

NUPL and SOPR: measuring paper gains and realized gains on-chain

NUPL estimates how much of a cryptocurrency's market value is unrealized profit or loss, while SOPR shows whether coins actually spent were moved at a gain or a loss.

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1. How to read it / Where it misleads

NUPL and SOPR are two on-chain gauges of profit and loss. NUPL, short for net unrealized profit and loss, estimates what share of a cryptocurrency's market value is paper gain or paper loss for all holders. SOPR, the spent output profit ratio, looks only at coins that actually moved in a given period and asks whether they moved at a higher or lower value than when they last changed hands on the chain.

Both inherit the limits of realized cap, the sum of every coin valued at the price on the day it last moved. A coin moving on-chain is not a sale: a self-transfer or an exchange reshuffling its wallets resets the cost basis with no new owner, and lost coins stay in the count at their old price. Both also depend on the provider's price feed, and the standard forms work only on chains that track coins as unspent outputs, such as bitcoin.

SOPR adds its own noise. Coins created and spent within hours carry almost the same price at both ends, which drags a short-period reading toward 1, and that is why some providers publish filtered versions. Same name, different numbers: two firms can report different SOPR values for the same day.

This explains how a metric is calculated. It is not a signal, forecast or recommendation, and past readings do not predict prices. Le Coin does not publish live readings of this metric.

2. The formula

$$\text{NUPL} = (\text{market cap} - \text{realized cap}) / \text{market cap}$$

Because MVRV is market cap divided by realized cap, NUPL can also be written as $1 - 1/\text{MVRV}$. A positive NUPL means the market values coins above their on-chain cost basis in aggregate, and a negative one means below.

$$\text{SOPR} = \frac{\text{the sum, over every output spent in the period, of (units} \times \text{price when spent)}}{\text{the sum of (units} \times \text{price when created)}}$$

An output is a discrete chunk of coins created by a past transaction. A SOPR above 1 means spenders as a group moved coins at a gain; below 1, at a loss.

3. Example data

The figures below are invented to show the arithmetic. For NUPL, take an imaginary coin with a market cap of \$400,000 and a realized cap of \$300,000. NUPL is $100,000 / 400,000 = 0.25$, and MVRV is about 1.33.

For SOPR, two outputs are spent on one day:

Output	Units	Price at creation	Price at spend
X	2	\$50	\$100
Y	1	\$150	\$100

Spent value is $2 \times \$100 + 1 \times \$100 = \$300$, and creation value is $2 \times \$50 + 1 \times \$150 = \$250$, so SOPR is $300 / 250 = 1.2$. A count of outputs instead of their value would show one profit and one loss, which is how an unweighted version can tell a different story from the same spending.

4. Who publishes it and how definitions differ

Coin Metrics, a crypto data firm, describes NUPL as the share of an asset's market cap that is unrealized profit or loss across all coins in circulation, computed from its market cap and realized cap series. It defines SOPR as total spent value divided by total creation value for the outputs in each interval, and it also publishes an earlier version that does not weight outputs by their value (source 1).

CryptoQuant, another on-chain data firm, uses the same NUPL formula and says it assumes the latest movement of a coin was a purchase (source 2). For SOPR, it publishes several cuts: an adjusted version that ignores outputs younger than one hour, a short-term holder version for coins aged more than one hour and less than 155 days, and a long-term holder version for coins aged more than 155 days (source 3).

In Le Coin's view, NUPL is largely standard across these two providers, while SOPR is not. A weighted reading, an unweighted one and a one-hour-filtered one answer slightly different questions, so any SOPR figure needs its provider and variant named beside it.

5. Where the measures come from

Renato Shirakashi introduced SOPR in an Apr. 25, 2019 post on Medium (source 4), and Coin Metrics credits him with it (source 1). The NUPL formula appeared earlier, in a Feb. 20, 2019 primer by Adamant Capital, an investment firm, under the name "Relative Unrealized Profit/Loss Ratio" (source 5). That primer does not use the label NUPL. Adamant Capital says the work builds on research going back to 2011 (source 5). Le Coin could not confirm who first used the name NUPL.

6. What it means

In Le Coin's view, the pair works best as a description of holder behavior: NUPL sketches paper positions across the whole supply, and SOPR records what spenders actually locked in. Before comparing readings, check that they share a provider, a price feed and, for SOPR, the same variant.

Sources

- 1 Coin Metrics docs, "Valuation" (NUPL and SOPR entries), <https://docs.coinmetrics.io/network-data/network-data-overview/economics/valuation>, accessed 2026-10-16, 10:54 p.m. ET.
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- 5 Adamant Capital, "A Primer on Bitcoin Investor Sentiment and Changes in Saving Behavior," Medium, Feb. 20, 2019, https://medium.com/@adamant_capital/a-primer-on-bitcoin-investor-sentiment-and-changes-in-saving-behavior-a5fb70109d32, accessed 2026-10-16, 10:55 p.m. ET (Internet Archive copy).

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