

Regression R Squared Trend

Expert Advisor Documentation

PLATFORM

MetaTrader 5 (MT5)

TYPE

Trend Following (Trend-Quality Gated)

TIMEFRAME

M15 – H1

WEBSITE

www.algobot.live

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Overview

Regression R Squared Trend is a trend-following Expert Advisor that decides when to trade from the statistical *quality* of the recent trend, not from price crossing a moving average, an oscillator reaching an extreme, or a channel being touched. On every closed bar it fits an ordinary least-squares (OLS) straight line to the last **N** closes and computes the coefficient of determination, **R²** — a number between 0 and 1 that measures how tightly price hugs that fitted line.

R² answers a single question: "*how straight is the recent path?*" — independent of direction. In choppy, random conditions the closes scatter around the fit and R² collapses toward 0. When a genuine trend takes over, the closes cling to the regression line and R² climbs toward 1. The EA acts on the exact bar where R² **freshly crosses up** through a trigger level: the moment a market stops being random and organises into a statistically well-defined line. The regression **slope** then supplies the direction, and the fitted rise over the window supplies an ATR-based volatility check.

Core idea — trade the transition, not the state. The edge is the emergence of order out of noise, captured on the single bar where R² first breaks above the trigger. Entering as the trend is *born* — rather than after it is already obvious — is what keeps entries early. Because every threshold is expressed in ATR units, the same settings adapt across instruments and timeframes.

How It Works

1. Measuring trend quality (R^2)

Each closed bar, the EA fits a straight line $y = \text{intercept} + \text{slope} \cdot x$ (where $x = 0 \dots N-1$, oldest to newest) to the last `RegPeriod` closes and computes the coefficient of determination:

$$R^2 = 1 - (SS_{\text{residual}} / SS_{\text{total}})$$

$SS_{\text{total}} = \sum (\text{close} - \text{mean_close})^2$ total variation of price

$SS_{\text{residual}} = \sum (\text{close} - \text{fitted_value})^2$ variation left unexplained by the line

$R^2 = 0 \rightarrow$ pure noise (price scatters around the fit)

$R^2 = 1 \rightarrow$ a perfectly clean straight line

The same regression is computed twice: once on the **current** window (newest bar = the just-closed bar) and once on the **previous** window (shifted back one bar). Comparing the two R^2 values is what lets the EA detect a *fresh* quality cross.

2. The fresh quality cross

A trend is considered to be *emerging* only on the bar where R^2 transitions from below the trigger to at or above it:

$$\text{freshCross} = (\text{prevR2} < \text{R2Trigger}) \text{ AND } (r2 \geq \text{R2Trigger})$$

If R^2 was already above the trigger on the previous window, no entry is taken — the trend is already established and the early-entry edge is gone. Only the transition bar qualifies.

3. Direction and the volatility filter

Once a fresh cross is detected, two further gates confirm the setup is tradeable:

- **Direction** — the regression `slope` must point the correct way (`slope > 0` for longs, `slope < 0` for shorts). A clean line can slope either way; slope decides the trade side.
- **Volatility significance** — the fitted rise across the window, `slope · (N-1)`, must be at least `SlopeAtrMult × ATR` in magnitude. This rejects a tidy but nearly-flat line whose R^2 is high only because there is barely any movement to explain.
- **Price leads the fit** — for a long, the close must sit *above* the regression end-point; for a short, *below* it. Price confirms it is pulling the line in the trade's direction.

4. Entry rules

All rules are evaluated on a freshly **closed** bar and are fully symmetric:

Long entry

R^2 freshly crosses up through `R2Trigger`

AND

`slope > 0`

AND

`|slope · (N-1)| ≥ SlopeAtrMult × ATR`

AND

close sits above the regression end-point. Buy at Ask; place the stop `AtrStopMult × ATR` below and the target `AtrTpMult × ATR` above.

Short entry

Mirror image: R^2 freshly crosses up through `R2Trigger`

AND

`slope < 0`

AND

the fitted fall clears the ATR threshold

AND

close sits below the regression end-point. Sell at Bid; stop above, target below.

Entries are only considered when the EA is flat (one position per magic number) and when the current spread is no wider than `MaxSpreadPoints`.

5. Exit and active management

Beyond the fixed ATR stop-loss and take-profit bracket attached at entry, the open position is closed early under either of two conditions:

- **Line dissolved** — R^2 decays below `R2Exit`. The straight line has lost its statistical definition, so the trend no longer exists as a clean structure and the trade is exited.
- **Trend reversed** — while the fit is still strong (`$R^2 \geq R2Trigger$`), the regression slope flips against the open trade. A well-defined line now points the other way, which is treated as a genuine reversal rather than noise.

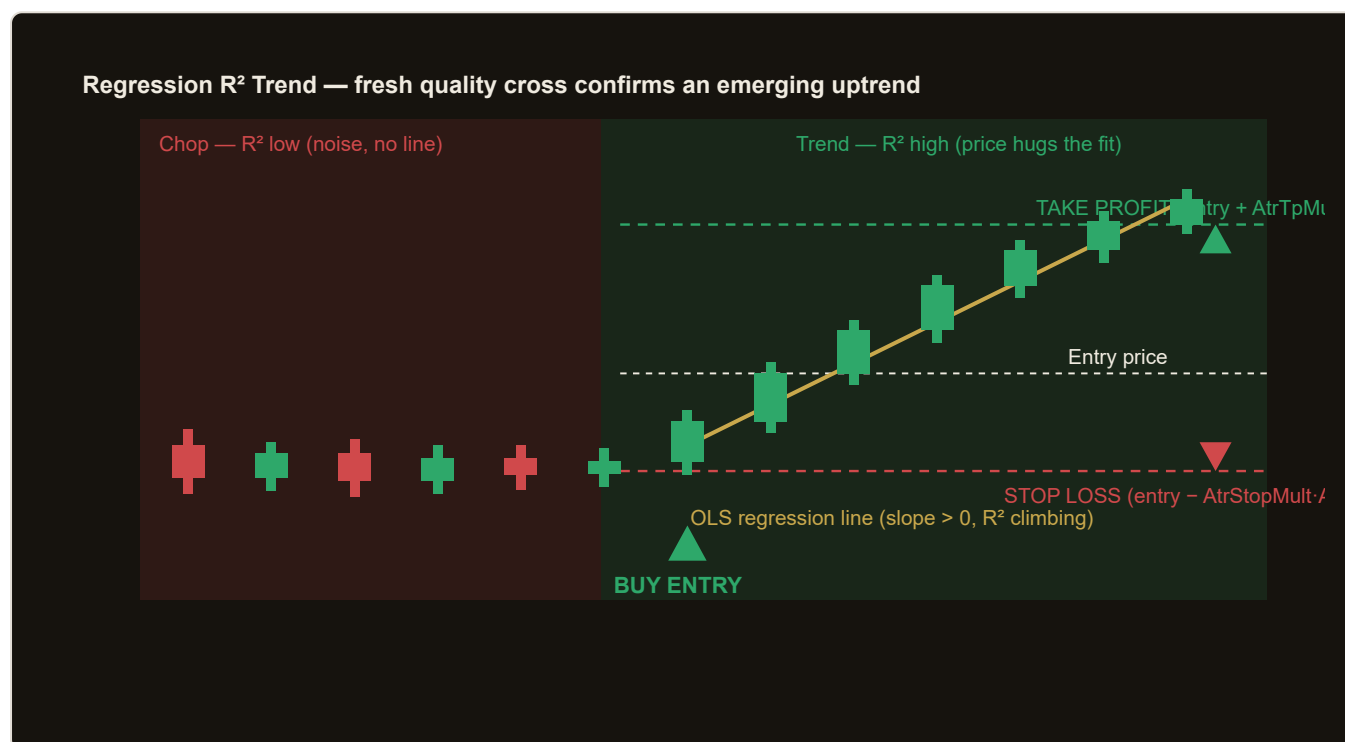
Why two exit conditions? The *dissolved* rule protects against a trend fading quietly into chop; the *reversed* rule protects against a sharp, high-quality turn. Together with the ATR bracket, they give the position three independent ways to close.

6. Volatility self-scaling

Stops, targets and the slope significance test are all expressed in multiples of the Average True Range (`AtrPeriod` lookback). Because every distance breathes with market volatility, the strategy does not need re-tuning between a quiet FX major and a livelier index — the natural home is liquid trending instruments such as EURUSD or US100 on M15–H1.

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
RegPeriod	20	Number of closed bars fitted by the least-squares regression. Range 8–60, step 1. Shorter windows react faster but are noisier; longer windows demand a more sustained line.
R2Trigger	0.55	The R^2 level the fresh cross must break above to confirm an emerging trend. Range 0.30–0.90, step 0.05. Higher values demand a cleaner line before entering.
R2Exit	0.25	Close the trade when trend quality decays below this R^2 (the fitted line has dissolved). Range 0.05–0.60, step 0.05.
SlopeAtrMult	1.0	Minimum fitted displacement over the window, in ATR units. Range 0.0–3.0, step 0.1. Kills nearly-flat but tidy lines whose R^2 is high with little real movement.
AtrPeriod	14	ATR lookback used for volatility scaling of the slope test, stop and target. Range 5–40, step 1.
AtrStopMult	2.0	Stop-loss distance in ATR multiples, placed below (long) / above (short) the entry. Range 0.5–5.0, step 0.1.
AtrTpMult	3.0	Take-profit distance in ATR multiples, placed above (long) / below (short) the entry. Range 0.5–8.0, step 0.1.
MaxSpreadPoints	80	Skip new entries when the current spread (in points) is wider than this. Range 5–300, step 5.
Lots	0.10	Order volume in lots. Range 0.01–1.0, step 0.05.
Magic	5310	Magic number identifying this EA's positions (one position per magic). Range 0–9,999,999, step 1.

Recommended Settings

The defaults above are a balanced starting point for liquid trending markets. Consider the following when adapting to an instrument or timeframe:

- **Instrument & timeframe** — Best suited to trending FX majors (e.g. EURUSD) or an index such as US100 on **M15–H1**. Nothing is hardcoded: every bar read uses the chart's timeframe, so it runs on whatever timeframe the chart or backtest selects.

- **Trend quality (R2Trigger)** — Raise toward 0.65–0.75 for fewer, higher-conviction entries in noisier markets; lower toward 0.45–0.50 to catch trends earlier at the cost of more false starts.
- **Window length (RegPeriod)** — Increase for higher timeframes or slower instruments so the fit spans a meaningful stretch of price action; decrease to react faster on lower timeframes.
- **Risk-to-reward (AtrStopMult / AtrTpMult)** — The 2.0 / 3.0 default gives a 1.5:1 reward-to-risk. Tighten or widen both together to preserve the ratio while adjusting overall exposure.
- **Spread guard (MaxSpreadPoints)** — Keep this tight on major FX pairs; widen it for higher-spread indices or during volatile sessions so valid entries are not skipped.

Tip: Always run a backtest and a period of forward testing on a demo account with your chosen symbol, timeframe and broker before committing real capital. Because thresholds are ATR-scaled, a single parameter set often transfers reasonably across similar instruments, but broker spread and tick behaviour still differ.

How to Install on MetaTrader 5

- 1 Copy `RegressionRSquaredTrend.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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