dependent structured products. Its architecture brings exotic payoff engineering (long familiar to traditional structured-product desks) directly on-chain, enabling users to capture yield from volatility via transparent and automated smart contracts. Cega's flagship product, the *Fixed Coupon Note (FCN)*, replicates the payoff profile of equity-linked notes widely used in private banking and structured yield products in traditional finance [**?**].

**Mechanism Overview.** Cega vaults pool user deposits and deploy capital into multi-leg option structures executed with professional market makers off-chain. Each vault cycle is defined by parameters such as the underlying asset (e.g., ETH, BTC), coupon rate $c$, observation frequency, and lower and upper barrier levels $(L, U)$. The FCN structure pays a fixed coupon provided that the underlying price $S_t$ remains within the specified price corridor throughout the investment horizon $T$. If the lower barrier is breached, the note "knocks in," converting the investor's position into a short put payoff at expiry.

Formally, the terminal payoff is expressed as:

$$P_T = c \cdot \mathbb{1}_{\{S_t \in [L,U], \forall t \le T\}} + \min(S_T, K),$$

where:

- $S_t$ is the price of the underlying at time $t$,
- $K$ is the strike price,

- $c$ is the fixed coupon rate,
- $[L, U]$ denotes the monitored price corridor.

The first term represents the fixed coupon contingent on barrier survival, while the second term determines settlement in the event of a knock-in scenario.

**Mathematical Intuition.** Cega's pricing engine evaluates the expected discounted value of the path-dependent payoff via Monte Carlo simulation:

$$V_0 = e^{-rT}\,\mathbb{E}\big[P_T(S_t, \omega)\big],$$

where $r$ is the risk-free rate and $\omega$ represents stochastic paths of the underlying. This approach integrates continuous monitoring of barriers and binary coupon outcomes, resulting in a hybrid payoff combining:

1. a *digital coupon leg*, which pays $c$ conditional on the survival of the barrier event, and
2. a *short put leg*, activated upon lower barrier breach, capturing downside risk.

Thus, the FCN payoff structure can be viewed as a convex combination of digital and vanilla option payoffs. Cega's model targets positive yield in low-to-moderate volatility regimes—precisely where directional option strategies struggle to maintain profitability.

**Liquidity Architecture and Market Structure.** Cega's smart contracts tokenize each FCN vault cycle as an ERC-20 receipt token, enabling composability with secondary DeFi markets. Market makers provide option legs and hedging off-chain through centralized venues, while vault participants supply on-chain capital. This design bridges professional derivatives infrastructure with retail DeFi access, preserving pricing integrity through bilateral market maker partnerships.

Each FCN vault cycle typically spans 2–4 weeks, with coupon rates dynamically adjusted based on implied volatility and barrier distance. As volatility rises, coupons increase due to the higher premium embedded in the short put component, mirroring risk-reward calibration in traditional structured notes.

**Institutional Relevance.** Cega's contribution lies in translating the complex payoff logic of structured yield products into a composable DeFi primitive. Its main innovations include:

- **Yield efficiency:** Fixed coupons are sourced from volatility spreads, producing returns that outperform spot lending and staking under stable market conditions.
- **Transparency:** Vault parameters like coupon rates, barrier levels, and maturities are auditable and encoded on-chain.
- **Institutional bridge:** Risk transfer is achieved between professional market makers (hedging off-chain) and retail DeFi investors (earning on-chain coupons).

Although Cega has since sunset operations following its acquisition, its design pioneered the on-chain tokenization of path-dependent payoffs and validated that exotic derivatives could be decentralized while maintaining institutional-grade risk management.[9]

[9] Cega Finance Documentation, 2024; DeFiLlama: Cega Finance Overview, 2025.

### 3.6 Panoptic: Perpetual, Oracle-Free Options on Uniswap v3 Liquidity

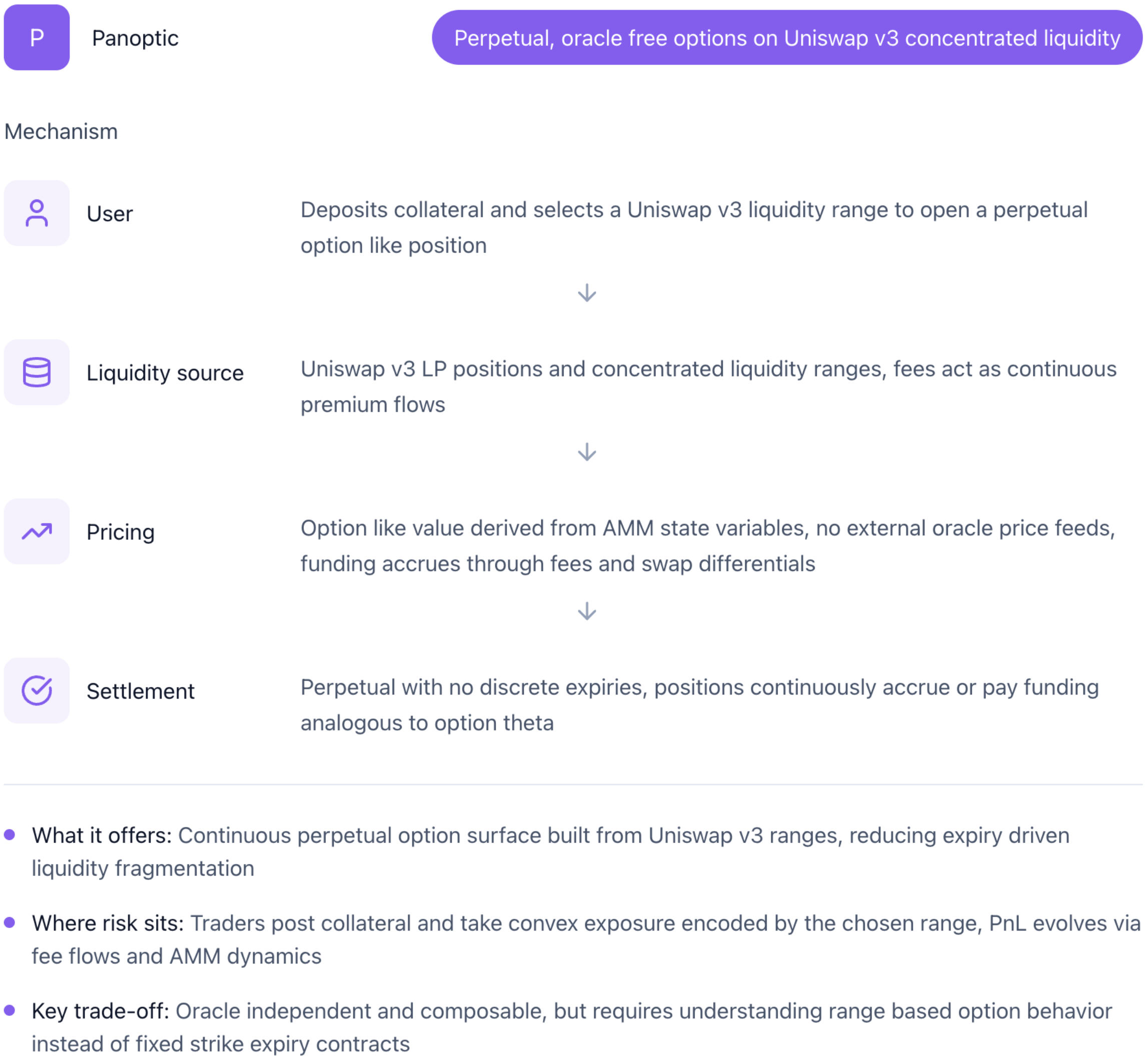


Figure 8: A little simple overview of Panoptic protocol.

Panoptic represents a foundational shift in decentralized derivatives: it introduces a framework for **perpetual, oracle-free options** built directly on top of Uniswap v3's concentrated liquidity model [**?**, 2]. Rather than relying on discrete expiries or external oracles, Panoptic synthesizes continuous option-like payoffs from Uniswap v3 liquidity positions, transforming automated market making into a perpetual option engine. Through this mechanism, any Uniswap LP position can be interpreted as a combination of long and short options, with fees functioning as continuous premium flows.

**Mechanism Overview.** At the core of Panoptic lies the insight that a Uniswap v3 position within a price range $[P_L, P_U]$ behaves like a portfolio of short options whose deltas vary with price. Panoptic formalizes this relationship by allowing traders to open *perpetual option positions* by depositing collateral and selecting liquidity ranges. Each position continuously accrues or pays funding, analogous to option theta, through trading fees and swap differentials.

Given a spot price $S_t$, the liquidity $L$ of a position concentrated in range $[P_L, P_U]$ defines the notional exposure:

$$L = \frac{\sqrt{P_U} - \sqrt{P_L}}{\sqrt{P_U P_L}} \times \text{LiquidityAmount}.$$

This liquidity range effectively encodes an option payoff, where the lower and upper bounds function as strike-equivalent levels.

Panoptic expresses the virtual call and put payoffs of a Uniswap v3 range as:

$$\Pi_{\text{call}}(S_t) = \max(S_t - P_L, 0), \quad \Pi_{\text{put}}(S_t) = \max(P_U - S_t, 0),$$

aggregated across active liquidity ranges. By superposing these positions, Panoptic reconstructs a continuous, perpetual option surface directly from AMM state variables without the need for oracle price feeds.

**Mathematical Intuition.** Panoptic formalizes the instantaneous value of a perpetual option as the differential return of a self-financing strategy on the AMM invariant:

$$V_t = \Delta_t S_t - C_t,$$

where $C_t$ represents the collateral posted by the LP, and $\Delta_t = \frac{\partial V_t}{\partial S_t}$ captures the delta of the virtual option position. The change in value over time follows:

$$dV_t = \Delta_t \, dS_t + \frac{1}{2}\Gamma_t \sigma_t^2 \, dt + \phi_t \, dt,$$

where:

- $\Gamma_t = \frac{\partial^2 V_t}{\partial S_t^2}$ captures convexity derived from the Uniswap liquidity curve,
- $\phi_t$ represents accrued AMM trading fees (interpreted as continuous option premium),
- $\sigma_t$ is the realized volatility of the underlying pool.

This structure yields a perpetual option that continuously earns or pays premiums without expiry or re-minting.

Panoptic's payoff stream is therefore time-unbounded, and the trader's total return can be expressed as:

$$R_t = \int_0^t \left( \Delta_u \frac{dS_u}{S_u} + \phi_u \, du \right),$$

mirroring the continuous compounding of funding in perpetual futures but with second-order (gamma) sensitivity.

**Liquidity and Risk Model.** Each Panoptic position is collateralized in USDC or ETH through a margining mechanism similar to perpetual swaps. Rather than liquidating at fixed strikes, liquidation occurs when the collateral no longer covers the mark-to-market value of the synthetic options portfolio:

$$\text{Health Factor} = \frac{\text{Collateral}}{\text{Notional Exposure}} \leq H^*,$$

where $H^*$ is the protocol-defined liquidation threshold. This mechanism ensures continuous solvency while allowing indefinite holding of option exposure.

LPs in Panoptic effectively earn perpetual option premiums through swap fees and funding differentials, while traders obtain pure volatility exposure (either delta-hedged or directional) without expiry. The system eliminates oracle dependencies entirely by deriving all prices and payoffs endogenously from the Uniswap v3 tick state.

**Innovation and Institutional Relevance.** Panoptic's contribution to the DeFi derivatives landscape is threefold:

- **Oracle-free valuation:** All positions are priced using Uniswap's internal tick and liquidity data, removing oracle manipulation and latency risk.
- **Perpetual exposure:** Options can be held indefinitely, creating a continuous stream of premiums rather than discrete expiries and settlements.

- **Composability:** Built directly on top of Uniswap v3, Panoptic integrates seamlessly with lending, structured yield, and hedging protocols to form higher-order derivatives.

From an institutional standpoint, Panoptic redefines the concept of volatility trading in DeFi. By merging AMM liquidity provisioning with continuous option replication, it establishes a new class of self-funding derivatives that replicate the risk-return dynamics of professional option market making, while remaining entirely on-chain. In doing so, Panoptic advances DeFi toward a more mature and capital-efficient options market, bridging delta-neutral liquidity provision and perpetual volatility exposure within a unified mathematical framework.[10]

[10] Panoptic Whitepaper v1.3.1, Lambert & Kristensen, 2023.

# 4 Other Notable Experiments and Lessons in DeFi Options

| Category | Subcategory | Representative Protocols | Core Function or Mechanism |
|---|---|---|---|
| Option Primitive | Vanilla (European) Options | Hegic, Derive, Opyn, Lien | Standardized European-style call and put options with fixed strike and expiry dates. |
| | Perpetual (Expiryless) Options | Deri, GammaSwap, Panoptic | Continuous funding-based exposure to delta/gamma; no discrete expiry. |
| | Vault-Based / DOV Strategies | Stryke (Dopex), TYMIO, Pods Finance, Ribbon Earn | Automated recurring option-selling vaults that tokenize covered calls, put spreads, and strangles as yield. |
| | Volatility Meta / Structured Yield Products | Rysk Finance | Short-volatility vaults offering customizable strikes; structured yield exposure without continuous hedging. |
| | Structured / Exotic / Clearing Frameworks | Ithaca Protocol, Zomma Protocol, SOFA.org | Auction-based or multi-leg structured product platforms integrating clearing, portfolio margining, or complex payoffs. |
| Execution Model | AMM-Based | Hegic, Derive, Stryke, GammaSwap, Deri, Panoptic, Zomma Protocol | On-chain AMM mechanisms; liquidity pooled via bonding curves or implied-volatility-driven curves. |
| | Orderbook / Auction-Based | Ithaca Protocol | Frequent Batch Auctions (FBA) with MILP optimization; centralized clearing and multi-product matching. |
| | Hybrid / RFQ / Off-chain Matching | Opyn, TYMIO, SOFA.org, Pods Finance | Quote-driven execution or off-chain price discovery with on-chain settlement for improved liquidity and composability. |
| Collateralization and Risk Model | Fully Collateralized | Hegic, Stryke, Lien | One-to-one collateralization ensuring solvency; limited leverage and reduced counterparty risk. |
| | Dynamic / Margined | Derive, Opyn, Deri, Panoptic | Margin-based systems supporting dynamic rebalancing; continuous mark-to-market margining. |
| Oracle Dependence | Oracle-Free (Endogenous Pricing) | Panoptic, GammaSwap | Endogenous AMM pricing based on Uniswap pool state or LP invariant; eliminates oracle manipulation risk. |
| | Oracle-Dependent | Derive, Opyn, SOFA.org, Ithaca Protocol, Rysk Finance | Relies on external data feeds (Chainlink, Pyth) or off-chain reference prices for strike and settlement valuation. |
| Settlement Horizon | Dated (European Style) | Hegic, Derive, Stryke, TYMIO, Pods Finance, Ithaca Protocol | Discrete expiry cycles with auto-exercise or vault rollover at maturity. |
| | Expiryless (Perpetual Style) | Panoptic, GammaSwap, Deri | Perpetual streaming payoffs with continuous funding and no time decay. |
| Liquidity and Underwriting Source | Retail LP Pools | Hegic, Derive, GammaSwap, Stryke, Zomma Protocol | Permissionless retail liquidity underwriting options risk directly on-chain. |
| | Institutional / Off-Chain Market Makers | Opyn, SOFA.org, Cega | Professional market makers quoting or hedging off-chain; bridging TradFi liquidity into DeFi options markets. |
| | Aggregated / Vault-Based Liquidity | TYMIO, Pods Finance, Rysk Finance | Vault aggregation of user capital across strikes and maturities to optimize utilization and yield generation. |

Figure 9: Taxonomy of DeFi Options Protocols: comprehensive overview of the DeFi options landscape, categorizing 24 protocols by their primitives, execution models, and risk frameworks compiled from protocol documentation, DeFiLlama analytics, and whitepapers (Late 2025).

## 4.1 Protocol Experiments

Over the past few years, a diverse wave of experimental protocols has explored how to represent and trade options natively on-chain. Some achieved meaningful adoption, while others faded, yet each contributed critical insights to the design space of decentralized derivatives. The earliest milestone came with **Opyn**, which introduced fully collateralized *oTokens* through the Convexity Protocol, establishing the first standard for tokenized, ERC-20–compliant options and setting the blueprint for subsequent DeFi derivatives infrastructure.[11] Its follow-up product, **Squeeth**, pioneered a perpetual squared-ETH exposure mecha-

[11] See Opyn documentation and historical audit reports: `https://opyn.gitbook.io/opyn` and `https://blog.openzeppelin.com/opyn-contracts-audit/`.

nism blending continuous funding with convex option payoffs, a conceptual precursor to the streaming and oracle-free models later refined by *Panoptic* [2].

A parallel stream of innovation emerged in the form of composable vault and auction architectures. **Pods Finance** introduced modular ERC-1155–based options vaults allowing customizable strategies (e.g., covered calls, protective puts) through simplified interfaces. **Premia** expanded on this by combining peer-to-pool AMM mechanics with off-chain implied volatility curves, providing market-driven option pricing and early secondary market depth [8]. Although both protocols later faced liquidity fragmentation and capital scaling limits, they established the foundation for automated vault strategies that informed later systems such as *Polynomial* [9] and *Aevo* [27, 11].

In the structured and hybrid segment, **Cega Finance** and **Opium** integrated multi-leg payoffs and principal-protected notes directly on-chain, bridging DeFi investors and institutional market makers through RFQ-style workflows [14]. Similarly, **Buffer Finance** offered simplified binary and "turbo" options aimed at high-frequency speculation, while **Charm Finance** explored dynamic hedging AMMs replicating dealer-style delta adjustment; both designs that later inspired perpetual option architectures. **Zomma Protocol** extended this trajectory by optimizing implied volatility surfaces and on-chain Greeks using concentrated-liquidity AMM logic similar to Uniswap v3 [1].

Other experiments focused on AMM mechanisms and risk-sharing primitives. **Hegic**, one of the first retail-facing options AMMs, enabled non-custodial European-style calls and puts collateralized in ETH and USDC, introducing permissionless underwriting and fixed-expiry options to DeFi. **SOFA.org** later targeted institutional-grade execution with a hybrid RFQ framework integrating composable DeFi collateral and quote streaming. Meanwhile, **Deri Protocol** unified perpetual futures and options into a single margin system, creating "perpetual derivatives" with continuous mark-to-market settlement and funding-based exposure; an early bridge between perps and options markets [14, 19].

Despite uneven adoption, these ten experimental protocols collectively mapped the design frontier of DeFi options, spanning from fully collateralized vaults and exotic payoff engineering to auction-based, oracle-free, and cross-margined frameworks. Each iteration, whether *Opyn*'s tokenized options, *Hegic*'s AMM underwriting, or *Zomma*'s volatility optimization, contributed building blocks toward today's more capital-efficient and institutionally credible architectures such as *Panoptic*, *Stryke*, and *Ithaca* [7, 2, 28, 29]. Through this iterative process, DeFi derivatives have evolved from static, over-collateralized instruments into dynamically composable primitives capable of replicating the flexibility and risk management sophistication of traditional options markets.

More recently, **Paradex** advanced a central limit order book implementation of *perpetual options*, aiming to remove expiry management while preserving vanilla call and put payoffs. In Paradex's design, options can be held indefinitely and the economic cost of optionality is paid through continuous funding rather than a single upfront premium, with funding tied directly to the option's time value. Pricing is derived from a Black Scholes based formulation adapted to perpetual options with continuous funding, where the mark price depends on the option type, spot oracle price, strike, mark implied volatility, and an interest rate that Paradex derives from its perpetual futures funding rate. Operationally, strikes are listed automatically on a fixed cadence using delta based moneyness bands, and the venue supports unified and cross margin so that PnL can offset across futures and options positions, with margin requirements parameterized by option type and moneyness. [40, 41, 42, 43, 44]

## 4.2 Lessons from DeFi Options

Across the first wave of DeFi options protocols, several clear lessons have emerged: technical, behavioral, and structural.

**Market Structure Lessons.** Early DeFi options frameworks revealed deep structural frictions. Liquidity was – and still is – fragmented across expiries and strikes, leaving books thin and capital inefficient. Oracle-dependent settlement added latency and manipulation risk, while fully collateralized vaults constrained scalability. These limitations led to a shift toward pooled, perpetual, and partially oracle-free systems such as *Panoptic* and *Stryke*, which unify liquidity across maturities and dynamically adjust price risk [2, 7]. This design evolution, also visible in the re-architecture of *Lyra* into *Derive*, emphasizes continuous pricing and endogenous margining [4, 5]. Empirical data from DeFiLlama show how sectoral TVL expanded above $600M during 2021–2022 and later contracted below $100M in late 2025 as protocols consolidated and inefficient liquidity was rotated [19, 18].

**Behavioral Lessons.** Market participation has been dominated by retail users pursuing yield rather than institutions seeking hedges. Vault users often treated options as passive income vehicles: selling covered calls and puts for premium, rather than as instruments for volatility transfer. When volatility spiked, the absence of offsetting hedgers amplified liquidation cascades and systemic stress. The collapse of **Terra/UST** (2022) illustrated the danger of unhedged convexity: the algorithmic peg failed without any derivative layer to absorb tail risk. Similarly, the **Mango Markets** exploit (2022) exposed how under-collateralized systems collapse when price manipulation is unbounded by volatility-linked collateral logic. Each episode reinforces that DeFi's missing risk layer is not yield, but insurance—a functioning options market capable of pricing and transferring risk before it becomes contagion.

**Institutional and Treasury Lessons.** DAO and protocol treasuries still seldom hedge native-token or revenue exposure via options. Most rely on spot diversification or stablecoin conversions, leaving them exposed to cyclical drawdowns and forced liquidations in bear markets. In contrast, traditional finance repeatedly demonstrates how systematic option overlays cushion shocks—index puts in 1987, deep OTM hedges in 2008, and volatility strategies during the 2020 COVID-19 crash all acted as stabilizers. A similar approach on-chain could transform protocol balance-sheet management, embedding calls, puts, and collars as routine treasury instruments. As more sophisticated risk engines and hybrid execution models (AMM + orderbook/RFQ) mature across platforms such as *Derive*, *Aevo*, and *Panoptic*, options can evolve from speculative leverage into foundational primitives for on-chain risk governance [4, 11, 2].

**Protocol Trajectories.** Not every pioneering experiment survived, but each advanced the collective design space. *Opyn* established the first fully collateralized oTokens and set transparency standards through public audits and post-mortems. *Cega* proved the feasibility of tokenized exotic payoffs before sunsetting after its acquisition, highlighting both demand for structured yield and the challenge of sustaining two-sided liquidity. Rebrands and architectural pivots, from *Lyra* to *Derive*, and *Dopex* to *Stryke*, reflect the sector's ongoing optimization toward hybrid execution, cross-margining, and professionalized liquidity provisioning [4, 7, 19].

**Forward Insight.** The next growth phase will come less from retail speculation and more from protocols and funds integrating options for self-hedging, structured yield, and capital preservation. True institutional adoption will occur once options are treated as embedded financial infrastructure, automatically balancing risk within DAOs, vaults, and credit systems, rather than as discretionary speculation.

# 5 Strategic Insights for Institutional Players

DeFi options are not merely experimental products; they represent a new toolkit for institutional risk management, yield generation, and structured strategy design. This section highlights how different actors: DAO treasuries, funds, and professional LPs can integrate options into their strategies.

## 5.1 Treasury Management Applications

For DAOs and crypto-native institutions, options provide an effective mechanism for treasury risk management. Native tokens often dominate DAO balance sheets, exposing treasuries to severe drawdowns during market downturns. Rather than relying solely on liquidations or ad hoc token sales, treasuries can:

- **Purchase put options** to hedge against downside risk, locking in a minimum value for their treasury assets.
- **Generate yield** by selling covered calls against idle assets, creating systematic income streams.

- **Tokenize risk positions** by wrapping option exposures into ERC20/1155 instruments, allowing treasury risk to be managed transparently on-chain.

Such strategies transform volatile token holdings into more stable, risk-adjusted reserves, a critical step toward institutional adoption of DAO treasuries. Also, institutional adoption of crypto derivatives accelerated sharply in 2025, with financial incumbents (Citigroup, Fidelity, Visa, Stripe) and fintech platforms (Robinhood, PayPal) integrating crypto trading and settlement. This creates a natural bridge for DeFi options protocols to provide yield-enhanced, risk-managed instruments to the same institutions now active on-chain.

## 5.2 LP Strategy Optimization

Liquidity providers (LPs) in DeFi continuously balance fee income with exposure to the underlying asset's price movement. Options extend their portfolio management toolkit by transforming passive liquidity into actively hedged or yield-enhanced strategies.

- **Options as dynamic hedges:** LPs in Uniswap v3 or similar CFMMs can mitigate impermanent loss by buying on-chain puts or constructing delta-neutral spreads. Protocols such as *GammaSwap* and *Panoptic* allow liquidity to serve as collateral for continuous option payoffs that act as an endogenous hedge, offsetting parts of AMM exposure as price moves rather than via fixed strikes or expiries.

- **Options as income overlays:** Vaults like *Stryke (ex Dopex)* and *Rysk Finance* automate covered-call and cash-secured-put strategies on top of LP or spot positions, converting volatility into systematic yield. These overlays provide LPs with additional return channels beyond swap fees.

- **Delta-targeted strategies:** *Panoptic* introduces continuous, perpetual options that allow LPs to select different types of strategies (delta neutral, short, long) by adjusting strike and timescales to construct payoffs equivalent to synthetic Greeks, replicating long gamma, theta decay, or short vega exposure without relying on oracles or discrete expiries.

For professional LPs, these adaptive option overlays transform liquidity provision from passive yield farming into a quantitative, volatility-driven strategy. Backtests and on-chain data suggest that dynamically hedged LP portfolios achieve superior Sharpe ratios and lower drawdowns compared to unhedged AMM exposure.

## 5.3 Risk Hedging Use Cases

Institutions and funds can now deploy DeFi-native options as precise and composable hedging instruments, offering flexibility unmatched in traditional markets.

- **Market downside hedges:** Protocols like *Stryke*, *Derive*, *PsyOptions*, and *Ithaca* enable straightforward long–put exposure on majors (e.g., ETH, BTC) and selected alt pairs, allowing on-chain NAV protection during systemic drawdowns.

- **Yield opportunity hedges:** Investors holding stablecoin or RWA-backed positions can buy calls on volatile assets (ETH, SOL, or BTC) to hedge against the opportunity cost of rallies—an automated version of risk-reversal strategies seen in TradFi.

- **Protocol-specific hedges:** LPs can neutralize AMM exposure or collateral risks by opening offsetting positions in oracle free, perpetual frameworks like *Panoptic*, including its upcoming Perpetual Option Vaults (POVs), or in structured hedging vaults such as *Rysk* and *Cega*. This creates delta and gamma balanced portfolios that respond dynamically to volatility rather than discrete rebalancing.

Unlike centralized venues that rely on standardized contract maturities, DeFi protocols offer customizable payoff structures, settlement currencies, and composable hedges across long-tail assets. While liquidity fragmentation remains a challenge, the ability to integrate hedges across multiple protocols introduces a fundamentally new dimension of precision risk management.

### 5.4 Integration Opportunities: Vaults and Structured Products

DeFi's composability enables the creation of higher-order financial primitives that integrate options into yield-bearing or hedged structured instruments.

- **Vault integrations:** Automated vaults package short-volatility strategies like covered calls, put spreads, and delta-hedged vaults into tokenized yield instruments. These vaults function as on-chain analogues to structured notes and volatility income funds, allowing institutional allocators to access systematic option-writing strategies with transparent collateralization and real-time performance tracking.

- **Structured products:** Protocols like *Cega* and *Pods Finance* engineer multi-leg exotic payoffs (e.g., dual-currency notes, autocallables) with on-chain transparency. These strategies replicate complex TradFi derivatives while leveraging stablecoin collateral and verifiable smart contract logic.

- **Composability across protocols:** Option payoffs can now be combined with lending, restaking, or perps protocols to create hybrid risk instruments, for example, interest rate–hedged covered calls or RWA-backed put spreads. *Panoptic*'s perpetual options, when paired with yield-bearing tokens, enable continuously hedged structured yield without expiry.

These integrations signal DeFi's transition from isolated options markets to a composable, structured finance layer. Tokenized real-world assets (RWAs), a market now exceeding $30 billion [39], are further expanding the collateral universe for structured options and volatility-linked yield products. As vaults, credit protocols, and option layers converge, DeFi options are evolving into institutional-grade infrastructure for on-chain risk management and capital efficiency.

## 6 Future Outlook

The DeFi options market is still in its early stages, but the design space is expanding rapidly. We expect the next cycle of growth to be driven by cross-chain deployment, integration with new collateral types, and greater alignment with institutional TradFi practices.

### 6.1 Where the Market is Headed

Options have historically been the final major building block to mature in financial ecosystems. In DeFi, the same trajectory is unfolding: while lending markets, stablecoins, and perpetual futures collectively command tens of billions in total value locked, the options sector remains comparatively nascent. Nevertheless, structural improvements are converging to accelerate growth. Vault strategies are standardizing recurring yield generation, perpetual options are removing expiry fragmentation, and introducing a new volatility surface, and DAO treasuries are beginning to adopt option overlays for hedging and capital preservation. Together, these developments suggest that the on-chain options are entering an inflection phase that transitions from experimental primitives to an integrated layer of the broader DeFi risk management infrastructure.

In the near term, volumes are likely to concentrate around ETH, BTC, and liquid stablecoin pairs. Long-tail assets will benefit from oracle-free designs (e.g., Panoptic), which lower the barrier to listing and avoid oracle dependency. Over the medium term, we foresee options becoming embedded at the protocol level; with lending markets, treasuries, and structured vaults integrating options as a native risk-management primitive.

### 6.2 Potential Breakthroughs

Several technical and market breakthroughs could catalyze the next wave of innovation:

- **Cross-chain options:** With liquidity fragmented across Ethereum, L2s, and alternative L1s, interoperability layers (LayerZero, Wormhole, CCIP) could enable cross-chain settlement of options. A unified options market across chains would unlock deeper liquidity and more efficient hedging.

- **Restaking integration:** Restaked ETH and other liquid restaking tokens (LRTs) can serve as collateral for option writing, combining yield from securing AVSs with option premium income. This creates a new class of high-efficiency collateral and links options to Ethereum's security layer.

- **RWA-backed options:** Tokenized treasuries, bonds, and commodities (RWAs) will introduce entirely new underlyings for DeFi options. DAO treasuries and funds could trade interest-rate options, credit spreads, or commodity hedges on-chain once these RWAs achieve liquidity.

- **AI:** The convergence of artificial intelligence and decentralized finance is opening new frontiers for autonomous derivatives markets. Machine learning models are increasingly applied to implied-volatility forecasting, option pricing, and dynamic hedging, while reinforcement-learning agents can manage liquidity and execute risk-adjusted strategies in real time. Emerging decentralized compute protocols (e.g., Bittensor, Ritual) and parameter-optimization frameworks (e.g., Gauntlet, Chaos Labs) further suggest an evolution toward self-optimizing, AI-native risk management systems capable of continuous on-chain adaptation.

- **Integration with Fixed Income:** As tokenized Treasuries, money market funds, and on-chain bonds grow into core DeFi primitives, options will play a crucial role in replicating fixed-income exposures and engineering duration-hedged yield products. Protocols such as *Cega*, *Opium*, and emerging structured-yield vaults are already bridging interest rate derivatives and volatility-based instruments, paving the way for option-based replication of fixed-income payoffs and principal-protected notes. This convergence suggests a future in which DeFi fixed income and options form an integrated risk and yield layer, mirroring the interdependence seen in traditional bond–option markets.

### 6.3 Convergence with Traditional Finance

A long-term theme is the gradual convergence between DeFi options and TradFi derivatives markets. We see this happening along three dimensions:

1. **Collateral efficiency:** Adoption of margin frameworks similar to TradFi (eg, risk-based haircuts, cross-margining) will reduce capital costs and attract professional traders.

2. **Standardization:** While DeFi thrives on customization, institutional participation will require standardized contracts for major assets (ETH, BTC), akin to CME or Deribit. We expect coexistence: standardized contracts for deep liquidity, and bespoke options enabled by composability for DeFi-native use cases.

3. **Bridging liquidity:** Funds already active on Deribit may hedge exposure in DeFi, or vice versa. Over time, we anticipate arbitrage flows and integration of DeFi IV surfaces into institutional trading models.

Ultimately, the endgame for DeFi options is to become not a niche product, but a foundational layer of on-chain risk management and structured finance. Protocols that combine capital efficiency, oracle resilience, and composability are positioned to lead the next cycle of adoption, bridging the gap between permissionless innovation and institutional-grade infrastructure.

## 7 Conclusion

DeFi options have evolved from scattered experiments into a coherent market infrastructure where risk, yield, and liquidity converge on-chain.
Their significance no longer lies in mimicking TradFi derivatives, but in reimagining them under new constraints, composability, transparency, and continuous settlement. Across designs AMMs, vaults, perpetual options, and structured products the common thread is a shift from speculation to system design: options are becoming the mechanism through which liquidity itself is priced and distributed.

The sector's maturity will be measured not by total value locked, but by how seamlessly these protocols interconnect and hedge one another. As capital, data, and risk begin to circulate in a single composable layer, DeFi options cease to be a niche product, they become one of the most important languages of on-chain finance itself.

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