Defi Accelerator

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Abstract

In this paper, we go over a proposed protocol which leverages arbitrage opportunities in existing lending protocols to maximize returns whilst automatically and algorithmically managing risk. Safe protocol functionality will require the success of Ethereum 2.0.

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1 Introduction

In just over four years since Ethereum's launch, a vast ecosystem of thousands of applications [0] has been constructed. Initially, these applications lacked significant utility and users.

However, recently with the advent of decentralized finance, there has been an explosion in applications that provide real world value, attracting hundreds of millions of dollars in locked value [1]. In just two years, the Defi ecosystem has amassed over $600 million in locked assets

[1]. Among the most popular Defi applications exist lending protocols, such as: Compound, dYdX, and bZx's Fulcrum. These protocols revolutionized money markets by allowing for frictionless peer-to-peer lending and borrowing using liquidity pools and algorithmically derived interest rates based on supply and demand.

Between these money markets exist arbitrage opportunities that can be used to leverage supplied assets, thereby increasing interest rates for lenders. However, leveraging volatile money markets in this manner comes with risks. Defi Accelerator intends to take advantage of arbitrage opportunities whilst algorithmically managing risk.

2 The Compound Protocol

Before we can understand the Defi Accelerator protocol, we must understand the base on which it will be created - The Compound Protocol. Compound is a decentralized protocol on the Ethereum blockchain that provides access to peer-to-peer lending and borrowing using algorithmically determined interest rates based on supply and demand. The advent of liquidity pools allows for frictionless lending and borrowing, transforming the landscape of money markets.

Protocol lenders are incentivized to supply assets by earning interest on their loan. Borrowers have access to a portion of the value of the collateral they supply to the protocol and pay a greater interest rate than the lenders earn. This maintains sufficient liquidity in the protocol. As the size of the liquidity pool decreases, interest rates are increased, incentivizing lenders to supply assets and disincentivizing borrowing. In the case that a user's supplied assets become worth less than the value of their borrowed assets, a portion of the outstanding borrowing may be repaid in exchange for user's collateral at the current market value minus a liquidation discount; incentivizing arbitrageurs to eliminate the protocol's risk.

3 The Defi Accelerator Protocol

Defi Accelerator takes advantage of differences in interest rates between money markets, also known as arbitrage. This allows users to supply more assets than they would normally have access to, increasing the interest they earn from the protocol.

3.1 Arbitrage

In finance, arbitrage is defined as, "the practice of taking advantage of a price difference between two or more markets: striking a combination of matching deals that capitalize upon the imbalance, the profit being the difference between the market prices at which the unit is traded." Arbitrage is also not only legal, but often encouraged in financial markets as it contributes to market efficiency and provides greater liquidity to markets.

In the following sections, we will look at how arbitrage can be used to profit from interest imbalances in Compound's money markets.

3.2 Depositing Assets

Since it's generally the most profitable asset, deposits will initially only be available in Dai. In the future, if other assets become competitively profitable, they will also be implemented into the protocol.

Much like Compound, when an asset is supplied to Defi Accelerator, the user gets an ERC-20 token (Leveraged Dai - lDai) to represent their supplied asset(s). As the value of the underlying asset accrues interest, the lDai token exchange rate increases at the same rate minus a small reserve fee determined by governance.

Deposits are not accepted by the protocol if no arbitrage opportunities are present.

3.3 Supplying & Leveraging Assets

Once a user deposits their assets in the protocol, the assets are immediately supplied to Compound. The supplied assets are then used as collateral so that Ether can be borrowed. The value of Ether borrowed is determined by the value of the supplied assets multiplied by a collateral factor determined by governance. Borrowed Ether is then exchanged using Uniswap for an equivalent value of Dai, and the Dai is supplied to the protocol.

This process of leveraging gives users a higher rate of return on the same investment.

3.4 Risk Management

Risk management is the greatest pitfall that comes with leveraging loans on Compound. If the exchange rate of the borrowed Ether increases beyond the value of the supplied Dai used as collateral, liquidation can take place. Defi Accelerator automatically manages risk to prevent liquidation from occurring.

If the value of the borrowed Ether increases beyond a specified safe value, a mechanism is triggered to decrease leverage. Alternatively, if the price of the borrowed Ether decreases too much, a similar mechanism will be triggered to increase leverage.

3.5 Withdrawing Assets

When a user chooses to withdraw some or all of their assets, the amount they are withdrawing from the contract is de-leveraged in a series of steps. If the amount that a user is withdrawing can be redeemed from Compound without exceeding a safe risk level, the funds are simply redeemed and exchanged for the user's lDai. If, however, redeeming the withdraw amount will cause the protocol to exceed a safe risk level, the contract will not exceed the safe risk level. Instead, the contract will use the redeemed assets to deleverage it's position until it can safely withdraw the full amount requested. This process allows any and all users to withdraw as much as they please, whenever they please.

4 Implementation & Architecture

Defi Accelerator and the protocol smart contracts will be open source and free to use by anyone.

4.1 lDai Token

The lDai token is a mintable and burnable ERC-20 token. The token represents user's positions with an ever-increasing exchange rate where the longer they hold the token, the more Dai it can be exchanged for.

Whenever users deposit Dai in the protocol, an equivalent value of lDai is minted to their address in exchange. When a user withdraws their assets from the contract, their lDai is burned in exchange for their funds. The minting and burning of the token allows it to always represent the appropriate value of underlying Dai.

4.1.1 Exchange Rate

The token's exchange rate increases over time as interest is accrued, and is calculated based on a few variables: underlying assets, debt, the reserve addition, and the total supply of lDai.

```
exchangeRate = (underlying assets - debt - reserveAddition) / ldai supply
```

The reserve addition is calculated based off of the additional interest accrued from leverage and the reserve factor, which is determined by governance.

```
reserveAddition = (additionalInterest * reserveFactor)
```

4.2 Leverage

The protocol leveraging process is relatively simple. After depositing Dai to Compound, we calculate a safe amount of Ether to borrow based on the amount of account liquidity and the governance determined safe collateral factor.

```
safeBorrowAmount = accountLiquidity * collateralFactor
```

With our safe borrow amount we execute the borrow function on Compound, and exchange our Ether for Dai on Uniswap. We then simply supply our Dai back to Compound.

4.3 Risk Management

To manage risk, the protocol continuously monitors the collateral factor of its position, as well as providing an ever-increasing liquidity pool.

4.3.1 Deleveraging

The protocol continuously makes calls to Compound, and subsequent leverage modifications to maintain a safe collateral factor. A safe range for the collateral factor is determined by governance and keeps the risk profile optimal by achieving maximum leverage whilst mitigating the risk of liquidation.

```
collateralFactor > maxCollateralFactor ? decreaseRisk
collateralFactor < minCollateralFactor ? increaseRisk
```

4.3.2 Liquidity

The protocol also has a backup incase of unlikely deleveraging failure. A small portion of interest generated is reserved to the contract. This way if liquidation occurs, there will most likely be additional funds to cover the loss, maintaining user balance. Additions to the reserve take place when users make withdrawals. The reserve addition can be calculated based on the following function:

```
reserveAddition = (additionalInterest * reserveFactor)
```

4.4 Governance

The protocol will begin with centralized governance to determine safe values. Eventually, the protocol will be controlled entirely based on ownership of the lDai token.

The values controlled by governance are as follows:

- The rate of funds supplied to the reserve (reserveMantissa)
- The safe collateral factor to borrow funds (collateralFactor)
- The maximum safe position collateral factor (maxCollateralFactor)
- The minimum position collateral factor (minCollateralFactor)

4.5 Scaling

Due to unclogged blockchain reliance, with the current scalability of Ethereum, this application is *not* risk-free. As of the date of this paper, a clogged blockchain may lead to loss of funds.

Sources

- [0] https://www.stateofthedapps.com/
- [1] https://defipulse.com/
- [2] https://compound.finance/documents/Compound.Whitepaper.pdf