Liquidity Unleashed: A Research-driven Analysis of Post-Shanghai LSDs

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Table of Contents

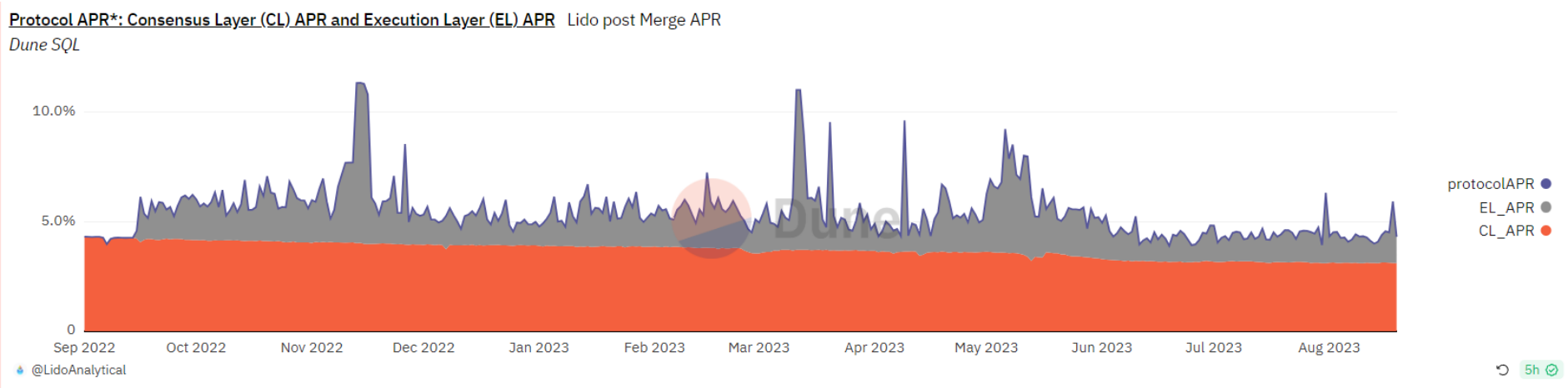
History of Ethereum Staking

- The Merge (Sep 2022): Ethereum migrated from PoW to PoS
  $\Rightarrow$ Now anyone can stake 32Ξ on mainnet and accrue rewards as a validator

- The Shapella/Shanghai Upgrade (Apr 2023)
  $\Rightarrow$ Introduced option to withdraw staked ETH (unstake)

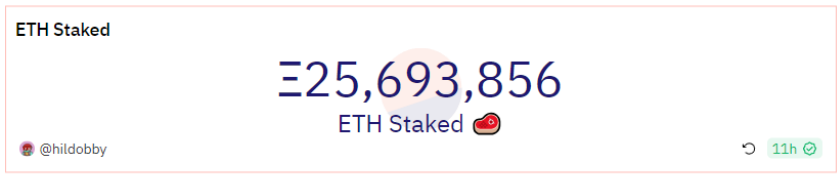
Breakdown of Ethereum Staking Rewards

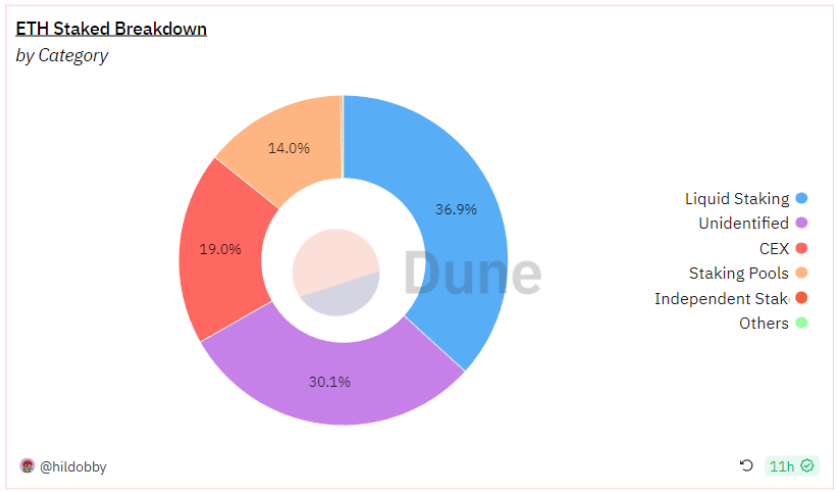
- Consensus layer rewards: Attestation, block proposal, sync committee
- Execution layer rewards: Txn fee (EIP-1559), MEV



source: @LidoAnalytical on Dune

ETH Staking Landscape





source: @hildobby on Dune

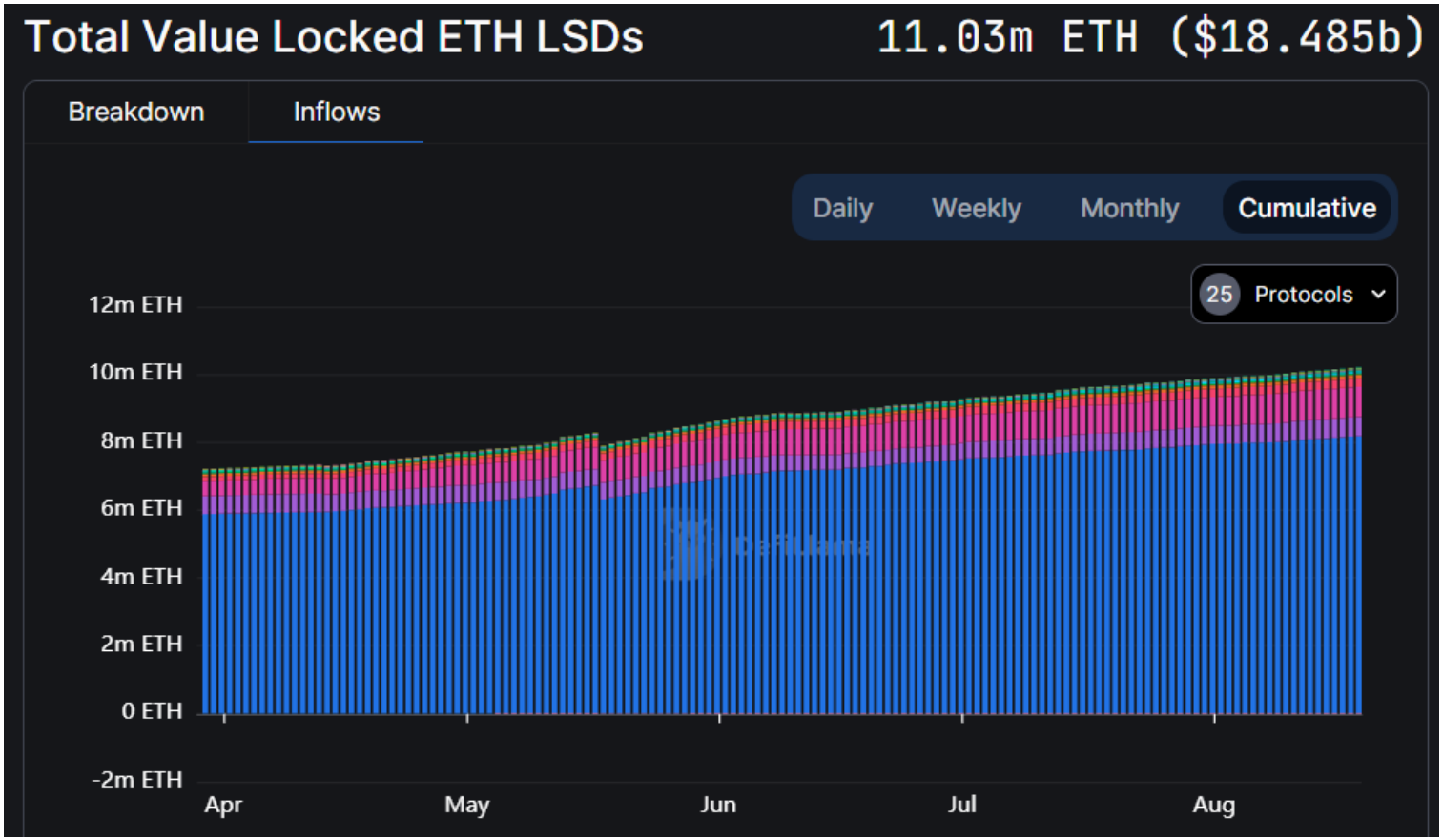
Liquid Staking Derivatives (LSDs)

Actors: stakers, staking pools, node operators

1. Stakers deposit ETH into staking pools in exchange for LSDs
2. Staking pools delegate batches of 32Ξ to NOs to run Ethereum validators and earn staking rewards
3. LSDs can be traded on AMMs, used as DeFi collateral, etc.
4. LSDs are redeemable for ETH at any time

Most LSDs accrue rewards automatically i.e. **holding LSDs is equivalent to staking ETH in the pool**

LSDs saw huge growth after Shapella



source: DeFi Llama

Liquid Staking Pools as Banks

[1]Banks are financial intermediaries which creates liquidity by:

- Holding liquid funds (e.g. customer deposits) as liabilities
- Investing in illiquid investment projects (e.g. loans, bonds) as assets

	Banks	Liquid Staking Pools
Invests in	Loans	ETH validators
Deposits	Checking accounts	ETH deposits

[1]Diamond and Dybvig (1983) Theory of Banking

Supply and Demand Analysis

How Liquid are LSDs, Really?

Introducing quantitative measures of liquidity queues

Risks

- Liquidity risk: e.g. CRV exploit July 2023
- Price risk: e.g. ETH price drop
- Bank runs

More Risks

- APR drop
- Inflationary ETH

LSD Risk Simulations

References I

Diamond, D. W. (2007).Banks and liquidity creation: A simple exposition of the diamond-dybvig model. *FRB Richmond Economic Quarterly*, *93*(2), 189–200.

Diamond, D. W., & Dybvig, P. H. (1983).Bank runs, deposit insurance, and liquidity. *Journal of political economy*, *91*(3), 401–419.