Masterclass #5: The MVRV Ratio

The MVRV Ratio is the original onchain oscillator, describing the average unrealised profit or loss held by Bitcoin investors. This makes it an ideal mean reversion model for tracking cycles.

There are very few constants in markets, but one of the few reliable ones is that investors and traders respond to the profit and loss of their portfolio. With the transparency of Bitcoin onchain data, we can use this insight to our advantage.

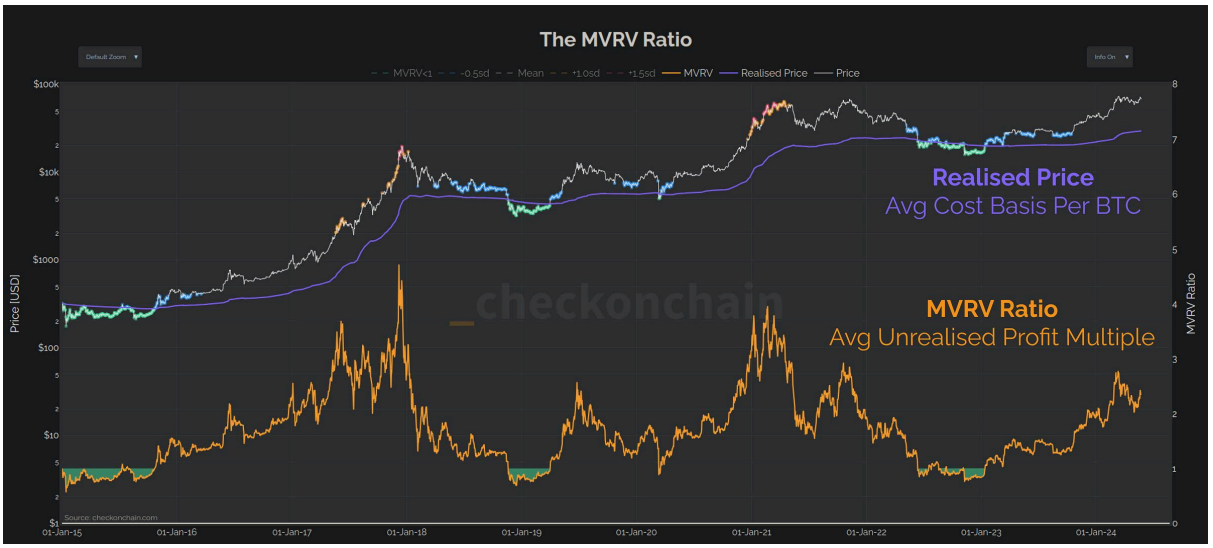
By pricestamping every coin in the Bitcoin supply, we can track the average cost basis where coins were acquired (the realised price). We can then compare this cost basis to the spot price and calculate the magnitude of unrealised (paper) profit or loss held across the market. This is how we arrive at the Market Value to Realised Value (MVRV) Ratio, which is one of the oldest, and most widely recognised onchain metrics. It is calculated as the ratio between the Market Cap and the Realised Cap (or between the spot price and the realised price).

$$MVRV\ Ratio = \frac{Market\ Cap}{Realised\ Cap} = \frac{Spot\ Price}{Realised\ Price}$$

This powerful oscillator reflects **the average unrealised profit/loss held per unit of BTC,** and is an invaluable addition to the onchain

analysis toolbox. In this article, we will explore the foundations of the MVRV Ratio, and how we can use it to model and analyse:

- The magnitude of paper gains and profits held by Bitcoin investors.
- Points of seller exhaustion near cycle lows.
- Periods of maximum HODLer sell-side pressure near cycle tops.
- Pricing levels where investor sentiment and behaviour is likely to change.
- Market inflection points and shifts in momentum.



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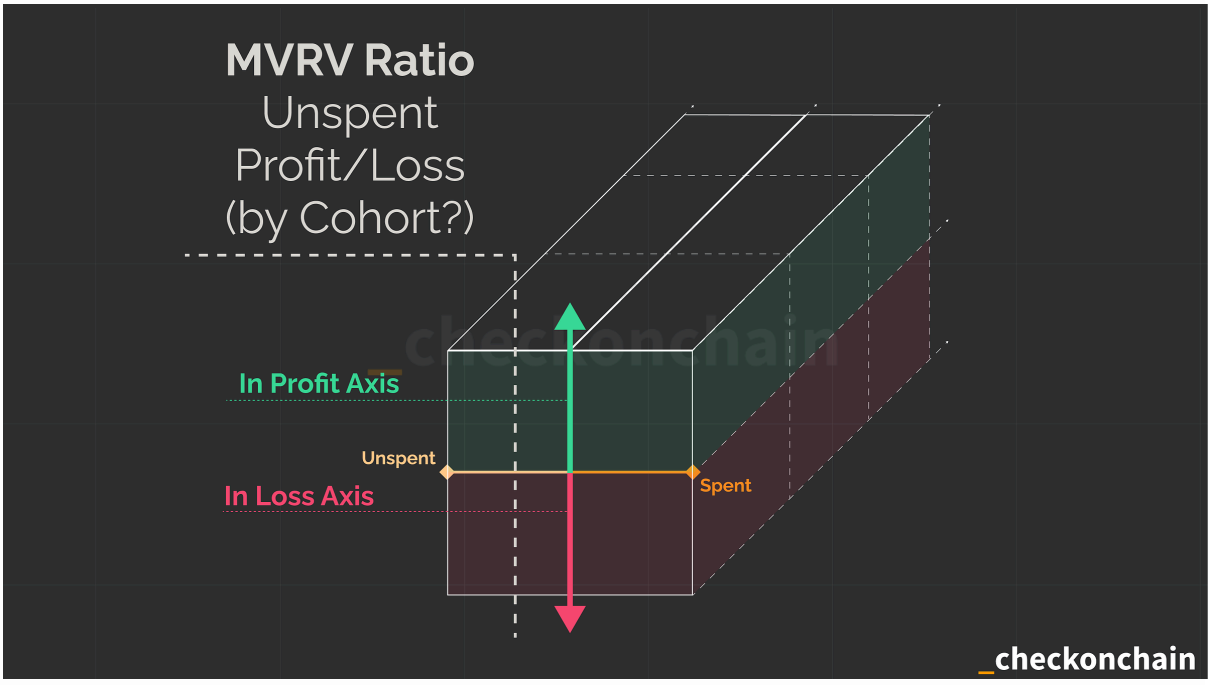
https://www.youtube.com/watch?v=XG14Fsg0wjI

The Unrealised Profit/Loss Multiple

If we refer back to our Checkonchain framework, the MVRV Ratio is taking a cross section along two axes:

- **Unspent Supply** - coins that are still held by investors
- **Profit/Loss Axis** - measuring the average paper gains or losses per coin.

We can also consider MVRV Ratios for different cohorts (such as Long/Short-Term Holders) if we want to take full advantage of all three axes.



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MVRV describes the Unrealised Profit and Loss held within the coin supply.

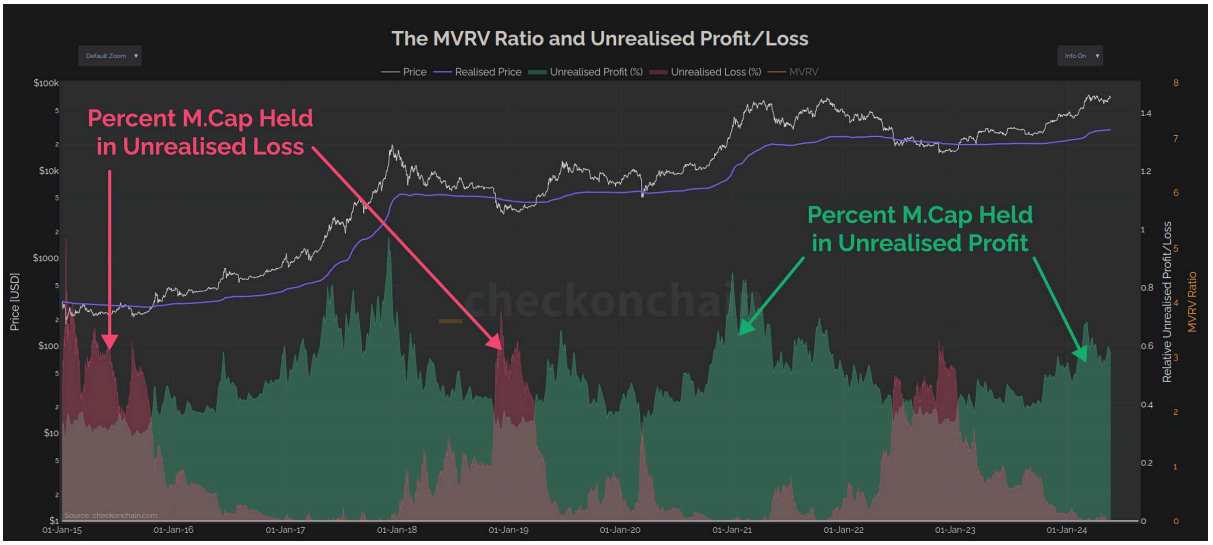
In simpler terms, MVRV describes the magnitude of paper gain or paper loss held by the average coin.

An MVRV of 1.0 means the market is at break-even, and the spot price is equal to the average cost basis (0% profit). The average unrealised profit can therefore be calculated as MVRV minus 1. For example:

- MVRV of 1.00 means the average BTC is at break-even (0% profit or loss).
- MVRV of 2.40 means the average BTC is holding a +140% paper gain.
- MVRV of 0.85 means the average BTC is holding a -15% paper loss.

We can visualise these dynamics via the chart below, which shows the percent of the Bitcoin Market Cap which is held in an unrealised profit (green) or loss (red).

Notice how losses expand during bear markets, representing the unfortunate investors who acquired coins at high prices. Conversely, unrealised profits naturally climb during bull markets, and create the incentive for investors to sell their holdings and take chips off the table.



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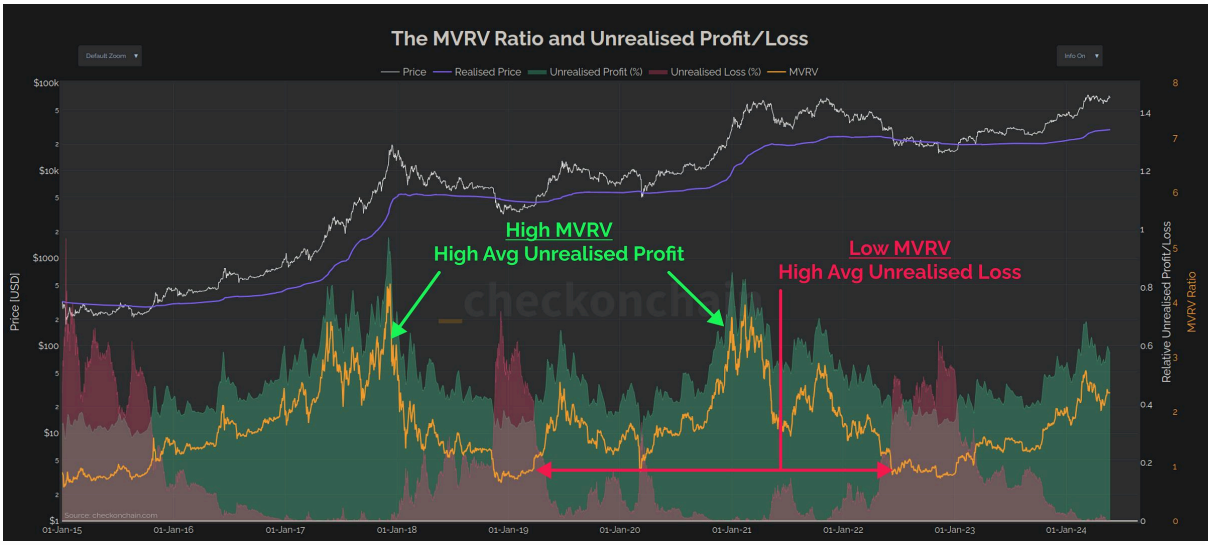
If we now overlay the MVRV Ratio, we can start to think about the investor psychology and the incentives the metric is describing:

- **Low MVRV values < 1.0** signal that investors are holding very large unrealised losses. The reality is that very few investors have the fortitude to hold onto an asset that trades significantly below their cost basis, and they eventually capitulate. The holders who do remain near cycle lows, usually have a very high conviction, and are less price sensitive (and ultimately help establish the cycle floor).
- **High MVRV values > 2.0** signal that investors are holding increasingly large unrealised profits. No matter how strong an investors conviction is, if we continuously ratchet up their portfolio value to +200%...then +300%...+400%(!) eventually, everyone will reach their profit taking threshold. The resulting sell-side is what ultimately saturates demand, and establishes both local and global tops.



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Probabilities and Pricing Bands

We have now established the market dynamics described by high and low MVRV values. But what exactly constitutes a ‘high vs low’ value? Is 2.4 big? Is 0.8 better than 0.7?

The chart below shows a histogram of the historical MVRV values (bars), and the cumulative distribution function (CDF, line). The CDF moves from 0% to 100% and shows the percentage of all trading days which closed with a lower MVRV value.

Let’s start with a very simple approach where we consider 10% to be a relatively uncommon event. Under this simple assumption:

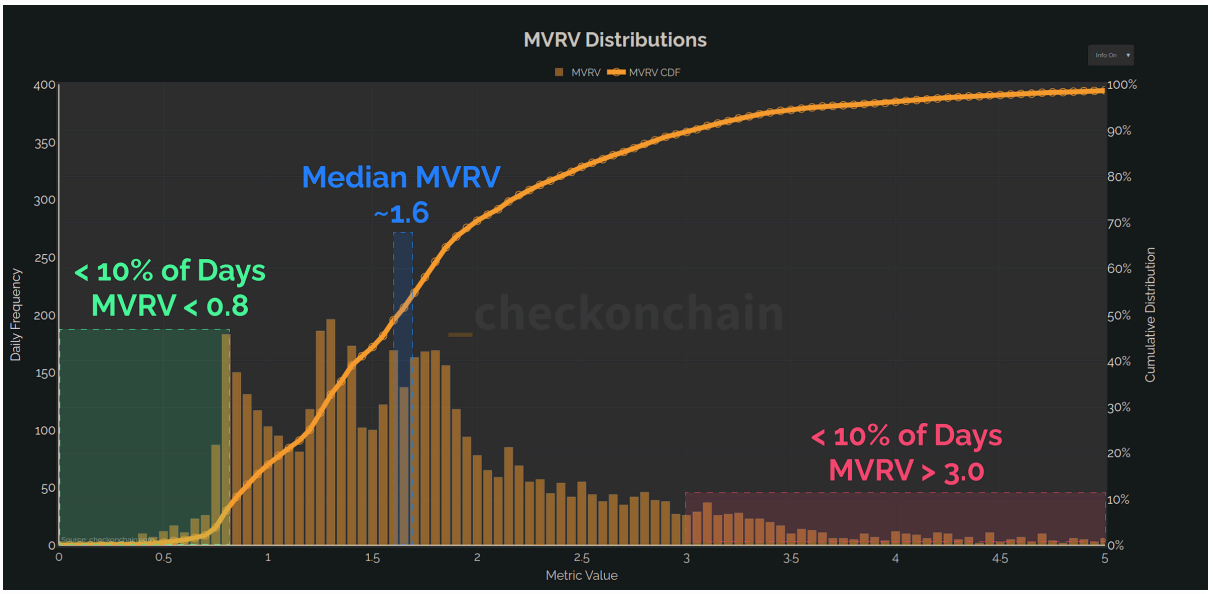
- 🟩 Fewer than 10% of days have an MVRV Below 0.8.
- 🟥 Fewer than 10% of days have an MVRV Above 3.0 (90% of days are smaller).

- 🟦 Half of all days have an MVRV above/below 1.6 (the median MVRV).

This is a very simple framework, but the way I like think about it is that if there are only 10% of days with MVRV above 3.0, then the probability MVRV wants to trade to a lower value is somewhere around 90%. It isn't impossible to trade higher, but it would be relatively uncommon.

The reason MVRV struggles to trade above 3.0 for long periods of time is that an average unrealised profit of 200%+ is a strong enough incentive for a large pool of investors to sell.

Similarly, when MVRV is below 0.8, most of the weaker hands have capitulated, and only the high conviction HODLers remain as holders.



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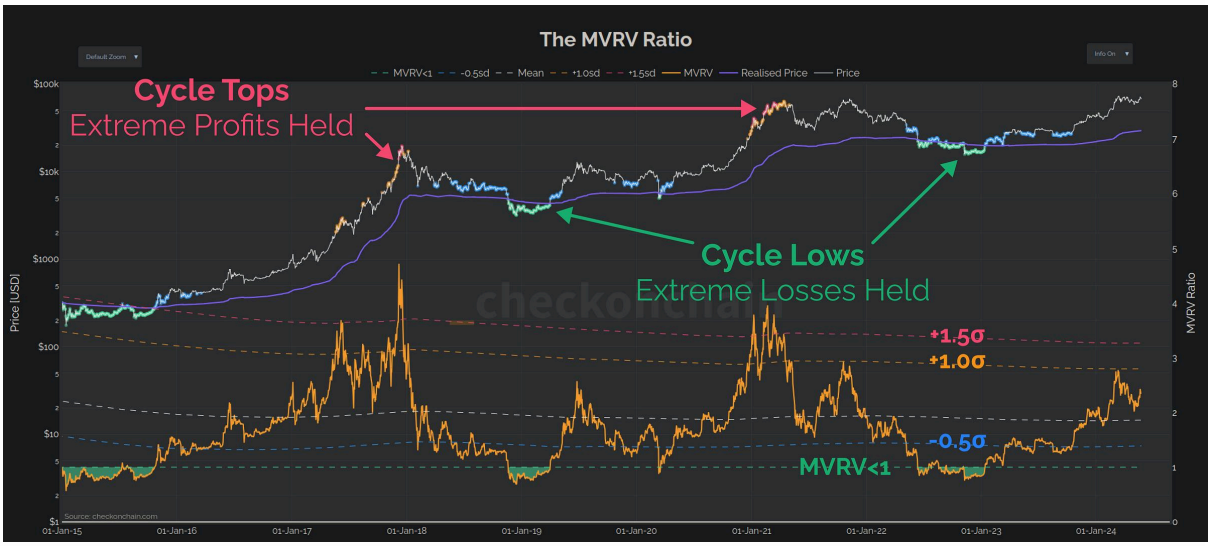
This methodology is simple, but effective. However, it does lack a little bit of scientific rigour. So we can take it to the next level and calculate the long-term average and standard deviation of the MVRV Ratio.

The chart below shows various bands which represent certain deviations from the long term average. We now have a toolkit for

identifying MVRV values that we can consider to be high or low from a statistical standpoint.



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Recall that MVRV is a ratio between the spot price and the realised price. Therefore if we believe that an MVRV Ratio of 3.0 is getting ‘too high’ we can back-calculate a price level where this risk tolerance level is reached.

$$MVRV\ Pricing\ Band_{3.0} = Realised\ Price * 3.0$$

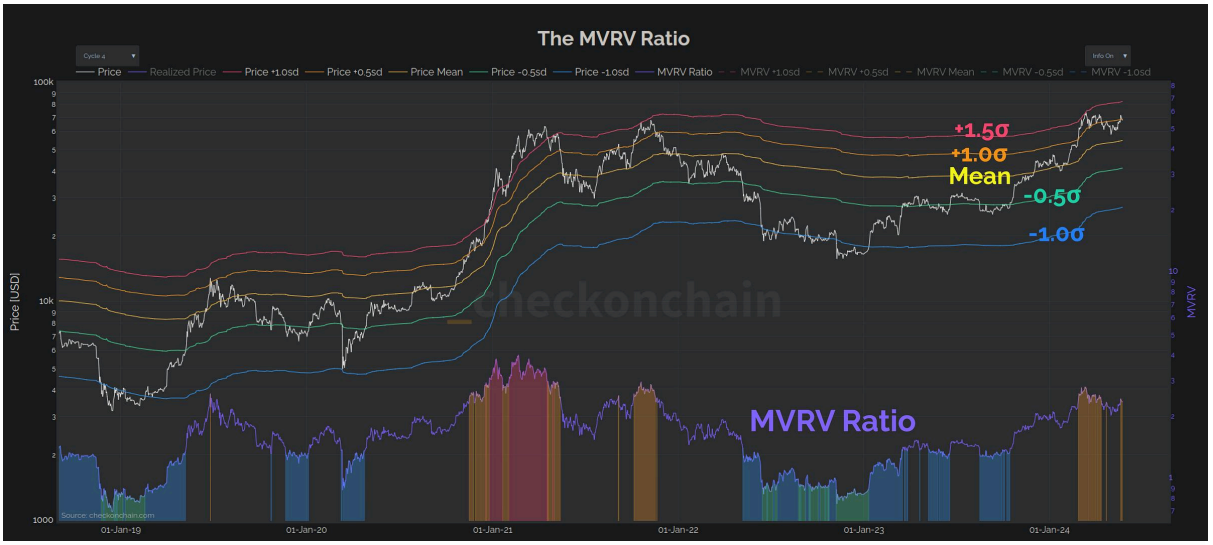
Similarly, if we consider MVRV trading at +1.5 standard deviations above the mean to be ‘high’, we can back-calculate a pricing band where MVRV would reach that deviation.

$$MVRV\ Pricing\ Band_{\mu+1.5\sigma} = Realised\ Price * MVRV_{\mu+1.5\sigma}$$

The chart below translates a set of these MVRV deviations into a ribbon of price bands. The interpretation of these are levels are prices

where the unrealised profit or loss held by investors is getting large (statistically speaking).

Should the spot price ever reach these altitudes, we can start anticipating a shift in investor behaviour patterns towards strong profit taking, panic selling, or capitulation.



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MVRV Z-Score

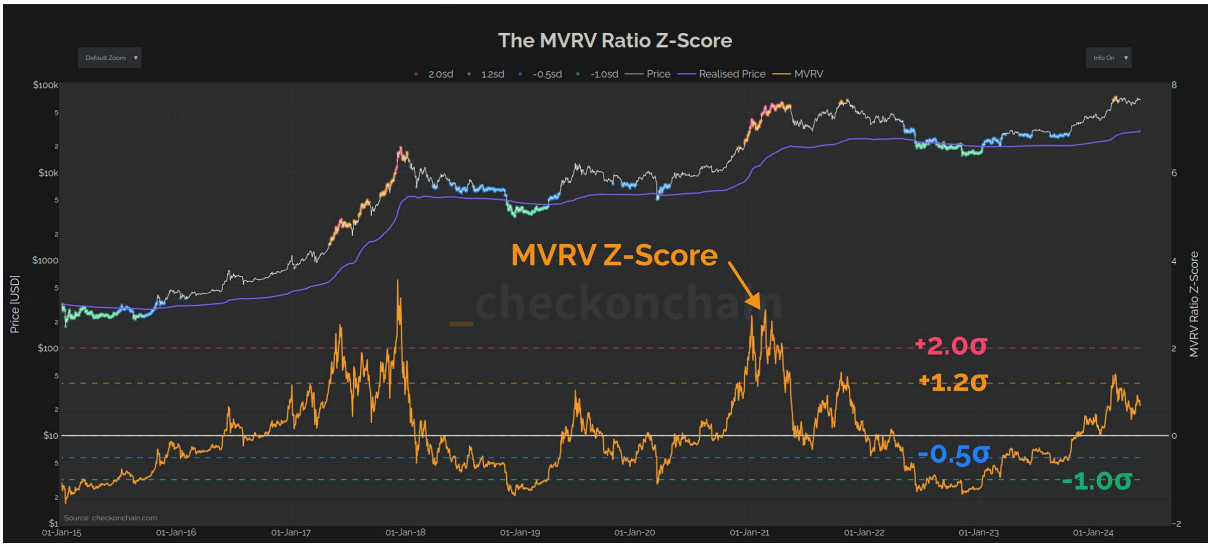
One of the challenges analysts have with the classic MVRV is the gradual drift it experiences, with lower global highs, and higher global lows over time. This is result of Bitcoin getting larger over time, where price deviations from the realised price get smaller as volatility compresses.

A great solution to this problem is to normalise the MVRV ratio using a Z-Score. This enables us to more accurately measure horizontal levels, representing statistical deviations from the long-term average.

$$MVRV\ ZScore = \frac{MVRV - MVRV_{Mean}}{MVRV_{Std}}$$

Technical note: I will usually use either an all-time-average, or a 4-year rolling average applied to MVRV data since 2012 to calculate the MVRV Z-score.

For the majority of casual analyst applications, the MVRV Z-Score is going to be a more intuitive and reliable indicator than the vanilla metric.



[Live Chart]

Monitoring Market Momentum

The fun doesn't stop there, and we can also use the MVRV Ratio to track when the tides are turning, and the market experiences a major inflection point. Imagine the following scenario:

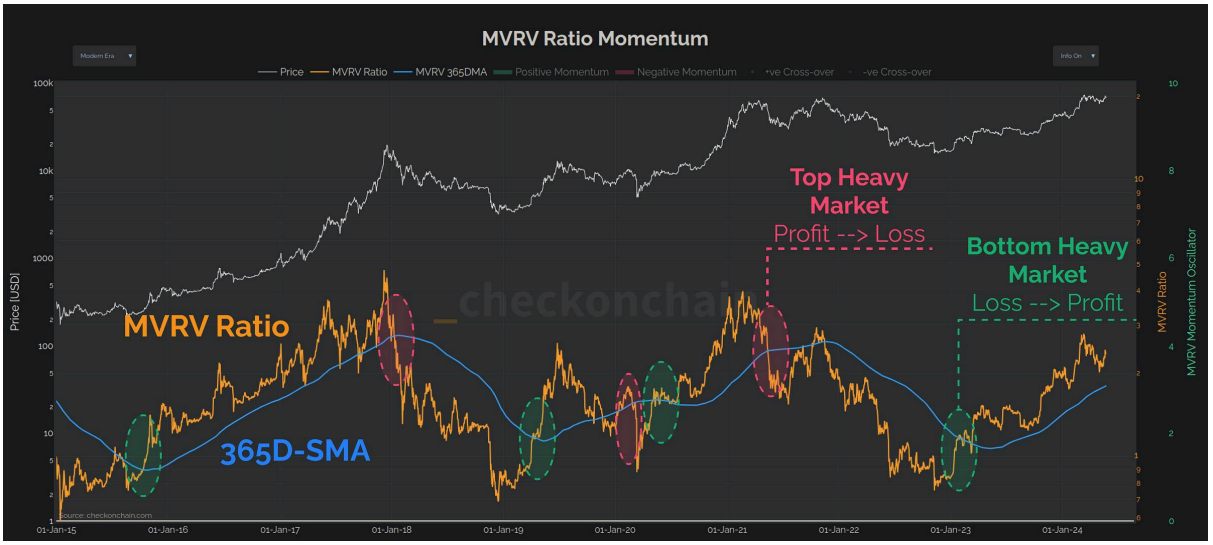
- A bull market has been running for three years, and every dip has been bought.
- Investor confidence in the trend is up only, and everyone expects it to continue.
- More and more people hear about Bitcoin from their uber driver getting rich.
- Buyers start to pour in, but many of them have little market experience.
- The most exciting period of a bull is right before the end, and a huge volume of new and inexperienced buyers invest their life savings, hoping to get rich…
- Who sold them the coins?…The experienced HODLers, who have seen these market patterns before, and know the trend is almost over.

What this situation looks like under the hood is **too many buyers, buying too many coins, at too high of a price.** We call this condition a 'Top Heavy Market'. The inexperienced buyers now have a cost basis which is very high and sensitive to a sell-off. They are also the cohort who is very likely to panic when that happens. Meanwhile, the smart money have divested, and they are patiently waiting for a cool down to MUCH lower prices before they start re-accumulating.

MVRV shows this exact event after a cycle peaks 🔴. MVRV goes from very high values…to VERY low values almost overnight. All those unrealised profits have evaporated to become unrealised losses. The average investor is caught offside, and MVRV plunges sharply below its 365-day moving average 🔵.

When the MVRV Ratio breaks convincingly below its 365-day moving average, the bear market has usually arrived. Too many investors are trapped with a high and unfavourable cost basis, and sentiment usually takes a long time to recover.

A similar situation occurs near cycle lows, where all sellers are exhausted and finally capitulate…selling huge volumes of coins at much cheaper prices to the strong hand HODLers who will hold until the next bull. As price climbs off the bottom, those HODLers see their portfolio go from holding large paper losses, back into profit.



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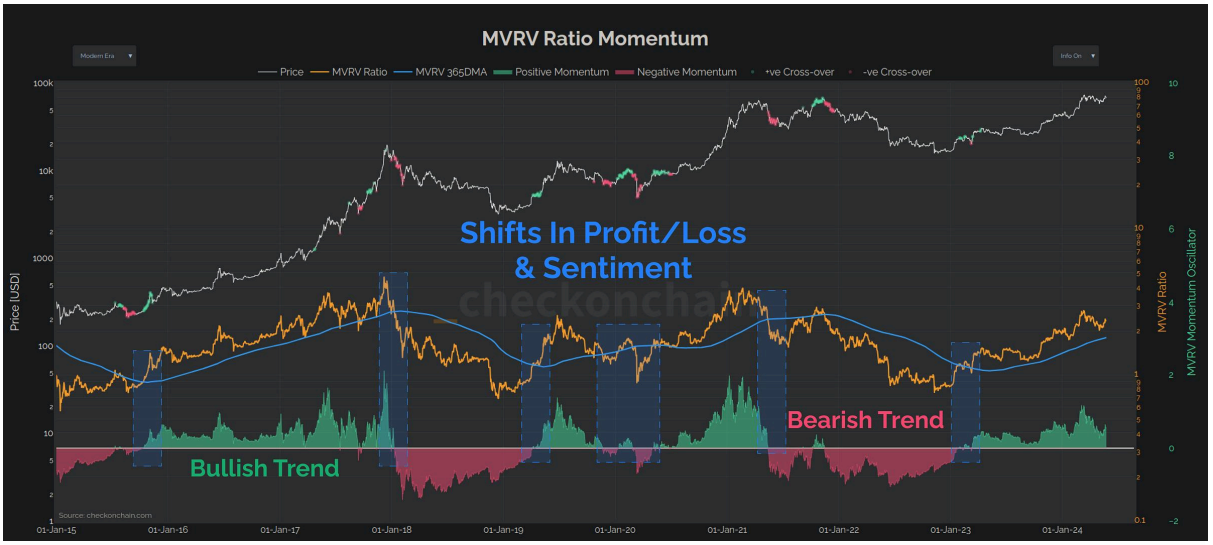
If we take the ratio between MVRV and its 365-day average, we can construct a relatively simple oscillator that helps us visualise the strength of a market trend. Severe breaks above or below zero become easy to identify, and so height of the oscillator, signalling stronger or weaker trends.

Momentum cross-overs generally indicate a major inflection point has been reached, and show us when a large cluster of coins have just moved from in profit…to in loss (or vice versa).



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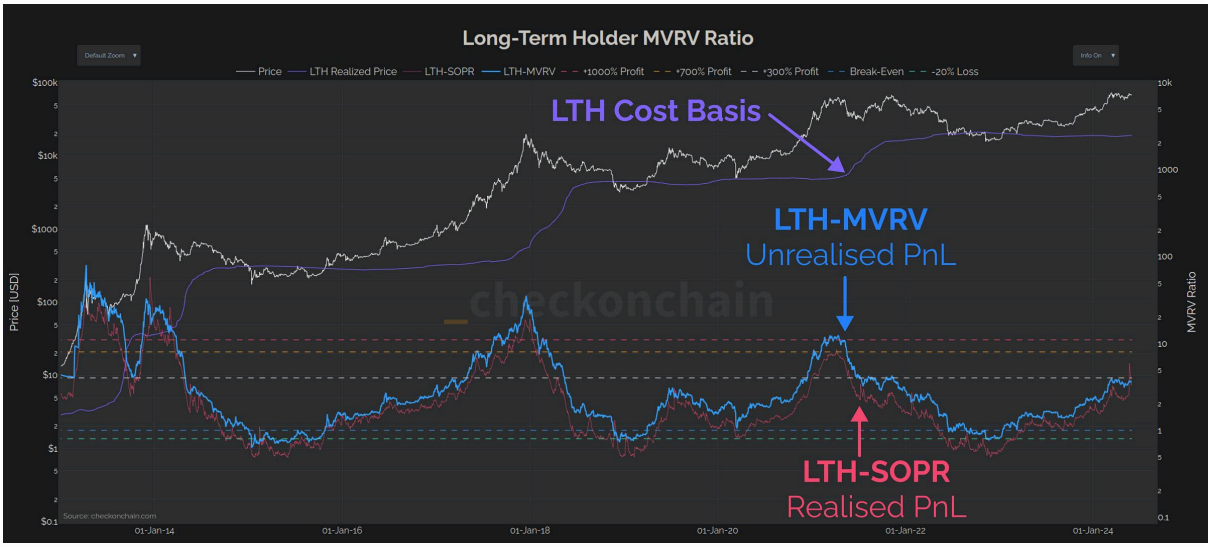
Long and Short-Term Holder MVRV

Rounding out this topic, we can introduce the third cohort axis, in this case from the perspective of Long and Short-Term Holders.
The Long-Term Holder MVRV tends to be a very big picture and macro oscillator. It describes the tremendous profits they hold in a bull (often exceeding 10x gains), and losses comparable with the average market in a bear (-20% near the lows). It is also interesting that due to the long holding period of this cohort (at least 155-day), their average realised profit/loss described by LTH-SOPR is very similar.

Generally speaking, LTH-MVRV and LTH-SOPR are slower macro metrics. They can help us identify where we are in a cycle, but are not the most responsive tools for day-to-day analysis.



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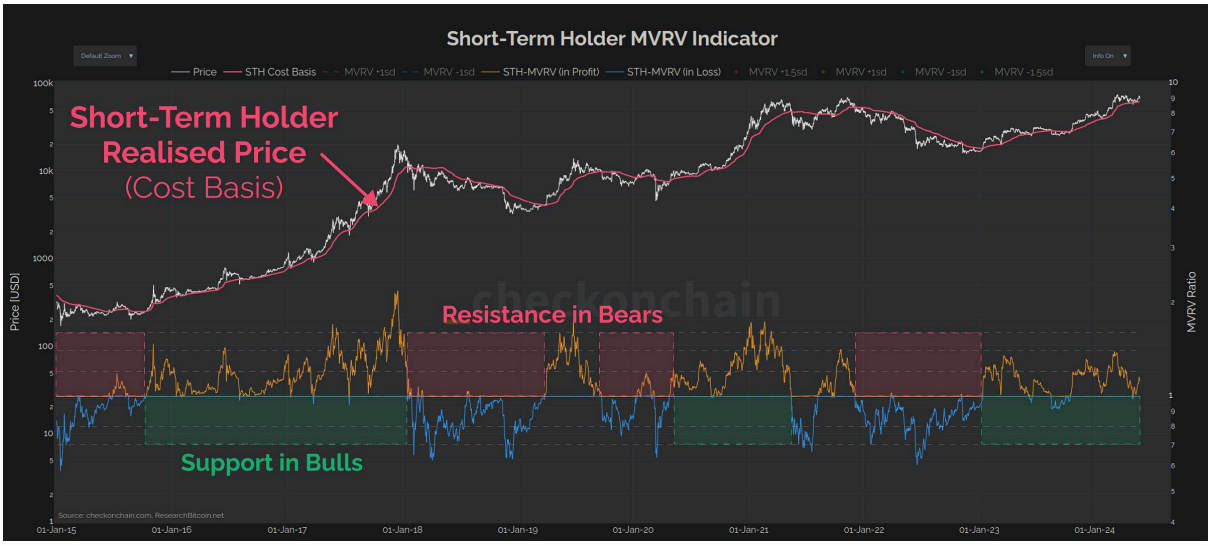
Short-Term Holder MVRV on the other hand is incredibly useful in all phases of the market cycle. Given it describes the unrealised profit and loss of recent buyers (within the last 155-day), it is an exceptional tool for tracking support, resistance, overbought and oversold conditions.

The break-even level of STH-MVRV equalling 1.0 is support in a bull and resistance in a bear. This signifies when investors are buying the dip, or selling the rip near their cost basis. The psychology at play is as follows:

- **In a bull market when STH-MVRV equals 1.0**, traders often look to add to their positions on pullbacks. The STH-cost basis acts as a sort of psychological 'value zone', where they get a second bite at the cherry.
- **Local tops are often established at STH-MVRV of around 1.2, 1.4, and 1.6**. These values signify that traders who recently bought in have very quickly seen their position go into +20%, +40%, or +60%+ profit, respectively.
- **In a bear market when STH-MVRV equals 1.0**, traders often look for any relief rally opportunity to get exit liquidity. They experience the emotion of 'please give me my money back, Mr Market', and sell into whatever strength is available.
- **Local bottoms are often established at STH-MVRV of around 0.8 and 0.7.** These values signify that traders have quickly fallen into -10% or -20% unrealised loss, and may exit, thinking the market is heading lower (a sort of seller exhaustion).

STH-MVRV is one of my favourite all weather metrics, and I personally use it all the time to track where we are. It is a lens into the psychology of the hot ball of money which is most sensitive to near-term volatility.

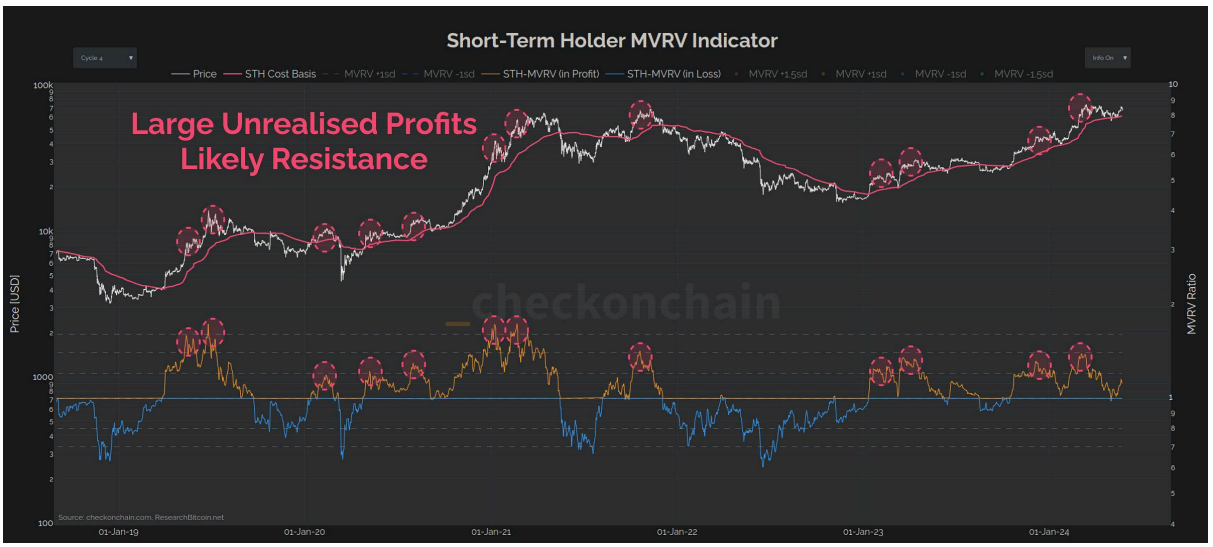


[Live Chart]

The chart below shows STH-MVRV signalling a local and even global peak when the Short-Term Holder cohort get into too much profit too quickly. The incentive for these traders to take profit is large enough that they overwhelm demand.

Whilst there is no perfect STH-MVRV level which triggers this behaviour, using the levels of 1.2, 1.4, and 1.6 have shown to be fairly decent points of interest.

Also note that we can get a read on the strength of the trend when STH-MVRV is able to consistently blast through above 1.4 and 1.6. This means that even though traders are holding large profit, there is sufficient demand to absorb sell-side and keep going. Quiet and stable uptrends during early bull markets tend to be characterised by STH-MVRV trading below 1.4.



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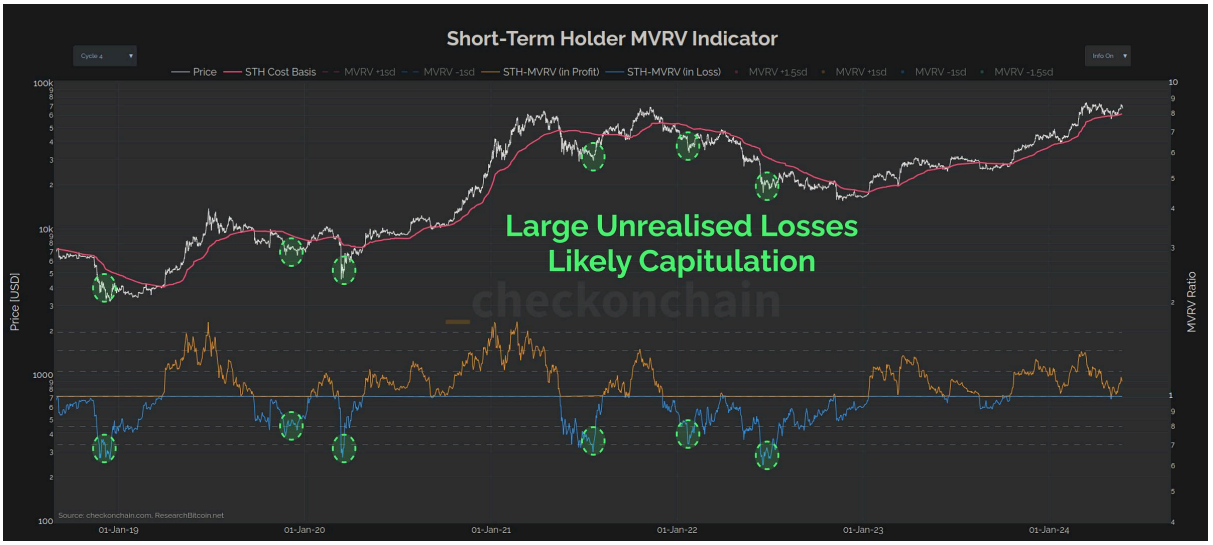
On the flip side, local and global market lows often align with deep STH-MVRV prints below 1.0, as recent buyers are quickly plunged into an unrealised loss. Since the Short-Term Holder cohort is statistically the most likely to panic during a sell-off, this helps us identify seller exhaustion and capitulation events.

Similar to finding local tops, there is no perfect level for STH-MVRV on the downside, although values of 0.8 to 0.7 have historically been good reference levels.



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Closing Thoughts

The MVRV Ratio is one of the most important metrics for the budding onchain analyst to wrap their head around. The secret sauce is thinking about what MVRV values mean relative to investor psychology and incentives.

The standard MVRV ratio is important to establish a baseline understanding of the metric. However, for most practical applications, I would recommend analysts consider the MVRV Z-Score and STH-MVRV variants, which are likely to be the most useful additions to our toolkit.

Thanks for reading,

James

Ivan Tracks 2d

Liked by James Check (Checkmatey)

It's hard for me to show it because I can't post images, but it looks like there was a bearish divergence on the STH MVRV Indicator between March 2024 and Nov 2024, and then we went below 1, and the BTC price crashed. Previous divergences have been good indications for both bear and bull markets' reversals. I don't believe we are entering a bear market rn, but it's another data point to pay attention to imo.

Fwiw I mapped out all the divs I could spot in the STH MVRV, and as in standard TA not all are signaling reversal patterns, and there was one that was just a short-term correction in the 2017 bull.

Another important factor is divs are most accurate on a 14-bar range on the timeframe they are observed. The larger the range, the more inaccurate they are in my experience.

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James Check (Checkmatey) 1d

Author

Gday Ivan. I can see the one you're referring to.

You correctly identified the challenge with STH-MVRV, since the lookback window is 155-days (~5months), we're comparing two separate market regimes. In a sesne, this is like a divergence on the 14-week RSI but comparing across 14 months. Not quite the same. I'd be more inclined to view divergences in STH-MVRV on a more local level, think over the span of a few weeks months.

You will find these local divergences on both MVRV and STH-MVRV on the first 2021 rounded top (April 21) and 2017 (which I noted in masterclass).

However, your observation is very correct, and I flagged the potential divergence you refer to this cycle using MVRV and AVIV in one of my Orange reports earlier in the year. We had a higher high in price between March 2024 and Dec 2025, but both AVIV and MVRV were equal height. Not quite a full blown divergence like in 2021, but close.

Higher price, equal avg unrealised profit, worth keeping an eye on.

You're thinking about this the right way, love to see it!

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twt2024 twt2024 Sep 6

Liked by James Check (Checkmatey)

Hi James, Thanks for this article. It has great information and I've read it about 10 times now :). I have a question RE: the recent STH-MVRV chart as it looks like 1.0 has been resistance since mid-July of this summer, 2024. It looks to be a sell the rip behavior as STH have been below their cost basis since late June. It's only been a little over 1 month so I'm not sure if my interpretation of the market STH psychology is on point or if it's just something we need to keep an eye on for the next couple of months. Thanks for any input.

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James Check (Checkmatey) Sep 6

Author

You're absolutely correct. So the interpretation I have is that tactically, we should assume sell the rip behaviour until proven otherwise. The signal will be that STH-MVRV flips back over and holds above 1.0.

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