VADER PROTOCOL: Incentivised liquidity, stablecoin and lending platform

Abstract. VADER is a liquidity protocol that combines a collateralized stablecoin with liquidity pools. The stablecoin, USDV, is issued by burning VADER tokens, which is issued by burning VETH tokens. Liquidity pools use USDV as the settlement asset. A daily emission rate of VADER funds liquidity incentives, a protocol interest rate, and impermanent loss protection. Pooled capital can be lent out by borrowers, who lock collateral such as pool shares or VADER. The collateral is used to pay an interest rate which is added into the pools to increase returns.

Introduction

Stablecoins are a noble problem to solve. The key problem is a matter of liquidity and sensing the correct purchasing power of assets at all times. In addition, the use of incentives can ensure the maximum uptake of the system and the fast bootstrapping of capital. Existing stablecoins and synthetic asset designs fall short because they use oracles that are not liquidity sensitive and can be manipulated, do not incentivise the makers of liquidity properly, and do not use liquidity-sensitive fee models.

VADER is a new form of liquidity protocol that seeks to be self-serving. It uses its own liquidity and awareness of asset purchasing power to support the creation of a collateralized stablecoin. It has a fair and transparent incentive strategy to maximise the depth of liquidity pools and adoption of the stablecoin. It uses a liquidity-sensitive fee to ensure safe and sustainable creation of debt, which can increase the capital efficiency of the system.

Key Features

The following are the key features of VADER Protocol:

1) Uses a collateralized stablecoin settlement asset
2) Holders of VADER can burn their VADER to mint USDV, driving value accrual into VADER
3) Holders of USDV can earn interest by locking up USDV tokens
4) Impermanent Loss protection for Liquidity Providers in the pools
5) Incentivised pools that receive continual dividends
6) Holders of collateral can borrow assets out of the pools

Architecture

There are two types of pools in the system, although it is abstracted to the user. The first group of pools are the “Anchor pools” which use VADER as a settlement asset. This allows the system to sense the anchor price, which is the median of the prices of the anchor pools. The second group of pools are the “Asset pools” which use USDV as the base asset, which drives liquidity and demand of the stablecoin.

The Anchor pools [VADER:stablecoin] are linked to the Asset pools [USDV:Asset] via 0-slippage swaps between USDV<>VADER.

VADER ERC20 Contract

VADER has extra functions to ERC20:

1) VADER is minted if VETH is burnt, 1:1
2) VADER is minted if USDV is burnt, in accordance with the inverse Anchor price
3) Has a daily emission rate of VADER, which is sent to the USDV Contract.

USDV Contract

USDV has extra functions to ERC20:

1) USDV is minted if VADER is burnt, in accordance with the Anchor price
2) Allows anyone to lock up USDV and earn an interest rate, claimable every block.
3) Receives VADER from the VADER contract, of which it burns a proportion of it into USDV, then makes that available to be claimed by USDV stakers. The rest it sends to the Router Contract to be used by its Reserve.

VADER Router and Vault Contract

The Vault contains all the assets in the pools. It does not issue liquidity tokens to members to minimise gas, avoid complexity, and to enable Impermanent Loss protection tracking for each member. The Vault is wrapped by the Router which contains permissionless logic about how to interact with the Vault as well as a balance of VADER and USDV given to it by the USDV contract, which is used as the reserve of the system. This reserve facilitates:

1) Incentives for each pool
2) Impermanent Loss Protection

VADER Utils Contract

The Utils contract contains non-critical logic for the system.

VADER Token

There are three use cases of VADER. The first is as a common settlement asset in anchor pools to enable the system to sense the purchasing power of a group of stablecoins - this transmits the "anchor" price of USD. The second is to allow anyone to burn VADER to mint USDV at 1:1 the anchor price. The third is to allow anyone to lock up VADER as collateral for borrowing against.

VADER is issued 1:1 for holders of Vether (VETH) - which itself is distributed via a fair process of Proof-of-Value. Since VETH is acquired only by the provable burning of ETH; it is sybil-resistant, decentralised and has unforgeable costliness. VETH has a maximum supply of 1,000,000 units, issued over 10 years.

VADER has a maximum supply of 2,000,000. 1,000,000 is claimed by the holders of VETH, and the additional 1,000,000 is paid out based on a smooth emission curve starting at 50% APY and dropping to roughly 10% after 5 years. VADER will continue to pay out until 2m units have been issued. If the supply of VADER drops due to being burned to USDV, then emission rates will increase until meeting an equilibrium.

```
dailyEmission = (maxSupply - currentSupply) / emissionCurve
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Liquidity Incentives

Dividends are paid out to Liquidity Pools, both in the form of VADER and USDV, as well as paying USDV stakers. The split at any point of time is such that an equilibrium is targeted:

1) There is an equivalent amount of USDV staked and pooled
2) There is an equivalent amount of pooled capital in the Anchor Pools and Asset Pools.

Over time this will ensure the system has enough capital in each component of the ecosystem. The incentives are synced into pool balances each time a swap is made, so over time LPs realise a yield. This yield, as well as slip-based fees, offsets any Impermanent Loss, and the LP should always realise a gain after a period of time.

Impermanent Loss Protection

The deposit value for each member is recorded when they deposit. When they go to withdraw, the redemption value is computed. If it is less than the deposit value, the member is paid the deficit from the reserve. The protection issued increases from 0 to 100% linearly for 100 days. Coverage is given by the following equation:

```
coverage = (V0 - V1) + (A0 - A1) * V1/A1
V0: USDVDeposited; A0: assetDeposited;
V1: USDVToRedeem; A0: assetToRedeem;
```

Liquidity Pools

Liquidity Pools use either VADER or USDV as the common settlement asset. This allows the system to accurately price any pool, as well as sensing purchasing power of its assets. Using USDV as a

common settlement asset in Asset pools takes away any friction for requiring users hold exposure to a particular asset. In fact, all of the VADER Liquidity Pools (Anchor and Asset) are stablecoin-paired pools, making Impermanent Loss easy to reason about.

The liquidity model includes a liquidity-sensitive slip-based fee. This maximises revenue for liquidity providers under high demand of liquidity, and prevents manipulation. It is also necessary to support liquidations of collateral.

The algorithm is:

$$y = \frac{x*X*Y}{(x+X)^2}$$

```
x: input; X: Input Balance;
y: output; Y: Output Balance;
```

Anchor Pools

Anchor pools are special pools that specifically have VADER as the base asset. Anyone can create a pool, but only some of them are allowed to be part of the pricing mechanism. The conditions to list/delist an anchor pool:

1) The protocol will start with 5 anchor pools (DAI, USDT, USDC, BUSD, UST)
2) At any stage, an anchor pool can be replaced by another, as long as the conditions are met:
    a) Is within 2% of the price of the other four
    b) The pool to be replaced is outside 5% of the other four
    c) Has a depth that exceeds the pool to be replaced (in VADER)

Lending

Members can lock up collateral, which includes VADER, USDV or any system asset. VADER is taken from the reserve and swapped out to the debt asset. The member's collateral is added to a collateral pool, and their debt recorded. Since there is global collateral pool, members can not adjust collateral rate themselves - all debt is issued at 150% collateralization when minted. Interest is charged against the collateral and paid into the pools of the associated debt asset. A member can unlock their collateral by returning their debt amount. If the collateral drops below the debt value, then anyone can partially liquidate the pool of collateral, set at 10% each time.

The interest paid is tracked, such that when a member leaves, their redeemed collateral is their deposit minus their share of the paid interest. If the paid interest for a member is within 99% of their collateral, anyone can purge that member and claim the final 1% collateral. This will stop a build up of members who have consumed all their collateral in interest, but never leave, which adversely affects the accounting for the remaining members.

Liveness

The system is able to conduct its own servicing:

- Pay the daily emission rate
- Pay the Dividends
- Liquidate collateral 10% at a time

This is done by piggy-backing VADER transfers and VADER swaps which query a condition and do a single extra action. The member making the transfer/swap will subsidise the gas cost at that time.

Reserve

The VADER Vault contract has a reserve, which is topped up by emissions every day, and consumed by incentives, IL Protection and borrowers. This is to ensure the emission rate of VADER is programmed and immutable, and is not dependent on downstream requirements. As such, under heavy demand, the Reserve can go to 0, in which case incentives, protection and lending will stop. This is a throttle on the system, preventing run-away inflation.

Governance

VADER Protocol is autonomous code and won't be able to be changed. If the system ever needs to be upgraded, the entire ecosystem of holders, LPs and borrowers will need to opt-in to upgrade. During the bootstrap period, the DEPLOYER will retain the ability to tweak parameters, which can be purged by anyone after 3 months. The reserve of USDV in the USDV contract pays USDV stakers, who can decide to pay out grant funding to anyone in the ecosystem, (limited to 10% at a time).

Conclusion

VADER is an incentivised, governance-minimal and simple liquidity protocol that can scale itself sustainably. A stablecoin is issued by burning VADER, which itself is priced against the median of a group of anchor pools. This stablecoin allows the bearer to earn interest, as well as being the settlement asset in most of its liquidity pools. Liquidity providers are entitled to Impermanent Loss protection whilst they are in the pools. All pools receive daily liquidity incentives. A lending design allows members of pools and holders of VADER to lock up collateral to borrow debt against.

Appendix A - Code Architecture