

ON-CHAIN ANALYSIS

Bitcoin On-Chain Metrics Explained

The public ledger is the only market in the world that lets you read every participant's cost basis in real time. Here are the metrics that matter, what they signal today, and the limits every serious analyst must respect.

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BTC PRICE ~ \$61.9K Near cost basis	MVRV RATIO ~ 1.0 At realized value	NUPL ~ 0.12 Hope/Fear band	SUPPLY MINED 95.5% 20.05M of 21M
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THE BOTTOM LINE

On-chain metrics turn Bitcoin's transparent ledger into a set of behavioral signals — what price holders paid, whether they are in profit, and whether they are spending or hoarding. Used well, they reveal the *state* of the market with a clarity no traditional asset offers. Used badly, they become false prophets. As of July 3, 2026, Bitcoin trades near **\$61,900** with an MVRV close to **1.0** — meaning the average coin sits right at its cost basis, a neutral regime, not a euphoric top. This report explains the core metrics, reads them today, and is honest about what they cannot do.

01 What on-chain analysis actually is

On-chain analysis is the study of data recorded directly on Bitcoin's public ledger — transactions, balances, coin age, miner flows, and the valuation ratios built from them — to infer how participants are behaving in aggregate.

Bitcoin is uniquely suited to this. Its ledger is fully transparent, permissionless to read, and append-only: every transfer since 2009 is publicly auditable, and its accounting model timestamps the cost basis and holding period of **every single coin**. Traditional markets have no equivalent — equity ownership and cash settlement sit in siloed, permissioned systems visible only to intermediaries and regulators. On-chain analysis is the genuine, defensible edge of this asset class.

Practically, the raw ledger is not consumed directly. Data providers — Glassnode, CryptoQuant, Coin Metrics, and others — ingest every block, label known wallets, cluster addresses into likely entities, and package the result into the ratios and charts analysts actually use. That processing layer is where most of the value, and most of the disagreement, lives: two providers reading the same blockchain can publish materially different numbers for the same metric on the same day.

One honest caveat frames everything below: the transparency is of *pseudonymous* data. The ledger shows addresses and flows, not identities or intent. Every behavioral read is therefore a **heuristic reconstruction**,

not a direct measurement — a distinction that is the root of both the power and the limits of the discipline.

02 The valuation metrics: cost basis is everything

The most important family of metrics answers one question: **what did the market pay for its coins, and is it in profit?**

Realized Price values every coin at the price it last moved on-chain, then divides by supply — giving the network’s aggregate cost basis. When spot trades above it, holders are in aggregate profit; below it has historically marked capitulation and cycle-bottom zones. It is the anchor for the whole cost-basis family; we cover it in depth in [our report on Bitcoin realized price](#).

MVRV (Market Value to Realized Value) divides market cap by realized cap — how far spot has stretched from that cost basis. Readings above roughly 3.5 have historically flagged overheated tops; readings near or below 1 have flagged undervaluation. The related **MVRV Z-Score** normalizes the gap by the standard deviation of market cap and is not interchangeable with the plain ratio. The full mechanics are in [our MVRV explainer](#).

NUPL (Net Unrealized Profit/Loss) expresses the network’s paper gains as a fraction of market cap, banded into named sentiment zones — from Capitulation (below 0) through Hope, Optimism, and Belief to Euphoria (above 0.75). A crucial technical point: NUPL is mathematically $1 - (1 \div \text{MVRV})$, so it is not an independent confirmation of MVRV but a restatement of the same inputs.

03 The behavior metrics: are holders spending or hoarding?

A second family tracks the *movement* of coins by age — the fingerprints of conviction.

SOPR (Spent Output Profit Ratio) divides the price coins are sold at by the price they were acquired at. Above 1, the market is realizing profit; below 1, realizing losses; and the 1.0 line acts as support in bull markets and resistance in bears. The **adjusted** variant (aSOPR) strips out coins moved in under an hour to cut noise.

Coin Days Destroyed weights each moved coin by how long it sat dormant, surfacing when old, long-held “smart money” wakes up — often a distribution warning near tops. **Dormancy** and **Liveliness** are built from it: Liveliness, bounded between 0 and 1, rises when long-term holders spend and falls when accumulation dominates. **HODL Waves** visualize the whole supply banded by age, showing at a glance whether the coin base is maturing into strong hands or turning over.

What makes this family powerful is that age is expensive to fake. A trader can spoof an order book in seconds, but a coin that has sat untouched for five years carries a record no press release can manufacture. When these behavior metrics diverge from price — old coins moving into a rally, or young coins refusing to sell into a decline — they expose the conviction beneath the tape, which is precisely the information a chart of price alone withholds.

04 The flow and miner metrics

A third family watches money in motion and the supply side.

METRIC	WHAT IT MEASURES	READ
Active Addresses	Unique addresses transacting	Network usage / demand proxy

Exchange Netflow	Inflows minus outflows to exchanges	Inflow = sell pressure risk
Exchange Balance	BTC held on known exchanges	Falling = self-custody / accumulation
Puell Multiple	Miner issuance vs its yearly average	Low = miner stress / bottom zone

Two cautions belong beside this table. **Active addresses are not active users** — one entity can control thousands of addresses, and exchanges batch many users into few — so the count is a rough proxy, and its exact definition differs by data provider. And **exchange balances depend entirely on address labeling**, which is proprietary, imperfect, and frequently revised, so trust the trend far more than any single provider’s absolute level.

05 Reading Bitcoin on-chain today

Put the metrics together and mid-2026 tells a coherent story. Bitcoin trades near **\$61,900**, roughly **51% below** its October 2025 all-time high of about **\$126,080**. Circulating supply stands at **20.05 million** coins — about 95.5% of the eventual 21 million.

The valuation metrics all point to the same regime: an MVRV near **1.0** (with a low Z-Score around 0.2) and an NUPL near **0.12** in the Hope/Fear band. In plain terms, the average coin sits **right at its cost basis** — a neutral-to-mildly-undervalued market, nowhere near the Euphoria readings that mark tops, and above the deep-capitulation zone that marks bottoms. Supporting this, mid-2026 reporting describes long-term holders realizing losses as price broke below the short-term-holder cost basis, and spot Bitcoin ETFs swinging from a demand tailwind to net outflows. The on-chain picture is one of a **cost-basis retest**, not a blow-off. Whether that resolves up or down is a question of demand — the force these metrics cannot see, and the one we track through [the M2–Bitcoin correlation](#).

06 The limits every serious analyst must respect

Here is where honesty separates research from marketing. On-chain metrics quietly assume the blockchain captures a representative share of economic activity — and that assumption is eroding.

First, the **entity-adjustment problem**: raw metrics conflate addresses with actors, so internal transfers between an exchange’s own wallets can masquerade as economic activity. Firms like Glassnode and Coin Metrics correct this with clustering heuristics, but those maps are probabilistic, proprietary, and *differ by vendor* — the “same” adjusted metric is not comparable across providers. Second, **off-chain migration**: spot ETFs now hold on the order of 7% of supply, and the bulk of that sits with a single custodian whose activity providers admit they cannot cleanly measure. Add the Lightning Network, where only channel opens and closes settle on-chain, and wrapped BTC that locks a static coin while all activity happens elsewhere, and a growing share of real economic exchange leaves **no on-chain footprint at all**. Third, **self-transfer noise**: Bitcoin returns “change” on nearly every spend, and peer-reviewed clustering research found removing self-payments cut estimated volume by roughly 12% — which is why raw “billions moved on-chain” headlines routinely overstate reality.

07 Descriptive, not predictive

The deepest caution is the one crypto media most often ignores: on-chain metrics are largely **descriptive and lagging, not predictive**. Formal causality studies find that Bitcoin's price tends to lead network-activity metrics rather than the reverse — the chart is following the market, not forecasting it.

This is why fixed thresholds break. The tidy rule that “MVRV above 3.7 equals a top” was fitted to a mere handful of past cycles; in the 2024–2025 advance, MVRV peaked far lower and several classic top signals never fired. With a sample of only three or four cycles, such thresholds are prone to overfitting, and market structure keeps changing beneath them as ETFs and deeper liquidity arrive. Even Glassnode's own lead analyst has publicly warned that “your models might be broken.” Treat every hard line as a **hypothesis to be re-validated each cycle**, never a law.

This does not make the metrics useless — it makes them honest. A thermometer that reads the room accurately is valuable even though it cannot tell you tomorrow's weather. On-chain data excels at describing the present: who is underwater, who is holding, where the cost basis sits. The error is not in trusting that description; it is in mistaking it for a forecast and betting the portfolio on a threshold that was never a rule to begin with.

THE ANALYST'S TAKEAWAY

On-chain data is a lens on the market's *state* and cost basis — not a crystal ball. Its edge is Bitcoin's radical transparency; its weakness is that it sees supply and holder behavior but not demand, and lags the price it is meant to explain. Use it for context and conviction, never for prophecy.

08 How to actually use on-chain data

The mature institutional practice treats on-chain metrics as a **confluence layer, not a standalone signal engine**. No single chart decides anything. Instead, analysts look for multiple independent readings that agree — pairing MVRV with SOPR to confirm whether coins in motion are being sold at profit or loss, then setting that against price structure, derivatives positioning, liquidity, and macro conditions.

The strongest genuine use cases are the descriptive ones that are hard to fake: aggregate cost basis, the split of supply between long- and short-term holders, exchange-flow context, and the share of supply in profit or loss. These describe *where the market stands*, which is exactly what positioning requires. Prefer entity-adjusted, point-in-time data; distrust any unadjusted volume figure; and remember that metrics sharing the same inputs — MVRV, NUPL, and realized price all rest on realized cap — are not independent confirmations. Held this way, on-chain analysis becomes what it should be: not a promise about tomorrow's price, but the clearest available portrait of today's market.

“But test everything; hold fast what is good.” — 1 Thessalonians 5:21

METHODOLOGY & SOURCES. Data verified as of July 3, 2026. Price, all-time high, and supply are hard-sourced from live CoinGecko and CoinMarketCap feeds (spot ~\$61,940; ATH \$126,080 on 2025-10-06; circulating supply 20,051,500 BTC). On-chain valuation readings (MVRV ~1.0 / Z-Score ~0.2; NUPL ~0.12) are directional figures drawn from secondary reporting (Glassnode, CryptoQuant, Coin Metrics, MacroMicro) and should be re-pulled from primary provider feeds before trading use; precise decimals were deliberately not invented. Metric definitions and originators verified against Glassnode Academy, Coin Metrics, and CryptoQuant documentation: Realized Cap (Coin Metrics); MVRV (Mahmudov & Puell); SOPR (Shirakashi); NUPL (Adamant/Glassnode, where $NUPL = 1 - 1/MVRV$); Puell Multiple (D. Puell, issuance only); CDD/Dormancy/Liveliness (Blummer). Limitation evidence: Glassnode entity-adjustment and

point-in-time docs; Kappos et al. self-transfer study (~12%); on-chain causality research. Note: metrics differ by provider and are not directly comparable across vendors. This report is research and education, not investment advice.

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