METHODOLOGY GUIDE

Chainlink DeFi Yield Index

Chainlink

Contents

Version History

Version	Date Issued	Summary of Change	Owner
V1.0	September 2024	N/A	Chainlink Labs

Introduction

The Chainlink DeFi Yield Index (“CDY Index” or the “Index”) seeks to track the performance and dynamics of token lending rates across the most popular and active DeFi platforms supported by Chainlink oracles. The Index has been designed to be replicable and to be used by both traditional financial institutions and decentralized finance (“DeFi”) projects for applications including:

- Benchmarking performance of financial products.
- Passive replication in financial instruments and products.
- The settlement of financial instruments.
- Valuing holdings of digital assets.
- Comparing the capital efficiency of DeFi protocol parameters to optimize for risk and growth.
- Analysis and research of the DeFi lending yield market.

Definitions

- **APY:** Annualized percent yield.
- **Business Day:** A day other than a Saturday, Sunday, or public holiday in the United States, when banks in the United States are open for business.
- **Calculation Agent ("CA"):** The party that will calculate the value of the index.
- **Calculation Day:** Business day during which the index yield is calculated.
- **CDY Index**: Chainlink DeFi Yield Index, For a given token, the CDY Index for USDC will be labeled the "CDY-USDC Index."
- **CLL:** Chainlink Labs.
- **Constituent Review Date:** Date at which new members of a CDY index are determined based on the supply TVL of a given token in each protocol. This supply TVL is also used to calculate the weights of each member.
- **Index Administrator:** The entity that creates, maintains, and governs the calculation, maintenance, and distribution of the index and its methodology.
- **Index Member:** Constituent protocol of a given CDY Index for a given token.
- **Index Yield:** The calculated yield value of the CDY Index for a given Calculation Day.
- **Investable Universe:** The lending protocols that are eligible for consideration for inclusion in a CDY Index.
- **Observation Window:** Time range during a single day when snapshots of yields and TVLs are recorded.
- **Rebalance Date:** Date at which new index members and their respective weights are implemented in the CDY Index.
- **Rebalance Month:** Month during which the Rebalance Date occurs.
- **Total Value Locked ("TVL"):** For this product, TVL refers to the US dollar value of the total amount of a token supplied (both borrowed and unborrowed) on a lending protocol. In broader contexts, TVL can refer to several different concepts such as the amount of tokens locked, staked, borrowed, etc. However, since the construction of the CDY Index is principally driven by supplied TVL, this document sometimes refers to supplied tokens (in US dollars) as simply "TVL."

Index Construction

Data Inputs

1. **A live list of all lending protocols on Ethereum mainnet.** At every reconstitution calculation date, each index's members must be determined based on the inclusion criteria detailed below. In order to determine this, a live list of lending protocols must be procured.

2. **Oracle used by each lending protocol by token and chain.** For each lending protocol on Ethereum mainnet, we identify the addresses of the data feeds they use for prices. For instance, Aave v2 and Aave v3 have function calls to determine the source of an asset price. Compound v2 and Compound v3 explicitly state they use Chainlink Price Feeds, but v2 provides the ValidatorProxy contract addresses that can be used to verify which Chainlink oracles are being utilized. Also, Compound v3 has a function to output the source of address of a price feed. These addresses are then matched against Chainlink's data feeds found here (users can filter by chain under the Networks section). Fetching these can be accelerated by utilizing multicall contracts, which significantly speeds up bulk fetching balances.

3. **Supply TVL (in USD) of each lending protocol by token and chain.** This is accessed by directly querying each lending protocol. For instance, see Aave v2's docs here, Aave v3's docs here, Compound v2's function here, and Compound v3 's function here. As most protocols return supply in tokens, this amount is converted to USD based on the Chainlink price/USD of the token for the same block at which the supply is queried. Note that some assets do not have a direct feed denominated in USD, and instead use multiple Chainlink price feeds to ultimately derive a price in USD. Further, some of the supplied TVL on many protocols represent recursive borrowing and thus can be viewed as "double-counted" supply. This total supply amount is what drives the realized supply yield, and as such, the CDY Index does not adjust for double-counted supply.

4. **Supply APY of each lending protocol by token and chain**. Directly query each lending protocol. See Aave v2's docs here, Aave v3's docs here, Compound v2's function here, and Compound v3's function here. These rates need to be annualized based on the average block time of Ethereum mainnet.

The daily calculations for supply TVL and APY are detailed in the section "Index Calculation." The TVL values of all lending protocols are used to determine the investable universe and the eligibility of index membership (explained in detail in the sections below). The APY and TVL values of member protocols are then used to calculate the value of the CDY Index for a given day.

Investable Universe (Eligible Index Constituents)

The aggregate rates should be representative of the overall DeFi lending market, which means they should capture large and liquid constituents. Thus, there should be an active, transparent market for interacting with these rates. Liquidity helps participants minimize trading costs and change positions without significant market impact. Including very small constituents can add a burden to participants who wish to replicate the aggregate rates; execution risk and transaction costs would be higher, and tracking numerous holdings requires additional resources and may introduce complexity in rebalancing and overall management. Lending protocols that fulfill the following criteria are considered the investable universe for the CDY Index.

Oracle: Stability and reliability are key factors in any index's performance since unstable pricing methodologies can introduce volatility and distort the overall representation of the market. Therefore, **the index universe for aggregate rates includes protocols that utilize robust, manipulation-resistant price oracles—i.e., Chainlink oracles**. This includes Chainlink-interface-compliant feeds to provide price data. Note that if a protocol stops utilizing Chainlink oracles for any reason, that protocol must be excluded from the index universe at the next rebalance date.

Chain: At this time, **the index also only considers protocols that are on Ethereum mainnet**. As of 2024, about half of the TVL for the DeFi lending market resides on Ethereum mainnet, so this approach captures a representative set of overall lending activity.

TVL: Lending protocols must have a minimum of $25m in supplied TVL for a given token on a trailing average 7-day basis.

Liquidity: The lending pool of a given token must have at least $10m of available liquidity for depositors on a trailing average 30-day basis.

Other criteria for eligibility in the CDY Index include:

- Lending protocols must be in operation for a minimum of 3 months.
- Lending protocols must be open source.
- Lending protocols must have publicized audits.

Note that the CDY Index considers trustless lending primitives on Ethereum with permissionless lending markets. The total eligible supplied collateral asset in a vault is calculated as the sum of the unborrowed asset in the vault plus the assets borrowed in markets that use Chainlink oracles. The liquidity in a vault is the difference between the total supplied amount minus the total borrowed amount across all its markets. Our methodology then sums these values across vaults for a single index asset to treat the protocol as a single entity, and finally, applies the remaining requirements for eligibility ($25m in supplied TVL, $10m of available liquidity). The protocol's APY is calculated as the supply weighted average APY across the vaults.

While there can be segmentation across permissionless markets, the customizability of these lending primitives are helping them gain traction among users. The inclusion of these protocols ensures the CDY Index captures a broad representation of supplied tokens in lending.

Inclusion Criteria

To ensure 1) the aggregate lending rate is representative of an active, liquid lending market and 2) operational costs and complexity of maintaining the aggregate lending rate are not a burden, the aggregate lending rate imposes a minimum aggregate market share of the index universe for protocols to be included. Thus, we set the following requirements for protocols to be included in the index:

Market share: We set a market share threshold of 80% so that the index consists of the minimum number of the largest protocols whose total market shares of the investable universe total at least 80%. Using the table below as an example, Protocols 1, 2, and 3 would be included in the index since they collectively are the minimum number of protocols needed to reach at least 80% share of the investable universe.

	Supply (USD)	Market Share
Protocol 1	$200,000,000	40%
Protocol 2	$100,000,000	20%
Protocol 3	$125,000,000	25%
Protocol 4	$50,000,000	10%
Protocol 5	$25,000,000	5%
Total	$500,000,000	

Assets

The Chainlink DeFi Yield (“CDY”) Indexes will initially be calculated for the largest, most liquid crypto markets.

- USDC (“CDY-USDC”)
- USDT (“CDY-USDT”)
- Wrapped BTC (“CDY-WBTC”)
- ETH or Wrapped ETH (“CDY-WETH”)

For now, the CDY index only considers tokens on Ethereum mainnet. Also, Aave lists ETH while others may list Wrapped ETH instead; the index considers both tokens when considering CDY-WETH. That said, the index does not include pools of staking tokens with pools of their underlying tokens (i.e., it does not include staked ETH or wrapped staked ETH in the CDY-WETH index).

Reconstitution and Rebalance Frequency and Calculation

The index shall be reconstituted and rebalanced per the frequency defined in the Index Parameter table. The considerations for determining the rebalance frequency include annual turnover, operational upkeep in calculating and replicating the index, and market timeliness and representativeness.

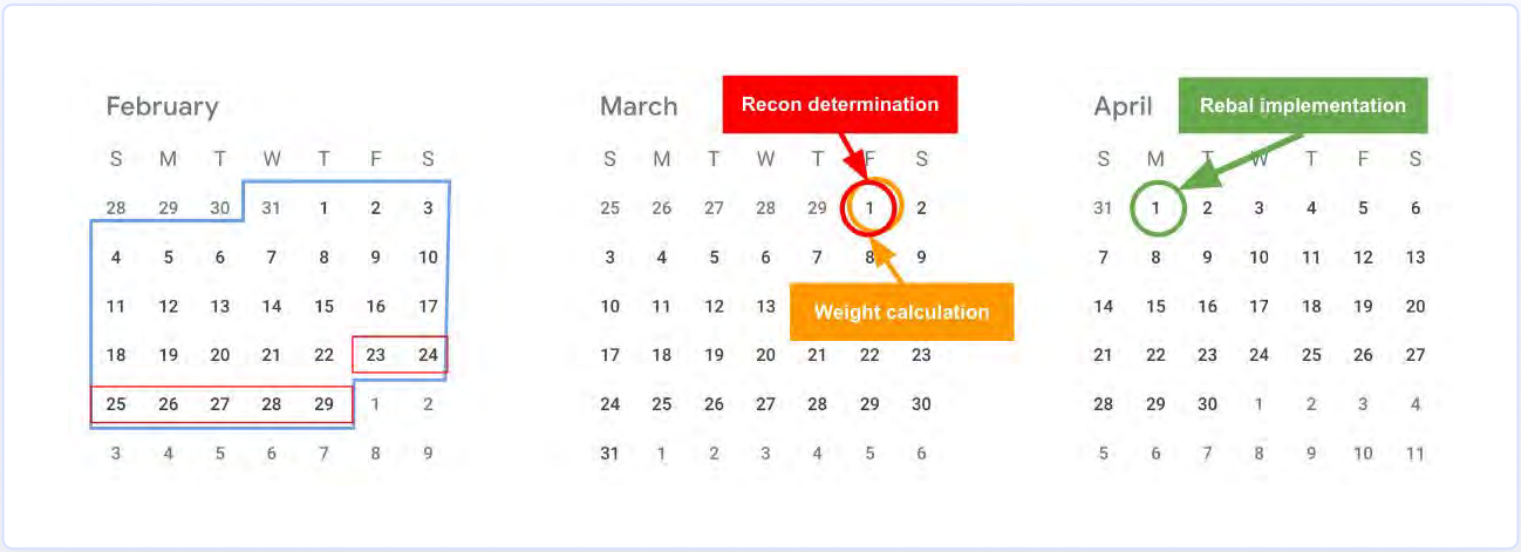
Constitution and Weight Determination Date and Parameters

- On the Constituent Review Date and Time, the new constituents of a CDY Index will be determined based on their supply TVL for the token in question.
- First, the investable universe is defined based on the eligibility criteria outlined in “Investable Universe.” The TVL and liquidity criteria will use the average trailing 7 and 30 calendar days, respectively, of data prior to the Constituent Review Date.
- From the investable universe, index members are chosen based on the inclusion criteria outlined in the section “Inclusion Criteria.”
- The supply TVL of the index members calculated at the Constituent Review Date is then used as the weights of each member.

Rebalance Implementation Time

- The new members and their respective weights will be implemented at the Index Calculation & Publication time on the Rebalance Date.

For clarity, the visual below demonstrates an example of the reconstitution and rebalance process, assuming a Rebalance month of April.



March 1: Constituent Review Date (new members) on the first business day prior to the Rebalance month.

- Investable Universe determination based on 7-day TVL and liquidity (30-day) (up to 1 calendar day prior to Constituent Review Date)

- Member and weight determination based on 7-day TVL (up to 1 calendar day prior to Constituent Review Date)

April 1: Rebalance Date (first business day of Rebalance month)

Index Parameter Table

Index Family	Chainlink DeFi Yield Indexes
Inception Date	January 2024
Base Units	Annualized percent yield
Calculation & Publication Frequency	Once a day, all calendar days, 365 days per year.
Calculation & Publication Time	Calculation between 16:05:00 ET and 16:15:00 ET. Publication between 16:30:00 ET and 16:45:00 ET.
Constituent Review Date and Time	On the first business day one month prior to the Rebalance Date, at 16:05:00 ET.
Constituent Market Share Minimum	Minimum number of protocols that collectively comprise 80% of the Investable Universe by supply TVL.
Constituent Weighting	Based on each protocol's supply TVL using a 7-calendar day trailing average prior to the Constituent Review Date.
Eligibility Thresholds for TVL and Liquidity	For each CDY index token, eligible protocols must have at least $25m of supplied TVL based on a 7-calendar day trailing average, and at least $10m of liquidity based on a 30-calendar day trailing average. Both trailing average metrics use the Observation Window for a given day's observation and exclude the calculation day from the calculation.
Observation Window	14:00:00-16:00:00 ET as the primary observation window. Two additional observation windows are recorded as fall backs: 10:00:00-12:00:00 ET and 12:00:00-14:00:00 ET.
Rebalance Date / Frequency	Every 6 months, on the first business days of April and October.
Rebalance Determination Time	The weights of the new constituents of the CDY Index will be calculated on the first business day one month prior to the Rebalance Date at 16:05:00 EST using the supply TVL of each new constituent over a 7-day trailing average prior to the Rebalance Date.
Weighting Caps	None.
Weight Floors	None.

Index Calculation

Approach

For a given token secured by a Chainlink oracle on a given protocol, the Chainlink DeFi Yield Indices reflect the weighted mean of the supply APYs, weighted by the value of the token's supply on that protocol. For a given token on a single Calculation day, the supply TVL and APY of a token on a member protocol is calculated as follows:

1. Every 1 minute during the Observation Window, a snapshot of the token's supply TVL and APY is taken.

2. To calculate that day's supply TVL, all the TVL snapshots are simply averaged.

3. To calculate that day's supply APY, all the APY values are averaged using their respective supply TVLs at each minute as weights.

This results in a supply-weighted APY for each member of that token's CDY index. That day's value for the CDY Index is then calculated by averaging those APYs, weighted by the weights determined at the Rebalance Date. The calculation of these weights is detailed in the section "Reconstitution and Rebalance Frequency and Calculation."

The visual below is meant to help interpret the approach for one token on a given day assuming only two protocols are in that token's index. This example assumes that Protocols 1 and 2 have a weight of 40% and 60%, respectively, as determined on the most recent Rebalance Date.

	Protocol 1		Protocol 2	
Time	Yield	Supply (USD)	Yield	Supply (USD)
2:00 PM	10.0%	$1,000	7.5%	$5,000
2:01 PM	10.1%	$1,001	7.6%	$5,010
2:02 PM	10.2%	$1,002	7.7%	$5,020
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
3:58 PM	10.3%	$1,003	7.8%	$5,030
3:59 PM	10.4%	$1,004	7.9%	$5,040
4:00 PM	10.5%	$1,005	8.0%	$5,050
Weighted Avg Yield		10.25%		7.75%
Weights from Rebalance		40%		60%
CDY Index Value Today		**8.75%**		

Formal Presentation

This demonstrates the calculation of the CDY Index for one day for a given token.
Setup:

- t: Unit time period.
- T: The total time units in the Observation Window.
- Yield: Supply APY at a given time for a given token on a given member protocol.
- TVL: Supply TVL at a given time for a given token on a given member protocol.
- Protocol Yield: Average Supply APY of a token over the Observation Window on a member protocol weighted by its TVL over the Observation Window.
- Protocol Weight: A member protocol's weight as calculated on the Rebalance Date.
- Index Yield (Chainlink DeFi Yield Index value): The average of all Protocol Rates weighted by their respective Protocol Weights At Rebalance.

$$Protocol\ Yield = \frac{\sum_{t=1}^{T} Yield_t \cdot TVL_t}{\sum_{t=1}^{T} TVL_t}$$

$$Index\ Yield = \frac{\sum^{P} Protocol\ Yield_p \cdot Protocol\ Weight_p}{\sum^{P} Protocol\ Weight_p}$$

Contingency Calculation Rules

Delayed or Missing Data

Delayed data and missing data are treated according to the following rules:

1. Any relevant yield or TVL for a given Calculation Day's snapshot that is not available from an Index Member is disregarded in the calculation of the Index Yield for that snapshot.

2. If, for any of the periods in the Observation Window, no yield or TVL is available for any index member, the index member is disregarded in the calculation of the Index Yield for that Calculation Day.

3. If on any given Calculation Day there is no available Index Yield at in the Observation Window, then the Index Yield at the preceding Calculation Time snapshot that is available will be used. If there is no Index Yield at any Calculation Time snapshot on a given Calculation Day, then Calculation Failure will occur.

4. If on any given Calculation Day, an Index Member of a CDY Index for a given token no longer uses Chainlink price oracles, or for some reason is no longer operating, then the Index Member is henceforth disregarded in the calculation of the Index Yield.

Erroneous Data

All yields and TVL values of each index member retrieved by the CA for a given Calculation Day are subject to an automated screening for erroneous data according to the following rules:

1. If a yield value or TVL value shows a non-numeric or non-positive trade size, it is flagged as erroneous.

2. If a yield value or TVL value is reported in a format that deviates from the expected format such that it cannot be parsed, it is flagged as erroneous.

All yield values and TVL values flagged as erroneous for a given Calculation Day are disregarded in the calculation of the Index Yield, on that Calculation Day.

Delayed Calculation & Publication

Where for any reason the Index Administrator is not able to calculate and publish the index within the Publication Time on any given Calculation Day, then the Administrator of the CDY Index will notify its user ecosystem that the calculation and publication have been delayed. The Administrator will seek to publish the index for that Calculation Day as soon as it is able to. Should the CA not be able to calculate and publish the index by 23:59:59 EST then the provisions under “Calculation Failure” shall come into effect.

Expert Judgment

The CA does not utilize expert judgment in the day-to-day calculation of the Index. In extraordinary circumstances, expert judgment may be exercised by the CA in accordance with its codified policies and processes to be available upon request.

Calculation Failure

If a yield for a CDY Index cannot be calculated for a given Calculation Day before 23:59:59 EST, for instance because:

- For any reason yields cannot be retrieved from relevant input sources, or
- All yields or TVL values retrieved by the CA are flagged as erroneous or potentially erroneous; or any other reason or circumstance that prevents the orderly calculation of the index

then the yield for that Calculation Day undergoes Calculation Failure and NO value is published for that day, subject to Restatement & Republishing Rules.
In the occurrence of a Calculation Failure, the Administrator of the CDY Index will notify its user ecosystem that the calculation of the index for that day has failed.

Restatement & Republishing

The CA may restate and republish the yield values where the published values are found to be incorrect. This will occur only if both the below conditions are met:

1. Timeliness – where the Administrator can RESTATE and REPUBLISH the index value before the publication of the index value for the next Calculation Day.

2. Materiality – where the RESTATED Index value has an absolute variance greater than 0.20% for the Index for the given Calculation Day.

Where the above conditions are met the Administrator shall inform its user ecosystem that a restatement and republishing of the CDY Index yield will take place for that Calculation Day.
The Administrator shall restate the CDY Index as soon as possible and shall do so by overwriting the previously published CDY Index yield. This restated yield will carry no mark when published and will be final and not subject to any further change or republication.

Appendix

Backtest - Members and Weights

USDC - 2023-4 Rebalance

	Aave V2	Compound V2
TVL at Constituent Review	$844m	$612m
Weight	58.0%	42.0%
Market Share	46.8%	33.9%
Liquidity at Constituent Review	$300m	$300m

USDC - 2023-10 Rebalance

	Aave V2	Aave V3	Compound V2	Compound V3
TVL at Constituent Review	$399m	$285m	$292m	$324m
Weight	30.7%	21.9%	22.5%	24.9%
Market Share	29.8%	21.3%	21.8%	24.2%
Liquidity at Constituent Review	$60m	$29m	$110m	$18m

USDC - 2024-4 Rebalance

	Aave V2	Aave V3	Compound V3
TVL at Constituent Review	$295m	$691m	$453m
Weight	20.5%	48.0%	31.5%
Market Share	18.4%	43.2%	28.3%
Liquidity at Constituent Review	$29m	$63m	$27m

USDC - 2024-10 Rebalance

	Aave V3	Compound V3
TVL at Constituent Review	$1509m	$451m
Weight	77.0%	23.0%
Market Share	69.1%	20.7%
Liquidity at Constituent Review	$273m	$140m

USDT - 2023-4 Rebalance

	Aave V2	Compound V2
TVL at Constituent Review	$367m	$150m
Weight	71.0%	29.0%
Market Share	71.0%	29.0%
Liquidity at Constituent Review	$76m	$78m

USDT - 2023-10 Rebalance

	Aave V2	Aave V3	Compound V2
TVL at Constituent Review	$320m	$205m	$269m
Weight	40.3%	25.8%	33.9%
Market Share	40.3%	25.8%	33.9%
Liquidity at Constituent Review	$95m	$40m	$67m

USDT - 2024-4 Rebalance

	Aave V3	Compound V2
TVL at Constituent Review	$620m	$187m
Weight	76.8%	23.2%
Market Share	62.8%	19.0%
Liquidity at Constituent Review	$68m	$39m

USDT - 2024-10 Rebalance

	Aave V3
TVL at Constituent Review	$1527m
Weight	100.0%
Market Share	85.7%
Liquidity at Constituent Review	$314m

WBTC - 2023-4 Rebalance

	Aave V2	Compound V2
TVL at Constituent Review	$709m	$317m
Weight	69.1%	30.9%
Market Share	69.1%	30.9%
Liquidity at Constituent Review	$603m	$330m

WBTC - 2023-10 Rebalance

	Aave V2	Aave V3	Compound V2
TVL at Constituent Review	$536m	$253m	$452m
Weight	43.2%	20.4%	36.4%
Market Share	42.3%	20.0%	35.6%
Liquidity at Constituent Review	$600m	$211m	$460m

WBTC - 2024-4 Rebalance

	Aave V2	Aave V3	Compound V2
TVL at Constituent Review	$730m	$1172m	$462m
Weight	30.9%	49.6%	19.6%
Market Share	26.8%	43.0%	16.9%
Liquidity at Constituent Review	$541m	$798m	$462m

WBTC - 2024-10 Rebalance

	Aave V2	Aave V3
TVL at Constituent Review	$340m	$2039m
Weight	14.3%	85.7%
Market Share	11.6%	69.5%
Liquidity at Constituent Review	$348m	$1924m

ETH - 2023-4 Rebalance

	Aave V2	Compound V2
TVL at Constituent Review	$1322m	$470m
Weight	73.8%	26.2%
Market Share	72.2%	25.7%
Liquidity at Constituent Review	$722m	$441m

ETH - 2023-10 Rebalance

	Aave V2	Aave V3	Compound V2
TVL at Constituent Review	$712m	$544m	$472m
Weight	41.2%	31.5%	27.3%
Market Share	39.8%	30.4%	26.4%
Liquidity at Constituent Review	$474m	$257m	$489m

ETH - 2024-4 Rebalance

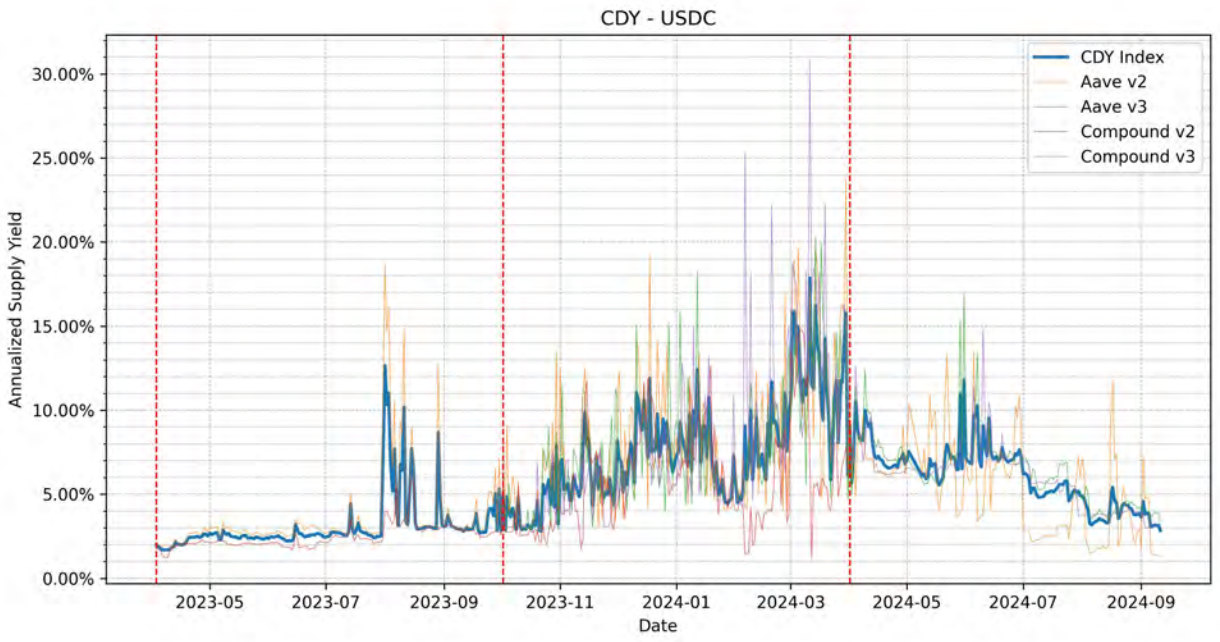
	Aave V2	Aave V3	Spark
TVL at Constituent Review	$724m	$1808m	$746m
Weight	22.1%	55.2%	22.8%
Market Share	18.7%	46.7%	19.3%
Liquidity at Constituent Review	$395m	$362m	$245m

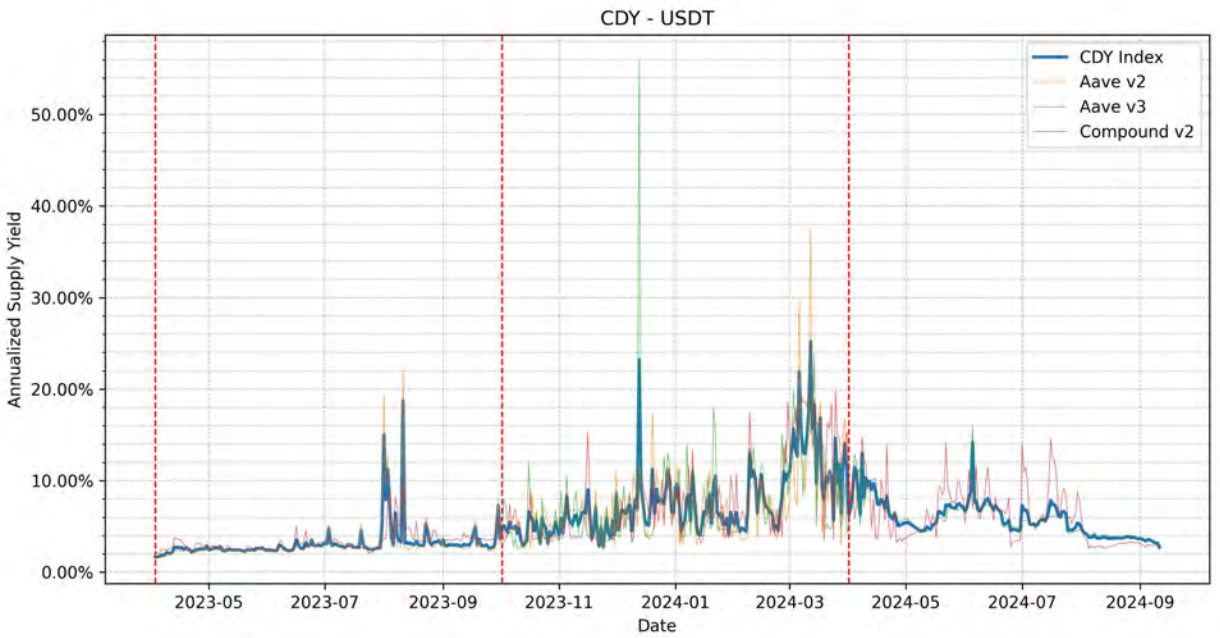
ETH - 2024-10 Rebalance

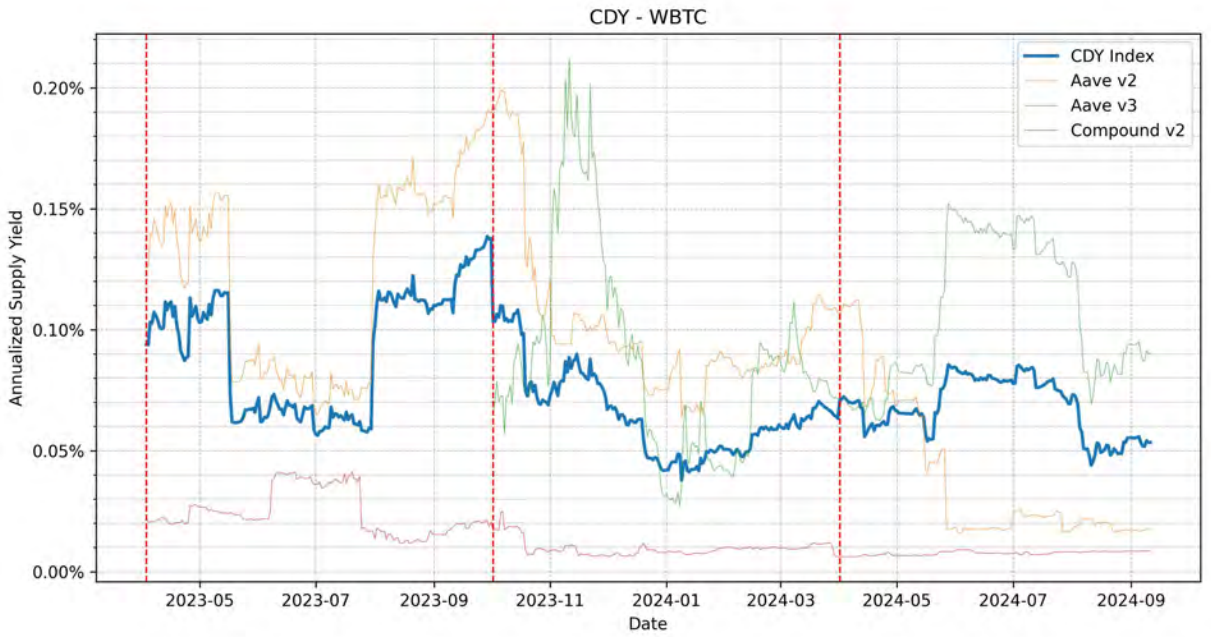
	Aave V3	Spark
TVL at Constituent Review	$2899m	$710m
Weight	80.3%	19.7%
Market Share	65.3%	16.0%
Liquidity at Constituent Review	$398m	$111m

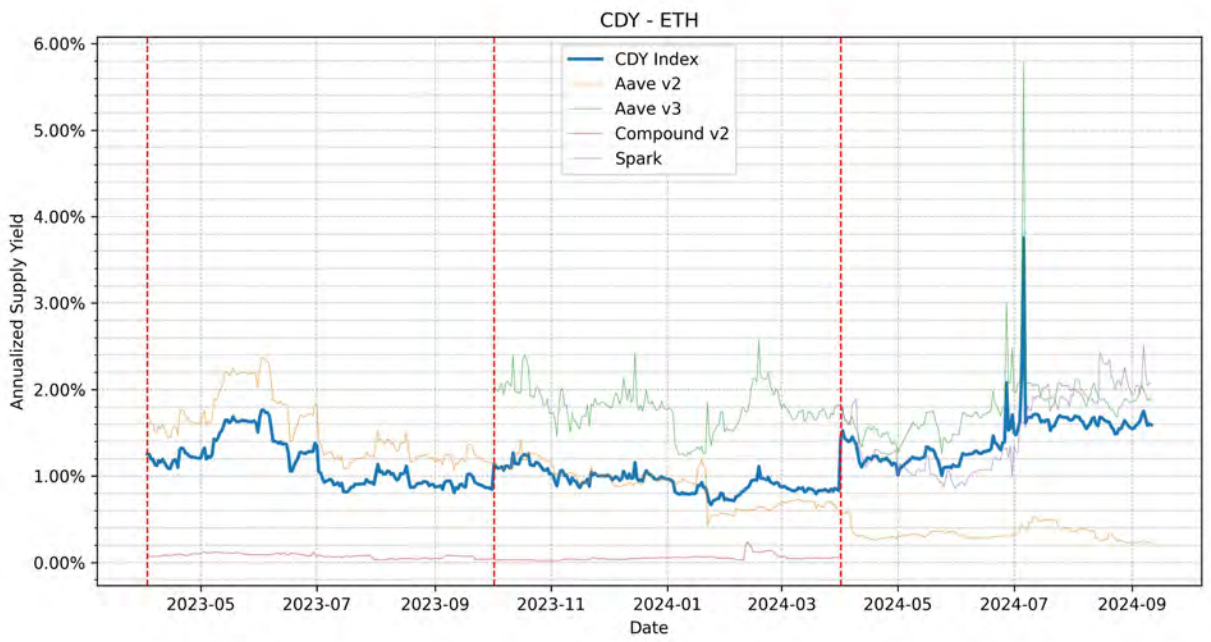
Backtest - Index Values

The charts below show the values of the CDY Index for different tokens, as well as the values of the index's constituent protocols. Rebalance implementation dates are represented by vertical red dashed lines. The CDY Index itself is in bold, while the constituent values are in light lines.



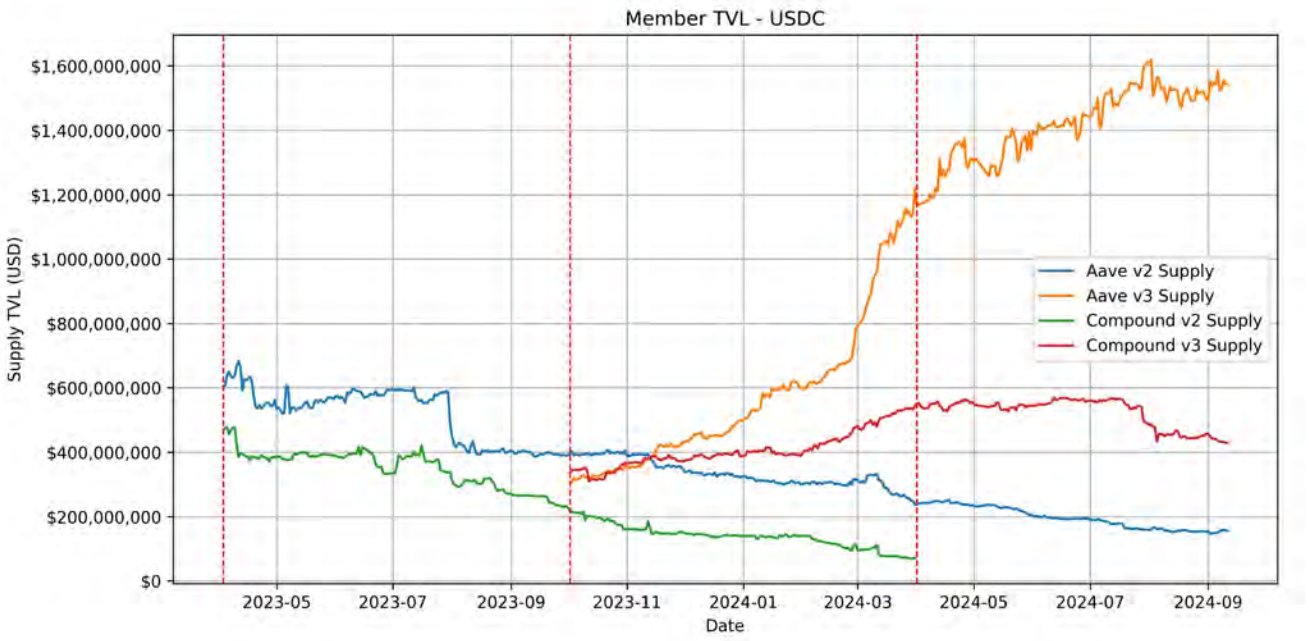


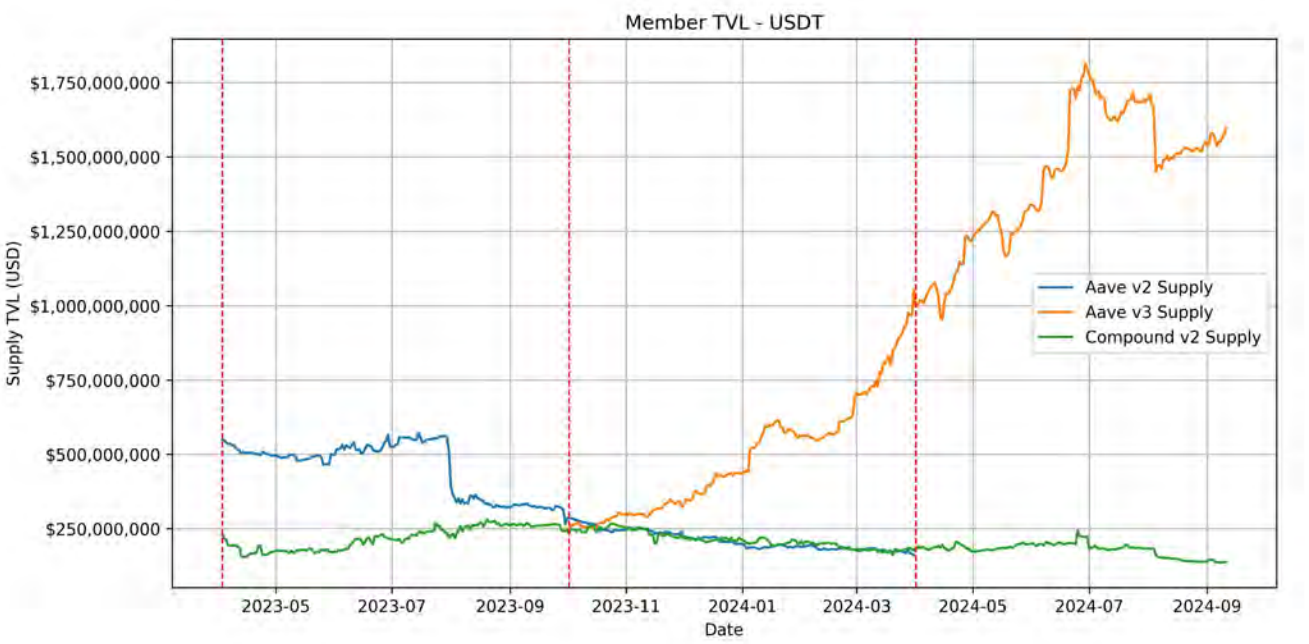

CDY - WBTC
CDY Index
Aave v2
Aave v3
Compound v2
Annualized Supply Yield
0.20%
0.15%
0.10%
0.05%
0.00%
2023-05
2023-07
2023-09
2023-11
2024-01
2024-03
2024-05
2024-07
2024-09
Date

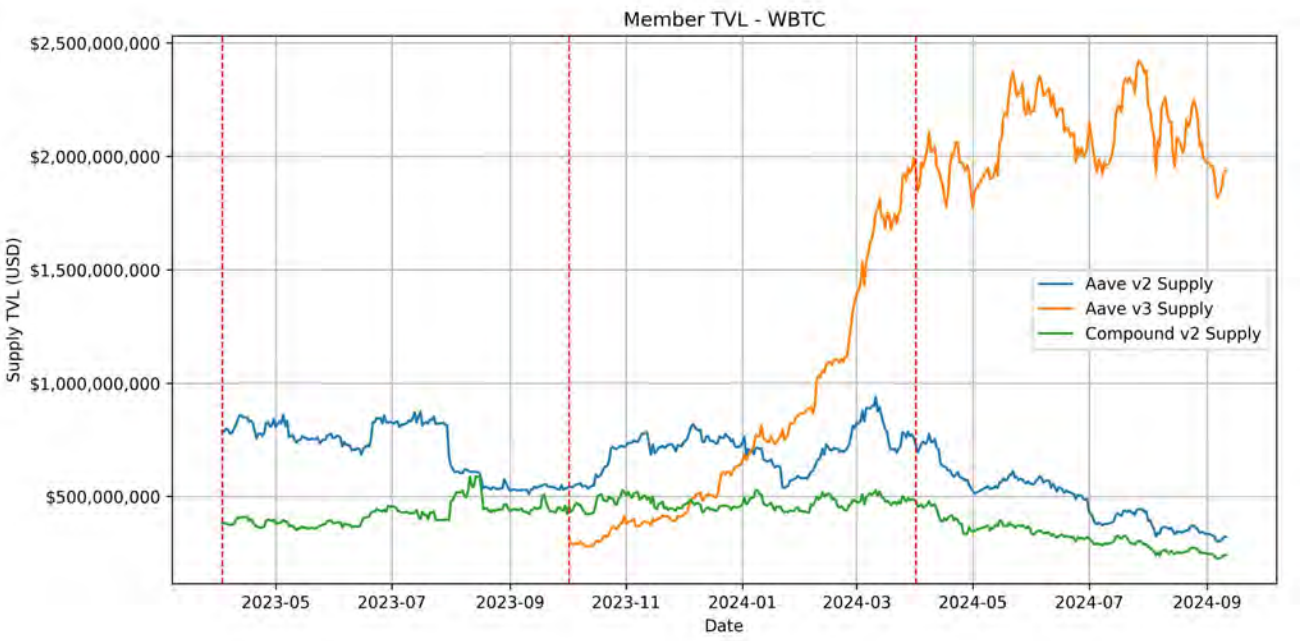

CDY - ETH
CDY Index
Aave v2
Aave v3
Compound v2
Spark
Annualized Supply Yield
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
2023-05
2023-07
2023-09
2023-11
2024-01
2024-03
2024-05
2024-07
2024-09
Date

Backtest - TVL

The following charts show the aggregate TVLs of index member protocols for each token over time. Rebalance implementation dates are represented by vertical red dashed lines.





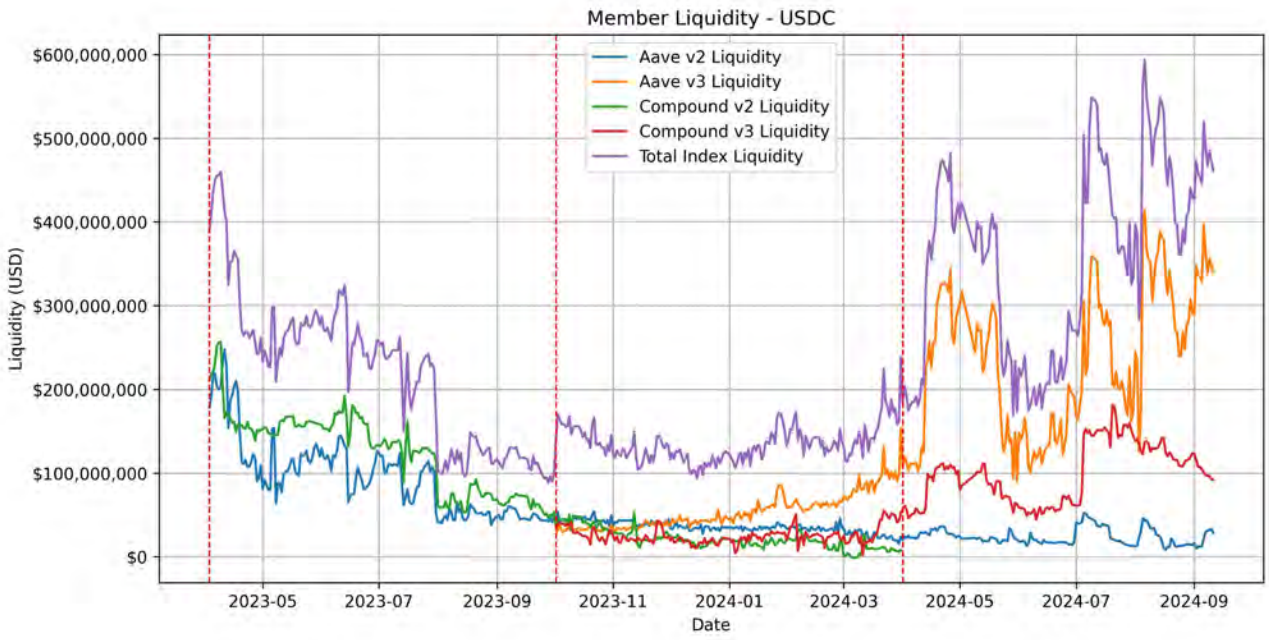

Member TVL - WBTC
$2,500,000,000
$2,000,000,000
$1,500,000,000
$1,000,000,000
$500,000,000
Supply TVL (USD)
2023-05
2023-07
2023-09
2023-11
2024-01
2024-03
2024-05
2024-07
2024-09
Date
Aave v2 Supply
Aave v3 Supply
Compound v2 Supply

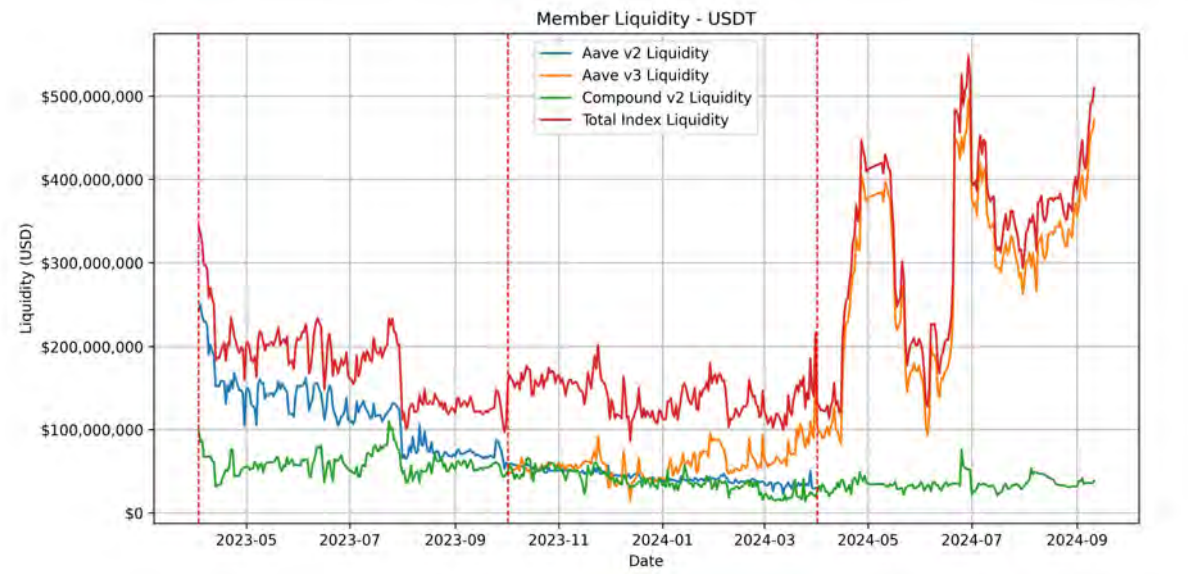

Member TVL - ETH
$3,500,000,000
$3,000,000,000
$2,500,000,000
$2,000,000,000
$1,500,000,000
$1,000,000,000
$500,000,000
Supply TVL (USD)
2023-05
2023-07
2023-09
2023-11
2024-01
2024-03
2024-05
2024-07
2024-09
Date
Aave v2 Supply
Aave v3 Supply
Compound v2 Supply
Spark Supply

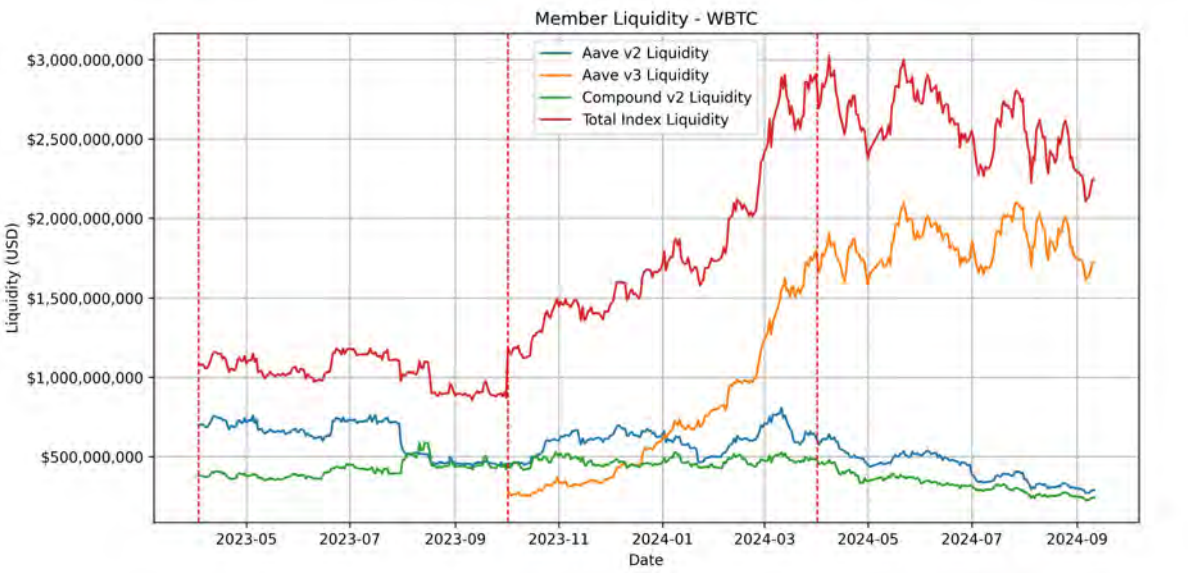
Backtest - Liquidity

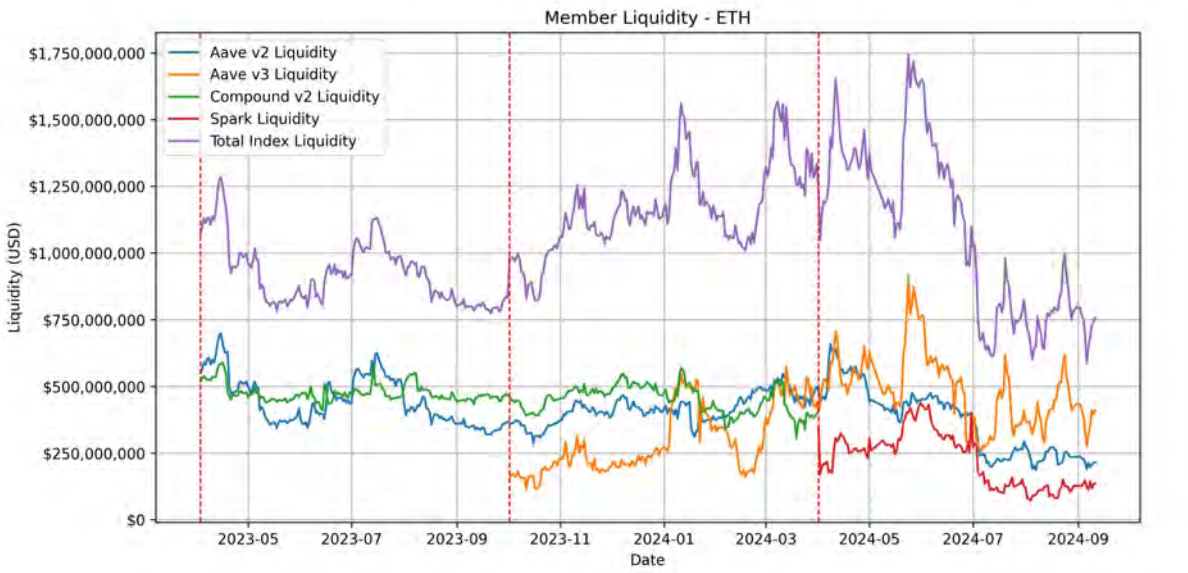
Liquidity is critical to the replicability of an index. Generally, the available liquidity to suppliers on a lending protocol is the amount of supplied token minus the amount of that token that has been borrowed. If suppliers cannot withdraw their tokens from that pool, they risk being exposed to losses or opportunity cost. Borrowing demand varies across tokens, with stablecoins having higher demand while blue-chip tokens like WBTC and WETH have lower relative demand. The liquidity for blue-chip tokens WBTC and WETH are generally very sufficient on lending protocols as even a minimum requirement of $100m available liquidity does not meaningfully impact the constitution of the indexes. But for USDC and USDT, a liquidity requirement of $10-20m begins to impact index membership. This is because USDC and USDT are heavily borrowed relative to their supplies, while WBTC and WETH are not.

To show liquidity characteristics of the index, below we provide the liquidity of each constituent protocol for the various tokens of the CDY Index. Each chart shows a different metric of liquidity for each token of the member protocols. To be clear, the liquidity requirement represents the required liquidity on individual protocols, not the entire index. Theoretically, the total amount of available liquidity for the entire index would be at least: (individual liquidity threshold requirement) x (number of members in the index). Rebalance implementation dates are represented by vertical red dashed lines.




Member Liquidity - USDT
Aave v2 Liquidity
Aave v3 Liquidity
Compound v2 Liquidity
Total Index Liquidity
$500,000,000
$400,000,000
$300,000,000
$200,000,000
$100,000,000
$0
Liquidity (USD)
2023-05
2023-07
2023-09
2023-11
2024-01
2024-03
2024-05
2024-07
2024-09
Date


Member Liquidity - WBTC
Aave v2 Liquidity
Aave v3 Liquidity
Compound v2 Liquidity
Total Index Liquidity
$3,000,000,000
$2,500,000,000
$2,000,000,000
$1,500,000,000
$1,000,000,000
$500,000,000
Liquidity (USD)
2023-05
2023-07
2023-09
2023-11
2024-01
2024-03
2024-05
2024-07
2024-09
Date


Member Liquidity - ETH
Aave v2 Liquidity
Aave v3 Liquidity
Compound v2 Liquidity
Spark Liquidity
Total Index Liquidity
$1,750,000,000
$1,500,000,000
$1,250,000,000
$1,000,000,000
$750,000,000
$500,000,000
$250,000,000
$0
Liquidity (USD)
2023-05
2023-07
2023-09
2023-11
2024-01
2024-03
2024-05
2024-07
2024-09
Date

Backtest - Turnover

The backtesting period for determining the optimal rebalance frequency spanned April 2023 to April 2024, which included a unique period in DeFi as both Aave and Compound, two of the largest lending protocols, upgraded their respective protocols. Both protocols encouraged their users to migrate to the upgraded versions, thus causing large changes in TVL across protocols. As a result, **the testing period includes an abnormally high amount of turnover as the new versions of Aave and Compound entered the CDY Index. While projects do occasionally upgrade their protocols, this is not a frequent occurrence and we do not think this reflects on the design of the CDY Index**. Therefore, our backtesting includes unadjusted turnover results as well as turnover results that adjust for protocol upgrades by **treating each protocol version as the same entity**. While there is no "trading cost" to withdrawing tokens from one protocol and depositing them in another (excluding gas), imperfect execution could result in tracking error to the CDY index; that said, this movement of tokens would not have occurred if not for the protocols' upgrades, and thus we believe treating the versions of each protocol as the same pool for backtesting analysis is justified.

In summary, with a rebalance frequency of 6 months, the annualized adjusted turnover ranges between 0-17%.

	CDY-USDC	CDY-USDT	CDY-WBTC	CDY-ETH
Unadjusted Turnover	89.7%	97.2%	89.7%	76.4%
Adjusted Turnover	15.9%	0.0%	16.9%	4.5%

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