



Compass Staking Yield Reference Index Ethereum

Methodology

February 23rd, 2023

Version History

Readers can access versions of the methodology for the Compass Staking Yield Reference Index Ethereum online when they become available on Compass Financial Technologies website (<https://www.compass-ft.com>).

Date	Version	Change	Author(s)
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1 Introduction

The Compass Staking Yield Reference Index Ethereum (the *CSRI*, the *CCSRI*, the *Indices* or the *Index*) measures the annualized staking yield obtained when staking on the Ethereum blockchain.

Staking on the Ethereum blockchain

Staking ether (ETH) involves holding a quantity of ether to become a validator and support the security and operations of the Ethereum blockchain.

Staking gives the network participants an economic incentive to act in the best interests of the network. Validators are rewarded for carrying out validator duties, but lose varying amounts of ETH if they misbehave. Ethereum uses a consensus mechanism called Proof of Stake, in which the network ensures that all transactions are verified and secured without a trusted third party in the middle.

Proof of Stake (PoS)

The consensus mechanism called Proof of Stake has emerged, aiming to increase speed and computing resources consumption efficiency while simultaneously lowering fees without sacrificing the security of the network.

In Proof of Work mechanisms (the mechanism previously used by Ethereum before The Merge, and currently used by Bitcoin), miners prove they have capital at risk by solving complex mathematical puzzles. Proof of Work has proven to be a very robust mechanism to facilitate consensus in a decentralized manner, but it involves substantial arbitrary computation. This makes it a very energy-intensive process.

In Proof of Stake mechanisms, network participant (also called validators) stake capital which acts as collateral that can be burnt if the validator behaves dishonestly or lazily. The validator is then responsible for checking that new blocks propagated over the network are valid, while occasionally creating and propagating new blocks themselves. If the validator fulfills these actions, they receive an award called “staking reward”.

Providing a reliable and trusted staking yield

In order to avoid potential conflict of interest or the risk of using incomplete information, Compass has decided to extract information directly from the Ethereum blockchain by connecting to a node without the use of an external data provider. The staking computation implements the Consensus-Specs¹ as described by Ethereum core developers, meaning that rewards and penalties are the same as those computed by the network, and therefore earned by validators.

Compass Staking Yield Reference Index Ethereum indices are part of the Compass Staking Yield Reference Index family.

Compass Staking Yield Reference Index Ethereum can be accessed online on the Compass Financial Technologies website (<https://www.compass-ft.com>) or on Bloomberg or Refinitiv.

Compass Staking Yield Reference Index Ethereum are owned by Compass Financial Technologies SA. The Index Administrator and Calculation Agent is Compass Financial Technologies (France).

Compass Staking Yield Reference Index Ethereum available as of March 1st 2023 are listed in tables of section 10.

¹ Implementation of the consensus specifications for each network update: <https://github.com/ethereum/consensus-specs>

2 Index Calculation

Ethereum² is secured using its native cryptocurrency, ether (ETH). Node operators that wish to participate in validating blocks and identifying the head of the chain have to deposit at least 32 ether to the Beacon Deposit Contract. They are then paid in ether to run validator software that checks the validity of new blocks received over the peer-to-peer network and apply the fork-choice algorithm to identify the head of the chain.

There are two main roles for a validator: 1) checking new blocks and “attesting” if they are valid, and 2) proposing new blocks when they are selected to do so. If the validator does not perform any of these tasks when required to do so, they miss out on an ether payout. Validators are also sometimes tasked with participation in sync committees.

There are also some actions that are intentionally malicious, such as proposing multiple blocks for the same slot or attesting to multiple blocks for the same slot. These behaviors result in the validator being “slashed” and having some amount of ether burned. It may eventually result to the removal of the validator from the network.

2.1 Rewards definition

Ethereum rewards and penalties are computed based on the implementation of the Ethereum consensus specifications (<https://github.com/ethereum/consensus-specs>) and of the Ethereum execution specifications (<https://github.com/ethereum/execution-specs>). A distinction is made between rewards generated at the Consensus layer level and rewards generated at the Execution layer level:

Consensus layer rewards/penalties

- Attestation: validators receive rewards when they make votes that are consistent with the majority of other validators. A validator is supposed to propose an attestation at each epoch. Therefore, each validator that proposes an attestation is rewarded. If a validator misses the attestation proposition, they will be penalized.
- Slashing: a validator is slashed if they misbehave. If a validator is slashed, then a part of their effective balance is burned, and the validator that proposed this slashing is rewarded.
- Sync committee: sync committees are groups of validators selected randomly to broadcast the state of the blockchain to light clients. If a validator is part of a sync committee, then they sign block headers for each slot used by a light client. A validator receives a reward for completing this action. If a validator in a sync committees misses an attestation, they are penalize

Execution layer reward

- Transaction fees: to execute a transaction on the Blockchain, you will need to pay a transaction fee to the block proposers to add this transaction to the block. The transaction fees are earned by the block proposer.

²Source : [ethereum.org \(https://ethereum.org/fr/developers/docs/consensus-mechanisms/pos/rewards-and-penalties/\)](https://ethereum.org/fr/developers/docs/consensus-mechanisms/pos/rewards-and-penalties/)

2.2 Calculation formula

2.2.1 Real time indices

On each day t and for each epoch i , two indices are computed according to the formula described in this section.

- The *Compass Staking Yield Consensus Real Time Ethereum* represents the annualized staking yield computed over epoch i and purely linked to the blockchain consensus
- The *Compass Staking Yield Real Time Ethereum* represents the overall annualized staking yield computed over epoch i and including in addition to the consensus net rewards the transaction fee received by the validators

The *Compass Staking Yield Consensus Real Time Ethereum* over epoch i is defined as:

$$STYCRT_i = \left(1 + \frac{(ConsensusRewards_i - ConsensusPenalties_i)}{effective_balance_i} \right)^{\frac{nbSec}{d_i}} - 1 \quad (1)$$

and the *Compass Staking Yield Real Time Ethereum* over epoch i is defined as:

$$STYRT_i = \left(1 + \frac{(ConsensusRewards_i - ConsensusPenalties_i + transaction_fee_i)}{effective_balance_i} \right)^{\frac{nbSec}{d_i}} - 1 \quad (2)$$

With,

$$ConsensusRewards_i = attestation_reward_i + sync_committee_reward_i + slashing_reward_i \quad (3)$$

$$ConsensusPenalties_i = attestation_penalty_i + sync_committee_penalty_i + slashing_penalty_i \quad (4)$$

Where,

- $epoch_i$: a fixed timeframe to provide all validators a common frame of reference for scheduled events on the blockchain
- $epoch_start_time_i$: in respect of epoch i , the start time of epoch i
- $epoch_end_time_i$: in respect of epoch i , the end time of epoch i
- $effective_balance_i$: in respect of epoch i , the sum of all active validators reference balance which are used by the network to calculate the size of rewards and penalties given to the validators
- $attestation_reward_i$: in respect of epoch i , the rewards attributed to the validators for validating the blocks and proposing the blocks
- $attestation_penalty_i$: in respect of epoch i , the penalties attributed to the validators for missing the validation of the blocks
- $slashing_reward_i$: in respect of epoch i , the rewards attributed to the validator(s) for slashing other validator(s)
- $slashing_penalty_i$: in respect of epoch i , the penalties attributed to the validators which have been slashed
- $sync_committee_reward_i$: in respect of epoch i , the rewards attributed to validators which participated in a sync committee for proposing and attesting the blocks

- *sync_committee_penalty_i*: in respect of epoch *i*, the penalties attributed to validators for missing their participation to a sync committee
- *transaction_fee_i*: in respect of epoch *i*, the fees paid during epoch *i* to use the Ethereum network
- nbSec: the number of seconds in 1 year
- *d_i*: the number of second in epoch *i*
- *STYCRT_i* is the Compass Staking Yield Consensus Real Time Ethereum on epoch *i* which represents the annualised staking yield linked to the consensus layer on epoch *i*
- *STYRT_i* is the Compass Staking Yield Real Time Ethereum on epoch *i* which represents the annualised staking yield on epoch *i*

2.2.2 End of day Indices

For each calculation date *t*, the *Compass Staking Yield Reference Index Ethereum*, *STY_t*, and the *Compass Staking Yield Consensus Reference Index Ethereum*, *STYC_t*, correspond respectively to the annualised staking yield (respectively to the annualised staking yield linked to the consensus layer only) based on the net staking rewards generated by the blockchain between 4pm London time on *t* - 1 and 4pm London time on *t*. They are calculated based on the following formulas:

$$STYC_t = Median_{i \in N_t}(STYCRT_i) \tag{5}$$

$$STY_t = Median_{i \in N_t}(STYRT_i) \tag{6}$$

Where,

- *STY_t* is Compass Staking Yield Reference Index Ethereum on *t*
- *STYC_t* is Compass Staking Yield Consensus Reference Index Ethereum on *t*
- *N_t* is the set of epochs with an *epoch_end_time* greater than or equal to 4pm London time on t-1 and an *epoch_end_time* strictly preceding 4pm London time on *t*.

2.3 Rounding of Data

Indices values are computed with all decimals available and are published with 6 decimals.

2.4 Calculation Frequency and Dissemination

The Indices are computed and published every day of the year.

Real time indices (i.e. staking yield computed for each epoch) are computed and published 2 epochs after the end of the relevant epoch.

End of day indices levels are computed every day at 4:30pm London time.

Indices levels are published on the Compass Financial Technologies website (<https://www.compass-ft.com>) and are distributed to Bloomberg and Refinitiv under the ticker symbols listed in tables in section 10.

3 Index Governance

3.1 Index Administrator

Compass Financial Technologies (France) is the Administrator of the Index ("the Index Administrator"). The Index Administrator is responsible for the day-to-day management of the Index as well as for decisions regarding the interpretation of these rules.

3.2 Index Calculation Agent

Compass Financial Technologies (France) is the Calculation Agent of the Compass Staking Yield Reference Index Ethereum. It is responsible for the day-to-day management of Indices computation according to this methodology.

3.3 Index Committees – Supervisor

Compass Financial Technologies has established governance functions to review and provide challenges on all aspects of the Indices determination process. Governance functions are managed by the Compass Oversight Committee and by the Compass Staking Yield Reference Index Steering Committee.

Compass Oversight Committee:

The Compass Oversight Committee oversees all areas of the benchmark determination processes. It is responsible for supervising and controlling the Index operations team on all Compass Indices. It is also responsible for:

1. Periodic review of incidents
2. Making final decisions in case the Index operations team is not capable of or not allowed to make decisions
3. Defining and implementing organization procedures for the Index operations team
4. Defining and overseeing measures that allow for mitigation of operational risks
5. Supervising internal or external audit results
6. The implementation and supervision of the potential codes of conduct that must be implemented

The Committee is comprised of senior representatives at Compass Financial Technologies and external industry experts.

Compass Staking Yield Reference Index Steering Committee:

The Compass Staking Yield Reference Index Steering Committee is responsible for:

1. Determining the calculation methodology and the rules governing the publication of the Compass Staking Yield Reference Index
2. Making periodic reviews of the Compass Staking Yield Reference Index to validate the robustness of the methodology and to analyse the impact of methodology changes
3. Organizing consultation with Compass Staking Yield Reference Index stakeholders if necessary
4. Ensuring that Compass Staking Yield Reference Index offers a reliable and representative view of the market

The Compass Staking Yield Reference Index Steering Committee is composed of members from Compass and may include individuals or representatives from companies, academics, external counsels, or market participants.

The Compass Staking Yield Reference Index Steering Committee assembles once a year in April. However, at the request of a committee member, the Committee may meet on any other day of the year to discuss

potential “market emergency” and “force majeure” events or any other situation, that makes an extraordinary meeting necessary.

All Committee decisions will be published without delay following the Committee decision.

The Compass Staking Yield Reference Index Steering Committee members as of February 2023 are:

- Edouard Mouton, Compass Financial Technologies
- Guillaume Le Fur, Compass Financial Technologies
- Wenceslas Sanchez, Compass Financial Technologies
- Michael Petch, Independent

As of February 23rd, 2023, Edouard Mouton chairs the Compass Staking Yield Reference Index Steering Committee.

4 Methodology Changes - Maintenance

This methodology may be supplemented, amended in part or in whole, or revised or withdrawn at any time. Supplements, amendments, revisions and withdrawals may also lead to changes in the way the Index is compiled or calculated or affect the Index in another way.

In the absence of exceptional circumstances affecting the Index calculation or methodology, this Methodology is reviewed annually. The review will include, inter alia, the following points:

1. Verify if the methodology and computation are still in line with the original purpose of the Indices
2. Make sure the quality and quantity of the input data remain sufficient

Changes made to this methodology are published after the review date and implemented within a reasonable time horizon.

Compass Financial Technologies may terminate a Compass Staking Yield Reference Index due to certain extraordinary market circumstances. These circumstances include, but are not limited to:

1. The liquidity of the underlying cryptocurrency of a Compass Staking Yield Reference Index declines and becomes not sufficient enough to provide an efficient market
2. The underlying cryptocurrency of a Compass Staking Yield Reference Index experiences a contentious hard fork in which both forks survive

Changes or termination will be subject to the review and approval of the Compass Staking Yield Reference Index Steering Committee which will receive all the information related to the change or termination. In case of material changes, a notice will be provided at least two weeks in advance.

The results of the Compass Staking Yield Reference Index Steering Committee will be published in a press release on Compass Financial Technologies website and distributed to data vendors and major news sources in a timely manner.

5 Expert Judgment

The Compass Staking Yield Reference Indices are based on written and transparent rules and procedures with the purpose of minimizing the exercise of discretion and expert judgment as much as possible.

The Compass Staking Yield Reference Indices are built from input data that is not interpolated, extrapolated or adjusted.

Nevertheless, the exercise of expert judgment may become necessary in the case of errors and Index restatements, delayed and missing data, hard forks, airdrops, or unexpected situations arising from market stress.

In the event that expert judgment is exercised, this will be done by resorting to the written procedures reported in the methodology and by communicating the decisions taken to the Compass Staking Yield Reference Indices Steering Committee and the Internal Compliance Function in order to prevent conflicts of interest and protect the integrity and independence of the Index determinations. The interest of the Index users and market integrity will also be taken into account.

6 Errors and Recalculations

Even though the process of Index calculation is completely automated and pre-defined, an error can be discovered after the publication of the Index.

In case of a material error the Index will be redetermined, and the Index clients will be notified about the error and the date of the publication of the redetermined Index. An error is considered material on the basis of its size, the dates of its discovery and occurrence, and the impact of the Index redetermination on the users. The discovery of any error is reported to the Compass Staking Yield Reference Indices Steering Committee.

In the case that a material error is discovered and the Administrator recognizes a manipulation or an attempted manipulation of the Index level or the input data it will be reported to the regulator.

7 Potential Limitations

The issues presented in the following non-exhaustive list may obstruct the computation of the Indices or may limit the ability of some of the Indices to represent the market they are intended to measure, the ease of replication by investors, and the general usefulness of the Indices to users.

- Input data used to compute the Index may become unavailable due to disruption or outage of the related blockchain
- The market the Index is meant to measure may be volatile. In particular, staking yield may be subject to abnormal market movements much more than traditional asset classes like stocks and bonds as a consequence of illiquidity, market trends and market structure changes
- Lastly, the publication of the Indices may cease. Should this occur, the regulation regarding user transitions will be followed, but the existence of a suitable substitute is not assured

8 Cases not covered in rules

In cases that are not expressly covered in these rules, operational adjustments will take place along the lines of the aim of the index. Operational adjustments may also take place if, in the opinion of the Index Administrator, it is desirable to do so in order to maintain a fair and orderly market in derivatives on this index and/or it is in the best interests of the investors of products based on the Index and/or the proper functioning of the markets. The Index Administrator will report to the Supervisor if it makes a decision about a case which is not specifically covered in the rules for comments and review.

9 Liability

The Index Administrator and the Supervisor are not liable for any losses resulting from supplementing, amending, revising or withdrawing the rules for the index. The Administrator will do everything in its power to ensure the accuracy of the composition, calculation, publication and adjustment of the Index in accordance with relevant rules. However, neither the Index Administrator, nor the Supervisor are liable for any inaccuracies regarding index composition, calculation and publication of the Index, information used to make adjustments to the Index and actual adjustments. Furthermore, the Index Administrator and the Supervisor do not guarantee the continuity of the composition of the Index, the continuity of the method of calculation of the Index, the continuity of the dissemination of the index levels, and the continuity of the calculation of the Index.

10 Compass Staking Yield Reference Index Ethereum - Codes - Rounding

Compass Staking Yield Reference Index Ethereum			
Index	Compass API Code	Bloomberg Code	Refinitiv Code
Compass Staking Yield Reference Index Ethereum	STYETH	STYETH	.STYETH
Compass Staking Yield Real Time Ethereum	STYRTETH	Coming Soon	.STYRTETH

Table 1: Compass Staking Yield Reference Index Ethereum - Publication Codes and Rounding

Compass Staking Yield Consensus Reference Index Ethereum			
Index	Compass API Code	Bloomberg Code	Refinitiv Code
Compass Staking Yield Consensus Reference Index Ethereum	STYCETH	Coming Soon	.STYCETH
Compass Staking Yield Consensus Real Time Ethereum	STYCRTETH	Coming Soon	.STYCRTETH

Table 2: Compass Staking Yield Consensus Reference Index Ethereum - Publication Codes and Rounding

11 Disclaimer

Nothing contained herein shall constitute or be deemed to constitute a financial, legal, tax or other advice of any kind, or a solicitation to purchase, sell or invest in any financial products or to engage in any financial strategy. Compass Financial Technologies SA or any of its affiliates (“Compass”) (i) does not guarantee the adequacy, the accuracy, the timeliness, the completeness, the evolution and/or the movements of its indices or any data included therein (the “Indices” or the “Index”), (ii) shall not have any liability for any errors, omissions, delays or interruptions therein and (iii) makes no warranty, express or implied, as to results to be obtained by owners of any securities, or by any other person or entity from the use of the Indices. Compass does not make any express or implied warranties, and expressly disclaims, all warranties of merchantability or fitness for a particular purpose or use with respect to the Indices. Without limiting any of the foregoing, in no event shall Compass have any liability for any lost profits or indirect, punitive, special or consequential damages or losses, even if notified of the possibility thereof.



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