

Cox Stuart Trend Shift

Expert Advisor Documentation

PLATFORM

MetaTrader 5 (MT5)

TYPE

Nonparametric Trend Following

TIMEFRAME

H1 (any timeframe)

WEBSITE

www.algoBot.live

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Overview

Cox Stuart Trend Shift is a distribution-free (nonparametric) trend-direction detector built on the classic **Cox-Stuart sign test for trend**. Rather than fitting a moving average or measuring the slope of a regression line, it asks a purely statistical question of the recent price window: *has the series migrated one way significantly more often than chance would allow?*

The test takes the last **Window** completed closes and splits them into an **early half** and a **late half**. Each early close is paired with the close exactly **Window/2** bars ahead of it. Every pair is scored with a simple sign — **+1** if the later close is higher, **-1** if it is lower, and ties are discarded. Under the null hypothesis of "no trend", the number of positive signs follows a Binomial(m, 0.5) distribution. The surplus of + or - signs is standardised into a signed z-score:

$$z = (S+ - m/2) / \text{sqrt}(m/4)$$

A large positive **z** means the whole window has broadly drifted **up**; a large negative **z** means it has drifted **down**; **z** near zero means there is no directional edge. Because it compares *far-apart* points instead of neighbours, the statistic ignores single-bar noise and only fires when the entire window has genuinely migrated one way — catching persistent trends while they are still young.

What makes it different: The Cox-Stuart sign test is mechanically distinct from Mann-Kendall all-pairs concordance, rank correlation, or Theil-Sen median-slope models. It only counts the sign of far-apart pairs, giving a robust, self-normalising trend gauge that is insensitive to outlier bars and requires no assumptions about the distribution of returns.

How It Works

The Cox-Stuart Statistic

On each newly completed bar, the EA appends the close to a rolling buffer and recomputes the trend statistic over the last `Window` closes (the window is forced even so it splits cleanly). With `c = Window/2` as the split offset, each early close `x[i]` is paired with `x[i + c]`:

- **Later close higher** → count a + sign (`S+`) and a valid pair (`m`).
- **Later close lower** → count a valid pair (`m`) only.
- **Tie** → discarded, contributes to neither.

The counts are then standardised into the signed z-score. If every pair is a tie (`m = 0`), the statistic returns 0 (no signal).

Entry Logic (symmetric long & short)

Entries fire on a **fresh** crossing of the significance threshold — the previous bar's z must have been on the non-significant side and the current bar's z must have just crossed through. This ensures the EA trades the *moment* a trend becomes statistically significant rather than re-entering continuously.

- **LONG** — `z` crosses *up* through `+EntryThreshold` **and** the close is above the fast confirmation SMA.
- **SHORT** — `z` crosses *down* through `-EntryThreshold` **and** the close is below the fast confirmation SMA.

The confirmation SMA (`ConfirmPeriod`) acts as a spike filter: it rejects a significant z reading if price has whipped to the wrong side of its own short-term average, avoiding entries into exhausted spikes. If an opposing position is open when a fresh signal fires, it is closed first (the EA flips into the new direction).

Exit Logic

The EA exits the moment the statistical trend evaporates — that is, when the z-score falls back through zero and loses its directional edge:

- **Close a long** when `z < 0`.
- **Close a short** when `z > 0`.

This "stand down when significance is lost" rule exits before the drift fully decays, rather than waiting for a fixed stop.

Stop Loss & Take Profit

Every trade also carries a hard protective stop and target, both measured in multiples of a simple Average True Range (ATR):

- **Stop loss** = entry $\pm$ `StopAtrMult` $\times$ ATR
- **Take profit** = entry $\pm$ `TargetAtrMult` $\times$ ATR

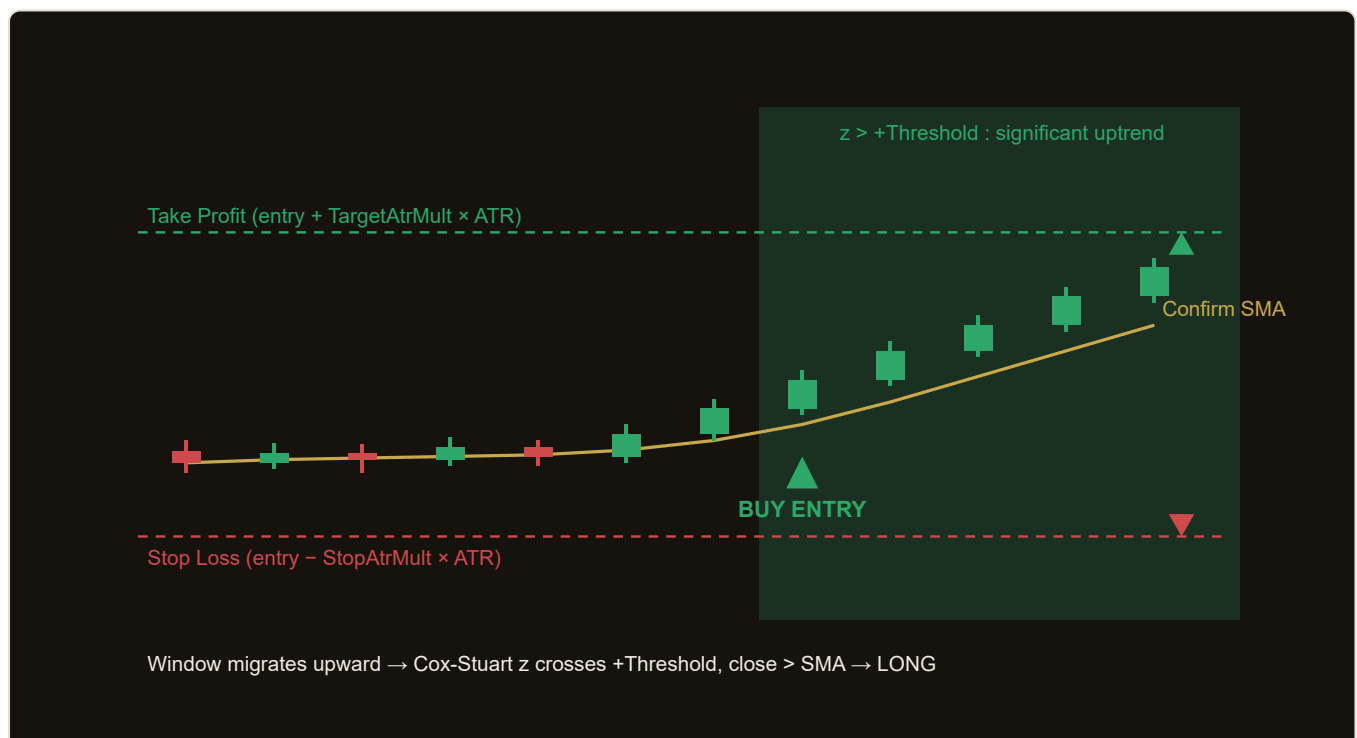
ATR note: The ATR here is a plain arithmetic mean of True Range over `AtrPeriod` bars — deliberately *not* the Wilder/RMA-smoothed `iATR`. The MQL5 port reproduces the C# calculation exactly so that stop and target distances match between backtest and live behaviour.

No Repaint

All statistics are read from **completed** bars (shift ≥ 1) and the EA acts only once per bar, on the bar that just closed. Nothing is computed from the still-forming bar, so signals never repaint. The strategy is single-timeframe — every price read uses the chart's own timeframe, so it runs on whatever period you attach it to.

Strategy in Action

The illustration below shows an example of how the strategy identifies a setup and triggers its entry and exit. This is a simplified, illustrative example for educational purposes — not real market data.



Illustrative example only. Actual market behaviour varies.

Parameters

Parameter	Default	Description
Window	20	Cox-Stuart lookback window of completed closes (forced even; the split point is <code>Window/2</code>). Range 10–60, step 2. Larger = smoother, slower trend confirmation.
EntryThreshold	1.6	The $ z $ the test must reach to declare a significant trend. ≈ 1.64 corresponds to a 95% one-sided confidence level. Range 0.5–3.0, step 0.1. Higher = fewer, stronger signals.
ConfirmPeriod	5	Fast confirmation SMA the close must be on the right side of, to avoid buying spikes. Range 2–20, step 1.
AtrPeriod	14	ATR length (plain mean of True Range) used for stop and target distances. Range 7–30, step 1.
StopAtrMult	2.0	Stop-loss distance expressed as this many ATRs from entry. Range 0.5–5.0, step 0.1.
TargetAtrMult	3.0	Take-profit distance expressed as this many ATRs from entry. Range 0.5–8.0, step 0.1.
Lots	0.10	Fixed trade volume in lots. Range 0.01–1.0, step 0.05.
Magic	42101	Magic number identifying this EA's positions, so it manages only its own trades.

Recommended Settings

The strategy is timeframe-agnostic and runs on whatever period you attach it to. For a balanced signal cadence, the following starting points are suggested:

- **Timeframe:** H1 offers a good balance between noise rejection and responsiveness. M15 or M30 produce more frequent signals; H4 fewer but cleaner.
- **Symbols:** Trending, liquid instruments such as major FX pairs (EUR/USD, GBP/USD, USD/JPY) or index CFDs, where broad directional drift is common.
- **Window:** 20 (default) suits H1. Increase toward 30–40 on lower timeframes to filter more noise; decrease toward 12–16 on higher timeframes for earlier entries.
- **EntryThreshold:** 1.6 ($\approx 95\%$ confidence) is a sensible default. Raise to 2.0+ for stricter, higher-conviction entries; lower toward 1.0 for a more active system.
- **Risk:** Keep `StopAtrMult` $\leq$ `TargetAtrMult` for a favourable reward-to-risk ratio (defaults give $\sim 1.5:1$). Size `Lots` to your account so a full stop risks a small, fixed fraction of equity.

Example configuration (EUR/USD, H1)

Window = 20, EntryThreshold = 1.6, ConfirmPeriod = 5, AtrPeriod = 14, StopAtrMult = 2.0, TargetAtrMult = 3.0, Lots = 0.10. This trades a fresh 95%-significant Cox-Stuart trend confirmed by the fast SMA, protects each position with a 2-ATR stop and 3-ATR target, and exits early whenever the trend statistic collapses back through zero.

Tip: Always validate any parameter set in the MT5 Strategy Tester on your chosen symbol and timeframe before considering live use. Optimise the `Window` / `EntryThreshold` pair first, since together they define how early and how confidently the EA commits to a trend.

How to Install on MetaTrader 5

- 1 Copy `CoxStuartTrendShift.ex5` to your MT5 `MQL5\Experts\` folder
- 2 Restart MetaTrader 5 and refresh the Navigator panel
- 3 Drag the EA onto a chart matching the recommended symbol and timeframe
- 4 Configure the input parameters and click **OK**
- 5 Enable **Algo Trading** in the MT5 toolbar

Risk Warning

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