

DefiHedge: A Marketplace for Fixed Rate Defi Lending and Interest-Rate Derivatives

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1 Introduction

Since Ethereum’s inception, its ecosystem of decentralized financial applications has steadily progressed towards providing the financial infrastructure necessary to replace traditional centralized financial services. Today nearly \$10 Billion are locked into decentralized protocols[1].

This market has seen exponential adoption, yet still lacks the financial infrastructure necessary to provide fixed-rate lending and/or interest-rate derivative markets.

While the available variable-rate lending services (e.g. Compound, Aave) allow those with surplus assets to put them to use, only those with a high risk tolerance find the volatile rates these services offer to be acceptable.

Further, users that find these volatile rates within their risk tolerance are not provided access to the leverage necessary to exploit these opportunities. Without the existence of decentralized interest-rate derivative markets/interest rate swaps, one can only benefit from a high rate to the extent that they can extend their capital.

In this paper we introduce a unique, trust-less decentralized protocol which enables fixed-rate peer-to-peer loans, in addition to derivative interest-rate markets. In doing so we enable users to hedge against the volatility inherent to decentralized finance, while giving others the ability to leverage their capital through access to derivative interest-rate markets.

2 The DefiHedge Protocol

DefiHedge is a decentralized protocol built on the Ethereum blockchain, utilizing the Compound Protocol. The DefiHedge protocol establishes the infrastructure for the creation of algorithmically enforced fixed-rate lending agreements and truly trustless interest-rate swaps through the use of strictly defined smart contracts.

Users are able to interact with our lending market to create a fixed-side or floating-side interest-rate swap offer for any Ethereum token (offered by Compound). Takers are then able to fill the offer’s terms, locking in both the maker and taker’s funds until the agreed upon term is complete.

2.1 Market Construction

Unlike many contemporaries, DefiHedge does not aggregate capital into a fungible AMM pool. Instead, similar to a traditional exchange, DefiHedge’s infrastructure involves standard market participants in the form of offer makers and offer takers. While this infrastructure limits on-chain accessibility, such a system requires significantly less liquidity than other equivalents, reduces order slippage, and increases the precision of a market’s pricing.

In order to ensure liquidity and organizational structure, the available markets are defined by fixed time periods (e.g. 3-month, 6-month, 12-month). Limiting

offers to specific term lengths results in increased activity in the given defined markets, therefore increasing the efficiency of rate arbitration across the protocol and improving the experience of the user.

For every swap, there is a fixed and a floating side of the agreement. As is implied, the fixed-side party commits a pool of capital with the intention of locking in a fixed yield. Whereas the floating-side party commits the capital to back the fixed party's yield, receiving the floating yield generated by the fixed-side's capital.

Given fixed-side users are incentivized to lock in the highest fixed-rate possible, while floating-side users would like to give out the lowest fixed-rate possible, fixed and floating side users are then analogous to a traditional market's sellers and buyers respectively. This then results in an exchange that offers users the ability to easily identify market rates, and take positions, without sacrificing the familiar user experience of a traditional exchange.

2.2 Fixed-Side Rate-Swap Contracts

Fixed-side swap offers can be placed above market rate, equating to a limit sell order on a traditional exchange, or below market rate, resulting in what would be considered a "market sell", locking in the best fixed-rate available.

In order to accurately display the volume for a given offer, volume is normalized based on whether a user has selected to place a fixed or floating offer (e.g. a 5% 1yr fixed offer of \$1000 equates to a 5% 1yr floating offer of \$50).

2.2.1 Use Cases

Individuals with long-term investments in Ethereum based assets may find that an excessive yet highly variable rate offers significantly more risk than a high fixed-rate. For those with a sensitive risk tolerance, DefiHedge provides the ability to hedge their investment and reduce their risk profile through a fixed-side interest rate swap.

Given the exchange's design, users are also provided the opportunity to arbitrage and speculate on fixed-rates within the DefiHedge ecosystem. Provided variable maturities for a single asset, and significant decentralized rate volatility in general, users can easily arbitrage across available term periods and lock in additional profit by filling rates lower than their own fixed rate.

2.3 Floating-Side Rate-Swap Contracts

Floating-side users with the collateral to cover a fixed-rate can similarly place an order below market rate, equating to a limit order, or above market rate, resulting in a "market buy" of the currently lowest fixed-side offers.

2.3.1 Use Cases

For those with a higher personal risk tolerance and those wishing to take a long/leveraged position on decentralized rates, DefiHedge provides the ability to extend their investment significantly and take leveraged positions through a process similar to a traditional interest rate swap.

For example, a user wants to long the current 8% DAI rate. Using DeFi hedge, with only \$50, this user could cover a theoretical fixed rate 5% APR bond for one year. Should the DAI rate remain at 8%, the user would stand to gain \$34, a 68% year over year gain, a yield nearly 10x that of the 8% DAI rate the \$50 would have otherwise been accumulating.

2.4 Potential Developments

DefiHedge provides the initial infrastructure for a number of interest rate derivatives. Future implementations could include Caps, Floors and Swaptions. The Bank for International Settlements estimated the notional value of all OTC derivatives to be \$524 Trillion at the end of June-2019[2] and DefiHedge intends to be the first to truly bridge the gap between the growing decentralized financial industry and the established interest rate derivative market.

3 Implementation

DefiHedge's current implementation contains three major components, a high throughput off-chain orderbook & libp2p network, a siloed & censorship resistant on-chain orderbook, and a ledger to track active lending agreements.

3.1 Off-Chain Orderbook

To provide an experience similar to a traditional centralized exchange, our exchange interface utilizes an entirely off-chain orderbook. Using EIP-712 signature validation, DefiHedge provides a human-readable message containing the specifications of a given lending agreement. Users can sign and submit the message's hash entirely off-chain, allowing near instant creation and cancellation of orders.

In future implementations, our off-chain orderbook will be hosted and shared entirely using a libp2p based network. The implementation of a libp2p order sharing system, similar to 0x Mesh, provides a number of benefits to venues, users, and market makers in terms of resilience, censorship-resistance and accessibility.

Once an order has been signed and accepted by a taker, the lending agreement's details and user signatures are then sent to the broker contract for redundant signature validation. Once validated, the contract pools the appropriate capital from each user, mints cTokens, and records the parameters of the agreement.

3.2 On-Chain Orderbook

In order to provide system redundancy and resilience to censorship, a separate orderbook will also be available on the Ethereum blockchain.

Given all on-chain activity necessitates a transaction, signatures are no longer necessary. Like other on-chain exchanges, funds are committed and returned when creating or cancelling an order rather than when an order is filled. Once an order is filled, funds are pooled and minted into cTokens, and the parameters of agreement are recorded.

With current Ethereum throughput and gas price bottlenecks, we do not expect any significant volume to utilize this on-chain system in the immediate future. However, should Compound or Aave migrate to the OVM, or Ethereum protocol upgrades prove sufficient, an on-chain orderbook may allow for contract fillable liquidity, providing the potential for interoperability.

3.3 Ledger & Fund Release

As mentioned, when a given order is accepted, its parameters are immediately recorded. Both on-chain and off-chain systems maintain their own respective ledgers containing a complete history of agreements in either created, active, or inactive states. Each agreement can be identified by the hash of its given origin/owner/timestamp, a record of which is maintained both on and off-chain.

Within the current implementation, once a lending agreement has reached maturity, either the maker, or taker can initiate a return of funds, returning the fixed-side their fixed yield, and the floating-side the remaining interest.

Future implementations may also include user choice regarding the "automation" of this process in the form of third party incentivization. In a process similar to some protocol's liquidations, a user could permit third parties to bid on the right to process their transaction, resulting in the ability for another user to make small arbitrage profits in return for initiating the return of both the fixed and floating funds.

4 Governance & Token Distribution

Given the recent community discussion and enthusiasm surrounding the "Fair Launch" model (<https://fairlaunch.capital>), it is worthwhile to identify the core incentives that derive a truly fair launch.

Fundamentally, the "Fair Launch" model intends to ensure protocol governance is placed in the hands of the most important stakeholders, the users. However, as others have criticized, a fair launch may also not be quite as "fair" as intended, as the only parties that can truly impact governance are those with large amounts of capital to commit as initial liquidity.

Additionally, while the ethos behind the requiring founders to take no token allocation may be sound, in practicality, this design presents a number of issues. Primarily, doing so removes the strong incentives for leadership to ensure the success of a project, in addition to removing a founders influence over a project's initial growth. A combination of the two presents an uncertain environment for any business structure, but is particularly destabilizing in a decentralized development environment, especially when stakeholder identities may be unknown.

That said, we would propose a token distribution and governance mechanism that attempts to align the incentives of founders, investors and users, without sacrificing key components of successful project development.

4.0.1 Proposed Token Distribution:

1% Compound Stakeholders	1% Aave Stakeholders
8% Community Voted Initiatives	10% Developer Funds
10% DefiHedge	5% Founding Team
25% Early Investors	40% Liquidity Providers

4.0.2 Proposed Governance Modifier

Through the implementation of a vesting smart contract, certain DefiHedge owned wallets will be unable to move funds for a pre-determined period after official launch. Over the course of this period, should these wallets participate in the governance process, their voting power on a given proposal will be limited by a constant modifier.

Proposed Modifier:

$$votingpower = n * \frac{1}{\left(\frac{x}{4}\right) + 1}$$

n = Number of Tokens

x = Months Post Launch

Distribution After 3 Yrs:

1.16% Compound Stakeholders	1.16% Aave Stakeholders
9.25% Community Voted Initiatives	11.56% Developer Funds
1.16% DefiHedge	0.58% Founding Team
28.90% Early Investors	46.24% Liquidity Providers

4.0.3 Resulting Governance

This construction results in a governance design that ensures initial stewardship of the protocol will stay in the hands of the DefiHedge team, without damaging the fair launch ethos of true community ownership. Through a distribution that guarantees governance decentralization and community stakeholder plurality, we hope to retain this ethos, without putting the success of our protocol at risk.

Importantly, this design also ensures that the incentives of the primary ecosystem stakeholders are aligned. Regardless of whether a stakeholder is a member of the

community, a core developer, a liquidity provider, an investor, or a founder, the sustained progression and development of the DefiHedge Protocol is the only rational priority.

5 Liquidity Provision

Given slippage is an integral component of a user's experience, many exchanges find the onboarding of initial users difficult as slippage is inversely related to available liquidity. Without enough users, there is insufficient liquidity, and without liquidity, users move to another platform; chicken & egg.

That said, much of our protocol, outside of its core functionality, has been designed with the provision of liquidity in mind.

5.1 Compound & Aave Stakeholder Token Distribution

With the expectation that our userbase may initially overlap significantly with the base of lenders and borrowers utilizing the current major lending protocols, we feel it necessary to both attract these initial users and align their interests with the future success of DefiHedge.

The simplest way to achieve this goal is through direct financial alignment preceding each market's launch.

In order to concentrate liquidity within a given maturity, we will initially launch with our lending system built solely on top of the Compound Protocol. However, once liquidity has proven to be consistent, we plan to allow users to lend funds using Aave, further providing opportunities for arbitrage.

That said, before the launch of each respective market, we will reward Compound/Aave liquidity providers with DefiHedge tokens for their contribution over a 2-4 week period.

Effectively, this distribution ensures that stakeholders are aware of new leveraged or fixed-rate lending opportunities, aligns stakeholder incentives with DefiHedge's development, and guarantees representation within our governance (which in itself may impact Compound/Aave's lending layer).

5.2 Liquidity Incentives

Upon official launch, DefiHedge intends to offer 0% taker fees and negative maker fees.

Through the implementation of negative maker fees, DefiHedge rewards market participants and incentivizes healthy market behavior, significantly improving market dynamics and user experience.

5.2.1 Negative Maker Fees: Increase Marginal Yield

Through incentives, now standard in decentralized finance, DefiHedge rewards market makers (liquidity providers) with additional yield for the time value of their assets, directly incentivizing liquidity provision.

5.2.2 Negative Maker Fees: Decentralize Protocol Governance

With the combination of incentivized market making and our governance dilution curve, our community of liquidity providers are guaranteed governance plurality, ensuring users are the ones who control the protocol's future.

5.2.3 Negative Maker Fees: Concentrate liquidity

As market participants compete as makers, users are forced to outbid one another resulting in tighter spreads and a concentrated orderbook, significantly reducing liquidity requirements (particularly in low liquidity markets).

Further, the marginal yield provided by liquidity incentives buffers the risk of "impermanent loss" for market makers, additionally tightening market spread.

5.3 Venue Neutral Architecture

As briefly mentioned, DefiHedge plans to implement a venue neutral design utilizing a libp2p network for order propagation, enabling the creation of additional rate-swap venues with minimal effort.

In terms of market dynamics, the implementation of a decentralized order propagation network provides resilience and censorship resistance for users, venues, and market makers. However, in the context of protocol adoption, it provides the incentive to build on the DefiHedge Protocol and benefit from existing liquidity rather than forking or building from scratch.

Unlike recent controversial yearn.finance and Uniswap forks, a DefiHedge fork would result in fractionalized liquidity, worse pricing, and a subpar product. Alternatively, should a third party wish to "copy" the DefiHedge Exchange and build on top of our protocol, they may find themselves benefiting from our community voted funding and shared liquidity while contributing further towards a network effect of adoption.

6 Summary

- The DefiHedge Protocol provides the infrastructure to create functioning, trustless interest-rate derivative markets (swaps).
- The DefiHedge Exchange provides a familiar and seamless traditional limit orderbook exchange experience for users to arbitrate interest-rates and accept lending agreements.
- The proposed distribution of DefiHedge tokens and unique governance curve guarantees the community a plurality over the governance process.
- The proposed liquidity incentives/negative maker fees reduce slippage and promote lower liquidity requirements.