Greek.fi : Decentralized American-style Options Protocol

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Greek.fi Protocol
Decentralized Options Protocol
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Greek.fi is a protocol that enables decentralized American-style exercise options that are fully collateralized without requiring oracles or margin. It is designed for composability, exercisability, and univsersal use on any EVM compatible chain and allows any ERC20 token to be used as collateral and consideration (i.e. WBTC, WETH, stETH, USDC, USDT)

Similar to yield generating tokens, the protocol generates two ERC20 tokens: a redemption token (which provides capital efficiency) and an option token. We dive into the menchanics of these tokens and how they impact a new level of composibility to create a new options ecosystem that both, encompasses and surpasses traditional financial options strategies.

I. INTRODUCTION

A. Overview

Options in the crypto have exploded in usage and approaches. Currently, there's over $6B USD in 24hour volume in perpetuals trading. Additionally, Deribit was purchased by Coinbase for nearly $3B USD. This is of no surprise as the traditional finance market sees $2.7T USD in daily notional trading in the options market ($600B in open interest daily) the crypto market can easily catch up to these numbers.

One issue arises in the current state of the options industry in the DeFi space: early exercizable (American) options have not existed in a decentralized, tokenized manner. American options need the following abilities to be considered as such:

- Expirable at some future fixed date
- exercizable so that the option holder can swap consideration for underlying collateral prior to expiration
- The option writer can use the collateral freely after expiration, unless...
- The contract written has been exercised, providing consideration to the option writer to be used freely

In order to achieve the goal of providing an American options protocol in a fully decentralized manner, all of the above needs to be solved in a decentralized manner. We present the Greek.fi Options Protol, the first fully decentralized, collateralized, tokenized, exercizable, expirable options protocol in the Ethereum ecosystem. The protocol achieves the following:

- Fully ERC20 compatible - allowing full composability
- Fully collateralized protocol so that every option can be exercised to swap for the collateral
- Exercizable so that the option holder can swap consideration tokens for the collateral
- The option writer can redeem consideration prior to expiration, or
- The option writer can redeem collateral post expiration, or
- The option writer can redeem collateral prior to expiration if they also own the option
- Two tokens/contracts drive the protocol (LONG and SHORT) similar to yield platforms

This protocol will unlock a trove of possibilities to DeFi, for example:

- hedge risk
- take on risk
- leverage
- earn yield through covered calls
- transfer options from within ecosytems to other ecosystems

give overview on basic necessities of options Uniswap is a protocol for automated token exchange on Ethereum. It is designed around ease-of-use, gas efficiency, censorship resistance, and zero rent extraction. It is useful for traders and functions particularily well as a component of other smart contracts which require guaranteed on-chain liquidity.

Most exchanges maintain an order book and facilitate matches between buyers and sellers. Uniswap smart contracts hold liquidity reserves of various tokens, and trades are executed directly against these reserves. Prices are set automatically using the constant product (x*y=k) market maker mechanism, which keeps overall reserves in relative equilibrium. Reserves are pooled between a network of liquidity providers who supply the system with

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tokens in exchange for a proportional share of transaction fees.

An important feature of Uniswap is the utilization of a factory/registry contract that deploys a separate exchange contract for each ERC20 token. These exchange contracts each hold a reserve of ETH and their associated ERC20. This allows trades between the two based on relative supply. Exchange contracts are linked through the registry, allowing for direct ERC20 to ERC20 trades between any tokens using ETH as an itermediary.

This document outlines the core mechanics and technical details for Uniswap. Some code is simplified for readability. Safety features such as overflow checks and purchase minimums are ommited. The full source code is availible on GitHub.

Greek.fi is a decentralized American-style options protocol that allows for the creation of options with full collateralization. The design of the protocol along with full collateralization allows exercisability, composability, and universal use on any EVM compatible chain.

B. Background

Options in the crypto space have grown. With the purchase of Deribit by Coinbase, the options ecosystem has

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Typically, options have been centralized, with providers like Deribit, being the most popular. These providers use margin to allow a variety of options to be created and traded. Additionally, most derivative strategies involve perpetual futures, which require oracles for pricing.

Our protocol is designed to be a decentralized alternative to these providers. No oracles are required, and no margin is required. Additionally, any locked collateral used to create one side of the trade can be used as collateral for loans, as the position is represented by an ERC20 token.

One limitation in all the different ecosystems is the ability to connect them and take them to other chains.

II. PROTOCOL OVERVIEW

The Greek.fi protocol is a contract factory system that creates a new pair of contracts for each tuple that represents an options (Collateral, Consideration, Strike, Expiration, CallOrPut). This allows the protocol to be upgradeable with new features to improve useability. The pair of contracts created are two ERC20 contracts that are coupled to each other, LONG and SHORT. By depositing collateral tokens into the protocol, one mints the two tokens allowing them to be used in different strategies. Let's desccribe the tokens in detail to illustrate their usability.

1. *LONG Token*

The LONG token represents the position of the option buyer, they are entitled to purchase the underlying collateral asset when the option is exercised.

- The LONG token can allow you to exercise the option at any time before expiration.
- The LONG token can be traded on DEXs like Uniswap, CoW, and RFQs like 0x, Bebop.

2. *SHORT Token*

The short token represents the position of the option writer, they are obligated to swap the underlying collateral asset for the consideration asset when the LONG option is exercised.

- The SHORT token can be used to redeem the underlying asset after expiration.
- The SHORT token can be used as collateral for loans (Silo).
- Together, the LONG and SHORT tokens can be redeemed for the underlying asset before expiration to recover the collateral (Neutral position).

Our protocol is simple. Any ERC20 token can be used as collateral for options. This includes WBTC, WETH, stETH, SBTC, AAVE, UNI, and more. The user chooses the strike price, expiration, and option type (call or put) when creating the option. A user mints two ERC20 tokens when creating an option:

- **LONG**: Represents the right to exercise the option
- **SHORT**: Represents the obligation and right to the collateral

Use any EVM compatible chain to mint the options.

A. Token Functionality

B. Technical Implementation

1. *Token Linking*

The two tokens/contracts are linked to each other.

2. *Margin-Free Design*

Because the LONG and SHORT tokens are linked to each other, the protocol is able to provide a margin-free experience.

3. Collateralization

The protocol is able to provide full collateralization for the options.

4. Compound Options

The protocol is able to provide compound options. This allows for the creation of options with multiple underlying assets.

5. Loanable Collateral

The protocol is able to provide loanable collateral for the options.

6. Composibility

The protocol is able to be composed with other protocols to create more complex strategies.

7. Default Swaps

The protocol is able to provide default swaps for the options.
OPTION INSTEAD OF TOKENS DROP

C. Example: Minting Options

1. Connect your wallet to the protocol
2. Select option parameters:
    - Collateral Asset: WETH
    - Consideration Asset: USDC
    - Strike Price: 5000 USDC
    - Expiration Date: 30 days
    - Option Type: Call
3. Mint Approve the LONG contract to capture your WETH
4. Receive LONG and SHORT tokens

III. TRADING

Once options are minted, the obvious question is how to trade them. We have considered using a DEX AMM, such as Uniswap, but options could have low volume and low liquidity. This can cause slippage and nobody wants that.

The obvious solution is to use RFQs, such as 0x, Bebop, etc. This allows for the options to be traded at a price that is determined by the market. This would allow partnering with market makers to provide liquidity for the options. This would also solve pricing the options where the MMs set their own prices. This will create a new market maker ecosystem.

A. Short Token Trading

The SHORT token represents two things: Collateral/consideration ownership and a short position in the option trade. Let's say you sold an in the money call (WETH at 3000 expiring soon). When you sold your LONG token you received a premium of 1000 USDC in addition to IV and Time Value. This is potentially priced in the SHORT token making it tradable since it has a value.

IV. VAULTS

Vaults allow for more complex strategies using the options protocol. This simplifies the experience for users and reduces the amount of work required to implement these strategies.

A. Covered Call Vaults

One strategy, such as covered call vaults, which allow for the creation of options with a portion of the collateral as the option premium. A simple strategy could involve users depositing WETH as collateral, and then the vault handles:

1. minting options with the collateral
2. selling the options
3. let the options expire worthless
4. redeem the collateral
5. mint more options with the collateral and repeat

This strategy is nearly identical to ETF strategies (i.e., XYLD). Covered call vaults do not exist on chain, but this protocol allows for the creation of these strategies. This same strategy can be applied for Covered Put vaults, where the vault mints the put options and sells them.

B. Margined Options Vaults

Similar to covered call vaults, margined options vaults allow for the minting of call options using collateral. Afterwards, the vault takes a loan on the collateral (AAVE, Silo, etc) and uses the proceeds to mint more options.

This allows for the vault to mint more options than it would have been able to otherwise.

V. FAQ

A. Traditional vs. On-Chain Options

a. In the traditional covered call world, I don't need to mint tokens or anything. Why do I need to mint tokens here? In traditional call strategies, the custodian (E-Trade, Fidelity, etc) holds the collateral and establishes the short position. On Chain, we do not have custodians. We have smart contracts. We need to mint tokens to represent the two positions, which technically is neutral wrt to the option trade.

b. Why do this on chain? You don't have to. If you're looking for high frequency trading, this is not for you. If you're looking for a low-friction, low-cost way to create covered options strategies, this is for you.

c. Ok, I'm holding X, why do this? couldn't I just get a loan on the X and buy more X? Again, you don't have to, but this is almost like staking.

B. Technical Questions

a. Explain this SHORT token? isn't that just a PUT? The short token is simply a combination of two things: Your ownership of the collateral + the short position in the option trade. The SHORT token is basically looking at your brokerage account and seeing "1 wETH + (-1 call option)". If you tack on a LONG token it's like seeing "1 wETH + (-1 call option) + 1 call option" which equals "1 wETH".

b. How do you do this for PUTs? Yes! Believe it or not, puts are simply calls where the consideration and collateral are swapped. For example, in a put use USDC becomes the collateral and WETH is the consideration. What this means is that you have the option to "buy" USDC with your WETH.

The only real difference between puts and calls is the strike price. In a call you buy 1 wETH for 4000 USDC, so in a put instead of saying "buy USDC for 0.00025 wETH/USDC" you say "sell you 1 wETH for 4000 USDC/wETH".

C. User Experience

a. I want to buy some options, how do I do that? Use the trade page to buy options. It uses 0x and Bebop to provide liquidity and execute trades.

b. Okay, I'm up on my options, how do I sell them? Use the trade page to sell options, as well as buy.

c. Can I try this on Testnets? Yes, definitely. Choose testnets when you mint. We'll give you free wETH testnet tokens to mint with.

VI. APPENDIX

A. Key Concepts

- **Call Option**: Right to buy an asset at a specified price before expiration
- **Put Option**: Right to sell an asset at a specified price before expiration
- **Strike Price**: The price at which the option can be exercised
- **Expiration Date**: The last date the option can be exercised
- **LONG Token**: Represents the right to exercise the option
- **SHORT Token**: Represents the obligation and right to the collateral

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