LendBook
a Lending Limit Order Book
(light paper)

prevert*

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Abstract

A lending limit order book is a non-custodial, peer to peer, permissionless, high loan-to-value lending protocol that enables users to borrow limit orders' assets collateralized by their own limit orders. This new financial primitive offers users multiple benefits: stop loss orders with guaranteed stop price, zero liquidation penalty, high leverage strategies and interest-bearing limit orders. In addition, the protocol is immune to the risk of bad debt and can operate without the need for off-chain governance.

Persistent issues with lending protocols

Lending protocols face two persistent challenges:

1) Incomplete decentralization

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Off-chain risk management has overgrown with time, putting governance decisions in the hand of a few experts and delegates. Contracts can be patched or paused by developers or guardians.

2) Borrowing restrictions impair users' experience:

- borrowing limits (max LTV, borrowing cap, ...)
- costly liquidation
- whitelisted assets limited to blue chips

Both issues stem from the necessity of protecting the protocol's solvency from the risk of bad debt.

LendBook, a lending limit order book, is a new financial primitive which eliminates the insolvency risk, can achieve full decentralization and brings along the way a host of new benefits for lenders and borrowers, like high Loan-To-Value (LTV) and leverage, stop-loss orders with guaranteed price, borrowing programmability and interest-bearing limit orders.

What is a lending limit order book

A lending limit order book (LLOB) is a non-custodial, peer to peer and permissionless lending protocol that enables users to borrow limit orders' assets. Borrowing positions are collateralized by limit orders posted the other side of the order book. Borrowed assets from buy orders are collateralized by the assets deposited in sell orders, and reciprocally.

The main rule governing the protocol stipulates that any position borrowing against a limit order must be closed when that limit order is executed. The alignment of the two events significantly streamlines the settlement process for both parties.

Benefits of using LendBook

1) Zero cost liquidation

The closing of a borrowing position does not rely on the active monitoring of liquidators but on that of takers. A minimal part of limit orders are kept non-borrowable and reserved to traders who, by taking the non-borrowed part of the assets, initiate the internal transfer from the borrowers to the lenders.

Since lenders agree to receive the collateral as a payment, the protocol does not need to incentivize bots to liquidate unhealthy positions on time. The borrower does not incur liquidation costs as a result.

2) High leverage

LendBook enables leverage factors a magnitude higher than what other lending protocols offer. Traders can obtain LTV close to 100% by borrowing from orders which limit prices are close enough to market price.

Fig. 1 shows the maximum leverage factor as a function of the distance of the limit price to the market price.

3) Stop loss orders

A stop-loss order allows traders to close long positions by selling the assets or a short position by buying the assets. In LendBook, users open stop-loss orders by borrowing assets from limit orders. The stop price in case of price decrease (or increase) is the limit price of the buy (sell) order from which they borrow.

In traditional or crypto finance, once the stop price is met, the stop loss order becomes a market order and is executed at the next available price. The obtained price can be significantly less favorable than the specified price when markets move fast. Here the stop price is guaranteed by the filling of the sell order at the limit price.

A guaranteed stop price is particularly useful to hedge against the risk of assets losing their peg or protocol's hacks.

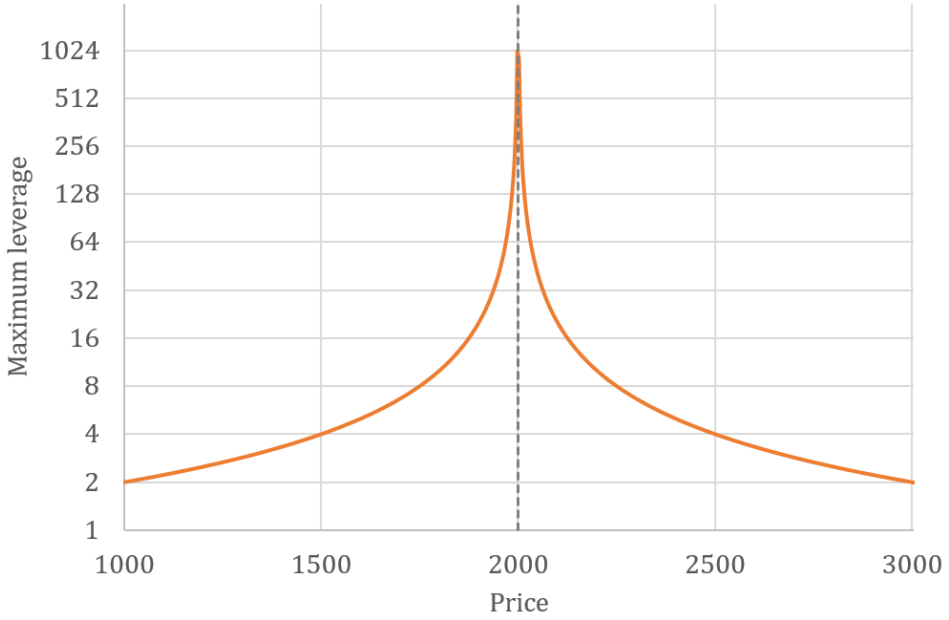

Figure 1: Distance of limit price to market price (2000) and maximum leverage (base-2 log scale).

4) Absence of bad debt

A major implication of borrowing assets from limit orders is the dramatic simplification and high safety of the liquidation process. Borrowing positions cannot go under-collateralized even in case of strong and rapid price action, gas fee spike, or blockchain congestion/downtime. The closing of a borrowing position does not rely on trading against an AMM pool with the risk of a sub-optimal execution. The risk of rapid price variation is still present but borne by the maker of the limit order. Although the opportunity cost is common to all limit order books, makers are compensated in LendBook by an interest rate.

The fact that lending pools stay well collateralized under any market conditions has many benefits at the UX and governance levels. In particular, there is no need for supervision by third party, funding a safety module, liquidation costs, or borrowing restrictions (supply caps, borrowing caps, low loan-to-value) anymore.

5) Governance minimization

Despite committing considerable resources and expertise to risk management, protocols' solvency is still at risk of a lack of due diligence or governance failure. Lending protocols have also implemented and funded sizeable financial buffers to absorb shortfall events and protect lenders from bad debt. Those safety measures mitigate solvency risk at the expense of token holders.

In contrast, the functioning of a LLOB is fully algorithmic and automated. As pools' solvency is encoded at the smart contract level and does not rely on team's interventions or governance by a DAO, full decentralization becomes a realistic objective which LendBook will actively pursue. The protocol will be governance free with non-upgradeable smart contracts and parameters set at the time of contract deployment.

Conclusion

Lending protocols are an essential building block for blockchain's applications and have grown to represent tens of billions of dollars in value. However, the vast majority of this value is held in smart contracts which management is still partially centralized. A complete decentralization process has failed so far, due to a persistent risk of insolvency, which management creates points of centralization.

LendBook's immunity to insolvency risk marks a significant advancement in the space. There is no concept of bad debt that might need to be absorbed by a DAO treasury / insurance fund or socialized across lenders. There is no trade-off in case of liquidation between the costs incurred by borrowers, liquidators' incentives and lenders' safety. The radically innovative design unlocks many new features like high LTV and leverage, borrowing programmability and interest-bearing limit orders. This also makes possible the protocol to operate in a fully decentralized way.