

Q 4 2 0 2 4

Signals Report

A quarterly breakdown of key market metrics that could be impacting price and investor sentiment.

Fidelity Digital Assets[®] Research

Quarterly Observation of Current Market Conditions

► Click the boxes to see how we measured the conditions.

Bitcoin

Short-Term Outlook
(<1 year)

POSITIVE

Mid-Term Outlook
(1–5 years)

NEUTRAL

Long-Term Outlook
(>5 years)

POSITIVE

Ethereum

Short-Term Outlook
(<1 year)

POSITIVE

Mid-Term Outlook
(1–5 years)

NEUTRAL

Long-Term Outlook
(>5 years)

POSITIVE



What This Report Is and How to Use It

Digital assets are unique in that they not only generate traditional market signals based on price action, but they also generate an entirely new set of signals based on public on-chain data. These signals can be valuable for all types of investors, but the challenge lies in determining which signals to use, how to match the signal to the correct investment time horizon, and how to interpret the data correctly.

In this report, we have collected what we think are the most reliable signal indicators, grouped them by time horizon, and provided an overall assessment of the conditions for each time horizon. We then provide a breakdown of the signals included in each time horizon and their charts.

Executive Summary: Q4 2024

2024 was a significant year for digital assets: Spot Bitcoin and Ethereum exchange-traded products (ETPs) launched, Ethereum underwent an upgrade (Deneb-Cancun) reducing fees for Layer 2 networks through the introduction of blobs, Bitcoin completed its programmatic halving in April and users introduced a new innovative way to speculate on meme coins called Runes (driving block fees upward and causing quite a stir amongst the community), and multiple institutions and countries announced they were holding bitcoin on their balance sheet.

Bitcoin and ether's price closed out the year with healthy gains of roughly 113% and 42% after experiencing periods of volatility. Comparatively, the S&P 500 underperformed both assets with 25% gains.

Bitcoin

Bitcoin's 10-month sideways price action eventually ended in November and led markets to a new all-time high of \$108,388. Although bitcoin's price retraced mid-December, the price has maintained a healthy relationship with its long-term moving average (200-day) but has slipped below the short-term average (50-day) of \$96,493. However, by the end of 2024, bitcoin's price continued to test this short-term average as a level of support.

Additionally, bitcoin miners in aggregate have recovered from the halving and are experiencing larger profit margins with the latest move above \$90,000. Hash rate also continues to climb as the target difficulty adjusts higher to maintain the programmatic issuance schedule. The market value relative to investors' cost basis (MVRV Z-Score) remains split between "Overvalued" and "Undervalued," as sideways price action allow the cost basis to reset.

Ethereum

Ether experienced a significant shift in its short-term metrics, with MVRV sitting very close to the "Undervalued" end of the range despite recent price action. The price entered a golden cross on December 5, 2024, and sat just 9% above its longer-term average as of December 31, 2024. Neither the percentage of addresses in profit nor the realized price suggests that the price appreciation is over. These metrics stand in stark contrast to Q3 2024 when most short- and medium-term metrics were flashing negative signals.



What This Report Is and How to Use It

Digital assets are unique in that they not only generate traditional market signals based on price action, but they also generate an entirely new set of signals based on public on-chain data. These signals can be valuable for all types of investors, but the challenge lies in determining which signals to use, how to match the signal to the correct investment time horizon, and how to interpret the data correctly.

In this report, we have collected what we think are the most reliable signal indicators, grouped them by time horizon, and provided an overall assessment of the conditions for each time horizon. We then provide a breakdown of the signals included in each time horizon and their charts.

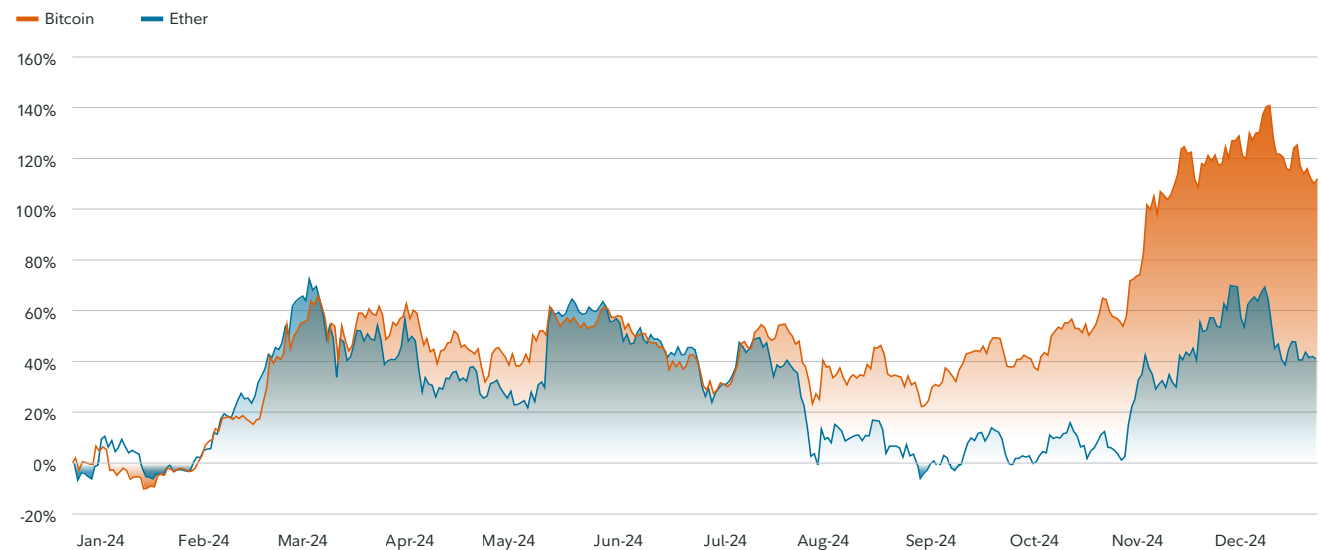
Executive Summary: Q4 2024 (continued)

Additionally, longer-term on-chain trends are still showing strong positive signals. For example, Layer 2 transaction growth increased by 55% this quarter, driven largely by Coinbase's L2, Base. Despite this growth on Layer 2s, the base layer also showed increases in activity, with all three of our monthly address metrics up over the quarter. The Ethereum network significantly grew in Q4. Combined with its relative underperformance compared to Bitcoin and strong signals across the timeseries, ether seems to be poised for a strong 2025.

One notable outlier in our signals was the decrease in active validators. This was the first quarter in Ethereum's history where we observed a decrease in this metric, which could signify two important possibilities.

First, it could mean that we have finally reached the terminal staking rate for Ethereum validators, implying that long-term issuance will remain relatively unchanged. This is a positive sign for ether holders, although it remains unclear how much security is sufficient. Second, it could be a symptom of increased on-chain activity, driving validators to higher-yielding activities relative to staking. While the reality could be a mix of both, we will be closely monitoring the validator count next quarter to determine which trend is playing out.

Bitcoin and Ether Returns Compared YTD



Source: Fidelity Digital Assets Research via Coin Metrics, 12/31/24.



Table of Contents

01. Measurement Breakdown

Bitcoin	05
Ethereum	06

02. Bitcoin Data to Watch

Death Cross Turned Golden Cross	07
BTC: Realized Price	07
BTC: Net Unrealized Profit/Loss (NUPL)	08
BTC: MVRV Z-Score	09
BTC: Reserve Risk	09
BTC: Puell Multiple	10
BTC: Percent of Bitcoin Sold vs. Accumulated by Miners	11
BTC: Hash Rate	11
BTC: Miner Revenue Denominated in BTC vs. USD	12
BTC: Hodler Net Position Change	12
BTC: Percentage of Addresses in Profit	13
BTC: Yardstick	13
BTC: Price Phases	14
BTC: 200-Week Moving Average	15
BTC: Monthly Address Metrics	15
BTC: New Address Momentum	16

BTC: Liquid vs. Illiquid Supply	16
BTC: Balance \geq \$1,000	17
BTC: Exchange Balance	18

03. Ethereum Data to Watch

Ether Closes 2024 Up 42%, Fundamentals Strong, Narrative Weak	19
ETH: Realized Price	19
ETH: MVRV Z-Score	20
ETH: Market Cap Ratio of Bitcoin	20
ETH: Net Unrealized Profit/Loss (NUPL)	21
ETH: Percent in Profit	21
ETH: Monthly Address Metrics	22
ETH: New Address Momentum	22
ETH: Layer 2 Transaction Count	23
ETH: Staking Numbers/Validators	23
ETH: Net Issuance and Burn	24

04. Contributors

05. Disclosures



Measurement Breakdown—Bitcoin

Short-Term (<1 year)		Overall Condition: POSITIVE
NAME	COMMENTARY	CONDITION
Is Price Trading Above the 200-Day Moving Average?	Yes, price is 27% higher than the 200-day	<div><div></div><div></div><div></div></div>
Golden Cross or Death Cross?	Golden cross formed on October 29, 2024	<div><div></div><div></div><div></div></div>
Price > Realized Price	Yes, 78% higher than realized price	<div><div></div><div></div><div></div></div>
Mid-Term (1–5 years)		Overall Condition: NEUTRAL
NAME	COMMENTARY	CONDITION
NUPL Ratio	Remains in “Belief” zone	<div><div></div><div></div><div></div></div>
MVRV Z-Score	Between “Undervalued” and “Overvalued” but not incentivizing extreme selling	<div><div></div><div></div><div></div></div>
Reserve Risk	Maintaining a healthy ratio	<div><div></div><div></div><div></div></div>
Puell Multiple	Miners’ returns are similar to annual average	<div><div></div><div></div><div></div></div>
Hash Rate	Hash rate continues to rise, setting new all-time highs	<div><div></div><div></div><div></div></div>
Hodler Net Position Change	Long-term holders are significantly adding to sell pressure	<div><div></div><div></div><div></div></div>
Addresses in Profit	94% of addresses are in profit which could incentivize selling	<div><div></div><div></div><div></div></div>
Bitcoin Yardstick	Yardstick “warning” bitcoin signal is persisting	<div><div></div><div></div><div></div></div>
Bitcoin Price Phases	Currently in “Acceleration” phase	<div><div></div><div></div><div></div></div>
Long-Term (>5 years)		Overall Condition: POSITIVE
NAME	COMMENTARY	CONDITION
Price > 200-Week	Yes, price is in a healthy position—75% above the 200-week	<div><div></div><div></div><div></div></div>
Monthly Address Metrics	Two out of three metrics are trending higher	<div><div></div><div></div><div></div></div>
New Address Momentum	Users are not demanding block space as much, however, new addresses are increasing	<div><div></div><div></div><div></div></div>
Liquid vs. Illiquid Supply	Illiquid supply fell 5% over Q4 while supply shock ratio rose	<div><div></div><div></div><div></div></div>
Balance ≥ 0.1 BTC	Positive trend of growth, new all-time high in December	<div><div></div><div></div><div></div></div>
Exchange Balances	Exchange balances continue to fall, users removed 8% of holdings throughout Q4	<div><div></div><div></div><div></div></div>



Measurement Breakdown—Ethereum

Short-Term (<1 year)		Overall Condition: POSITIVE
NAME	COMMENTARY	CONDITION
Is Price Trading Above the 200-Day Moving Average?	Yes, price is 9% higher than the 200-day	<div><div></div><div></div><div></div></div>
Golden Cross or Death Cross?	Golden cross formed on December 5, 2024	<div><div></div><div></div><div></div></div>
Price > Realized Price	Yes, 59% higher than realized price	<div><div></div><div></div><div></div></div>
Mid-Term (1–5 years)		Overall Condition: NEUTRAL
NAME	COMMENTARY	CONDITION
MVRV Z-Score	Weighted significantly toward undervalued zone	<div><div></div><div></div><div></div></div>
Ethereum Market Cap Ratio of Bitcoin	Continued to drop to lowest values seen since 2021 while longer-term trend is still positive sloping	<div><div></div><div></div><div></div></div>
NUPL Ratio	Remains in “Optimism” zone	<div><div></div><div></div><div></div></div>
Percent in Profit	82% of addresses in profit, closing in on top end of the range	<div><div></div><div></div><div></div></div>
Long-Term (>5 years)		Overall Condition: POSITIVE
NAME	COMMENTARY	CONDITION
Monthly Address Metrics	Significant increase in all three metrics, signaling strong demand for base layer amid heightened competition and increased Layer 2 growth	<div><div></div><div></div><div></div></div>
New Address Momentum	Short-term address growth exceeding long-term average, golden cross formed on November 19, 2024	<div><div></div><div></div><div></div></div>
Layer 2 Transaction Count	Layer 2 transactions grew 55%, signifying continued success of rollup-centric roadmap amid heightened base layer activity	<div><div></div><div></div><div></div></div>
Staking by the Numbers	Validator count was down 1.5% in Q4, breaking its steady climb with consistent validator exits throughout quarter	<div><div></div><div></div><div></div></div>
Net Issuance and Burn Rate	Annualized inflation rate of 0.19% during Q4	<div><div></div><div></div><div></div></div>



Bitcoin Data to Watch

Death Cross turned Golden Cross (Bitcoin)

Bitcoin's price ended its 10-month "consolidation" phase in early November, rising from \$75,000 to a new all-time high of roughly \$108,000. Our [analysis](#) identified a golden cross forming on October 29, which may have signaled to investors that the market was primed for further growth. The previous 10-month consolidation phase allowed both the 50-day simple moving average (SMA) and 200-day SMA to recollect and level out, creating a healthier support band.

End-of-year data shows bitcoin's price falling below the first support band (50-day SMA) of \$96,500. The 200-day SMA sat at approximately \$71,500 as of December 2024. If this support level were to be tested, it would mark a 34% drop from the new all-time high. That said, it is important to note that previous bull run cycles experienced multiple 20%, 30%, and even 40% drawdowns. We consider these pullbacks to be a healthy aspect of a bull run as profit margins are reset and new support levels are created.

By the end of 2024, bitcoin's price rose a total of 48% in Q4 and 121% throughout the entire year. The short-term moving average rose 60% to \$96,500, and the long-term average rose 12% to \$71,500.

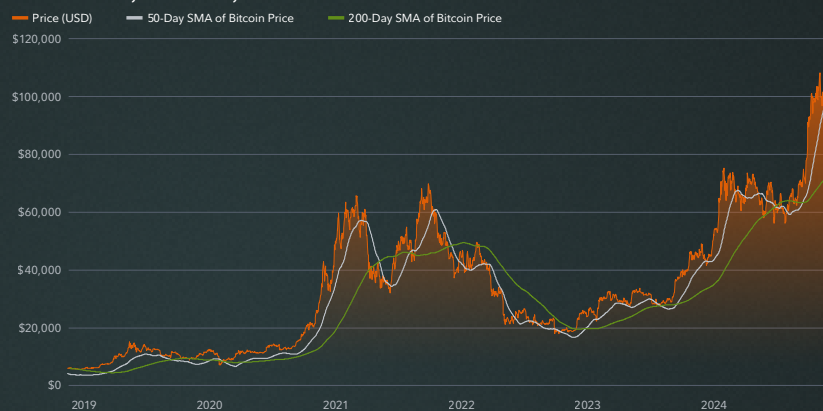
Realized Price (Bitcoin)

The realized price is a metric that aims to capture the average cost basis of all current token holders. By capturing a token's last trade price, tokens that are presumed to be lost can be discounted. Bitcoin's realized price was about \$41,000 at the close of Q4. The realized price has maintained a position of support since January 13, 2023. As of December 31, 2024, bitcoin's price sat approximately 78.1% above its realized price. This indicates that the incentive to continue taking profits has increased, which was likely the cause for December's volatility. While profit-taking may cause quick price pullbacks, the retracements may be short-lived if demand outweighs selling pressure as we have experienced this past quarter.

Additionally, we offer another view to the realized price through the realized market cap. This view can demonstrate the exact price levels bitcoin is being moved at relative to when it was last moved. If bitcoin was moved (bought or sold) at a low price and then moved again at a higher price, the realized cap would increase as the cost basis rises. Conversely, if bitcoin moved at a high price and moved again at a lower price, the realized cap would fall.

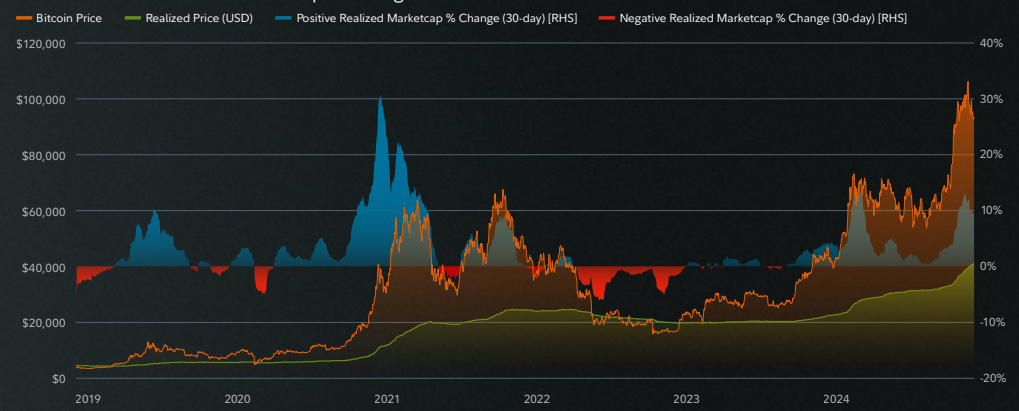
Using this metric, our analysis suggests that most investors are taking profit above their acquisition price, realizing relatively larger profits similar to when bitcoin's price first rose above \$70,000. However, these sellers have largely been met with buyers as the price continues to consolidate in the \$90,000 to \$100,000 range.

Bitcoin: 50-Day vs. 200-Day vs. Price



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

Bitcoin: Price vs. Realized Marketcap % Change



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Realized Price (Bitcoin) *continued*

We also want to draw attention to the previous bull market tops of 2021. Comparing the recent rise in realized cap to the 2021 run-up past \$60,000, the data reveals an increase of up to 30%. Put simply, sellers at that time were realizing such significant profits that the realized cap rose rapidly. Today's profit taking is more comparable to that of mid-2019 when bitcoin's price rose above \$10,000.

The most notable short-term support levels to watch are \$92,240 (average short-term realized price [fewer than three months]), \$96,492 (50-day SMA), \$71,530 (200-day SMA), and \$40,986 (realized price).

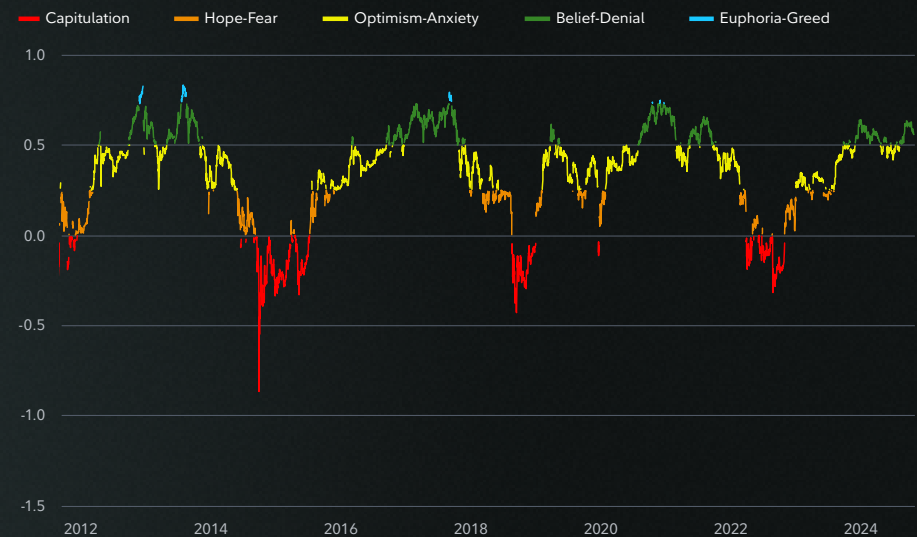
Net Unrealized Profit/Loss (NUPL) Ratio (Bitcoin)

Historically, this metric does a good job of assessing overall market sentiment. Bitcoin's NUPL score offers insight into the relative level of unrealized profits, or losses, visible on-chain at any given time. A NUPL score below zero, witnessed in Q4 2022, implies net unrealized losses and has historically signaled periods of capitulation. A NUPL score over 0.50 indicates large unrealized profits held on-chain, which may suggest some profit-taking could be likely.

This ratio maintained the "Belief-Denial" zone throughout Q4. While this remains a positive indicator for current sentiment, profit taking can quickly lead to anxiety and euphoria. It will remain important for traders to be aware of current sentiment when trading for short-term profits.

Read more [here](#).

Bitcoin: Net Unrealized Profit/Loss (NUPL)



Source: Fidelity Digital Assets Research via Glassnode, 12/31/2024.



MVRV Z-Score (Bitcoin)

The **MVRV Z-Score** is used to assess when bitcoin's price is over/undervalued relative to its "fair value." When the market value is significantly higher than the realized value (acquisition price), it has historically indicated a market top (red zone), while the opposite has indicated a market bottom (green zone).

The MVRV Z-Score rose sharply throughout Q4 as bitcoin's price rose from \$63,245 to \$93,460, representing a rise of 48%. The MVRV Z-Score remains in a relatively healthy position as the incentive to take profit here are not yet extreme. Although the Z-Score is moving closer to the "Overvalued" zone, price corrections have kept it balanced between the two extremes. Notably, the prior 10 months of sideways price action allowed this metric to gradually decline, indicating reduced on-chain profit margins.

Additionally, the MVRV Z-Score currently sits at a slightly lower level than when bitcoin's price first reached \$73,000 in March 2024. This indicates that profit taking is occurring but is keeping investors in a healthy position for continued growth.

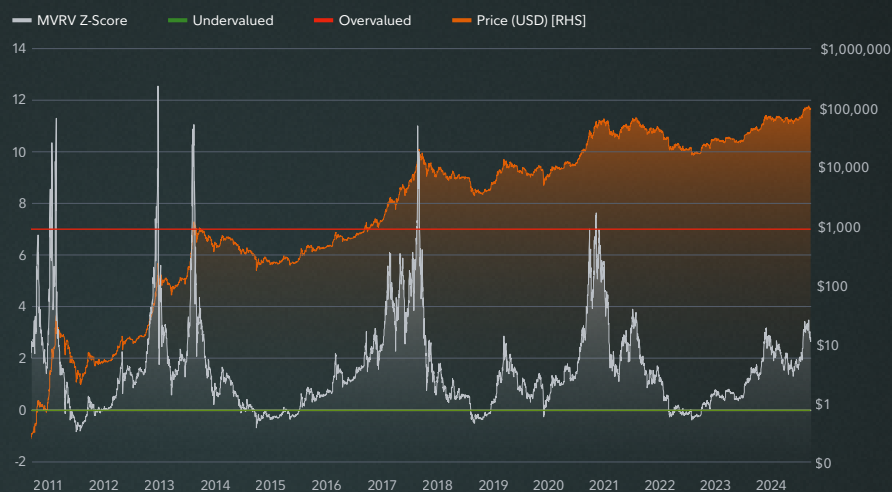
We see this indicator as currently "neutral." If price rises throughout Q1, investors should be wary of this metric because profit-takers will be looking at larger profit margins. As demonstrated throughout Q4, sudden sell pressure can potentially cause sudden downward volatility.

Reserve Risk (Bitcoin)

Reserve risk is used to assess the confidence of long-term holders relative to the native coin's (bitcoin) price at a given point. When confidence is high and the price is low, there is an attractive risk/reward to invest (the Reserve Risk is low). When confidence is low and the price is high, the risk/reward is unattractive (the Reserve Risk is high).

Reserve risk continues to mirror the MVRV Z-Score with its falling wedge pattern and a new local top. We continue to believe that bitcoin remains in the lower-risk category as there are significant tailwinds that could positively impact its price. The expansion of the money supply (M2) and continued significant investor inflows to spot bitcoin exchange-traded products (ETPs) regardless of price create favorable conditions for an asset with absolute scarcity (finite supply).

Bitcoin: MVRV Z-Score



Source: Fidelity Digital Assets via Glassnode, 12/31/24.

Bitcoin: Reserve Risk



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Puell Multiple (Bitcoin)

Created by David Puell, the Puell Multiple shows when miner profitability is low compared with the previous year. When the Puell Multiple is high, it means that mining revenue is higher than last year's average. Historically, when this metric is in the high red zone, it has generally corresponded to cycle tops.

With the year now over, the Puell Multiple offers a direct comparison of current mining profitability to that of 2024. It captures both a pre-halving environment (6.25 block reward from January to mid-April) and a post-halving (3.125 block reward from mid-April to December) one. Interestingly, this metric suggests that miner profitability is just under par (-0.14%) when compared to the 365-day average. This means that the difference between the current average and the annual average is 0.14%.

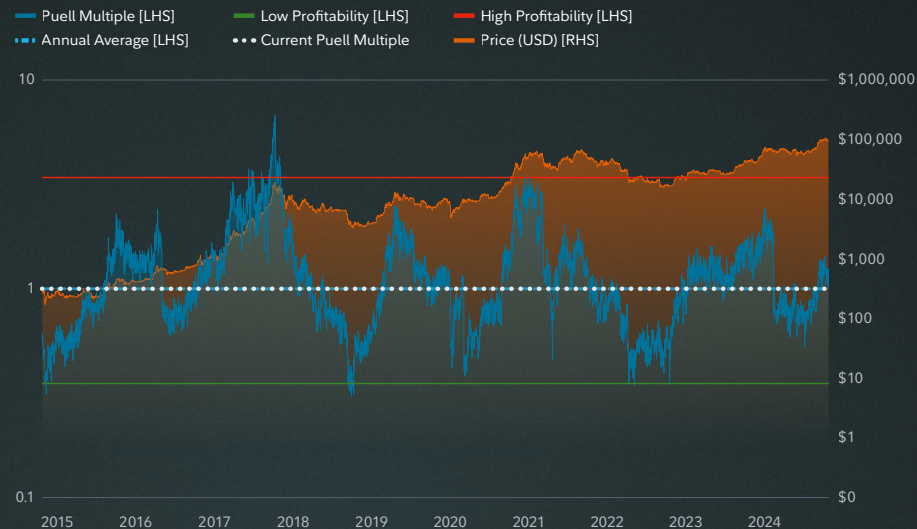
This data indicates the profitability of miners pre-halving, the reduction in rewards, and the recovery that ensued as price rose to over \$108,000. The \$108,000 price point was not sustainable by several metrics, however, and higher profit margins quickly incentivized more hash rate to come online. This influx of hash rate led to increased difficulty, and mining profits quickly returned to a more typical range.

When using this metric to gauge where we might be in the cycle, it closely mirrors patterns demonstrated in 2017—more specifically, when price fell by about 31% as it dropped from \$1,300 to \$900 in March 2017.

Additionally, hash rate continues climbing, rising roughly 21% throughout Q4. Mean hash rate rose from 641 EH/s on September 30, 2024, to roughly 778 EH/s. The target difficulty has risen approximately 24% while the hash price per TH/s rose 19%.

Explore more about the halving [here](#) and the economics from a miner's perspective [here](#).

Bitcoin: Puell Multiple vs. Price (USD)



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Percentage of Bitcoin Sold vs. Accumulated by Miners (Bitcoin)

Miners have been taking substantial profits this quarter as price volatility prompted them to offload some of their reserves. The 30-day average of miner selling reached the quarter high of 132% on December 31, 2024, as price continued to retrace from \$108,000 to the year-end price of \$92,652. Miner sell pressure likely contributed to a portion of this quarter's price volatility.

However, it is important to note that hash rate and the target difficulty have been rising, leading to lower profit margins for this cohort. Our view is that miners are capitalizing on higher prices, offloading previously mined bitcoin, and locking in profits. This metric does not indicate the cost basis of bitcoin sold.

Miner wallet balances fell roughly 0.84% throughout Q4.

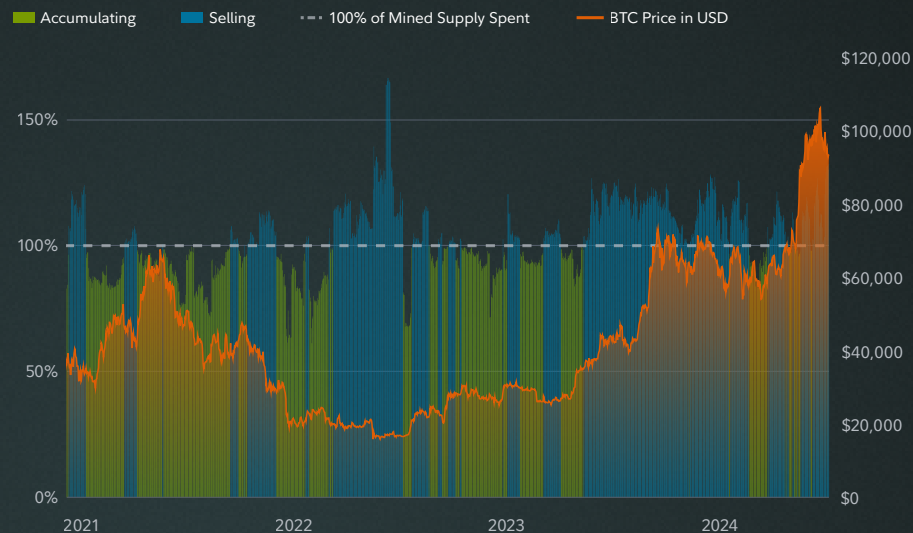
Hash Rate (Bitcoin)

Bitcoin's hash rate metric is a rough estimation of the number of hashes per second that are trying to find a new block. In other words, it allows us to measure the computational power of the Bitcoin network. While this metric is normally considered a lagging indicator to price, it provides additional insight into miner sentiment and network profitability. A basic view into this metric indicates that if the hash rate is falling, the cost of mining is higher than what the network pays in its block subsidy (3.125 bitcoin). When the hash rate is rising, it can be assumed that profit margins have increased for miners due to price appreciation or an increase in mining efficiency.

Throughout 2024, Bitcoin's hash rate continued to climb after recovering from April's halving. In Q4, the target difficulty rose by 24%, hash rate by 21%, and hash price by 19%. With an increase in hash price—a key metric miners use to estimate the value of their hashes—more hash rate is expected to come online. We also anticipate previously unprofitable hash rate to return.

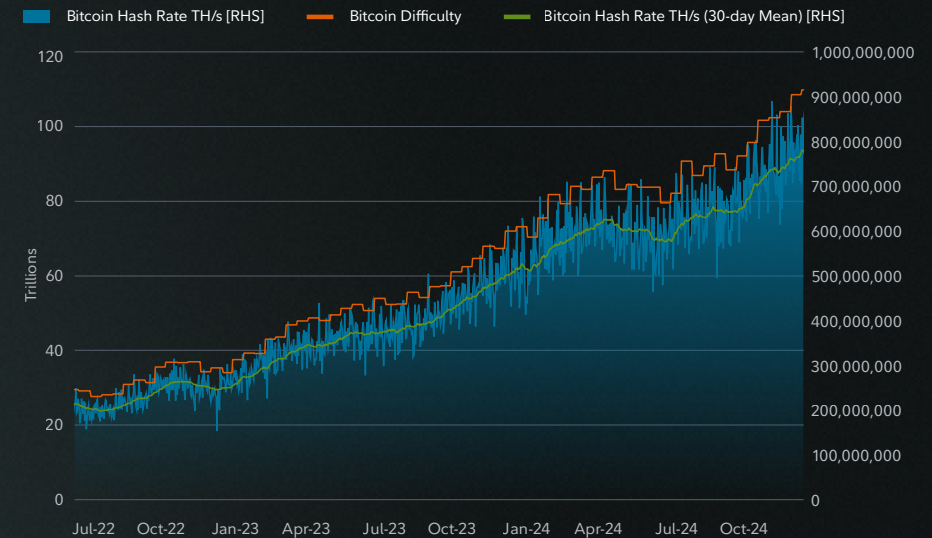
Overall, the target difficulty rose 53%, hash rate rose 54%, and the hash price fell 46% year-to-date, indicating a growing and healthy network going into 2025.

Bitcoin: Percent of Bitcoin Sold vs. Accumulated by Miners



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

Bitcoin: Hash Rate



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

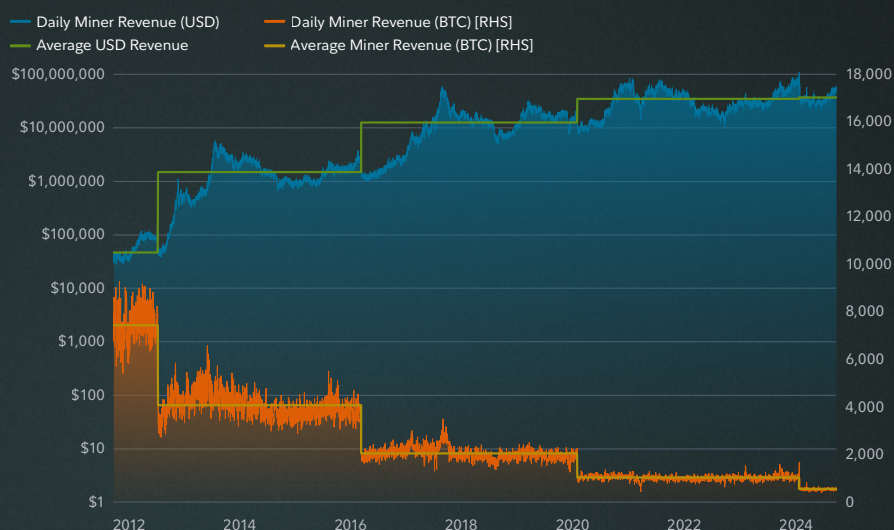


Miner Revenue Denominated in BTC vs. USD (Bitcoin)

In addition to these mining metrics, we can also view the average total miner revenue in bitcoin versus USD compared to the historical averages by epoch (approximately four years). Our analysis shows an expected decrease of roughly 50% in bitcoin-denominated revenues throughout this epoch compared to the previous epoch (2020–2024). This is due to the halving event that occurred on April 19, 2024.

More interestingly, the average miner revenue denominated in USD is now 7.6% higher than the previous epoch. As of December 31, 2024, the data shows miners earning 11% more (daily) than the current average since the 2024 halving (April 19 to December 31) and 7.6% more since the previous epoch (2020–2024). This is notable as hash rate and difficulty have continued to climb, pushing out the least efficient miners. This analysis—in addition to the Puell Multiple and Miner Percent Spent—suggests that miners are taking profits opportunistically.

Bitcoin: Miner Revenue in BTC vs. USD Over Time



Source: Fidelity Digital Assets Research via Coin Metrics, 12/31/24.

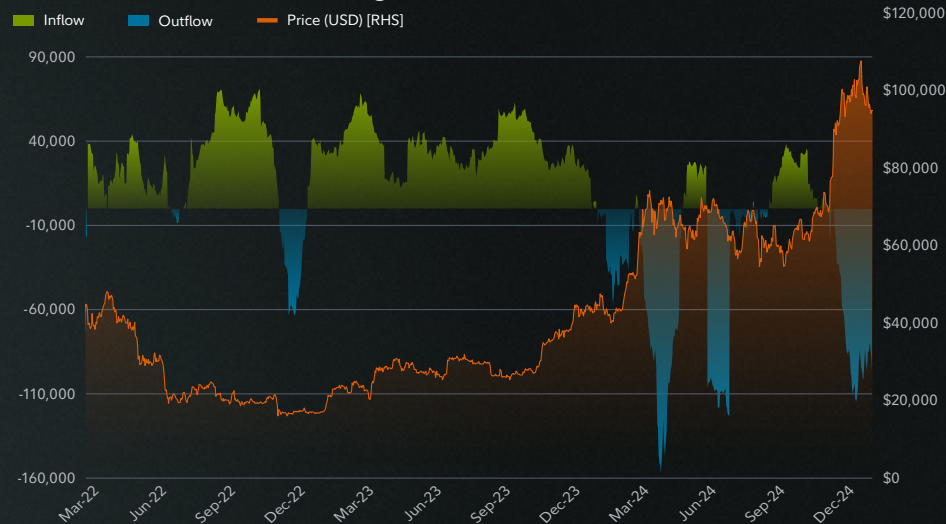
Hodler Net Position Change (Bitcoin)

Hodler net position change shows the monthly position change of long-term investors, known in Bitcoin culture as “Hodlers” or “HODLers.” It indicates when long-term investors sell (negative) and when they accumulate (positive) net-new positions. This metric identifies “known” wallets instead of time-based addresses. In other words, identities known to hold for the long term versus addresses that bought and held for a specific number of days.

The average net position change for long-term holders largely reversed from Q3 inflows to Q4 outflows. Q3 saw 9,316 bitcoin accumulated by this cohort per day, whereas Q4 saw an average of 37,868 bitcoin in outflows daily. This marks a fundamental change in long-term holder sentiment and outlook. Although the outflows appeared to be slowing down by the close of 2024, the daily average for December alone was still roughly 95,123 bitcoin per day—amounting to roughly \$9 billion with a bitcoin price of \$95,000.

This trend reversal started to gain traction mid-November, as bitcoin’s price reached \$90,000 for the first time in its history. Similar outflows were seen when bitcoin’s price first hit \$70,000 in early June 2024. Additionally, if you were to zoom out on the chart and compare to March 2017—where bitcoin’s price fell from \$1,300 to \$900—the cycles appear very similar.

Bitcoin: Hodler Net Position Change



Source: Fidelity Digital Assets via Glassnode, 12/31/24.



Percent of Addresses in Profit (Bitcoin)

The percentage of addresses in profit indicates unique addresses with funds that have an average buy price that is lower than the current price. “Buy price” is defined as the price at the time coins were transferred to an address.

The percentage of addresses in profit has risen from roughly 85% at the beginning of the quarter (\$60,895) to 94% at the end of Q4 (\$93,460). It is important to note that a high percentage of addresses in profit can lead to profit taking and volatility. However, bull markets will spend larger amounts of time with these higher percentages due to the trajectory of price. As bitcoin enters a price discovery period, new all-time highs will be set, and all market participants will be in profit.

While we alluded to investors becoming “comfortable” with the \$58,000 to \$64,000 range in the Q3 2024 Signals Report, it appears the same may be occurring within a new range of \$92,000 to \$99,000. However, the longer bitcoin’s price remains within any range, the longer the market has time to “reset” and set a new cost basis support level. Therefore, if we were to repeat 2024’s sideways price action, we think this would be a positive indicator for future growth.

Bitcoin Yardstick

The Bitcoin Yardstick, or Hashrate Yardstick, is a similar concept to the Price-to-Earnings (PE) Ratio. However, instead of stock price divided by company earnings, it calculates bitcoin’s total market cap divided by its hash rate (a measure of energy being expended to secure the network). The idea is that the lower the ratio, the “cheaper” bitcoin looks from an investor standpoint, just as a lower PE ratio can be interpreted as a “cheap” or undervalued stock.

The yardstick currently indicates that bitcoin has maintained a position between negative one and three deviations of the mean throughout Q4. However, it also indicates that the yardstick is increasingly becoming overheated. Within the complete 92-day quarter, 65 days fell within the “fair value” zone, which is between zero and two standard deviations of the mean. This marks a decrease of 18% of time spent within this zone heading into Q1 2025. The lost days from the “fair value” zone now reside in the “warning” zone, between two and three standard deviations, with a total of 22 days. The yardstick measured four days in the “Overvalued” zone, which is any number above three standard deviations.

Our analysis indicates the yardstick steadily rising as price outpaces the network’s hash rate. Price will always move quicker than hash rate, but if price is able to reset within a range and new hash rate comes online, then previously high prices will no longer appear as warnings.

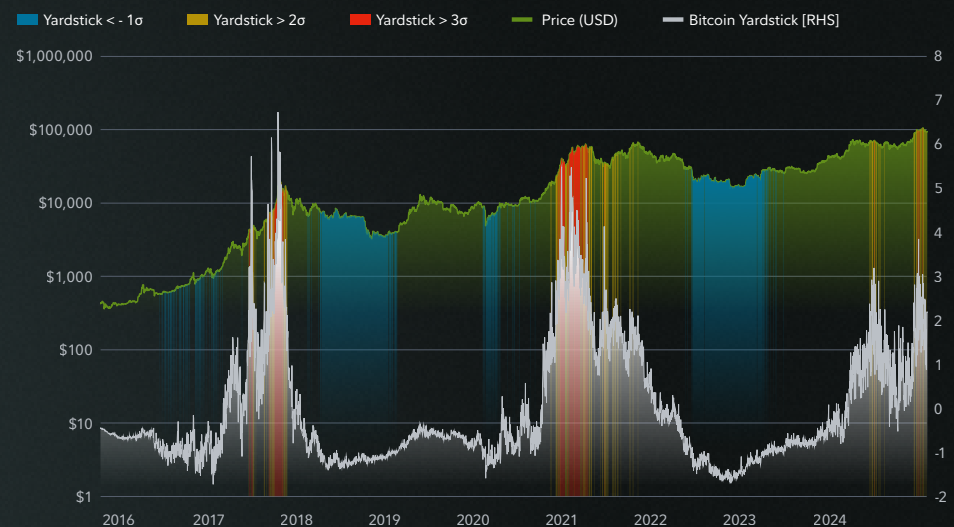
(continued on next page ▶)

Bitcoin: Percentage of Addresses in Profit



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

Bitcoin Yardstick



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Bitcoin Yardstick continued

For example, the yardstick flashed “Overvalued” during the 2021 price increase to over \$60,000. However, the overvalued prices of early December have slowly been recategorized as a “warning” zone as hash rate increases.

Reminder: Above two standard deviations of the mean indicate a relatively expensive bitcoin price compared to the network’s energy output. This should be carefully considered because a higher standard deviation of the mean has historically preceded bull markets. The yardstick has flashed a warning for “overvalued” bitcoin in December.

Bitcoin Price Phases

“Bitcoin Price Phases” helps to gauge the current bitcoin market environment. This metric considers bitcoin’s price through the lens of address profitability combined with volatility and can provide further detail that may not be found looking solely at price or the percent of addresses in profit metric.

In Q4, Bitcoin was firmly in the “Acceleration” phase. This phase can be described as highly volatile and highly profitable.

We have found that bitcoin’s price moves cyclically through four distinct environments, or phases, of high or low volatility and profit. These various phase combinations are color coded on the price chart titled “Bitcoin: Price Phases.” Here we can identify different patterns throughout most of bitcoin’s existence. The only time this pattern was interrupted was due to an abrupt spike in volatility during the COVID-19 pandemic.

Bitcoin’s volatility remained elevated in Q4 while profitability increased dramatically. From November 5 to December 21, bitcoin experienced 47 consecutive days of high profit and high volatility. The closing price on November 5 was \$69,372, and by December 21, it was \$97,204. This aligns with trends historically seen during the “Acceleration” phase, as large price increases are expected.

The end of 2024 marked our 170th day in the “Acceleration” phase. Previously, this phase has taken between 250 and 300 days to reach its peak price, suggesting that bitcoin may have further room to run in the first half of 2025. Read more about this metric [here](#).

Bitcoin: Price Phases



Source: Fidelity Digital Assets Research via Glassnode, 12/31/2024.



200-Week Moving Average (Bitcoin)

The 200-week simple moving average (SMA) is a long-term indicator and, until the 2021 bear market, bitcoin's price had rarely traded below it. Near the end of Q3 2023, bitcoin eclipsed this metric, turning it into support. Since then, bitcoin's price has maintained a healthy gap from the 200-week SMA. Bitcoin's price near the end of Q4 sat firmly above the 200-week SMA of \$42,728, marking a 75% difference.

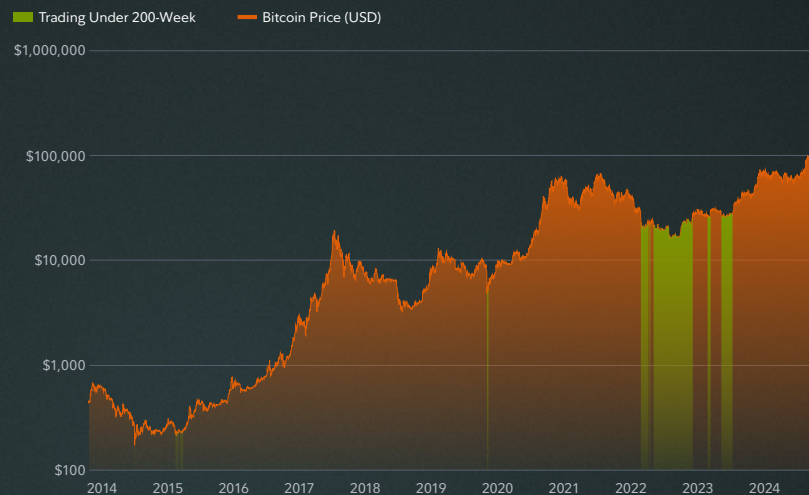
Monthly Address Metrics (Bitcoin)

"Bitcoin: Monthly Metrics" charts the monthly metrics for active addresses (+17.6%), new addresses (+10.3%), and transaction count (-31.9%).

We typically look for an alignment between transaction count and new addresses, as an increase in transaction count often indicates new addresses receiving bitcoin. However, the introduction of Ordinals caused this relationship to invert. A sharp decline of new addresses can be seen in early 2024. However, transaction count vastly grew during this time. We believe that this is likely due to address reuse associated with speculative Ordinal minting and trading.

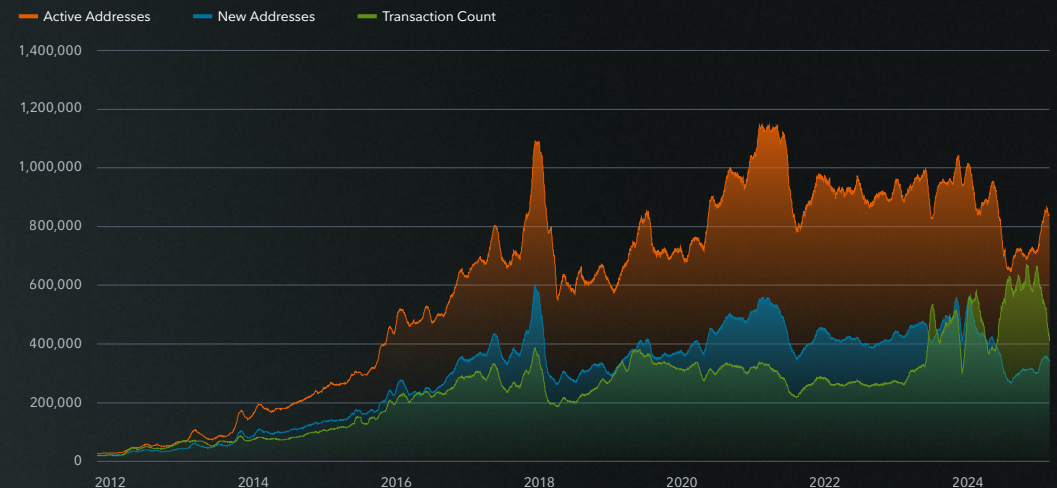
A new—and counterintuitive—pattern has now emerged in Q4: New and active addresses increased while transaction count fell. At first glance, we speculate that this may be due to the increase in bitcoin's price. A price increase incentivizes larger holders or entities to rethink their existing Unspent Transaction Output (UTXO) management to achieve more sophisticated liquidity management in preparation of future transactions. With increased institutional adoption, numerous addresses could be used for easier accounting practices or to separate funds between wallets for security reasons.

Bitcoin: Price vs. the 200-Week SMA



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

Bitcoin: Monthly Metrics



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



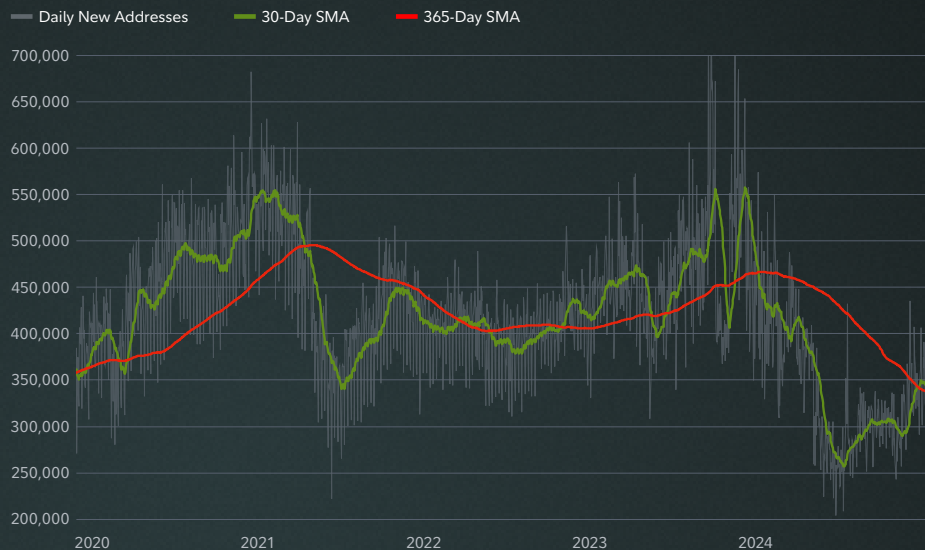
New Address Momentum (Bitcoin)

Taking a closer look at new addresses, we can also measure relative momentum. In this chart, the short-term momentum (30-day SMA) is compared to the longer-term average (365-day SMA). When the monthly average is greater than the yearly, it usually indicates higher on-chain activity and a positive short-term trend in network usage. When the opposite occurs, it usually indicates a decline.

The monthly average (green) began rising at the beginning of Q3 and continued to surpass the longer average on December 2, 2024. This would normally indicate a growth in on-chain activity. However, as mentioned previously in the “Monthly Address Metrics” section, we speculate that new addresses may be indicative of larger institutional adoption rather than increased peer-to-peer activity.

Could the introduction of spot bitcoin ETPs have contributed to the decline in on-chain transactions as new adoption shifted toward ETPs? As bitcoin’s price began to rise, it is possible that other institutions may have started purchasing and creating new addresses to streamline accounting and enhance security. Unfortunately, on-chain data alone cannot provide a definitive answer to this question.

Bitcoin: New Address Momentum



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

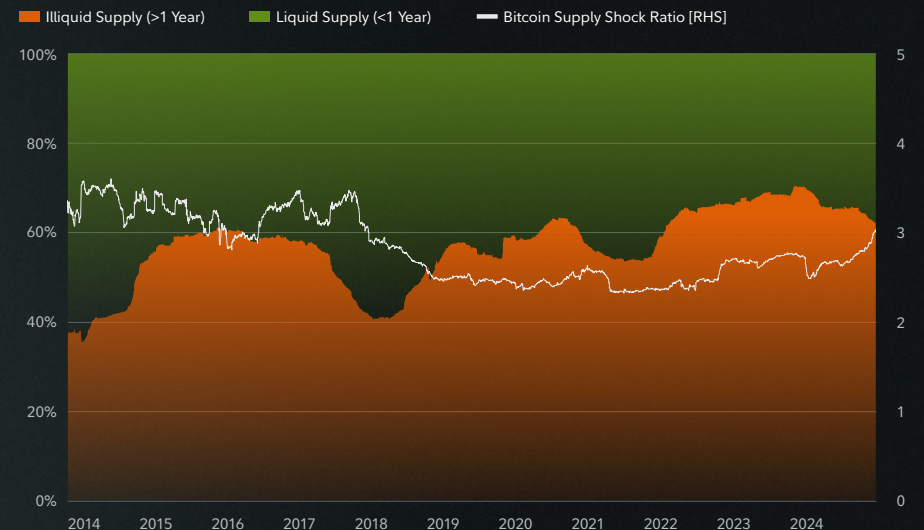
Liquid vs. Illiquid Supply (Bitcoin)

Bitcoin’s liquid supply continued to rise in Q4 as investors took profit above \$90,000 whereas illiquid supply sits at 62.1%. The last illiquid supply all-time high occurred on November 29, 2023, at roughly 70.54%.

Another way of looking at this is through the “Illiquid Supply Shock Ratio,” which attempts to model the probability of a supply shock. When the supply shock ratio trends higher, it indicates that the current sold supply is primarily flowing from the liquid token supply. However, when the opposite occurs, the illiquid supply falls as long-term holders exit the market, usually in profit.

As of December 31, 2024, the illiquid supply shock ratio sits just 13% below its 2017 high of 3.49. At the time, bitcoin’s price had largely been consolidating under \$1,000. As seen in the chart “Bitcoin Liquid vs. Illiquid Supply,” illiquid supply was maintaining approximately 60% but began selling off into the rise to \$20,000. The illiquid and liquid supply cohorts completely changed positions during this bull run with liquid supply rising as high as 59%. While there were roughly three million fewer bitcoin in circulation at that time, December 2024’s illiquid supply today is above the 2017 high, and liquid supply decreased by slightly over 1% in the third quarter.

Bitcoin: Liquid vs. Illiquid Supply



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Liquid vs. Illiquid Supply (Bitcoin) *continued*

However, much like the exchange balance metric, this metric can quickly change. Even as the supply shock ratio rises, illiquid supply can and will come out of cold storage to capture a profit. Even as price rose to \$108,000, illiquid supply fell by roughly 5%, introducing new coins back into the market.

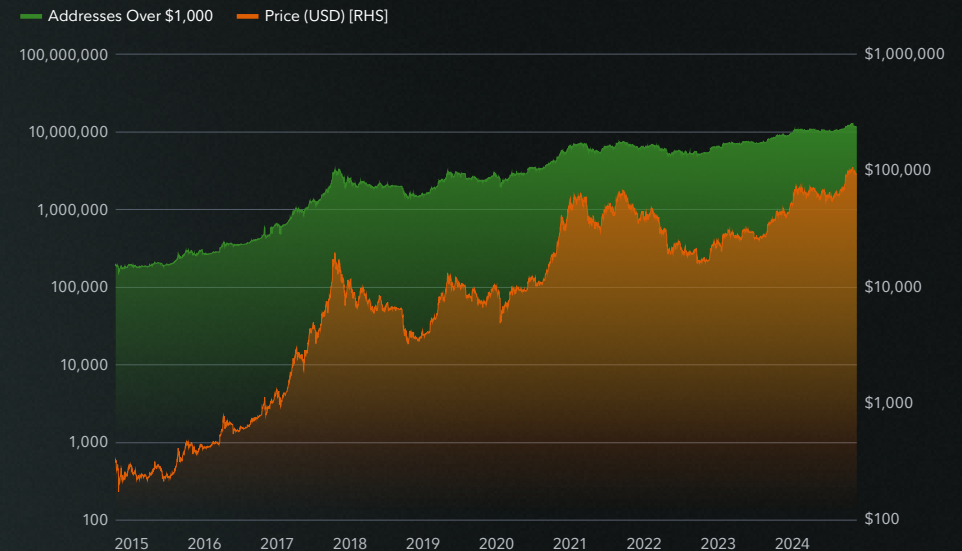
Balance \geq \$1,000 (Bitcoin)

This metric shows how many addresses hold greater than or equal to \$1,000 worth of bitcoin. Here, we see these “small” addresses continuing the trend of accumulation. Since the beginning of 2024, the number of addresses greater than or equal to \$1,000 of bitcoin has grown 27.3%, an increase of 10.5% for Q4. This metric hit a new all-time high on December 17, 2024, at 12,801,693 addresses.

This supports the thesis that small addresses are accumulating and saving bitcoin, even with rising prices. This may be representative of a growing distribution of bitcoin and its adoption among the “average” person.

The number of addresses with more than \$1,000 has grown roughly 116.5% since 2023 from 5.3 million addresses to 11,480,257 addresses as of the end of Q4. Note: This metric is not 100% accurate due to price appreciation during the time frame and address consolidation.

Bitcoin: Number of Addresses with Balance Over \$1,000



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Exchange Balance (Bitcoin)

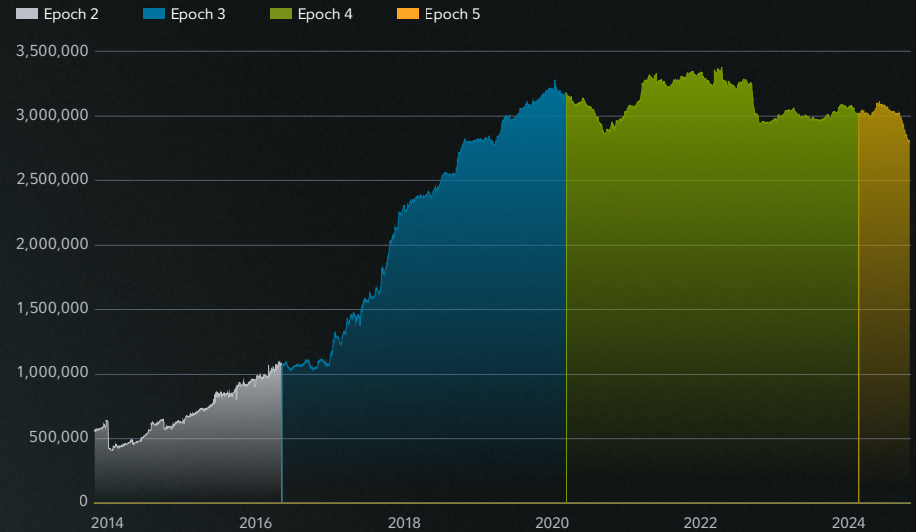
This metric shows how many bitcoin are held on known exchanges. This number has continued its trend down from its peak in 2022. Fueled by multiple major exchange collapses in 2022 and other troubled exchange practices, self-custody became a major part of the bitcoin journey throughout 2023 and continued throughout 2024. Additionally, the launch of spot bitcoin ETPs has established an alternative channel for investors to gain exposure to bitcoin's price.

Q3 brought unexpected changes to this metric as new exchange addresses were identified and added to the historical data. More specifically, Glassnode updated the Coinbase Exchange balances. Previously, a peak had been seen in the exchange balance at around three million as of late 2019. In the years since, the "exodus" has been largely muted. Balances since that 2020 "peak"—which is no longer considered to be a true peak—have only fallen 8.6%. When considering the updated data, the new peak now resides on June 14, 2022. Since then, exchange balances have fallen 17.5%.

As mentioned in the "Liquid vs. Illiquid Supply" section, exchange balances can and will react to price volatility. While voices in the industry may echo the common theme of a supply shock, short-term holders, as well as long-term holders, eventually send bitcoin back to exchanges to be sold. This is especially true when bitcoin's price is setting a new all-time high every other week.

While we use this metric to show trends in the market, it highlights the importance of not relying on a single metric. This metric may continue to change as addresses are identified or claimed by new or existing exchanges.

Bitcoin: Exchange Balance



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Ethereum Data to Watch

Ether Closes 2024 Up 42%, Fundamentals Strong, Narrative Weak

Ether entered the “golden cross” territory at the beginning of December, likely driven by U.S. election news. The long-term SMA typically acts as support during bull runs, suggesting ether’s price will likely remain above this level in the coming quarter. Given bitcoin’s recent outperformance over the past year, ether is well-positioned to potentially catch up.

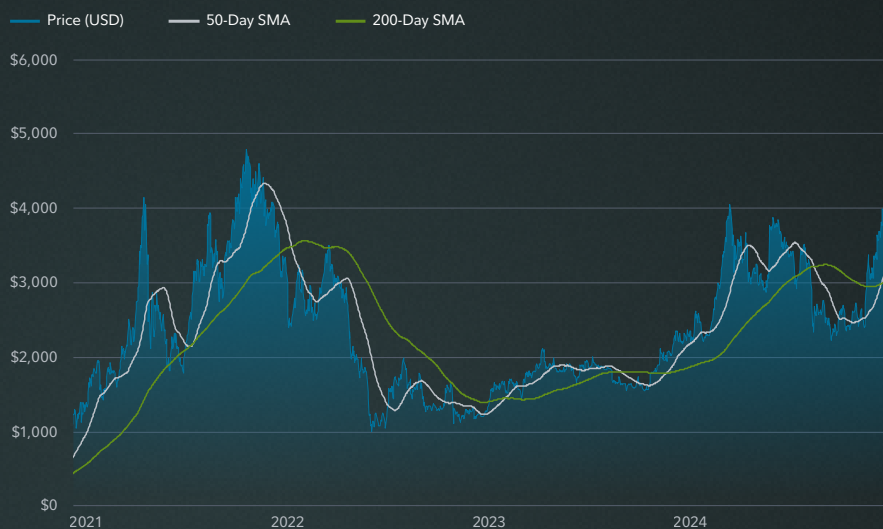
Despite facing one of its most challenging years in terms of competition, ether’s price increase of 42% is likely unsurprising to those who have been monitoring its fundamentals. The narrative surrounding the Deneb-Cancun upgrade has taken the community time to digest, while competition gained significant mindshare throughout 2024. In 2025, ether’s advantage may lie in its comparably strong network effects and growing fundamentals rather than short-term narratives.

Realized Price (Ethereum)

Realized price is a metric that aims to capture the average cost basis of all current token holders. By capturing a token’s last traded price, tokens that are presumed to be lost can be discounted. Using ether’s realized price as another support or resistance level, the realized price has maintained the title of “support” since January 2023.

Ether was trading approximately 59% above its realized price of \$2,094 at the end of Q4. In Q3, ether was trading just 39% above its realized price, suggesting it was nearing a local bottom—which proved accurate. During bear markets, this realized price often acts as support, while in bull runs, ether’s price can become significantly extended from it. At the beginning of 2024, ether was at \$2,350, which was 50% above its realized price. This indicates that throughout the year, the realized price steadily increased as ether gained mainstream attention. Notably, the realized price made all-time highs throughout the end of Q4, suggesting investors value ether more than ever before. However, it is still not close to levels seen in 2021, where the price was well over 100% above the realized price, indicating we are not overextended by this metric.

Ethereum: Ether 50-Day vs. 200-Day vs. Price



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

Ethereum: Realized Price vs. Price



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



MVRV Z-Score (Ethereum)

The **MVRV Z-Score** is used to assess when ether is over/undervalued relative to its "fair value." When the market value is significantly higher than the realized value (acquisition price), it has historically indicated a market top (red zone), while the opposite has indicated a market bottom (green zone).

The current MVRV Z-Score is 1.01. While higher than Q3, it remains a significantly positive metric, indicating that ether is near undervalued relative to its full history. Our analysis suggests the MVRV Z-Score rarely stays within the 1–2 range for any prolonged period, so ether's price may be setting up for a large move, which is largely going to be driven by investor's risk appetite as well as the new administration's actions on stablecoin legislation.

Ethereum Market Cap Ratio of Bitcoin

This metric is calculated by dividing the market cap of Ethereum by the market cap of Bitcoin. The observed change in the ratio over time helps investors understand the relative size and performance of Ethereum compared to Bitcoin.

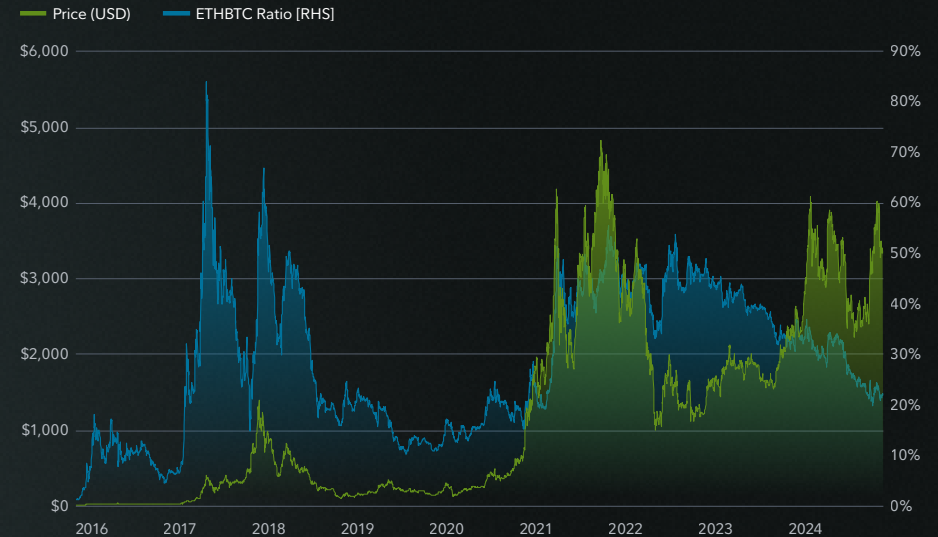
Ethereum's market cap relative to bitcoin's has been on a consistent decline since the end of 2022, marking the second full year of this trend. This ratio is now at levels last seen in early 2021 with a value of 0.22. While this may seem bearish, it could be attributed to bitcoin's massive success and the overextension of ether during the 2021 cycle. Looking at the full-time scale, ether is still up in bitcoin terms but has cooled off significantly. However, bitcoin's current success could be seen as ether's future opportunity, suggesting that we may eventually see a rally from ether relative to bitcoin.

Ethereum: MVRV Z-Score



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

Ethereum: Market Cap Ratio of Bitcoin



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Net Unrealized Profit/Loss (NUPL) Ratio (Ethereum)

Historically, this metric has been useful for assessing overall market sentiment. The chart titled “Ethereum: Net Unrealized Profit/Loss (NUPL)” shows that overall sentiment started the quarter in “Optimism-Anxiety” and briefly touched the green “Belief-Denial” zone, before finishing Q4 near its starting point. Ether’s NUPL score began the quarter at 0.32 and finished at 0.44, which is near the top of the “Optimism-Anxiety” range. This sector can be difficult to determine, as it does not provide a strong signal in either direction.

Percent in Profit (Ethereum)

Percent in profit is the percentage of unique addresses with funds that have an average buy price lower than the current price. The buy price is defined as the price at the time coins were transferred to an address. Only externally owned addresses (EOAs) are counted. This metric has not touched the bottom indicator since January 2020, which may be because ether is not necessarily considered a buy-and-hold asset. Ether owners may be using ether for trading, smart contracts in decentralized finance (DeFi) services, staking, or buying other digital assets.

The percent of addresses in profit increased 26% in Q4, with 82% of addresses currently in profit. We bounced firmly off the 95% mark on December 15, 2024, signaling that this threshold may hold some weight, especially as the year ended.

However, the bottom indicator here may be less reliable, as we did not see this signal flash a bottom at all during 2022 and 2023. This may be because a large portion of the holders that are long-term investors as well as users are willing to transact regardless of ether’s price. Therefore, we view this signal as having more confidence in flashing a top signal, which the network has been flirting with throughout 2024.

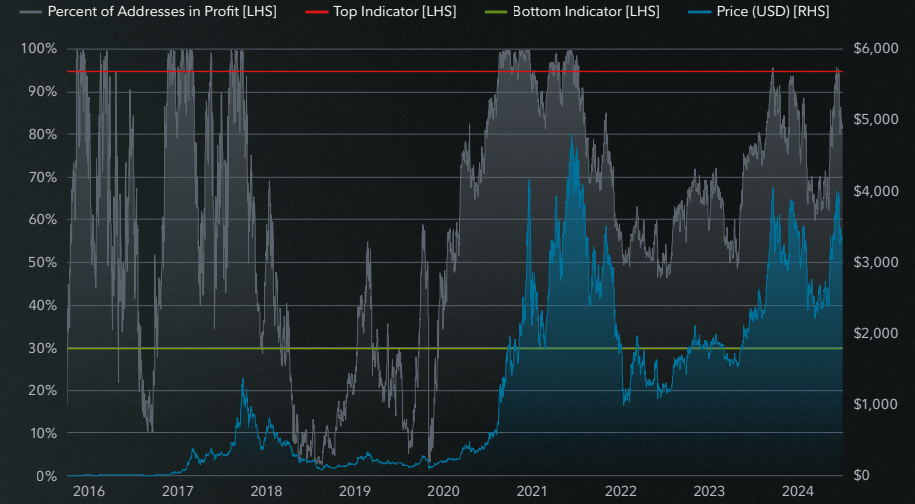
This may prove to be a headwind going into 2025 and limit potential upside, as we previously mentioned when we sat at 85% in Q3.

Ethereum: Net Unrealized Profit/Loss (NUPL)



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

Ethereum: Percent of Addresses in Profit



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Monthly Address Metrics (Ethereum)

Following a downturn in all three metrics during Q3, Ethereum base layer fundamentals rebounded once again in Q4. New and active addresses increased about 30% over the quarter with Layer 1 transaction counts rising 14%, just surpassing the previous high watermark in 2024.

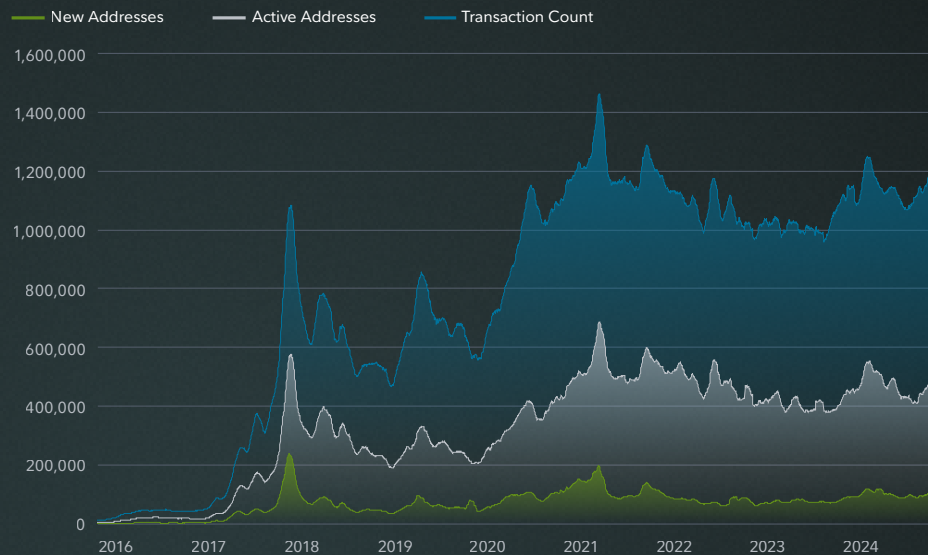
As the Layer 2 ecosystem continues to accelerate, it is interesting to see that many users still value transacting on the base layer of Ethereum. Despite relatively high average transaction costs compared to its competitors, this rebound signifies that users appreciate the unique characteristics Ethereum has built throughout its history and are still willing to pay a premium for it. Given that these metrics are somewhat constrained by the inefficiencies of the base layer, we will be monitoring their performance over time as Ethereum developers prioritize scaling Layer 1 in the coming year.

New Address Momentum (Ethereum)

New addresses are defined as unique addresses that appeared for the first time in a transaction. New addresses appear when users create new wallets and transact with them. This is different from Bitcoin addresses because Ethereum wallets do not typically create a new address for each transaction. Because of this difference, this metric could indicate a clearer picture of Ethereum's Layer 1 adoption.

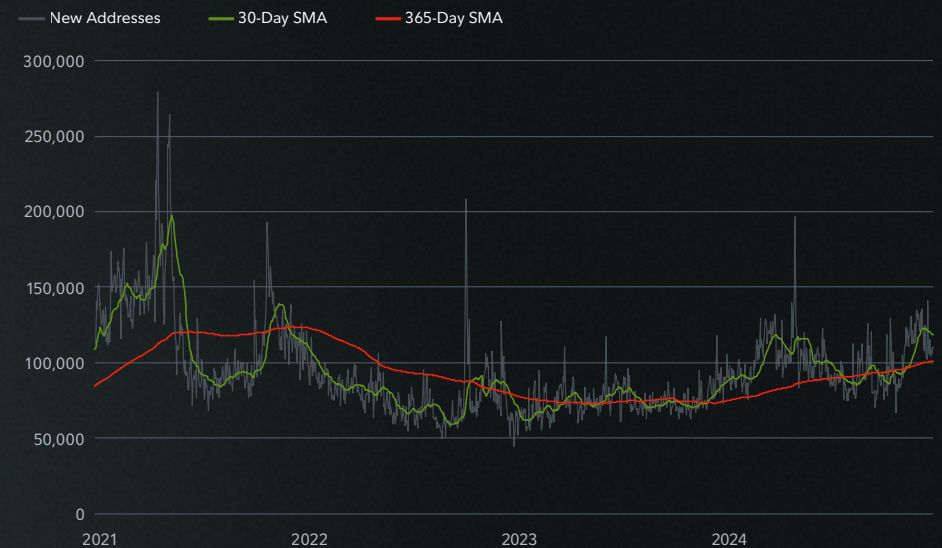
After converging for most of Q3, the short-term average of new addresses broke away from the long-term trend, with both moving higher. As of November 19, 2024, the relationship between the short-term and long-term moving averages in new addresses flipped to a golden cross. While this signal is largely bullish for the Ethereum ecosystem, our historical analysis suggests that these metrics will remain range-bound until the base layer improves.

Ethereum: Monthly Metrics



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.

Ethereum: New Address Momentum



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



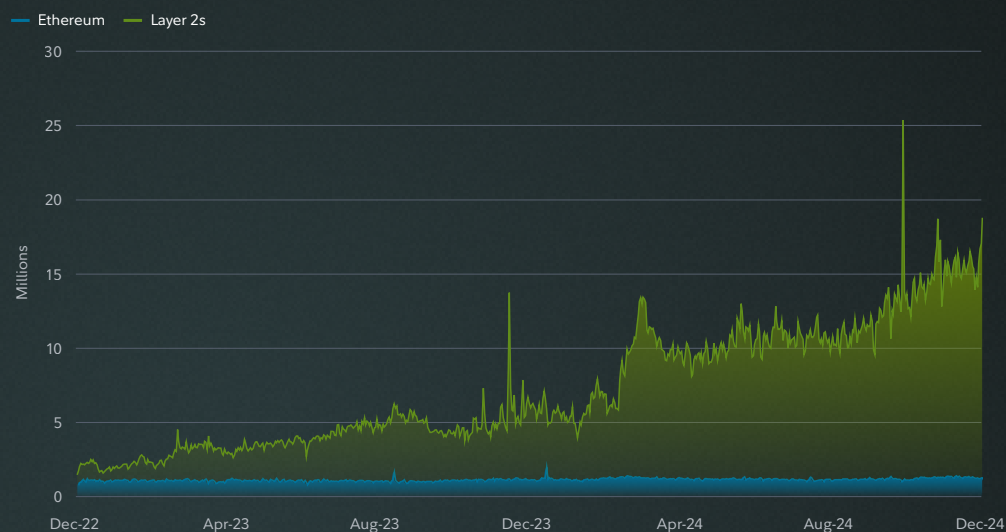
Layer 2 Transaction Count (Ethereum)

Since the Deneb-Cancun upgrade, transactions on Layer 2 platforms have become significantly more cost-effective, boosting both Layer 1 bridge activity and the overall Layer 2 transaction count. Continuing its year-long trend, Layer 2 transaction counts increased by 55% in Q4. This growth, largely attributed to Base, Coinbase's Layer 2, has continued to show why Ethereum network effects are the core metric to prioritize. Although the narrative after the Deneb-Cancun upgrade centered around the loss in revenue, the Ethereum network has demonstrated its ability to foster substantial growth this year. In our view, the future growth of Layer 2 platforms is one of the most important metrics to watch as it will be the driving force in network adoption over the long term.

It is important to remember that the Layer 2 space is still in its infancy and new projects are continually emerging. Consequently, our total Layer 2 transaction count does not encompass every available Layer 2, and the actual value is higher than what is shown here. Our count includes transactions from chains such as Optimism, Base, Arbitrum, ZKsync, Zora, Scroll, Blast, Linea, Mantle, Starknet, World Chain, and Mode.

Lastly, it is common for both new and existing Layer 2s to incentivize network activity, often through airdrops. This factor should be carefully considered when analyzing these metrics, as it would be misleading to attribute all activity solely to the utility of each Layer 2.

Ethereum: Transaction Counts



Source: Fidelity Digital Assets Research via Dune Analytics, 12/31/24.

Staking Numbers and Validators (Ethereum)

"Proof-of-Stake Change in Active Validators" illustrates the maximum number of validators permitted to join the network within a specific timeframe, along with the observed net change.

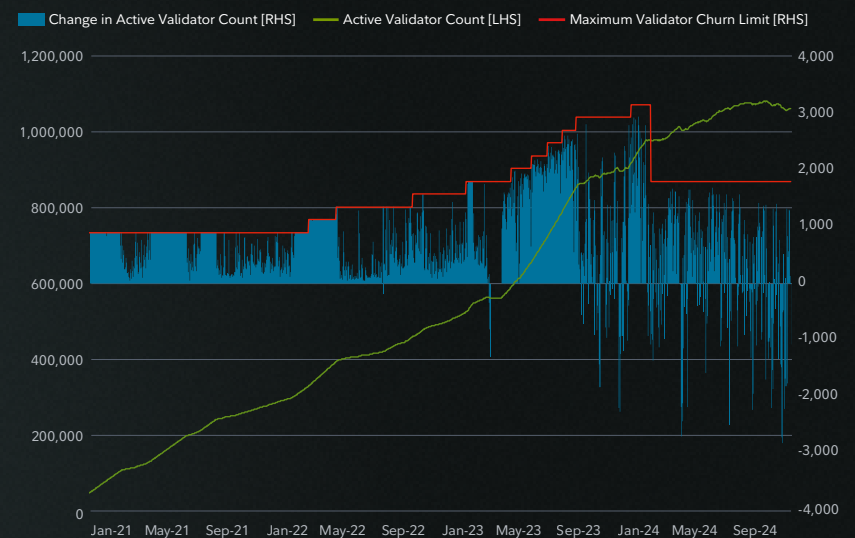
For the first time over an entire quarter, active validators decreased by 1.5%, or about 17,000. The largest daily exodus of validators occurred on October 25, 2024, when a net total of 1,418 validators left the network. Interestingly, this is not a historically large daily exit, highlighting that validators were more consistently exiting the network than usual throughout the quarter.

In our view, overall network health remains relatively unchanged. Given the increased activity across the Ethereum network, it seems likely that some validators thought it prudent to seek better yields elsewhere. A small decrease in validators can be overlooked, but if the consistency of exits accelerates, it would be concerning.

On the other hand, we always expected that the amount of staked ether would eventually reach an equilibrium, and this may be a sign that the long-term staking ratio has been reached.

(continued on next page ▶)

Ethereum: Proof-of-Stake Change in Active Validators



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Staking Numbers and Validators (Ethereum) **continued**

Additionally, should Ethereum validators remain flat for a sustained period, this would stop the upward climb in overall issuance that Ethereum has experienced because of increased stake, which would be a positive for ether holders.

An upcoming Ethereum upgrade is likely to include an Ethereum Improvement Proposal (EIP) that enables entities running multiple validators, which currently require 32 ether each, to consolidate into a single validator. This will thereby reduce network messaging bandwidth requirements and the individual validator count.

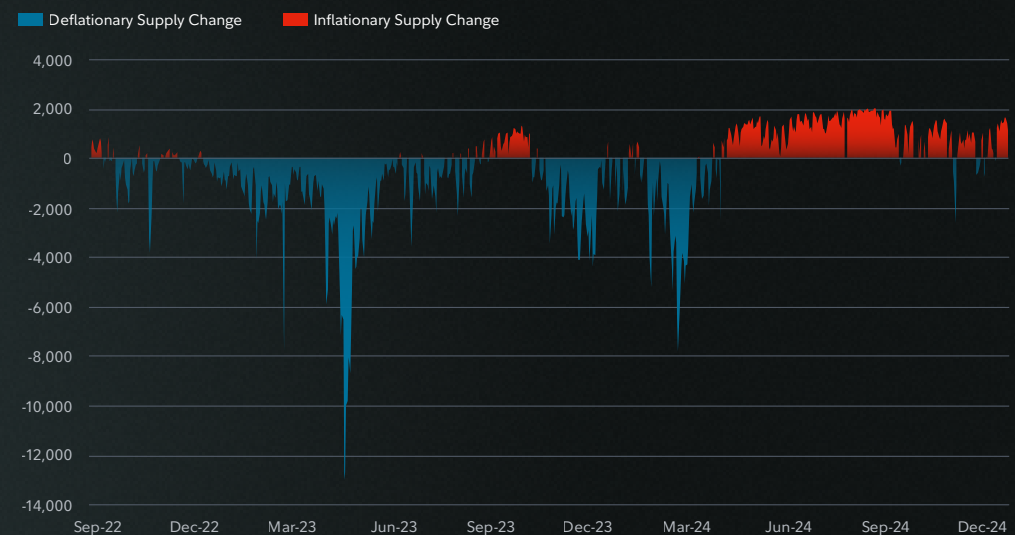
Net Issuance and Burn (Ethereum)

Since The Merge in September 2022, Ethereum's net issuance (the new supply issued by the network minus the supply burned from transactions) has led to an overall decrease in supply for over two years. This is significant because, theoretically, if ether's supply continues to decrease, it enhances the relative ownership of all remaining token holders. However, this trend has changed significantly because of the latest upgrade, and ether is likely to be net inflationary throughout 2025.

The inflationary and deflationary changes in supply are heavily influenced by the demand for staking—which drives issuance higher—and transactions that burn ether. In Q4, there were 18 net deflationary days for Ethereum's supply, an improvement from the previous quarter. The now stagnated issuance, coupled with slightly higher base layer activity, resulted in a net creation of just 58,246 ether over the quarter. When annualized using Ethereum's current supply, it translates to an annual inflation rate of 0.19%.

This dynamic is important for investors to understand because, although Ethereum's supply is not fixed, it remains quite stable over long periods, contributing to its sound properties as a monetary asset. Consequently, we anticipate this trend of ether being neither significantly deflationary nor inflationary to persist for the foreseeable future promoting a consistently stable ether supply.

Ethereum: Daily Net Issuance



Source: Fidelity Digital Assets Research via Glassnode, 12/31/24.



Contributors

Daniel Gray Senior Digital Assets Research Analyst, Fidelity Digital Assets®

Max Wadington Digital Assets Research Analyst, Fidelity Digital Assets®

Interested in learning how Fidelity Digital Assets® custody and execution services or investment solutions could be right for you?

Fill out [this form](#) and a member of the Fidelity Digital Assets® team will reach out to you.



Disclosures

The information herein was prepared by Fidelity Digital Asset Services, LLC ("FDAS LLC"), Fidelity Digital Assets, Ltd ("FDA LTD"), and Fidelity Digital Assets Ireland Limited ("FDA Ireland"). It is for informational purposes only and is not intended to constitute a recommendation, investment advice of any kind, or an offer to buy or sell any asset. Perform your own research and consult a qualified advisor to see if digital assets are an appropriate investment option.

Digital assets are speculative and highly volatile, can become illiquid at any time, and are for investors with a high-risk tolerance. Investors in digital assets could lose the entire value of their investment.

Custody and trading of digital assets are provided by Fidelity Digital Asset Services, LLC, which is chartered as a limited purpose trust company by the New York State Department of Financial Services to engage in virtual currency business (NMLS ID 1773897). FDA LTD and FDA Ireland rely on FDAS LLC for these services. FDA LTD is registered with the Financial Conduct Authority under the U.K.'s Money Laundering Regulations. The Financial Ombudsman Service and the Financial Services Compensation Scheme do not apply to the cryptoasset activities carried on by FDA LTD. FDA Ireland is incorporated in Ireland as a private limited company and provides certain virtual asset services described in the Criminal Justice (Money Laundering and Terrorist Financing) Acts 2010 to 2021. FDA Ireland is registered with the Central Bank of Ireland for anti-money laundering and countering the financing of terrorism (AML/CFT) purposes only (C526991).

To the extent this communication constitutes a financial promotion in the U.K., it is issued only to, or directed only at, persons who are: (i) investment professionals within the meaning of Article 19 of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "FPO"); (ii) high net worth companies and certain other entities falling within Article 49 of the FPO; and (iii) any other persons to whom it may lawfully be communicated.

This information is not intended for distribution to, or use by, anyone in any jurisdiction where such distribution would be contrary to local law or regulation. Persons accessing this information are required to inform themselves about and observe such restrictions.

FDAS LLC, FDA LTD, and FDA Ireland do not provide tax, legal, investment, or accounting advice. This material is not intended to provide, and should not be relied on, for tax, legal, or accounting advice. Tax laws and regulations are complex and subject to change. You should consult your own tax, legal, and accounting advisors before engaging in any transaction.

Some of this information is forward-looking and is subject to change.

Past performance is no guarantee of future results. Investment results cannot be predicted or projected.

Views expressed are as of the date indicated, based on the information available at that time, and may change based on market or other conditions. Unless otherwise noted, the opinions provided are those of the speaker or author and not necessarily those of Fidelity Digital Assets or its affiliates. Fidelity Digital Assets does not assume any duty to update any of the information.

Fidelity Digital Assets is a registered service mark and the Fidelity Digital Assets logo is a service mark of FMR LLC.

Coin Metrics is a trademark of Coin Metrics Inc. Copyright © Coin Metrics, 2025.

© 2025 FMR LLC. All rights reserved.

1186059.2.0