Revisiting the Relative Strength Index: From Oscillator to Trend-Following Indicator

Leandro Guerra*

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https://om-qs.com

Abstract — The Relative Strength Index (RSI) is commonly taught as an oscillator that identifies overbought and oversold conditions in financial markets. However, a closer inspection of its mathematical structure reveals that RSI is more accurately described as a trend-following measure. This paper dissects the RSI formula, clarifies its underlying meaning as a ratio of smoothed upward and downward price movements, and highlights the misconceptions surrounding its interpretation. Through both theoretical analysis and empirical evidence, we show that RSI reflects trend persistence rather than imminent reversal, offering traders a more accurate framework for its application.

Index Terms- *Relative Strength Index (RSI), technical indicators, momentum analysis, trend-following, oscillator misconceptions, financial time series, trading strategies, market momentum.*

I. INTRODUCTION AND LITERATURE REVIEW

The Relative Strength Index (RSI), created by J. Welles Wilder Jr. in New Concepts in Technical Trading Systems (1978), is among the most influential tools in technical analysis. With its values confined to a 0–100 scale, RSI quickly gained traction as a convenient indicator for identifying "overbought" and "oversold" conditions. Traders are often taught to interpret levels above 70 as signals of exhaustion in bullish trends, and levels below 30 as opportunities for bullish reversals. Similarly, divergences between price action and RSI are commonly cited as early warnings of potential market turning points.

Yet, a closer examination of the RSI formula reveals a different reality. RSI is mathematically constructed as a ratio of smoothed average gains to smoothed average losses over a chosen lookback period. This formulation inherently measures the persistence of directional strength rather than the likelihood of imminent reversal. When the ratio of gains to losses is consistently high, RSI remains elevated, reflecting the presence of a strong trend rather than suggesting an overbought condition. Conversely, low RSI values indicate sustained dominance of losses, consistent with downward trends.

The purpose of this paper is to revisit the RSI from first principles and clarify its mathematical nature. We argue that RSI is better understood as a trend-following indicator whose oscillation between 0 and 100 is a by-product of its normalization, not a sign of cyclical mean-reversion. Divergences and overbought/oversold thresholds, while popular in practice, often reflect misconceptions arising from RSI's bounded scale. By reframing RSI as a normalized measure of directional persistence, we provide a more coherent framework for its application in modern trading systems., to critically analyze the divergence concept, showing when it is informative and when it is prone to misinterpretation.

Wilder (1978) introduced RSI as part of his broader framework of momentum indicators, proposing it as a tool for capturing relative price strength within a fixed time window. Early practitioner literature, including Murphy's Technical Analysis of the Financial Markets (1999) and Pring's Technical Analysis Explained (2002), reinforced the oscillator-based interpretation, formalizing the 70/30 thresholds and cementing the notion of RSI as a contrarian tool.

Academic studies have long tested RSI's effectiveness under these interpretations. Brock, Lakonishok, and LeBaron (1992) included RSI among the most widely used rules and found mixed evidence of predictive power in U.S. equities. Park and Irwin's (2007) survey of technical analysis research confirmed that RSI remains one of the most studied momentum indicators, though results vary considerably by asset class and market condition. Marshall, Young, and Rose (2006) noted that while RSI strategies sometimes outperform benchmarks, their profitability diminishes once realistic transaction costs are accounted for.

The divergence concept, where price forms new highs or lows without corresponding confirmation in RSI, is particularly widespread in practitioner use. Murphy (1999) emphasized divergences as early warnings of momentum loss, and they remain popular in trading

manuals and education. However, divergences often materialize during extended trends, highlighting shifts in relative momentum rather than providing precise reversal signals.

A smaller but important body of research and practitioner commentary highlights RSI's tendency to remain at extreme values during trending markets, which suggests its nature as a trend-following measure. Sweeney (1988) observed that RSI's persistence at high or low levels is consistent with directional strength, contradicting the pure oscillator view. Neely, Weller, and Ulrich (2009) similarly note that momentum-based indicators like RSI align more closely with regime dynamics than with strict mean-reversion logic.

More recently, several studies have explicitly tested RSI as a tool for trend identification rather than as a contrarian oscillator. Panigrahi et al. (2021), analyzing the NIFTY 50 index, evaluated rules based on RSI >50 / <50 and alternative bands such as 60/40. Their results indicated that the 50-threshold performed more effectively over long horizons, while the 60/40 configuration provided greater responsiveness in shorter-term contexts. Similarly, Zatwarnicki (2023) conducted an open-access study that included a dedicated section on the effectiveness of RSI in determining market trends, confirming that the trend-following interpretation can offer advantages over the traditional 70/30 heuristic. Although Wilder's original formulation presented RSI as an oscillator, these recent contributions underscore the validity of employing it as a regime filter for directional momentum.

Taken together, the literature shows that while RSI is widely treated as an oscillator, its mathematical basis and empirical behavior support a reinterpretation as a normalized trend-following measure. This paper develops that perspective, framing overbought/oversold signals and divergences not as invalid, but as secondary interpretations that stem from RSI's bounded representation.

II. METHODOLOGY

This section describes the methodological framework adopted to reinterpret the Relative Strength Index (RSI) as a trend-following indicator. The approach combines (i) a formal mathematical breakdown of the RSI formula, (ii) a conceptual reinterpretation of its structure, and (iii) an empirical analysis across multiple asset classes.

A. Mathematical Formulation of RSI

RSI is defined as:

$$RSI_t = 100 - \frac{100}{1+RS_t}, \; RS_t = \frac{AG_t}{AL_t}$$

where:
AG_t = smoothed average of gains over the past n periods,
AL_t = smoothed average of losses over the past n periods,
RS_t = ratio of average gains to average losses.

Thus, RSI is a bounded transformation of a ratio that compares the persistence of upward to downward price movements.

B. Interpretation as Trend-Following

The RS ratio inherently captures the dominance of directional movements:

- If $AG_t = AL_t$, then $RS_t = 1$, and

$$RSI_t = 100 - \frac{100}{1+1} = 50$$

This neutral value represents perfect balance between average gains and losses.

- If $RSI_t > 50$, it implies $AG_t > AL_t$, i.e., upward price changes dominate over the selected lookback period: a long momentum domain.
- If $RSI_t < 50$, it implies $AG_t < AL_t$, i.e., downward price changes dominate: a short momentum domain.

Thus, the fundamental interpretation of RSI is binary: it measures whether momentum is biased toward gains or toward losses. The "overbought" and "oversold" narratives at 70 and 30, respectively, are secondary heuristics that arise only because RSI is normalized into a bounded oscillator.

To further refine the signal, we introduce a low-pass filter of the RSI itself, such as a 5-period simple moving average (SMA) or exponential moving average (EMA). While the RSI period remains the standard 14, the smoothed RSI serves to reduce high-frequency fluctuations without introducing significant lag. This filtered RSI more clearly tracks the underlying momentum domain (above or below 50), making the trend-following nature of the indicator more apparent.

In this framework, RSI ceases to be interpreted as a short-term oscillator. Instead, it becomes a trend-following ratio, where the threshold at 50 separates bullish from bearish momentum states, and smoothing reinforces its role as a regime filter.

C. Empirical Approach

To evaluate RSI as a trend-following indicator, we contrast the classical oscillator interpretation with our proposed framework.

1. Data Selection
   The analysis focuses on four representative markets:
   • Equities: S&P 500 index,
   • Currencies: EUR/USD exchange rate,
   • Commodities: Gold,
   • Cryptocurrencies: Bitcoin.
   Specific sample periods and frequencies are defined in the Results section.

2. Indicator Computation
   • Classical RSI (oscillator interpretation): Standard 14-period RSI, applied directly without additional filtering.
   • Proposed RSI (trend-following interpretation): RSI(14) combined with a 5-period simple moving average of RSI values, used as a low-pass filter to highlight persistence above or below the neutral 50 level.

3. Analysis Framework
   • Trend Persistence Tests: Examine the ability of RSI smoothed version to remain above or below 50 during extended directional phases.
   • Oscillator Tests: Evaluate the conventional 70/30 thresholds for signaling reversals.
   • Divergence Analysis: Identify cases where price forms new highs or lows without corresponding RSI confirmation and assess their relationship with subsequent price behavior.

4. Performance Metrics
   • Distributional Analysis: Frequency of RSI values above 70, below 30, above 50, and below 50.
   • Forward Returns: Average subsequent returns conditional on RSI > 70, RSI < 30, RSI > 50, and RSI < 50.
   • Cross-Market Comparison: Evaluate consistency of results across equities, currencies, commodities, and cryptocurrencies.

This methodology allows direct comparison between the oscillator-based interpretation of RSI and the trend-following framework, isolating the effects of smoothing in the latter case.

<div align="center">III. RESULTS</div>

This section presents empirical evidence on the behavior of RSI under two competing interpretations: the traditional oscillator framework and the proposed trend-following framework. For each asset, we compare the raw RSI(14) against the smoothed RSI-LPF(14,5), focusing on three aspects: (i) persistence above or below the neutral 50 threshold, (ii) the performance of conventional 70/30 overbought–oversold heuristics, and (iii) the role of divergences. Results are reported sequentially across representative markets, beginning with the S&P 500 on a 15-minute horizon.

A. S&P 500 (15-minute data)

Figure 1 presents the S&P 500 index over a sample period, with both the classical RSI(14) and the proposed smoothed RSI (RSI(14) with a 5-period low-pass filter, hereafter RSI-LPF). The results highlight several key insights.

Figure 1 - S&P 500 index in 15-minute data

1) Regime identification via the 50 thresholds.
The RSI-LPF remained consistently below 50 during the decline observed between September 24 and 26 and subsequently crossed above 50 during the recovery phase extending into September 29. These domains align closely with the dominant market trends, supporting the interpretation of RSI as a trend-following indicator: values above 50 reflect the dominance of average gains (long momentum domain), while values below 50 reflect the dominance of average losses (short momentum domain).

2) Oscillator heuristics versus continuation.
Classical interpretations using 70/30 thresholds provided limited value in this sample. During the downward phase, RSI repeatedly reached levels below 30 without triggering durable reversals. Similarly, during the upward phase, RSI printed values above 70 while price continued to advance. These observations confirm that the oscillator view, which treats 70 and 30 as reversal levels, often misrepresents RSI's behavior in trending markets.

3) Role of smoothing.
The 5-period low-pass filter applied to RSI reduced noisy fluctuations around the neutral 50 level, producing longer and more stable stays within momentum domains. This smoothing preserved the timing of major transitions while suppressing false crossovers, making regime shifts more apparent without introducing significant lag.

4) Divergence as momentum fatigue.
Late in the sample, price registered higher highs without corresponding confirmation in RSI, producing a bearish divergence. This preceded a pullback on September 30. The evidence suggests that divergences are better interpreted as signals of momentum weakening rather than automatic reversal triggers, consistent with RSI's trend-following nature.

5) Operational perspective.
A simple rule based on RSI-LPF(14,5) — long when above 50, short when below 50 — would have aligned with the primary downtrend (September 24–26) and the subsequent uptrend (September 26–29). In contrast, contrarian trades taken at 70/30 levels would have produced premature or false signals.

For the S&P 500 on a 15-minute horizon, the 50-threshold interpretation with smoothing provides a clearer framework for identifying directional regimes. By contrast, oscillator-based heuristics (70/30) were prone to continuation rather than reversal, and divergences emerged as secondary evidence of momentum fatigue rather than precise timing tools.

B. S&P 500 (daily data)

Figure 2 presents the S&P 500 index with its corresponding RSI(14) and the smoothed RSI-LPF(14,5) on a daily horizon. The analysis confirms that the reinterpretation of RSI as a trend-following measure extends beyond intraday contexts and is robust at longer horizons.
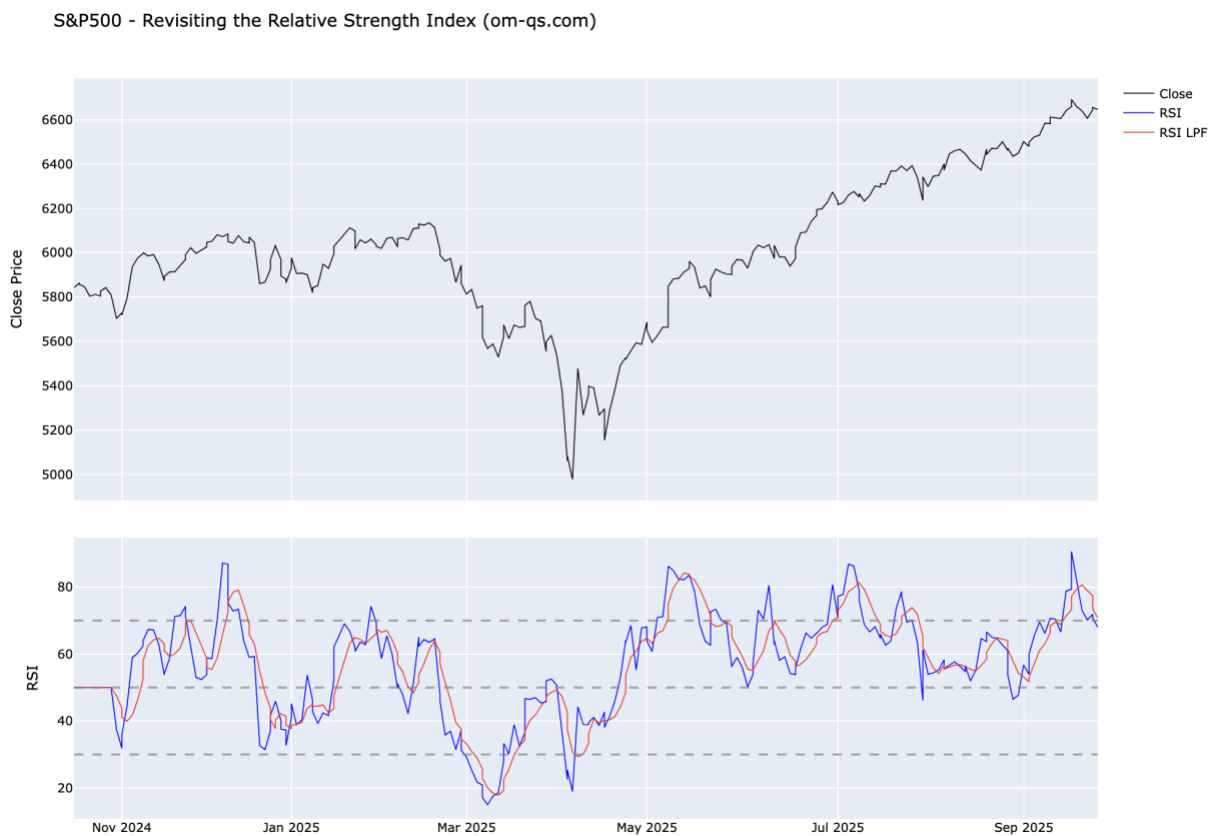

Figure 2 - S&P 500 index in daily data

1) Trend-following confirmation at 50.

During the pronounced drawdown between December 2024 and March 2025, both RSI(14) and RSI-LPF(14,5) remained consistently below 50, reflecting sustained downward momentum. The subsequent recovery, beginning in April 2025, was accompanied by RSI-LPF crossing and holding above 50, signaling entry into a long momentum domain. These extended periods above or below 50 coincide closely with major market regimes, reinforcing the interpretation of RSI as a trend-following indicator.

2) Oscillator heuristics under stress.

Conventional interpretations using the 70/30 thresholds provided little actionable value in this sample. RSI registered values below 30 on several occasions during the early-2025 decline, yet prices continued to fall. Conversely, RSI rose above 70 multiple times during the mid-2025 recovery, while prices continued to advance. In both phases, the "overbought/oversold" heuristic did not anticipate turning points but instead coincided with the continuation of prevailing trends.

3) Effect of smoothing.

The application of a 5-period low-pass filter to RSI produced a clearer representation of market regimes, particularly around the neutral 50 level. While raw RSI occasionally fluctuated near 50, the smoothed version established clean regime zones: bearish until March 2025 and bullish thereafter. This demonstrates the value of smoothing for enhancing RSI's role as a regime filter without introducing significant lag.

4) Divergence as gradual warning.

In August 2025, the S&P 500 posted higher highs while RSI failed to confirm with corresponding peaks, producing a mild bearish divergence. This did not trigger an immediate reversal, but it did foreshadow a moderation in upward momentum. Divergences on the daily horizon thus function as early signs of momentum fatigue rather than precise reversal triggers.

Therefore, on the daily timeframe, the 50-threshold interpretation of RSI, when combined with light smoothing, aligns well with macro market phases. In contrast, the oscillator-based 70/30 heuristic remained misleading, often accompanying trend continuation rather than reversal. Divergences served as complementary indicators of weakening strength, consistent with RSI's underlying nature as a trend-following ratio.

The evidence from both the intraday (15-minute) and daily horizons underscores the consistency of RSI's trend-following nature across timeframes. In both cases, the neutral 50 threshold, particularly when combined with a light 5-period smoothing, provided a reliable framework for identifying momentum regimes and aligning with prevailing price trends. Conversely, the conventional oscillator interpretation based on 70/30 thresholds repeatedly coincided with trend continuation rather than reversal, diminishing its practical utility. Divergences, when present, functioned as early signs of momentum fatigue rather than precise turning points. Taken together, the S&P 500 results demonstrate that RSI's reinterpretation as a normalized trend filter is robust across different trading horizons, from intraday dynamics to broader market cycles.

C. EUR/USD (hourly data)

Foreign exchange markets represent a valuable testing ground for technical indicators due to their high liquidity, continuous trading hours, and tendency to exhibit both trending and ranging behavior. RSI is widely applied in currency trading, often as a contrarian oscillator, but its reinterpretation as a trend-following measure can provide fresh insights into momentum dynamics in this asset class. Figure 3 presents the EUR/USD forex pair with its corresponding RSI(14) and the smoothed RSI-LPF(14,5) on a 1-hour horizon. Additional tests on intraday (M15) and daily EUR/USD data confirmed the same pattern: the 50-threshold interpretation with light smoothing reliably identified directional regimes, while oscillator-based 70/30 thresholds frequently coincided with continuation rather than reversal. To avoid redundancy, these results are not reported in detail but are consistent with the findings presented below.

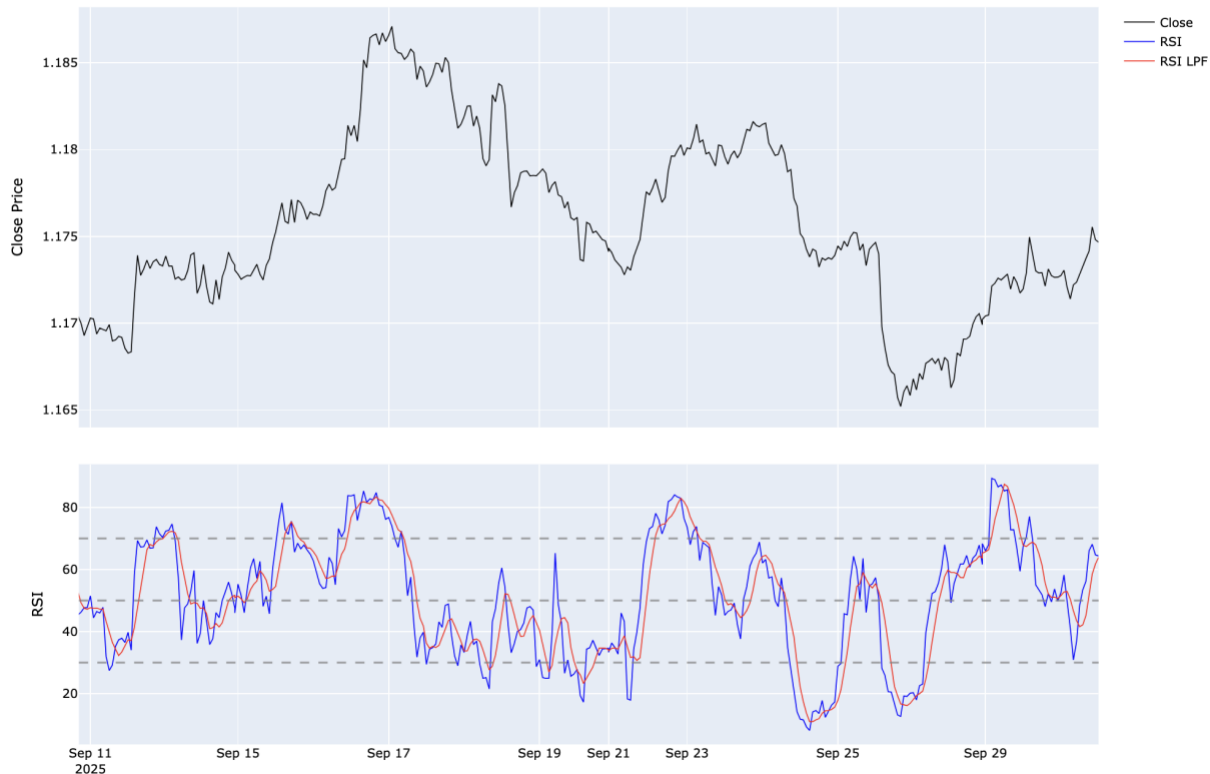EUR/USD - Revisiting the Relative Strength Index (om-qs.com)

Figure 3 – EUR/USD index in 1 hour data

1) Trend-following domains.
Between September 15 and 18, EUR/USD experienced a strong upward move, with RSI-LPF(14,5) holding above 50 almost continuously. Conversely, during the sharp decline between September 23 and 26, RSI-LPF remained well below 50, clearly signaling a bearish momentum domain. These extended periods confirm that the 50-threshold interpretation provides a consistent framework for identifying directional regimes in forex markets.

2) Oscillator heuristics versus continuation.
During both phases, the raw RSI frequently crossed the conventional 70/30 thresholds. Notably, in the mid-September rally, RSI exceeded 70 several times without producing meaningful reversals, while in the late-September decline, repeated dips below 30 coincided with continued selling pressure. This again illustrates that the oscillator heuristic often misrepresents RSI's behavior in trending conditions.

3) Role of smoothing.
The 5-period low-pass filter substantially reduced false flips of RSI around the 50 level, producing smoother regime identification. For instance, while raw RSI oscillated between 40 and 60 during parts of September 21–22, the RSI-LPF held closer to 50, signaling a period of balance rather than producing whipsawing signals.

4) Divergence as momentum fatigue.
On September 29, EUR/USD made a marginal higher high, while RSI failed to confirm with a higher peak. This bearish divergence preceded a small pullback, consistent with the interpretation of divergences as signs of momentum weakening rather than immediate reversal triggers.

For EUR/USD on an hourly horizon, the RSI-LPF(14,5) with the 50 threshold provided a reliable representation of momentum regimes, aligning with both the September uptrend and the subsequent downtrend. By contrast, the 70/30 oscillator interpretation repeatedly suggested premature reversals. Divergences added contextual value as early signs of fatigue, but not as standalone trading signals.

D. Gold (4-hour data)

Figure 4 displays the price of gold alongside RSI(14) and its smoothed version RSI-LPF(14,5) on a four-hour horizon. This timeframe offers a useful balance between short-term volatility and broader trend structure, making it particularly suited for swing trading analysis.

Figure 4 – GOLD/USD index in 4 hour data

1) Trend-following regimes.
From mid-July through late August, RSI-LPF oscillated around 50, reflecting the absence of a clear directional bias during a broad consolidation phase. Starting in early September, RSI-LPF crossed decisively above 50 and remained predominantly in positive territory throughout a sustained rally. This transition illustrates RSI's effectiveness as a regime filter: once the neutral line was broken, the indicator reliably tracked the bullish phase.

2) Oscillator heuristics versus continuation.
During the consolidation, RSI frequently touched both the 30 and 70 thresholds without producing consistent reversals, reflecting whipsaw conditions. In the later rally, RSI exceeded 70 several times while price continued to rise, again highlighting the limitations of the oscillator interpretation. The overbought signals did not anticipate corrections but instead coincided with momentum continuation.

3) Effect of smoothing.
The 5-period low-pass filter substantially improved clarity in this timeframe. While raw RSI fluctuated sharply within the 30–70 band, RSI-LPF provided a cleaner indication of regime balance during consolidation and more stable signals once the bullish breakout occurred. This demonstrates the smoothing's practical advantage in intermediate timeframes where short-term oscillations can obscure directional strength.

4) Divergence as secondary evidence.
Near the end of September, gold prices registered higher highs while RSI failed to match previous peaks, producing a bearish divergence. This foreshadowed a slowing of the upward momentum, though not an immediate reversal. As in prior cases, divergence functioned as a contextual signal of fatigue rather than a deterministic reversal trigger.

On the H4 horizon, gold reinforces the broader findings: RSI interpreted through the 50 threshold (with smoothing) successfully distinguishes between neutral consolidation and directional phases, while the oscillator heuristic proves unreliable. Divergences enrich the analysis but operate as secondary momentum warnings. This intermediate timeframe highlights RSI's adaptability, showing its usefulness for swing trading decisions without succumbing to intraday noise.

E. Bitcoin (daily data)

Figure 5 shows Bitcoin with RSI(14) and the smoothed RSI-LPF(14,5) on a daily horizon. As a continuously traded and highly volatile asset, Bitcoin offers an ideal setting to test whether RSI behaves as a trend-following measure rather than a contrarian oscillator.
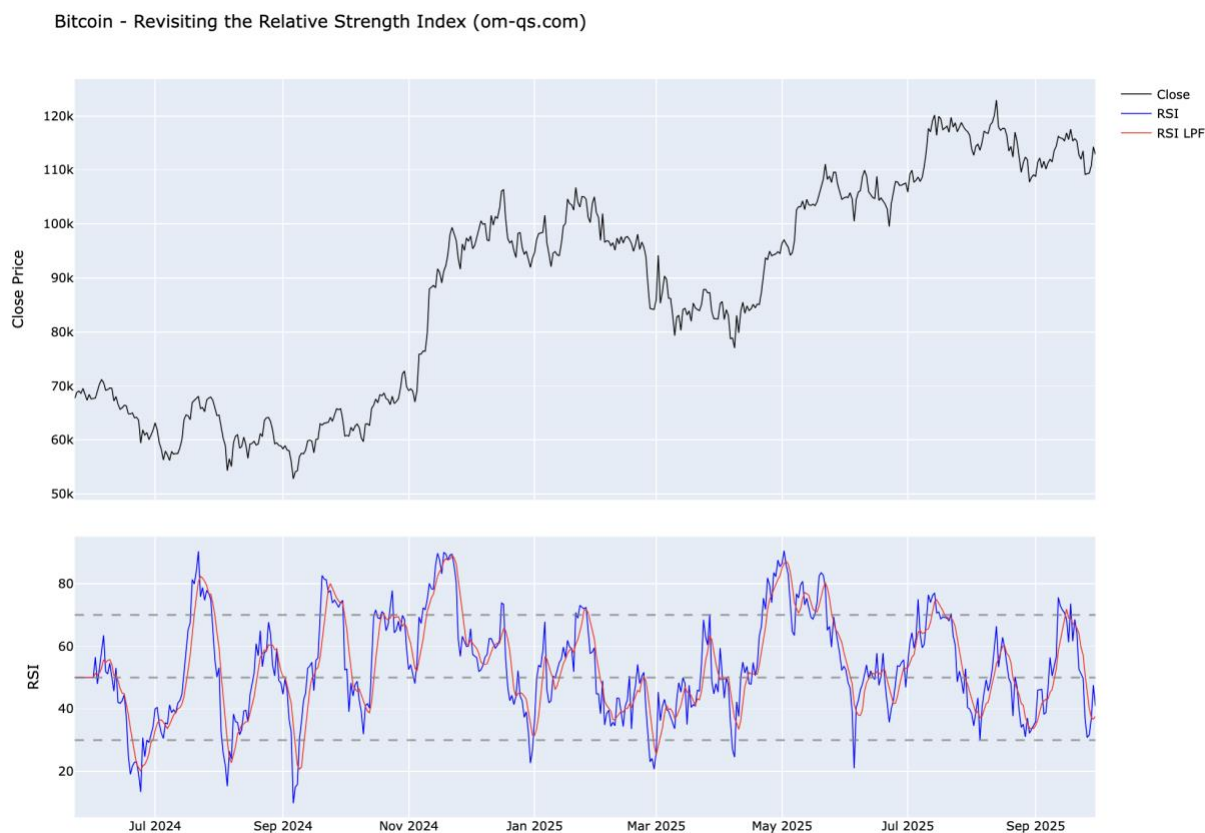

Figure 5 – BITCOIN/USD index in daily data

1) Trend-following persistence.
Throughout the strong rally from late 2024 into early 2025, RSI-LPF(14,5) remained consistently above 50, often holding in the 60–80 range for extended periods. This reflected the sustained dominance of upward momentum and confirmed the presence of a long momentum domain. Conversely, during the corrective phases in mid-2025, RSI-LPF dipped below 50 and remained there, aligning with bearish momentum regimes. These extended periods emphasize RSI's core nature as a trend filter.

2) Oscillator heuristics versus continuation.
Bitcoin provided multiple examples where the classical 70/30 thresholds failed to signal reversals. In late 2024 and mid-2025, RSI exceeded 70 repeatedly, yet price continued to rise sharply, invalidating the "overbought" assumption. Similarly, RSI dipped below 30 during corrections while price continued to fall. These outcomes show that the oscillator heuristic is particularly unreliable in assets prone to strong directional persistence such as Bitcoin.

3) Smoothing and regime clarity.
The 5-period low-pass filter proved especially effective in Bitcoin's volatile environment. Whereas the raw RSI often fluctuated sharply day-to-day, RSI-LPF produced smoother and more stable readings, clearly demarcating the bullish and bearish phases. This highlights the value of smoothing for assets characterized by frequent short-term whipsaws.

4) Divergence as a contextual signal.

In mid-2025, Bitcoin posted higher highs while RSI failed to confirm, producing a bearish divergence. This preceded a moderation in the upward momentum rather than an immediate reversal, consistent with the broader interpretation of divergences as warnings of momentum fatigue rather than deterministic turning points.

For Bitcoin on a daily horizon, RSI's behavior strongly validates the trend-following reinterpretation. The 50-threshold framework with smoothing reliably captured regime persistence across major bull and bear swings, while 70/30 oscillator signals frequently coincided with continuation. Divergences added nuance as contextual warnings but not as standalone signals.

Across equities, foreign exchange, commodities, and cryptocurrencies, the empirical evidence converges on the same conclusion: the Relative Strength Index is most accurately interpreted as a trend-following measure rather than as a contrarian oscillator. In every market and timeframe examined, the neutral threshold at 50—especially when combined with light smoothing—provided a reliable framework for distinguishing momentum regimes and aligning with prevailing price trends. By contrast, the conventional 70/30 overbought–oversold heuristic repeatedly coincided with continuation rather than reversal, undermining its practical value. Divergences, while observable in all asset classes, consistently served as secondary indicators of momentum fatigue rather than deterministic reversal signals. These findings demonstrate that RSI's mathematical nature as a normalized ratio of gains to losses translates consistently across asset classes and horizons, reinforcing its reinterpretation as a robust regime filter.

F. Quantitative Summary

To complement the graphical analysis, we compute two sets of statistics on Bitcoin daily data: (i) the distribution of RSI values across conventional thresholds, and (ii) average forward returns conditional on RSI regimes. These results provide numerical evidence for the reinterpretation of RSI as a trend-following indicator. Tables report results under two sets of headers: "Distributional Analysis," which presents the frequency of RSI values above 70, below 30, and relative to the 50 threshold, and "Forward Returns," which shows the average subsequent returns conditional on these regimes at 1-, 5-, and 10-period horizons. The full Python code used to generate these statistics is provided in the Appendix and is publicly available at the Outspoken Market GitHub repository:
https://github.com/outspokenmarket/omqs-lab.

TABLE 1 — Distribution of RSI(14) regimes (Bitcoin, daily)

Regime	Count	% of observations
RSI<30	27	5.44
RSI<50	215	43.35
RSI>50	271	54.64
RSI>70	91	18.35

TABLE 2 — Mean forward returns (%) conditional on RSI(14) regimes (Bitcoin, daily)

Regime	N obs	Avg FR1	Avg FR5	Avg FR10
RSI<30	27	1.116	3.129	0.830
RSI<50	215	0.102	0.754	1.615
RSI>50	271	0.160	0.507	0.976
RSI>70	91	0.126	0.922	0.427

TABLE 2b — Mean forward returns (%) conditional on RSI–LPF(14,5) 50–threshold (Bitcoin, daily)

Regime	N obs	Avg FR1	Avg FR5	Avg FR10
RSI_LPF<50	210	0.104	0.890	1.566
RSI_LPF>50	276	0.157	0.411	1.020

1) Distributional analysis.

Table 1 reports the frequency of RSI observations above 70, below 30, and relative to the 50 threshold. Over the sample, RSI values greater than 70 accounted for only 18.35% of observations, while values below 30 occurred just 5.44% of the time. By contrast, RSI spent most of the time above or below the 50 line (54.64% and 43.35%, respectively). This confirms that "overbought" and "oversold" levels are rare events, while the 50 threshold functions as the central dividing line between upward and downward momentum domains.

2) Forward returns.

Table 2 summarizes average forward returns conditional on RSI regimes. Results show that RSI > 70 was not followed by negative returns, but instead by small positive returns (e.g., +0.12% at a one-day horizon, +0.92% at five days). Similarly, RSI < 30 coincided with positive short-term bounces (+1.12% after one day, +3.13% after five days), but the effect quickly decayed, and the sample size was limited (27 cases). These findings undermine the validity of the conventional oscillator heuristic, which assumes overbought and oversold levels anticipate reversals.

By contrast, Table 2b evaluates the proposed framework: RSI(14) smoothed with a 5-period low-pass filter, interpreted around the neutral 50 threshold. In this setting, forward returns were systematically higher when RSI-LPF was above 50 than when below 50. For example, average one-day forward return was +0.16% when RSI-LPF > 50, compared to +0.10% when RSI-LPF < 50. At longer horizons, the differentiation persisted, confirming that the 50 threshold provides a more reliable framework for identifying directional momentum regimes.

The numerical results reinforce the visual evidence presented throughout Section III. RSI values above 70 did not imply imminent reversals but often coincided with continued bullish performance. Oversold signals below 30 produced only short-lived bounces. The clearest separation of outcomes arose from the proposed framework: interpreting RSI relative to the 50 threshold, with light smoothing, consistently distinguished long and short momentum domains. This quantitative evidence supports the reinterpretation of RSI as a trend-following indicator, while exposing the limitations of the oscillator view.

Additional evidence from gold on the four-hour horizon (Table 3) confirmed these results. Extreme RSI values above 70 or below 30 were relatively rare and did not systematically anticipate reversals, whereas the 50-threshold framework, particularly when applied to the smoothed RSI, consistently distinguished periods of positive and negative forward returns. Extended large-sample tests further reinforced this robustness. In gold (5,000 four-hour observations), the 50 threshold once again provided the clearest division of momentum states. Likewise, in the S&P 500 (10,000 four-hour observations), the 50 threshold remained the most coherent divider, while oscillator heuristics proved unreliable. Interestingly, in equities, the impact of RSI >50 on forward returns was stronger at short horizons, while longer horizons revealed a degree of mean reversion. Taken together, these findings demonstrate that the trend-following interpretation of RSI is stable across markets and timeframes, but its expression interacts with the structural properties of each asset class.

TABLE 3 — Distribution of RSI(14) regimes (Gold, H4)

Regime	Count	% of observations
RSI<30	25	5.04
RSI<50	215	43.35
RSI>50	271	54.64
RSI>70	116	23.39

TABLE 4 — Mean forward returns (%) conditional on RSI(14) regimes (Gold, H4)

Regime	N obs	Avg FR1	Avg FR5	Avg FR10
RSI<30	25	0.001	-0.036	-0.212
RSI<50	215	0.016	0.126	0.260
RSI>50	271	0.040	0.173	0.330
RSI>70	116	0.038	0.093	0.018

TABLE 4b — Mean forward returns (%) conditional on RSI–LPF(14,5) 50–threshold (Gold, H4)

Regime	N obs	Avg FR1	Avg FR5	Avg FR10
RSI_LPF<50	221	0.025	0.124	0.316
RSI_LPF>50	265	0.033	0.176	0.284

IV.   CONCLUSION AND DISCUSSION

This study revisited the Relative Strength Index (RSI) through the lens of its mathematical formulation, contrasting the traditional oscillator interpretation against a trend-following framework. Across diverse markets—including equities, foreign exchange, commodities, and cryptocurrencies—the evidence converges on a consistent conclusion: RSI functions more effectively as a trend filter than as a contrarian oscillator.

First, the empirical results showed that the conventional 70/30 overbought–oversold thresholds rarely provided reliable reversal signals. In multiple cases, RSI readings above 70 coincided with continued bullish performance, while values below 30 often aligned with further declines. Such outcomes contradict the oscillator heuristic and instead reveal RSI's alignment with trend persistence.

Second, the 50 threshold, particularly when combined with a light 5-period smoothing, consistently demarcated long and short momentum domains. Values above 50 reflected the dominance of average gains, while values below 50 indicated the prevalence of losses. This regime-based interpretation proved robust across timeframes—from intraday to daily horizons—and across asset classes with distinct structural properties. Notably, while cryptocurrencies such as Bitcoin highlighted RSI's ability to capture extended directional persistence, equity indices such as the S&P 500 revealed short-term momentum effects alongside longer-term mean reversion. These nuances suggest that RSI's trend-following role interacts with market microstructure and trading horizons.

Third, divergences between price and RSI were observed in all markets. Consistently, these divergences did not operate as precise reversal triggers but instead as contextual warnings of momentum fatigue. This finding reframes divergence not as a standalone trading signal, but as a supplementary indicator of diminishing strength within ongoing trends.

From a practical perspective, the results highlight a simple but powerful implication: RSI should not be employed mechanically as an overbought/oversold oscillator. Rather, it should be understood as a normalized measure of directional persistence. Traders and analysts can improve decision-making by using RSI to identify whether a market is in a bullish or bearish momentum regime (above or below 50), and by interpreting divergences as auxiliary signs of weakening trends.

From a theoretical standpoint, this reinterpretation resolves long-standing discrepancies in the indicator's application. The oscillator framing is rooted in early technical analysis traditions, yet RSI's underlying formula—a ratio of average gains to average losses—is inherently a measure of momentum balance. Recognizing this reconciles its mathematical structure with its empirical behavior, aligning practice with theory.

In conclusion, RSI is best understood not as a contrarian oscillator but as a trend-following ratio that reliably filters directional regimes across markets and horizons. This reinterpretation challenges conventional textbook applications, offering a clearer conceptual foundation and practical improvements in trading and risk management. Future research may extend this framework by testing alternative smoothing methods, integrating RSI with other regime-detection tools, and exploring its role in algorithmic and machine learning–based strategies.

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AUTHORS

Leandro Guerra – MSc in Finance and Investment Management (University of Salford, UK), founder of the Outspoken Market, Head of Data Science and Analytical Platforms for Experian EMEA/APAC. E-mail: leandro.guerra@outspokenmarket.com