Wasabi v1: On-Chain Options Protocol

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ABSTRACT

Wasabi v1 is an automated options contract protocol implemented on the Ethereum network. Wasabi v1 generates an ERC-721 token that represents an option for any Ethereum Virtual Machine (EVM) compatible commodity. Options are issued from option pools, which are created and supported by liquidity providers (LPs). In return, LPs make stable, low-risk income by receiving premiums. Wasabi protocol provides suggestions on the option metadata (e.g. strike price, premium, expiration date) based on current market conditions, but the final parameters are at the LPs discretion. Market participants (option holders) capitalize on the market's volatility by purchasing, executing, or trading options. Since Wasabi Options are tradable assets, they can be used or aggregated into more complex financial instruments or indices.

1 INTRODUCTION

The NFT market grew substantially in 2021 to $41B[5]. Interesting use cases for financial NFTs were introduced, such as the Uni-Swap V3 liquidity position tokens [1]. However, since the primary use-case for NFTs remained as PFPs, the market is still relatively illiquid.

NFTs enable the decentralized, transparent, and efficient representation of digital rights ownership. Their future applications in decentralizing art & talent, metaverse & gaming, and physical goods are exciting. Dkoda is eager to appreciate the new applications of this asset class. In the meantime, we are happy to present our original use case.

Wasabi v1 is a peer-to-peer covered options protocol. It introduces an original, financial use case for NFTs by allowing market participants to issue and trade option positions as non-fungible tokens. Option vehicles offer all participants in volatile markets to capitalize on their speculations. Option NFTs let participants hedge their positions and inject more liquidity into the market to correct inefficiencies.

Wasabi lets you wrap any EVM-compatible commodity allowing you to write call or put options on it. As an LP, you short calls and puts by selling options and incur a steady income by collecting premiums. Meanwhile, as an option holder, you long calls and puts to speculate on underlying commodities or hedge your position respectively.

2 PROPOSITION

We will allow LPs to create option pools to be able to write options. They will need to configure trading rules of a pool and deposit tokens to be used as collateral. Once the pool is fully configured, it will be available to the public. Market participants will interact with the pool by purchasing and executing options. An external user wanting to buy an option will trigger the mint of an option that fulfills the risk metrics predetermined by the LP. Wallets with valid Wasabi options can execute the option before the expiration date, similar to a traditional American style options [2]. Option Holders

(OHs) can trade their options with anyone. They can also sell it back to the pool (under the LPs discretion) to close the position. Option details (such as strike price, expiry date, issuer pool, collateral, and type) will be stored immutably as the ERC-721 token metadata.

2.1 Call Options

Wasabi v1 Call Options allow the option holders to capitalize on bullish speculations for an asset. If the liquidity price is lower than the strike price, option holders (OHs) can purchase the asset before the expiry date from the pool and sell it for a profit. In v1, pools can only issue *covered calls*. LPs need to deposit assets to be used as collateral in order to create a pool that can write call options. The maximum number of call options a pool is allowed to write at any time is equal to the number of non-collateral assets in the pool. The LP can withdraw the non-collateralized assets/funds anytime.
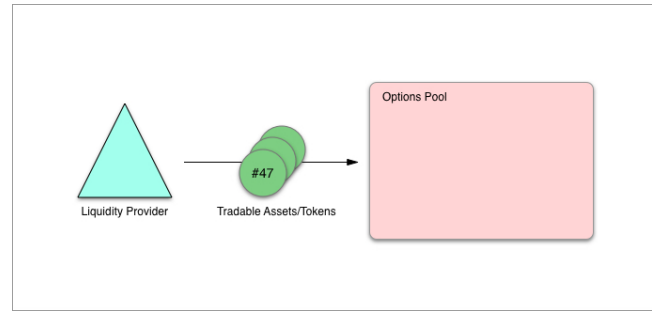

Figure 1: The liquidity provider configures the values and deposits assets to create an options pool.

Market participants are charged a premium when purchasing a call option. The premium is deposited into the pool and the corresponding asset in the pool is locked, then an option representing the position is minted and transferred to the option holder all in the same transaction.
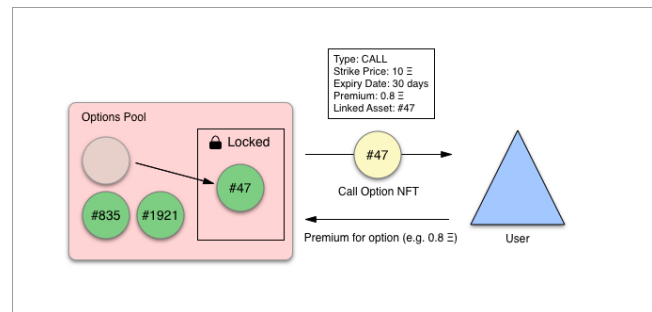

Figure 2: Market participant purchases a call option from the pool; the asset corresponding to the option is locked and can't be withdrawn by the LP until the option is resolved.

A valid wallet address with the ERC-721 option token is required to execute an option. Wasabi v1 provides American style options, where the contract can be executed any day up to the expiration date. Once executed, the user will purchase the collateral at the strike price.
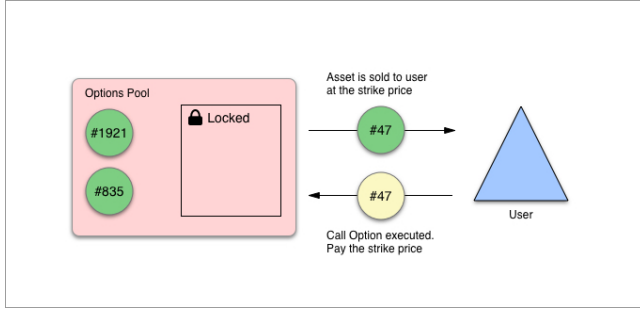

Figure 3: The option holder executes the option and is allowed to purchase the asset from the strike price.

2.2 Put Options

Wasabi v1 put options allow the option holders to capitalize on bearish speculations for an asset. OHs are purchasing the opportunity to sell the asset at an agreed upon strike price to a pool. The put options can be used as *insurance* for existing assets by hedging against potential losses.

As Wasabi v1 only supports covered puts, a pool can write a capped number of put options where the sum of all strike prices is less than or equal to the total amount of liquidity available in the pool. A pool cannot write a put option where the strike price is higher than the ETH value of the total non-collateralized fungible assets in the pool.
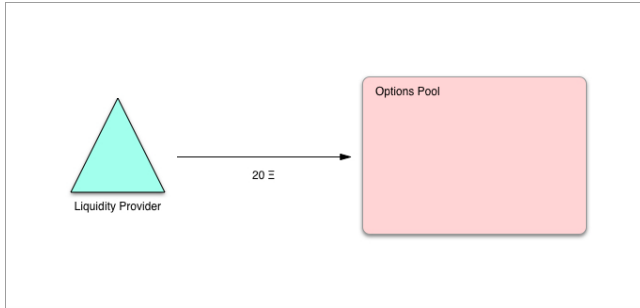

Figure 4: A liquidity provider configures risk parameters and deposits tokens to create an options pool.

A market participant deposits a premium into the pool to purchase a put option. The LP can withdraw non-collateralized funds anytime. The pool simultaneously locks the ETH amount corresponding to the strike price. An option representing the position is minted automatically and transferred to the option holder's wallet all in the same transaction.
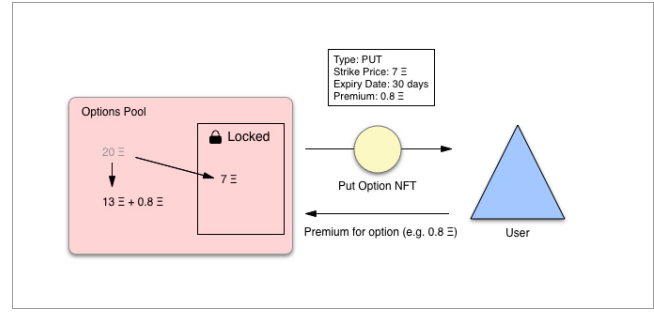

Figure 5: Market participant purchases a put option from the pool, fungible tokens equal to the strike price in Ethereum get collateralized. The LP cannot withdraw the collateralized amount until the option is resolved.

A valid wallet address with the ERC-721 option token is required to execute an option. Wasabi v1 provides American style options, where the contract can be executed any day up to the expiration date. Once executed, the user will sell an asset to the pool at the strike price.
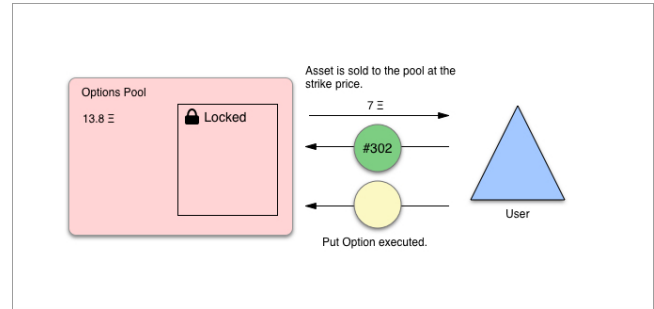

Figure 6: The option holder executes the option and is allowed to sell the asset to the pool at the strike price.

2.3 Pricing

Wasabi will charge a 1% transaction fee on all traded options and assets on the protocol.

3 EXPERIMENTS

DeFi Protocols make sense as long as they offer a more beneficial outcome for all parties involved in a transaction. To test the technical and financial feasibility of Wasabi v1, we followed a frequentist [4] approach, implemented a random walk algorithm [3] to generate LP and option parameters on ten notable digital collectibles, and observed the outcomes of issuing call options.

3.1 Setup

Digital collectibles selected for the test are listed on Table 1.

As an overview, a random number of call options were generated for an arbitrary number of NFTs initially deposited to LP pools for ten collections represented in Table 1. The testing algorithm compared the unexpired options' strike prices to the sale price

Table 1: Tested Collections and Their Macro Details

Name	Mint Date	All Time Volume Ξ	Most Recent Floor Price Ξ
Doodles	10/17/2021	149k	8.89
Moonbirds	04/15/2022	171k	11
Pudgy Penguins	07/22/2021	63k	3.29
Azuki	01/12/2022	262k	11.29
BAYC	04/22/2021	665k	77
Clone X	12/122021	230k	6
Cool Cats	06/27/2021	112k	2.59
Invisible Friends	02/21/2022	44k	2.2
Otherdeeds	04/29/2022	346k	1.71
Renga	09/02/2022	6k	1

of the cheapest sales on future dates. If the sale price was higher than the sum of the premium, strike price, and gas required for the transaction, the option was considered executed. If the option never met these conditions before the expiration date, the collateral was released back to the pool. The same random walk experiment was repeated 100 times for each collection, and results were observed.

For each collection, a random initial number of deposited NFTs (between 15 and 40) were generated in each experiment. For each day after January 1st, 2022, a random number of options (between 0 to 3) were generated with expiration dates ranging from 1 day to 3 months and strike prices 5% to 100% above the current floor price. The same random process was repeated 100 times for each of the ten collections to observe how the LP, OH, and protocol returns would converge.

3.2 Assumptions

To test the protocol against high standards, we picket assumptions that would yield the least optimal results for the parties involved. Below is a list of these assumptions.

(1) **NFTs as the collateralized asset class:** NFTs (digital collectibles) were used as the collateralized asset class for this experiment given their volatility. If Wasabi options are successful with NFTs, they are durable against most commodities.

(2) **0 secondary market sales for options:** In traditional markets, options get traded before the expiration date, which yields better financial outcomes for the LPs and the protocol. For the sake of simplicity, 0 secondary market sales for options were assumed.

(3) **Actual sales and gas price to determine option execution:** Instead of looking at the floor price, or the liquidity pools available in AMMs (such as sudoswap) the experiment compares the intrinsic value of the contract to the actual sale price of the cheapest asset of the collection and gas fees of on a given date to determine if the option would actually be ITM.

4 RESULTS

During the 100 iterations of the experiment, on average, a total of 274 NFTs were initialized across ten different pools as the underlying commodity. Pools wrote 372 options in total. 19.87% of the options were ITM. A breakdown of the deposited NFTs, options issued, and options ITM are delineated on Table 2.

Table 2: Deposited, Issued and ITM NFTs on Tested Collections

Name	Deposited NFTs	Options Issued	Options ITM
Doodles	28	36	12
Moonbirds	27	62	7
Pudgy Penguins	27	1	0
Azuki	29	39	28
BAYC	28	19	1
Clone X	26	82	7
Cool Cats	28	18	0
Invisible Friends	59	44k	8
Otherdeeds	27	46	4
Renga	26	10	6
Average	**27**	**37**	**7**

Their execution triggered the sale of 26.99% of the total number of NFTs initially deposited. Option writers collected a total of Ξ 1,056.36; Ξ 242.22 from 372 premiums and Ξ 814.15 from the strike price of 54 options in the money. At the same time, the option holders made a total of Ξ 182.60 from the delta between the underlying asssets' current price and the sum of the strike and premium prices from the 19.87% of the options that were ITM. Wasabi Protocol collected a total of Ξ 21.22 from the transactions. A breakdown of the premiums, strike, and execution price on ITM options are visualized on 3.

Table 3: Premiums Collected on Options, Strike and Execution Price on ITM Options

Name	Premiums Collected Ξ	Total ITM Strike Price Ξ	Total ITM Execution Price Ξ
Doodles	17.95	139.20	167.69
Moonbirds	58.18	158.86	185.01
Pudgy Penguins	0.10	0	0
Azuki	16.96	360.13	488.70
BAYC	87.10	41.39	56.10
Clone X	43.94	72.33	96.70
Cool Cats	5.63	1.88	2.61
Invisible Friends	11.09	36.68	43.17
Otherdeeds	3.38	9.04	10.36
Renga	0.32	2.87	4.48
Average	**24.47**	**82.24**	**105.49**

To approximate the minimum LP upside, we compare the liquidity generated from collecting premiums and selling ITM commodities at the strike price to merely selling the commodity for the ITM price of the options in the money. The results show that, on average, LPs generated 2% more by issuing options on ten collections than just selling the NFTs on ITM execution price. This is a biased experiment as it only looks at the future price of assets we know were ITM; however, it is a fair minimum upside approximation. On specific collections, this value still drove north of 100%.

Aside from hedging their risk and speculating on market volatility, we can calculate the expectation of return for holders by multiplying the percent of options in the money and ROI generated by executed options. On average, option holders are expected to make a 16% return on their premium, which is very high. This is due to collections like Azuki having too many options ITM, which will be fixed as the option pricing algorithm is fine-tuned to account for outlier collections.

It is fair to conclude that the Wasabi protocol offers a better financial outcome for all parties involved.

5 FUTURE WORK

Our roadmap includes the following:

(1) Simulate put option performance.
(2) Fine-tune option pricing algorithm for various collections.
(3) Support for naked calls and puts.
(4) Test for other EVM compatible commodities.
(5) Introduce tokenomics to provide APY for LPs.
(6) Introduce shared pools generated by multiple LPs.

6 DISCLAIMER

This paper is for general information purposes only. It does not constitute investment advice or a recommendation or solicitation to buy or sell any investment and should not be used in the evaluation of the merits of making any investment decision. It should not be relied upon for accounting, legal or tax advice or investment recommendations. This paper reflects the current opinions of the authors and is not made on behalf of Dkoda Inc. or their affiliates and does not necessarily reflect the opinions of Dkoda Inc. their affiliates or individuals associated with them. The opinions reflected herein are subject to change without being updated.

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