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## Assessment Summary

- BA Labs supports listing weETH token on Sparklend mainnet deployment
- Reference parameters for weETH are listed below

## Overview

Sparklend is a fork of the Aave v3 protocol. In addition to the standard features of Aave v3, Spark has a close integration with the core Maker protocol to facilitate deep liquidity and low, stable DAI borrowing rates.

To date, the Sparklend mainnet deployment has restricted listings to a very limited number of assets including the largest and most liquid staking tokens, which keeps the overall risk exposure of the market low. However, with the recent growth of restaking activity in defi, there is now a growing opportunity to take advantage of unmet borrowing demand by listing liquid restaking tokens (LRTs).

Etherfi's weETH is the largest and most liquid LRT on the market currently, with over \$4 billion in TVL. Etherfi also stands out as the only large LRT with withdrawals fully enabled, which helps ensure stable liquidity and a strong peg vs underlying ETH. Given these features, and current low level of competition for borrowing USD stablecoins using LRT collateral, listing weETH offers an attractive growth opportunity to increase total DAI borrow volume on Sparklend.

## Fundamental Risk

This section covers fundamental and qualitative risk factors for Etherfi, Eigenlayer, and weETH.

### Technical Risk

Both Etherfi and Eigenlayer have gone through significant auditing and code review processes. Eigenlayer has undergone 4 audits plus an audit competition, while Etherfi has also undergone 4 audits plus an audit competition. Eigenlayer and Etherfi also offer bug bounty programs through Immunefi, with maximum payouts of \$2 million and \$200,000 respectively. While the auditing and bounty provisions are adequate, the maximum caps for bounties may be on the low end considering the amount of value secured in the protocols. In each case, the maximum bounty payout is well below 0.01% of the protocols' TVL.

Etherfi and Eigenlayer have both been operating without exploits or bugs for roughly 1 year. Given the significant time integrated TVL during this period, they have accrued a decent level of technical lindy. However, each protocol has seen upgrades over this period particularly to support AVS, which opens up the possibility of bugs being introduced into the protocols. So we can only rely on historical time and TVL as evidence of security to a limited degree.

### Validation and Slashing Risk

As a liquid restaking token, weETH is subject to validation risk and slashing conditions for not only Ethereum protocol staking, but also staking via Eigenlayer AVS. Currently, Eigenlayer does not have slashing enabled for AVS staking, so there is no direct threat of slashing from operator failures during restaking. AVS slashing is not expected to be enabled in the near future, but over the medium term this will present an additional operational risk to LRTs like weETH.

Etherfi currently has a whitelisting process to accept operators to validate for the protocol. Once whitelisted by the team (based on the team's assessment of operator performance history and infrastructure), operators can place bids in ETH to earn the right to operate an Etherfi validator. There are plans to open up validation to more operators over time but the exact details to remove whitelisting have not been shared at present. As Etherfi onboards with more AVS, the operational overhead for validating for weETH is expected to increase significantly, and operator management may present a key challenge for scaling the protocol and minimizing slashing risk.

Etherfi has also entered into certain restaking agreements with AVS which commit them to providing certain amounts of restaked value (eg. [Ethos](#)). This may help boost weETH returns, but also represents a significant commitment on the part of token holders due to restaking operational risks and lack of clarity over returns. If Etherfi is unable to provide the agreed upon restake amount, weETH holders may also lose the potential benefits of AVS rewards or token distributions.

### Centralization and Admin Risk

Etherfi recently launched their governance token ETHFI via an airdrop to stakers. However, at present key admin authorities over the protocol are controlled by a 4 of 7 multisig, with 3 signers from the core team and 4 external signers. Most controls sit behind a 3 day timelock, with the exception of AVS related actions which are not subject to timelock due to their active state of development and deployment. The timeline for renouncing centralized admin authorities or transferring them to the DAO is somewhat unclear, with a [stated plan](#) to deploy full DAO governance in the coming months. The ETHFI governance token is immutable and has a fixed supply.

## Redemptions

Etherfi stands out as the only large LRT to offer redemptions to ETH. This provides a key arbitrage mechanism in cases where weETH falls below the value of underlying ETH holdings, as users can buy up discounted weETH and then unstake. This is similar to other LSTs like stETH and rETH, where activation of redemptions has significantly improved their resilience and peg strength. As an example, stETH saw persistent discounts vs peg of up to 7% before redemptions were enabled, but since then the stETH price has consistently stayed within 0.5% of underlying value.

### [Coinagecko stETH](#)

Eigenlayer introduces an additional 1 week withdrawal delay for restaked ETH, so we can expect that redemptions may provide somewhat lower price support for weETH versus traditional LSTs. Because of the additional Eigenlayer withdrawal delay, we estimate that fully withdrawing from weETH will take roughly 1 week longer than withdrawing from comparable LSTs like rETH or stETH. The result is that LRTs like weETH are likely to face larger discounts in a broad based market crash vs traditional LSTs like rETH and stETH, as the redemption arbitrage loop has a greater duration and therefore a lower yield to maturity for a given discount.

EtherFi also maintains a pool of liquid ETH inside the protocol to service withdrawals within 24 hours of user requests. Historically, this has amounted to roughly 2-3% of total ETH backing, and currently it is somewhat higher at roughly ~120,000 ETH. This represents an additional source of available liquidity to service withdrawals immediately, which can help prevent weETH from trading below redemption value during a market crash.

## Market Risk and Liquidity

This section discusses market and liquidity risk factors and process for determining appropriate asset specific parameters.

### weETH Liquidity Profile

weETH has several onchain sources of liquidity via DEX pools, in addition to the primary market liquidity provided through minting and redemptions. The largest DEX for weETH on mainnet is Uniswap v3, with \$84 million TVL in weETH<>ETH pool and \$29 million TVL in weETH<>wstETH pool. Balancer also offers an additional liquidity source, with \$46 million in a weETH<>rETH pool and \$15 million in a LRT pool including weETH, Renzo's ezETH, and Swell's rswETH.

However, the selection of pair assets makes some of these pools less resilient in case of broad market downturns or buildups in the Ethereum staking withdrawal queue. For example, the LRT Balancer pool provides limited assurance as neither ezETH or rswETH are currently redeemable, so any weETH sold through this pool would need to rely on limited secondary market liquidity for these tokens to swap into ETH or stablecoins. If a withdrawal queue builds up, then this could lead to broad based depegs across LSTs like wstETH and rETH, which would also drag down weETH price and make the weETH<>LST pools less useful.

The Uniswap weETH<>ETH pool is arguably the most resilient and useful of the liquidity pools as it doesn't have any reliance on other LSTs/LRTs. However, we note that there is only roughly 20,000 worth of ETH held in the pool available to buy weETH below peg, and it is highly concentrated within ~0.5% of current price. The weETH<>wstETH pool is similarly concentrated, with all wstETH buy side liquidity within 0.2% of current price.

### [Uniswap Info \(v3 weETH<>ETH 0.05%\)](#)

Taking aggregated liquidity across all sources from Cowswap, we see that sales up to around ~40,000 weETH can be executed with low market impact, but beyond this point liquidity drops off precipitously. Also note that because liquidity is highly concentrated around redemption price and relies partly on pairs with other LSTs/LRTs, we can expect the market depth to be much lower in cases where weETH trades below par or if there is broad based stress across staked ETH tokens.

The biggest source of off-peg liquidity (eg. 1-10% away from redemption rate of weETH) is on Balancer, which holds significant liquidity in a composable stable pool, a pool type which provides concentrated liquidity but continues to provide at least some liquidity over the entire range of possible prices. We see the primary Balancer pool with rETH offers liquidity to sell roughly ~3,600 weETH with up to 1% price discount, ~500 additional weETH to reach 2% discount, ~250 to reach 3% discount, and only another ~650 weETH sold to reach all the way to 10% divergence from peg. This demonstrates just how thin liquidity gets below peg, even in the largest pool that provides for full range weETH liquidity on mainnet.

### [Data: weETH on Sparklend Mainnet](#)

There are fairly significant pools of onchain leverage using weETH as collateral, which could potentially represent a demand on liquidity in a depeg event. Morpho has ~\$15 million of ETH borrowed against weETH at up to 86% LTV, using live oracle pricing through Redstone. Aave has ~\$595 million of ETH borrowed against weETH at up to 95% LTV (along with very small amounts of stablecoins collateralized by weETH), but in this case uses fixed pricing where eETH is assumed to always equal 1 ETH, which may lower the risk of sudden cascading liquidations. However, Aave users would still face some liquidation risk, as LST and LRT depegs would tend to push up the utilization and borrow rate for Aave ETH above rate of return for staking, which could push positions into liquidation over time via negative net interest accruals.

To summarize, DEX liquidity for weETH is ample in normal conditions but may become exhausted during market crashes. The most important source of liquidity for weETH remains the primary market redemptions process. Deeper liquidity over a wider range below peg would help increase efficiency of the redemption arbitrage process during depegs, and provide additional assurance against disorderly flash crashes.

## Oracle Settings and Price Deviation Risk

weETH can be priced using live market pricing via oracle, or via exchange rate pricing as measured by the weETH to eETH ratio in the wrapping, considering eETH to be worth a fixed 1 ETH value based on redeemability. Aave currently uses an exchange rate pricing mechanism for weETH on their deployment, while Morpho uses live pricing.

Live pricing has the advantage of potentially liquidation positions earlier in a depeg, before the price of weETH potentially falls further, and can also better account for the possibility of permanent impairments due to technical or slashing losses. But on the other hand, this also creates additional risk of liquidating at excessively low prices during a flash crash, as liquidations and oracle updates can lead to a negative feedback loop of lower prices creating more selling pressure creating further price drops. This sort of event was recently seen on Renzo's ezETH, which crashed to below 0.8 ETH before quickly recovering.

On balance, we believe using an exchange rate pricing mechanism rather than live oracle pricing is more appropriate for weETH. While the availability of redemptions may help reduce depeg risk, there is still a possibility of flash crashes occurring as it can take some time for bidders to step in to purchase weETH below par and arbitrage redemptions, while liquidations can happen immediately. Using exchange rate pricing eliminates the risk of liquidating positions based on short term price wicks, which can negatively impact UX and may even result in bad debt to the protocol depending on how low the price falls temporarily.

However, using exchange rate pricing does create a few new risks. weETH trading at a discount to the exchange/redemption rate results in a higher effective liquidation threshold, as the fair market value of collateral will be lower than suggested by the protocol. And if the weETH discount is larger than the liquidation penalty for weETH collateral, this would halt the liquidation process as liquidating unsafe positions would no longer be profitable (the value of debt repaid would be greater than immediately achievable value of collateral received). weETH parameters such as liquidation threshold (LT), maximum loan to value ratio (LTV), and liquidation penalty should be set with this in mind to account for any reasonably foreseeable, persistent weETH price discounts.

Our primary mode of evaluating maximum potential discount is by assessing arbitrage profitability from purchasing and redeeming discounted weETH. We make aggressive assumptions that 30% of staked ETH collateral on Aave, Maker, and Compound result in net withdrawals, and 10% of remaining staked ETH is withdrawn, resulting in roughly ~40 days to fully clear the staking withdrawal queue. Then, we compare LST withdrawals vs LRTs like weETH, based on the assumptions that the Eigenlayer withdrawal period puts LRTs towards the end of the exit queue and that arbitrageurs will demand more excess return to unstake LRTs versus traditional LSTs. The resulting estimates are shared below.

### [LST Liquidity Risk](#)

We estimate that LRTs like weETH may experience mid single digit percent discounts based on these arbitrage assumptions, versus low single digit discounts for LSTs like stETH. This suggests that liquidation penalty and liquidation threshold should be set more conservatively for weETH vs Spark's LST markets.

## weETH Parameters

The following parameters are proposed based on current market and liquidity conditions for weETH. We recommend to list weETH in isolation mode to prevent it from being used to borrow ETH on equal terms with stETH and rETH, which have a materially lower fundamental and liquidity risk profile. Current omnipool lending protocols like Sparklend cannot charge differential borrowing rates depending on collateral used, so allowing weETH to borrow ETH may not lead to increased ETH supply yield or protocol revenue until substantially all wstETH and rETH collateralized ETH borrowers have been displaced from the protocol. Until this threshold is reached, allowing this would result in increased protocol and liquidity risk with all value being leaked to consumer surplus of weETH collateral users.

Isolation mode will allow weETH to only be used to borrow DAI, where the risk premia versus alternative collaterals can be equalized through the use of more conservative LTV and liquidation threshold parameters. Due to the significant impact of points earned on weETH, we recommend to disable borrowing as any supply yield earned would likely be less valuable than Etherfi and Eigenlayer points.

Isolated debt ceiling is set to limit tail risk from unutilized borrowing capacity, with the debt ceiling roughly equaling Maker's surplus buffer. However, if weETH collateral shows strong demand with the limit being utilized fully, the debt ceiling and

supply cap max parameters can be progressively increased. Liquidation threshold is also set conservatively to account for potential price divergence, accommodating up to roughly 8% additional discount vs wstETH. Better liquidity depth below peg or demonstrated peg resilience during a broad based market crash would support raising LT and LTV closer towards parity with Spark's wstETH and rETH parameters.

Parameter

Value

Optimal Utilization

45%

Base

5%

Slope1

15%

Slope2

300%

Stable rate func (deprecated)

n/a

Enable Borrow

NO

Stable Rate Borrowing

NO

Isolation Borrowable

NO

Siloed Borrowing

NO

Flash Loan Enabled

NO

Loan To Value

72%

Liquidation Threshold

73%

Liquidation Bonus

10%

Reserve Factor

15%

Supply Cap

5,000 weETH

Supply Cap (max)

50,000 weETH

Supply Cap (gap)

5,000 weETH

Supply Cap (ttl)

12 hours

Borrow Cap

0

Borrow Cap (max)

n/a

Borrow Cap (gap)

n/a

Borrow Cap (ttl)

n/a

Isolation Mode

YES

Isolation Mode Debt Ceiling

50M USD

Liquidation Protocol Fee

10%

Emode Category

0

Oracle: weETH/eETH exchange rate (from contract) \* eETH/ETH fixed at 1

Implementation: [sparklend-advanced/src/WEETHExchangeRateOracle.sol at master · marsfoundation/sparklend-advanced · GitHub](https://github.com/marsfoundation/sparklend-advanced/blob/master/src/WEETHExchangeRateOracle.sol)

## References

- Eigenlayer details
- Website: <https://www.eigenlayer.xyz/>
- Github: [EigenLayer · GitHub](https://github.com/EigenLayer)
- Docs: <https://docs.eigenlayer.xyz/>
- Whitepaper: [Whitepapers | EigenLayer](#)
- Twitter: [x.com](https://twitter.com/x.com)
- Blog: <https://www.blog.eigenlayer.xyz/>
- Audits: [Audits | EigenLayer](#)
- Bounty: [EigenLayer Bug Bounties | Immunefi | Immunefi](#)
- Website: <https://www.eigenlayer.xyz/>
- Github: [EigenLayer · GitHub](https://github.com/EigenLayer)
- Docs: <https://docs.eigenlayer.xyz/>
- Whitepaper: [Whitepapers | EigenLayer](#)
- Twitter: [x.com](https://twitter.com/x.com)
- Blog: <https://www.blog.eigenlayer.xyz/>

- Audits: [Audits | EigenLayer](#)
- Bounty: [EigenLayer Bug Bounties | Immunefi | Immunefi](#)
- Etherfi details
- Website: <https://www.ether.fi/>
- Github: [etherfi-protocol · GitHub](#)
- Docs: [Getting Started | ether.fi](#)
- Whitepaper: [ether.fi Whitepaper | ether.fi](#)
- Twitter: [x.com](#)
- Blog: <https://medium.com/etherfi>
- Audits: [Etherfi](#)
- Bounty: [Ether.fi Bug Bounties | Immunefi | Immunefi](#)
- Node operator details: [Dapp walkthrough | ether.fi](#)
- Website: <https://www.ether.fi/>
- Github: [etherfi-protocol · GitHub](#)
- Docs: [Getting Started | ether.fi](#)
- Whitepaper: [ether.fi Whitepaper | ether.fi](#)
- Twitter: [x.com](#)
- Blog: <https://medium.com/etherfi>
- Audits: [Etherfi](#)
- Bounty: [Ether.fi Bug Bounties | Immunefi | Immunefi](#)
- Node operator details: [Dapp walkthrough | ether.fi](#)
- weETH token details
- eETH token contract: <https://etherscan.io/token/0x35fa164735182de50811e8e2e824cfb9b6118ac2>
- weETH token contract: <https://etherscan.io/token/0xcd5fe23c85820f7b72d0926fc9b05b43e359b7ee>
- eETH token contract: <https://etherscan.io/token/0x35fa164735182de50811e8e2e824cfb9b6118ac2>
- weETH token contract: <https://etherscan.io/token/0xcd5fe23c85820f7b72d0926fc9b05b43e359b7ee>
- Analytics dashboards
- Uniswap Info: [Uniswap Info](#)
- Aave weETH dashboard: [AAVE | Block Analitica](#)
- Morpho weETH market: [Morpho Info | Block Analitica](#)
- Uniswap Info: [Uniswap Info](#)
- Aave weETH dashboard: [AAVE | Block Analitica](#)
- Morpho weETH market: [Morpho Info | Block Analitica](#)
- Liquidity data
- [Data: weETH on Sparklend Mainnet](#)
- [LST Liquidity Risk](#)
- [Data: weETH on Sparklend Mainnet](#)

- [LST Liquidity Risk](#)