SECTOR IN-DEPTH
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Digital Economy — Bits, Bytes & Basis Points

As staking grows, investors face technology, regulatory and counterparty risks

Interview with Jesper Johansen (CEO), Sebastian Heine (CRCO), Luca Sorlini (Head of Product), Casper Wassmann (CFO) — employees of Northstake, a cryptocurrency staking service provider, as part of our Bits, Bytes & Basis Points series. The views expressed by Northstake are their own views and not those of Moody's Ratings.

Summary

Institutional and retail investors have grown increasingly interested in crypto asset staking, which means getting financial rewards from a blockchain network for locking crypto assets into the network and helping to operate it and verify transactions on the blockchain. The increased interest from investors, particularly in staking on Ethereum, has led to significant growth of the staking market, but also introduces multiple risks to investors as a result of staking's technological complexities.

We asked Jesper Johansen, Sebastian Heine, Luca Sorlini, and Casper Wassmann from Northstake about various staking models and the risks associated with them. They provided insights into the tax implications of staking and the potential integration of staking rewards into Ether ETFs. Jesper Johansen, Sebastian Heine, Luca Sorlini, and Casper Wassmann have also shared criteria that can be used to evaluate staking service providers to ensure their commitment to high operational integrity and risk management standards. Their responses are set out in question-and-answer format below and express their own views, not those of Moody's Ratings.

Below is a summary of key points from Northstake's responses to Moody's Ratings' questions.

Staking reached a peak market cap of $350 billion in 2024, with Ethereum being the largest proof-of-stake blockchain network. Various stakeholders are offering staking services via three main methods: solo staking, staking as a service, and pooled staking, each carrying unique rewards and risks.

All three staking methods face market and technological risks, while staking pools introduce additional risks like commingling of assets, sanctions exposure, tax regulation uncertainties, and issues with liquid staking derivatives.

For comprehensive risk assessment of staking counterparties, investors should consider factors such as regulatory compliance, transparency, and external audits. By doing so, they can select a provider that not only exhibits strong operational integrity and efficient risk management strategies, but also aligns with their personal risk tolerance and investment goals.

What is staking and what are the various staking methods?

Jesper Johansen, Sebastian Heine, Luca Sorlini, Casper Wassmann (Northstake):

Staking is the process by which participants contribute to a blockchain network's operations and validate its transactions. In the case of the Ethereum network, this involves using crypto assets like Ether (ETH) as a sort of 'security deposit'. This ETH is held in a locked state on servers running Ethereum validator node software, which allows them to interact with and participate in the Ethereum network. Stakers are rewarded for running the network, which is paid out as staking rewards in crypto assets to stakers by the network.

Staking reached an all-time high of $350 billion in total market cap in 2024.[1] Ethereum, the world's largest proof-of-stake blockchain network, constitutes a $1 trillion ecosystem[2] that is experiencing exponential growth. An increasing number of service providers, banks, custodians, noncustodial staking providers and protocols are offering all kinds of staking services and products. Institutional investors and financial institutions are starting to understand the new business models of blockchain and the role of staking as an infrastructure investment.

Staking methods can be divided into three main categories, in all of which crypto assets are locked on the blockchain for the purpose of validating transactions. In addition, how staking is managed may vary depending on the blockchain network, but for the purpose of this report only staking on the Ethereum network will be covered.

There are many pathways to staking crypto assets and a variety of staking offerings, which all have their own set of risks. On the Ethereum blockchain three types of staking activities[3] can be executed:

Solo staking

Solo staking on Ethereum is considered the gold standard for staking. It involves running an Ethereum node on a dedicated computer that is connected to the internet on a 24/7 basis. Each validator node requires 32 ETH and provides full participation rewards.

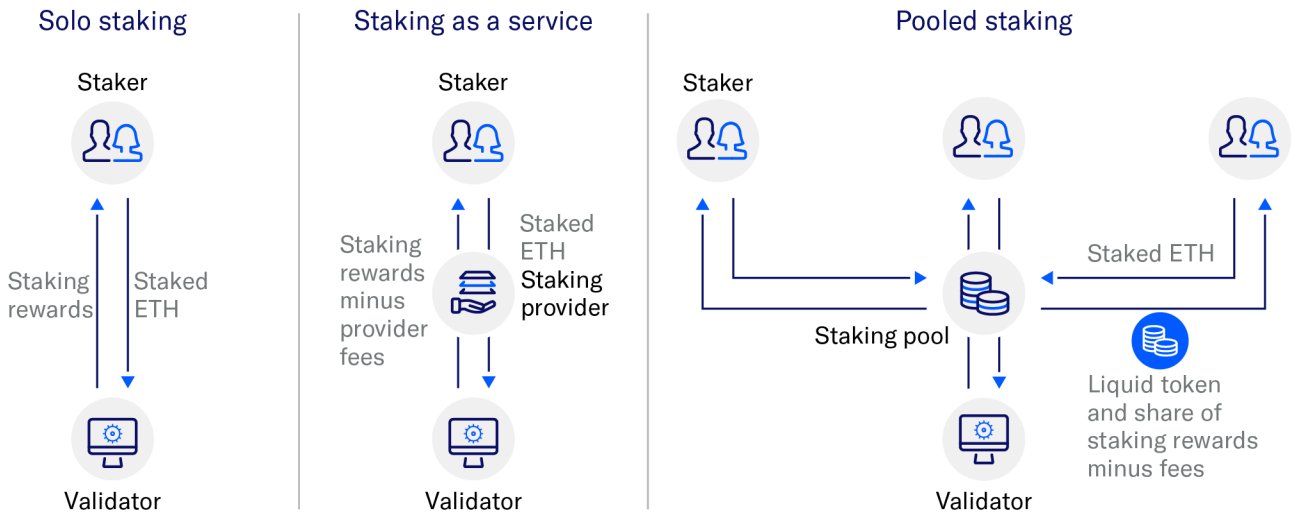
Staking as a service

Staking service providers can validate transactions on behalf of users by receiving validator credentials from users and deposits in 32 ETH increments. This method of staking requires a certain level of trust in the staking provider and can work as a noncustodial solution as well as custodial staking solution.[4]

Pooled staking

Several pooling solutions now exist to assist users who do not have 32 ETH or are not comfortable staking that sum. Many of these options include what is known as 'liquid staking'[5] which involves an ERC-20 liquidity token (equal in utility as a derivative product) that represents the staked ETH. Pooled staking is not native to the Ethereum network. Third parties are building these solutions, and they carry their own risks.

Exhibit 1
Methods of staking Ether



Source: Northstake

Ethereum staking is designed to incentivize individuals to achieve the greatest degree of decentralization of the Ethereum network possible. Initially, staking was seen as a way for users to engage in running the network and earn passive income but it has now evolved into an infrastructure investment in Web3, the next phase of the internet.

There are also several key Ethereum Improvement Proposals (EIP) on the roadmap for 2024, which primarily are focused on improving performance and cost to use the Ethereum blockchain. The upcoming EIP that will have the greatest effect on the staking model would likely be EIP-7251, also known as Maximum Effective Balance (MaxEB, Pectra Upgrade), that aims to address the issue of redundant network validators. The improvement proposal suggests increasing the maximum amount of Ether a validator can stake from the current 32 ETH to 2048 ETH, while maintaining a minimum staking balance limit of 32 ETH. The objective is to allow staking providers, who operate many validator nodes, to consolidate on fewer validators, thereby increasing efficiency. In addition, this approach will eliminate the need for validators to exit and re-enter validator nodes to consolidate their effective balances.

What are the potential risks associated with various staking methods, such as staking as a service, pool staking, and liquid staking?

Jesper Johansen, Sebastian Heine, Luca Sorlini, Casper Wassmann (Northstake):

Market risk and technological risk both apply to all three staking methods. For example, Ether, though a highly liquid asset, is also subject to significant volatility. Because staking rewards are distributed in the form of crypto assets, specifically Ether, these rewards are exposed to market risk. Technological risks also exist, such as potential bugs in the smart contracts that govern staking, which could lead to a loss of staked Ether. Running a validator node also demands some degree of technical expertise. Mistakes in managing the node could result in slashing[6] or loss of control over the staked Ether. For these reasons, many retail and institutional investors opt for staking as a service or pooled staking. However, such staking methods are not without their own risks, because they depend on third parties.

Investors using service providers for staking as a service face the following risks:

Regulatory risks

- **Anti-money laundering (AML) and counterterrorism financing (CFT) risks**: Staking generates staking rewards in Ether, which has monetary value, and the rewards are thus subject to AML and CFT regulations. Both the service provider and the ultimate beneficial owner (UBO) of the crypto assets must comply with these regulations. This includes adhering to mandatory AML/CFT practices such as know-your-customer (KYC) procedures, source-of-funds documentation, and assessment of politically exposed persons (PEPs), among others. Staking involves transferring crypto assets from wallet addresses controlled by the service provider, the asset owner, and other third parties. In the EU this process is governed by the Transfer of Funds Regulation (TFR), which requires identification of all parties involved in the transaction (sender, receiver).
- **Sanctions risk**: Staking may include the use of open-source middleware to access a competitive block building market known as Maximum Extractable Value (MEV) relays. The largest MEV relay, Flashbots, operates in compliance with OFAC's sanctions list, which means it blocks transactions from actors on this list.
- **Crypto regulation**: Staking providers are not regulated under any specific crypto regulation unless they serve EU markets or are located in the EU. The EU is the first and largest economic zone to regulate crypto assets, with the Market in Crypto Asset Regulation (MiCA) coming into effect in 2024. Although staking is not directly covered under MiCA, it does have several implications that should be considered. For instance, all regulated staking providers must be Crypto Asset Service Provider (CASP) licensed by national competent authorities (NCAs). All CASPs are obliged entities under EU AMLR, implying they are subject to enhanced due diligence. Outside the EU, crypto is regulated under AML/CFT and enforced by NCA, but the lack of regulatory clarity on the legal status of crypto assets creates uncertainty about how to regulate crypto.

Operational risks

Some staking service providers lack procedures to operationally secure fund transfers. These practices include whitelisting and screening of wallet addresses and information security safeguards. A staking provider should, at a minimum, be able to document its safeguards and controls, which are externally assured through inspection audits. The irreversible nature of blockchain may result in unrecoverable loss of funds.

Technical risks

- **Inactivity penalties**: Staking is subject to on-chain governance, and that includes inactivity penalties. For instance, on the Ethereum blockchain, infrastructural downtime or slow block validation by staking providers may lead to minor penalties, affecting the overall efficiency of staking.
- **Slashing risks**: Staking providers may face severe penalties if they exhibit malicious behavior such as validating the same blocks twice or inaccurate transaction validation. This can result in a loss of some percentage of staked tokens, known as slashing.

Liquidity risks

Staking requires a firm commitment to a blockchain. On Ethereum, stakers are required to stake Ether in 32 ETH increments. The assets are locked during the staking period and until exit transactions are executed, allowing the Ether to be returned to the staking provider. This process, known as the exit and withdrawal queue, is probabilistic and introduces a variable duration risk for both the staking provider and the staker.

Investors that do not have 32 ETH or are not willing to set up a validator node on the Ethereum blockchain may choose to use staking protocols for pool staking. Staking protocols or staking pools exists to remove or lower the technical, financial and usability barriers to staking, making them particularly suitable for retail investors. By simply connecting their wallets, these investors can begin accruing staking rewards. However, because of their permissionless design, these pools may not be suitable for institutional investors as they introduce additional risks:

- **Commingling of assets**: Using staking pools or staking protocols may require investors to pool their assets with unknown counterparties to meet the 32 ETH increments for each validator node on the blockchain network. Most protocols pool all staking rewards and distribute them pro rata to the owners of the pool. This introduces commingling of assets, where investors cannot distinguish between the assets initially deposited into the pool and the beneficial title to those assets. This problem also extends to the staking rewards.
- **Sanctions exposure**: Using staking pools or staking protocols can expose users to funds or entities under sanctions. Our recent analysis using Reactor by Chainanlysis suggests that there is approximately 0.46% to 1.56% direct sanctions exposure across the four largest staking pools and liquid staking providers.[7]
- **Tax regulation**: There is currently uncertainty about how to treat crypto assets and staking rewards under IFRS sections 7, 9 and 13. This issue is also prevalent in other accounting regulations, including US GAAP.
- **Risks associated with liquid staking derivatives**: Most staking protocols issue a liquidity token upon the deposit of Ether into the protocol. A liquid staking derivative (LSD) or liquid staking token (LST) is a synthetic derivative of Ether, which can be traded on a secondary market. However, investors who choose to use these liquid staking derivatives must be aware of the additional risks involved. Currently, the legal requirements for issuing LSDs or LSTs, including necessary licenses, remain ambiguous and could vary depending on jurisdiction. Furthermore, since the issuance of LSD/LST is not directly handled by the Ethereum blockchain but rather by a centralized or decentralized entity, stakers are exposed to the credit risk associated with the issuer.

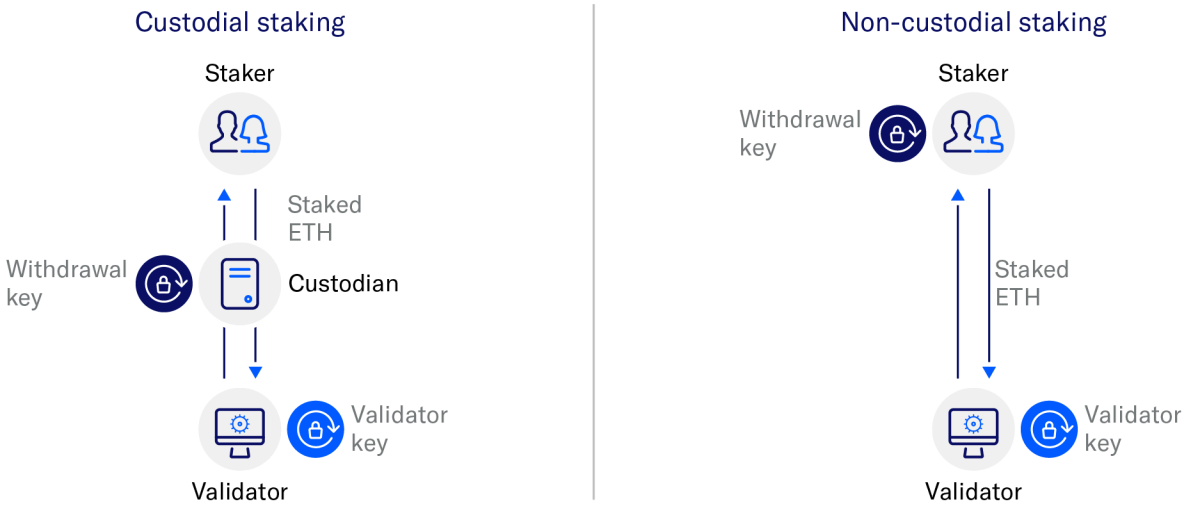
How does counterparty risk factor into these different methods and how can this risk be assessed?

Jesper Johansen, Sebastian Heine, Luca Sorlini, Casper Wassmann (Northstake):

Counterparties carrying out staking can be divided into two categories: noncustodial and custodial staking providers.

Exhibit 2

Custodial and noncustodial staking models



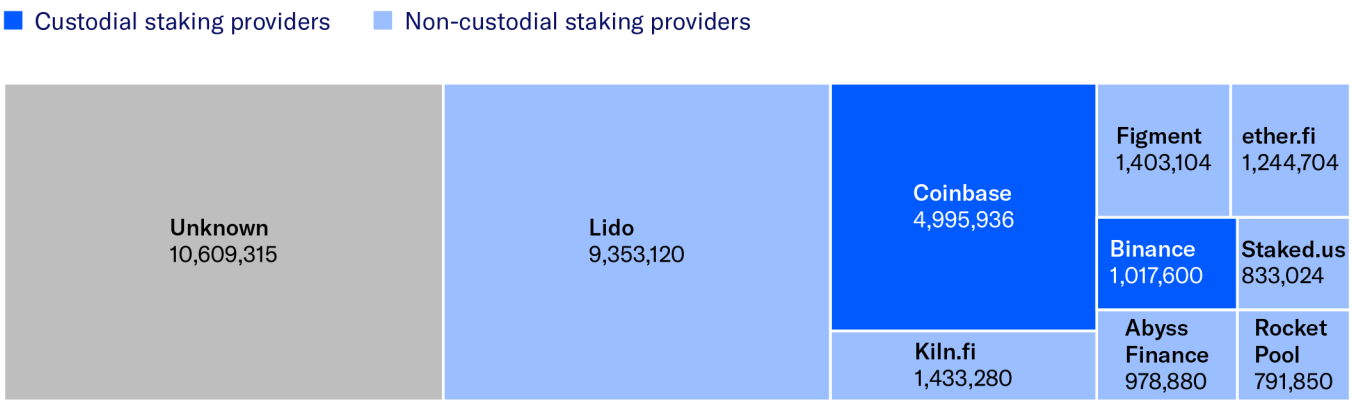
Source: Northstake

Noncustodial staking providers operate under the assumption that users maintain control over the assets by holding keys to the on-chain assets. In this case, the counterparty risk is primarily related to the performance of the staking provider. If the provider fails to validate transactions correctly, penalties may be imposed by the network, which could lead to a loss of staked assets. Additionally, the risk could arise from the provider's software or hardware failure.

Custodial staking providers operate under the assumption that users deposit crypto assets under their custody, and control. The custodial staking provider acts as a single counterparty, responsible for ensuring that staking is performed. This introduces an additional

counterparty risk: the risk that the provider could lose or misappropriate the assets. This could occur for reasons ranging from internal fraud or mismanagement to external factors like hacking.

Exhibit 3
Top custodial and noncustodial Ethereum staking providers



Source: Northstake, Nansen

The key factor here is the ability for an investor to perform a meaningful counterparty risk assessment to ensure that any contract or obligation on the counterparty can be enforced given the decentralized nature of some noncustodial staking providers or the inherent risks associated with liquid staking providers.

In assessing the risk of staking providers, it is beneficial to categorize them into regulated and unregulated groups. Regulated providers are subject to regulatory oversight by National Competent Authorities (NCAs) and are generally obligated to comply with specific legal and financial standards or regulatory frameworks, such as MiCA or AMLR. Conversely, unregulated providers function outside NCAs' regulatory oversight and typically operate from offshore locations or jurisdictions, which makes counterparty assessment challenging.

In addition to distinguishing between regulated and unregulated providers, investors should consider several factors to comprehensively assess the risks associated with staking providers.

» **Legal jurisdiction:** Understanding the jurisdiction of a staking provider is crucial, as is knowing the regulatory oversight it is subject to, considering the regulator's stance on crypto and how it might affect the service provider.

» **Regulatory compliance:** Ensure that the provider adheres to applicable compliance regulation.

» **Governance and transparency:** Engagement with a reputable counterparty can help mitigate legal and reputational risks.

» **Sanctions exposure:** Investors should verify that the provider conducts thorough chain analysis to avoid sanctions violations. This involves ensuring that the provider has measures in place to prevent transactions with addresses linked to sanctioned entities, such as Tornado cash.

» **External audits:** Check for third-party inspection audits conducted by reputable and established firms. These should cover not only the provider's financial status but also its information security practices and technology. Regular and comprehensive audits are indicative of a provider's commitment to maintaining high standards of security and operational integrity.

By carefully evaluating these features, investors can better understand the risk profile associated with different staking providers and choose one that aligns with their risk tolerance and investment objectives.

What criteria do you use to evaluate staking providers' reliability and security?

Jesper Johansen, Sebastian Heine, Luca Sorlini, Casper Wassmann (Northstake):

To evaluate the reliability and security of staking providers, several critical criteria should be considered to ensure they meet high standards of operational integrity and risk management:

- **Staking performance:** The historical performance of the validators operated by the staking provider should be reviewed. This includes their uptime[8], the frequency of being slashed (if applicable), and their overall network contribution. High-performing validators decrease the risk of penalties that can affect staking returns.
- **Information security:** Staking providers should at a minimum comply with international standards known as ISO27001 or ISAE3402, which includes System and Organization Controls (SOC1) type 1 and 2 reports. These assessments evaluate the effectiveness of a provider's safeguards and controls related to the security, availability, processing integrity, confidentiality, and privacy of a system. A SOC report from a reputable auditor indicates rigorous compliance with industry standards.
- **Insolvency protections:** Understanding the provider's insolvency setups is vital. These setups should clearly define how assets will be allocated in case of the provider's solvency issues. This includes legal structures that ensure client assets are segregated and protected from creditors (bankruptcy remote) thus providing a layer of financial security.
- **Separation of assets:** The provider should maintain a strict separation between customer assets and its own operational funds (treasury). This segregation protects client assets from being used in the operation of the provider's business or from being exposed to its corporate risks.
- **Renowned partners:** Associations with well-known and respected partners in the industry can be a strong indicator of a provider's reliability. Partnerships with leading technology providers, financial institutions, and regulatory bodies enhance credibility and suggest a commitment to high standards.
- **Adverse media screening:** Regular checks for any negative media that could affect the provider's reputation are important. Adverse media screening can reveal issues related to past regulatory problems, involvement in financial crimes, or other risks that might not be evident through financial audits alone.
- **Validator performance:** This includes assessing the historical accuracy, uptime, and effectiveness of the validators operated by the provider. Reliable validators should have a strong track record of successful block validations with minimal penalties or slashing incidents.
- **On-chain analysis and sanction exposure:** Continuous on-chain monitoring to detect and avoid transactions linked to illicit funds is essential. The provider needs to implement and maintain systems that perform detailed chain analysis to detect and avoid transactions linked to illicit funds. This includes identifying and blocking transactions connected to illegal activities, thereby preventing sanction violations and ensuring compliance with global regulations.

By applying these criteria, stakeholders can assess the reliability and security of staking providers effectively.

Given the lockup period associated with staking, how do staking providers manage redemptions? What strategies are in place to ensure liquidity under these circumstances?

Jesper Johansen, Sebastian Heine, Luca Sorlini, Casper Wassmann (Northstake):

On the Ethereum blockchain network, when users exit their validator from the beacon chain, then they are subject to the exit queue.[9] The exit queue is a mechanism that ensures the orderly exit of validator nodes to ensure network stability and security. The exit queue works by limiting the number of validators that can exit every 6.4 minutes.[10]

Once through the exit queue, validators' balance of Ether is swept and withdrawn to the staking provider. The network does this by cycling through the withdrawal queue in the order by which users entered the network and one by one withdraws their balances to the staking provider. The longer the queue, the longer a complete cycle takes.

The combined time of exit queue and withdrawal queue is known as a lockup or unbonding period, which introduces a duration risk, because users still have market exposure while queuing. Staking providers manage redemptions by exiting validators on request by staking clients. This is the only way you can return the client's asset to meet redemptions. There are alternatives to solving the duration risk through liquidity provisioning; however, they introduce new counterparty risks.

Such strategies include liquid staking derivatives, which increase the counterparty risk and the associated risks specific to liquid staking. Many regulators have yet to give no-objection to the use of liquid staking derivatives, which has led large institutions to use their balance sheets to ensure liquidity provisioning. This has proved to be challenging to scale while ensuring sustainable unit economics.

Liquid staking derivatives (LSD) or liquid staking tokens (LSTs) can be designed in a variety of ways, but typically represent a claim on the underlying staked asset and in some cases the yield it bears.

What are the implications of staking from a tax perspective?

Jesper Johansen, Sebastian Heine, Luca Sorlini, Casper Wassmann (Northstake):

There is currently no official guidance under IFRS or US GAAP on tax implications relating to staking and staking rewards, as the underlying process and mechanism is probabilistic. This makes it challenging to apply existing legal definitions and accepted practices. Staked ETH could be recognized under IAS 38 or IFRS sections 7, 9, and 13, depending on the circumstances.

IAS 38, which recognizes crypto as an intangible asset, might be applicable for crypto investors or those who do not primarily invest in financial instruments. This standard measures crypto initially at cost value, but there is uncertainty over whether it can be measured at fair market value if a credible price reference is available.

If the primary activity involves investing in financial assets or instruments, including crypto, management of crypto assets and staking rewards might fall under IFRS sections 7, 9, and 13. Under IFRS 7, crypto assets and staking rewards are not recognized as financial assets, but they could be considered as such within the IFRS context if the primary activity is investing in crypto. Under IFRS 9, if crypto assets and staking rewards are recognized under IFRS 7, they can be measured according to fair market value principles (IFRS 13) and recognized through profit and loss. This likely applies to staking rewards as well, until a generally accepted method of recognition is determined.

The lack of official general guidance is a result of the absence of specific crypto legislation in most jurisdictions. Additionally, there are few established practices from case law. As a result, uncertainty remains regarding how to apply existing accounting standards to staking and staking rewards.

Are there any insurance products available to protect staked assets?

Jesper Johansen, Sebastian Heine, Luca Sorlini, Casper Wassmann (Northstake):

Today, there are only bespoke insurance products for staking, primarily mitigating risks associated with asset custodianship. Specifically, they cover incidents such as theft, hacking, smart contract failures, and slashing risks. This development is critical for safeguarding staked assets, thereby enhancing investor confidence, and contributing to the stability and security of digital asset investments. But because insurance companies need to further their understanding of the risks associated with staking and for insurance companies to fully embrace crypto assets, standardized insurance products are not ready yet.

Specific policies are in place to protect staked assets, particularly for custodial staking providers. When engaging a custodial staking provider, one key aspect of assessing counterparty risk, is to ensure that beneficiary title to the assets is not transferred. A transfer of the beneficiary title to assets will turn into a claim on the staking provider in case of bankruptcy. Generally accepted practices under most jurisdictions is to return client assets in the event of a bankruptcy.

Under EU MiCAR, a custody policy will become mandatory as a part of the achieving licenses to operate as crypto asset service provider (CASP license). In addition, there are minimum requirements to have an information security policy and disaster recovery plans as well as generally accepted practices including, risk management and information security.

With the advent of Spot Ether ETFs, how do you foresee the mechanism of staking being integrated? Do you foresee the development of ETH staking ETFs, in addition to spot ETFs?

Jesper Johansen, Sebastian Heine, Luca Sorlini, Casper Wassmann (Northstake):

Based on our experience with North American and European ETFs/ETPs, we have observed specific examples of how staking mechanisms are being incorporated into Spot Ether ETFs, the expected distribution of staking rewards, and considerations for the potential development of ETH staking ETFs.

We expect that incorporating staking is the general direction that spot Ether ETFs will take given the nature of staking. If we consider Ethereum as an internet bond, then the staking rate can be compared to the coupon rate. There is a clear intention from all digital asset managers to stake a proportion of the ETF's funds. This will be done through selected staking providers, who have demonstrated the necessary technical and regulatory compliance expertise.

The distribution of staking rewards will likely accrue in the fund because of the current uncertainty of how these rewards will be recognized under federal income tax law. Moreover, any distribution of staking rewards could also create tax liabilities for shareholders. At present, it is unclear whether rewards will or can be distributed to investors because of regulatory uncertainty surrounding staking and tax considerations. Over time, as regulatory frameworks evolve and become more clearly defined, we can expect the introduction of specifically designed staking ETFs that distribute rewards to investors.

ETH staking ETFs already exist in Europe and Canada, where leading digital asset managers such as 21SHARES and 3iQ have launched ETH spot and staking ETPs/ETFs. However, when liquidity risk is mitigated, then ETH staking ETFs could outperform ETH spot ETFs. In other words, all ETH ETFs could become staking ETFs with various models to incorporate staking mechanisms. Regulatory restrictions in Canada and Europe impose certain limitations on staking. Current ETF/UCITS regulation stipulates that at least 90% of assets must be liquid, requiring ETFs/ETPs to actively manage their fund liquidity when staking to meet redemption requirements. Restrictions on the amount of ETH that can be staked could directly impact the performance of the ETF fund.

By limiting the volume of assets in the fund that can earn staking rewards, the potential returns from staking are capped, thereby affecting the overall performance. This means that the risk-adjusted return that the ETF can offer will be lower comparing to other vehicles or to a standardized benchmark rate for Ethereum staking, such as the Composite Ethereum Staking Rate (CESR) by CoinDesk Indices and Coinfund.

Although regulatory restrictions pose certain limitations, the overall appeal and feasibility of ETH staking ETFs can still be preserved through careful staking management and the adoption of innovative liquidity solutions. This significantly enhances the attractiveness of the fund as increasing the staking ratio can effectively reduce the performance deficit year on year, setting it on a race to a 100% stake ratio. Most allocators will invest in the best performing ETH ETFs, and the investment managers who optimize staking most effectively will outperform those who do not.

Recently, US ETH ETFs have been approved, although in response to SEC concerns, issuers removed any discussion of staking from their filings. Although ETF fund providers and investors had anticipated this development, it implies that the returns of US ETFs will be behind their Canadian and European counterparts. We also anticipate a similar process with the eventual approval of ETFs related to other proof-of-stake networks such as Solana (SOL), which will create further opportunities investors and industry operators.

Endnotes

1 See, for instance, https://www.stakingrewards.com/.
2 See, for instance, https://www.forbes.com/digital-assets/categories/ethereum-blockchain/.
3 See https://ethereum.org/en/staking/.
4 More details on custodial vs. noncustodial staking are provided in the following section.
5 Moody's - Liquid staking tokens may enhance investors' liquidity and yield, 25 April 2024.
6 If a validator tries to manipulate the system or acts erroneously, a portion of their stake is taken away or "slashed."
7 See https://www.dlnews.com/articles/defi/dirty-money-in-ethereum-staking-may-spook-institutions/.
8 "Uptime" refers to the amount of time a validator in a staking network is active and functioning properly.
9 See, for instance, https://www.validatorqueue.com/.
10 The duration of epoch, which refers to a specific period during which the Ethereum blockchain network processes blocks of transactions.

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