Honey Finance: A Peer-to-Contract Protocol for NFT Lending Markets

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Abstract. In this paper we present the core functionalities of Honey Finance, a decentralised protocol built for the capital efficiency and liquidity of non-fungible tokens. In it we outline the protocol's design around free market economics to efficiently determine variable rates on NFT loans, as well as to remove the friction from peer-to-peer markets. Also outlined is a solution to the liquidation problem for NFTs, which utilises specialised liquidity pools between fungible and non-fungible assets.

1. Introduction

Our thesis is that non-fungible tokens (NFTs), along with the metaverse, will continue to attract mainstream attention and adoption at a much faster pace than Decentralised Finance (DeFi). Thus, NFTs will serve as one of the biggest entry points for the next billion users who will discover the world of DeFi and cryptocurrencies, so long as we build the proper financial infrastructure in DeFi to support these assets.

Honey Finance is a decentralised protocol that can support the financial infrastructure for NFTs. It was designed with the objective of turning the NFTs held in our wallets into powerful financial instruments which can be utilised freely and by anybody. Loans in the protocol are always overcollateralised, meaning that the borrowers supply more collateral than the value they borrow. Overcollateralised loans on NFTs create a lot more use-cases than previous DeFi money markets, as non-fungible tokens are exchanged for fungible ones. This means that an NFT lending platform is not just a money market but also acts as a liquidity solution for illiquid assets.

On the demand side, it allows NFT holders to receive instant liquidity without immediately foregoing their assets, serving as an on-ramp from NFTs into DeFi. On the supply side, it allows liquidity providers to gain exposure to NFT markets and creates a new risk profile for lenders looking to obtain higher yields, serving as an on-ramp from DeFi into NFTs.

This solution aims to solve two inherent issues with NFTs which are their opportunity cost and their lack of liquidity.

1.1 Liquidity

Honey tackles the liquidity issue by allowing users to deposit non-fungible tokens into the protocol and borrow liquid tokens. The NFTs are used as collateral on overcollateralised loans, which means that if the borrower does not pay back the loan, the NFT collateral is liquidated and sold.

Honey introduces variable interest rates to allow a better matching of supply and demand within its isolated lending markets, loans can be issued at fixed duration rates. Variable interest rates change as a function of how much liquidity is available in the protocol's lending markets, or more specifically, how much of the supplied liquidity is being borrowed, referred to as the utilisation rate. Variable interest

rates prove to be a better reflection of the supply and demand for liquidity and are thus favoured by the protocol.

1.2 Opportunity cost

Acquiring an NFT presents an implicit cost (in the form of missed potential profits). If the price of an NFT is worth X, then X represents the capital that could be invested into DeFi in exchange for yield, which can be represented as the variable Y.

This compounds in the long run, as purchasing an NFT costs $X \cdot Y^N$, for N representing the number of years during which the NFT holder could have been receiving an APR on X. The variable Y can be expressed as the average yield of staking crypto in "lower-risk" DeFi protocols. This opportunity cost not only compounds into exponential losses, but it forms a significant psychological barrier to acquiring NFTs.

Ideally, borrowers could extract liquidity from their current NFTs and invest that liquidity into DeFi to obtain a net profit. The caveat is that interest rates must be low enough, for the average DeFi yield (previously expressed as Y) to be greater than the cost of borrowing. We can visualise the average borrow rate for NFTs as Z. So, if $Z > Y$, borrowers will have no incentive to extract liquidity from an NFT as the costs outweigh the potential returns.

In the long run, as NFT liquidations improve, and as the risk for lenders decreases, so will the interest rates for borrowers. It can be expected that Z will trend towards Y, as the risk profile of lending in non-fungible lending markets becomes akin to lending in fungible money markets. For borrowers to realise a net profit from their loans, purely by means of investing in DeFi, they will have to seek yield greater than Z through yield farming strategies and novel protocols, offering medium to high-risk yields. The creation of these strategies is detailed below in part 5.

2. Lending & Borrowing Architecture

Borrowing with NFT collateral will work with any collection so long as a lending market has been created for it. Instead of directly issuing loans through its treasury, Honey Finance serves as a platform for others to create lending markets. A lending market is comprised of the market creator, lenders, and borrowers.

DAOs or individuals can create lending markets on Honey to provide their collection with liquidity, thus becoming market creators. As market creators, they define the parameters of their lending market. This includes the base interest rate, the choice of oracle, liquidation method, type of lending market, and most importantly the market creator fee. The latter is paid whenever borrowers pay down their loans and is deduced from the APR received by lenders.

This allows NFT projects to create lending markets for their collections, in which they can bootstrap liquidity and earn fees, while providing a value to their community.

2.1 Interest Rates

Variable interest rates are automatically adjusted by the supply and demand for liquidity in a market. As the available liquidity in a market shrinks, interest rates go up to incentivise more lenders to supply liquidity, and more borrowers from dropping out of the market. As the available liquidity in a market grows, interest rates go down, incentivising lenders to drop out of the market and borrowers to demand more of the available liquidity. The protocol needs to establish a base rate for the variable interest rates to start from. This base rate, set by market creators, determines how much interest is quoted to borrowers if 0% of the available liquidity is borrowed.

The protocol also sets an optimal utilisation rate. This refers to the utilisation of the available liquidity, beyond the optimal utilisation rate, interest rates should incentivise borrowing, above the optimal utilisation rate, interest rates should incentivise lending. Honey Finance uses an optimal utilisation rate of 80%, separating interest rate calculations into two equations.

$U_t = $ utilisation rate at time t
$U_{optimal} = $ optimal utilisation rate
$R_v = $ varriable borrow rate
$R_{v0} = $ base variable borrow rate
$R_{slope1} = $ constant determining progression of interest rate when $U_t \leqslant U_{optimal}$
$R_{slope2} = $ constant determining progression of interest rate when $U_t > U_{optimal}$

When utilisation in a lending market is below the optimal rate:

$$R_v = R_{v0} + \left(\frac{U_t}{U_{optimal}} \right) * R_{slope\ 1}$$

When utilisation in a lending market is above the optimal rate:

$$R_v = R_{v0} + R_{slope\ 1} + \left(\frac{U_t - U_{optimal}}{1 - U_{optimal}} \right) * R_{slope\ 2}$$

2.2 Isolated Risk Markets

NFT collections are characterised by low volumes and high volatility. They inherently carry more risk than fungible tokens. To not spread the risk across the entire protocol, lending markets exist separately from one another. Lending market A crashing in no way affects the stakeholders in lending market B. This means lenders must select which lending market to supply liquidity to when using the protocol, gaining exposure to the risk of the collections they supply liquidity for. The protocol, namely the interest rate model, is designed so that greater is accompanied by greater rewards.

2.3 Liquidations

Effectively being able to sell collateral is what secures the integrity of any lending protocol. While most NFTs are currently liquidated on marketplaces, this process contains too much friction and is far from instant. Even listing NFTs below the value of their floor price is by no means a guarantee that it will sell.

To achieve instant liquidations and offer more security to its lending markets, Honey utilises NFT liquidity pools for liquidations. NFT liquidity pools contain both fungible and non-fungible assets of the same collection in one basket. Protocols like Solvent or NFT20 will create NFT liquidity pools (LPs) around collections of assets. In those pools, 100 tokens are usually redeemable for 1 NFT, and vice versa. This allows Honey Finance to swap NFTs to receive 100 fungible tokens in exchange.

While these kinds of liquidations are ideal, they are not available for any asset, as the liquidation pools require a certain amount of liquidity to be able to operate efficiently. For now, this means that market creators must also ensure that liquidity is present in the liquidation pools they assign to their markets. This can be done through incentives or liquidity mining, to attract liquidity providers to service NFT pools.

2.4 Risks

There are two different ways for liquidations to be triggered in a market.

The first is that the value of the collateral deposited by a borrower goes down. As mentioned previously, all loans must be overcollateralised to protect lenders. Liquidation thresholds are set to sell off collateral before its value goes below the value of the loan provided. Liquidation thresholds can also be set by market creators when initialising the market. They are expressed as a certain point upon the loan to value (LTV) curve. If a lending market has 50% as the maximum loan to value, the liquidation threshold could be 60%.

$$\text{Loan to Value} = \frac{Debt}{Value\ of\ collateral}$$

For the liquidation threshold to be met, the numerator must go up or the denominator must go down. At first, the amount borrowed is capped using the maximum loan to value parameter, so the collateral can only be liquidated if the value of the collateral goes down, as that would make the loan to value go up, possibly reaching the liquidation threshold. If it is met, the collateral is subject to being sold by the protocol.

Considering for a moment that the value of the collateral stays constant. Over time, the accrued interest makes the numerator of the LTV fraction go up, increasing the LTV of the position. If interest is not paid down, it will continue to accrue until the liquidation threshold is met.

3. **Governance**

As Honey Finance is a decentralised protocol, it is run and operated by a Decentralised Autonomous Organisation, the Honey DAO. The purpose of the DAO is to decentralise the protocol, make it self-sufficient, and censorship resistant. Protocol fees are accrued in the DAO's treasury, which also holds LP positions from the IDO, protocol owned liquidity, and 54% of the total allocation of HONEY tokens.

The Honey DAO uses token governance and Honey Improvement Proposals (HIPs) to implement changes to the protocol. The native token, HONEY, holds no right to governance, which is instead reserved to the veHONEY token. These tokens represent vote escrowed HONEY, tokens that have been locked up for a fixed duration. This model, pioneered by Michael Egorov of Curve Finance, allows votes to be held by those with long term incentives in the protocol, as the number of votes increases as a linear function of how both how many tokens are held and how long they are vested for.

In short, if the same amount of HONEY tokens are locked up by two individuals, the one who locks them for twice as long will have twice the voting power, and twice the number of shares in the DAO.

4. **Rarities**

Regardless of rarity, the floor price of an NFT collection usually represents the most accurate and reliable metric of liquidity at any moment in time. While this is less advantageous for rarer NFTs within collections, the market itself cannot provide reliable enough liquidity to secure loans for these NFTs.

Note that lending markets can be created for specific traits in an NFT collection, a lending market is not reserved to serving an entire collection and can instead focus supply and demand for a particular trait in a collection.

To better match supply and demand for unique NFTs, whose value is harder to determine, Honey Finance allows collateral bidding. Rather than guessing what a rare NFT should be worth, or implementing custom oracles, we allow liquidators to bid on NFT collateral, and therefore allow for decentralised price discovery. Initially, a rare NFT will receive instant liquidity based on the floor price, however, if liquidators place bids superior to the floor price, the borrower can choose to accept the new valuation as a basis for the loan. In the event of a liquidation, the NFT is sent directly to the liquidator, who is now also the only lender.

5. Yield Vaults

To offset the cost of borrowing, and to reduce potential default rates, the protocol incentivises borrowers to deposit their borrowed liquidity into yield vaults.

Borrowers will take out liquidity for an interest rate, previously defined as Z. They are free to do whatever they like with this borrowed money. Yield vaults are investment strategies and opportunities developed by members of the community, which aim to offer yields greater than Y, which represents the average lower risk returns that can be expected in DeFi. Vaults are instituted by the DAO to seize market opportunities such as yield farming events, initial liquidity mining, constructed products, and more sophisticated financial instruments, now accessible through NFTs. Creation of new and better vaults will be incentivised by a revenue sharing for their creators.

Vaults ensure the integration of the Honey Finance protocol with other decentralised applications, as strategies involve composability with partnered protocols by means of their NFTs. They are a critical component to achieving Honey's mission, as they allow retail NFT investors easy access to sophisticated financial strategies within DeFi.

Conclusion

The Honey Finance protocol solves the liquidity problem for NFTs by creating open and free lending markets for lenders and borrowers. Lending markets are designed to heavily rely on free market economics to determine their parameters as a function of supply and demand. This reduces the friction of obtaining loans for NFTs while also guaranteeing that rates remain competitive in the long run. Multiple agents communicating in peer-to-peer markets are now replaced by market signals such as interest rates, which aggregate all the available information in their respective markets. In this paper, we've also outlined how to solve the liquidation problem for NFT loans by utilising specialised liquidity pools, and utilising peer-to-peer interactions when necessary. This design enables a seamless bridge between NFTs and DeFi, presenting new opportunities for both sides.

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