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Von Neumann Ratio Trend

Expert Advisor Documentation

PLATFORM	TYPE	TIMEFRAME	WEBSITE
MetaTrader 5 (MT5)	Trend Continuation (Breakout)	H1 (single timeframe)	www.algobot.live

Overview

Von Neumann Ratio Trend is a trend-continuation Expert Advisor that only takes breakouts while the price path is certifiably *smooth*. It measures smoothness with the **von Neumann ratio** — the Durbin–Watson statistic applied to the price level itself — which compares the average successive squared change of price to the overall spread of the window:

```
VNR = SUM (x[i] - x[i-1])^2  /  SUM (x[i] - mean)^2
```

The statistic is interpreted as a regime gauge:

- For an i.i.d. random walk of returns, **VNR ≈ 2**.
- When the path is **smooth and persistent** (a genuine trend), each step is tiny relative to how far price has travelled from the window mean, so **VNR collapses well below 1**.
- When the path is **jagged / whipsawing** (chop, mean reversion), successive moves are large versus the modest spread, so **VNR climbs toward or past 2**.

A **low** von Neumann ratio therefore acts as a rigorous "the trend is smooth, keep riding" filter — grounded in successive-difference variance rather than in range statistics, runs of signs, or squared-return autocorrelation used by other regime tools. The EA only participates in breakouts while the path passes this smoothness test, aiming to avoid choppy conditions where breakouts tend to fail.

> **The core idea in one line.** When price is trending smoothly, its successive bar-to-bar changes are small compared with how far it has drifted from its own mean — so the von Neumann ratio is small. This EA only pushes into fresh breakouts while that condition holds.

How It Works

The EA evaluates its logic **once per completed bar** on a single timeframe (the chart's timeframe). On each new bar it checks a three-part condition — a smoothness regime gate, a directional bias, and a breakout trigger — and manages a single position per magic number with a stop-and-reverse rule.

1. Regime gate — smoothness via the von Neumann ratio

The von Neumann ratio is computed over the last `VnrPeriod` closing prices. If the result is invalid, or if **VNR is greater than or equal to** `PersistThreshold`, the path is not considered smooth enough and no trade is taken this bar. Only when **VNR < PersistThreshold** does the EA proceed. A lower threshold makes the "smooth trend" gate stricter.

2. Directional bias — net displacement

Direction is set by the net displacement of price over the `TrendPeriod` window: the current close minus the close `TrendPeriod` bars ago.

- **Up bias** (net displacement positive) → only long breakouts are considered.
- **Down bias** (net displacement negative) → only short breakouts are considered.
- If displacement is exactly zero, the EA does nothing this bar.

3. Breakout trigger — channel escape

The just-completed bar must close beyond the high/low channel formed by the preceding `TriggerLookback` bars:

- **Long signal:** up bias *and* the trigger bar closes **above** the highest high of the preceding channel.
- **Short signal:** down bias *and* the trigger bar closes **below** the lowest low of the preceding channel.

This confirms a fresh push in the direction of a path that has already been certified as smooth.

4. Entry, exits & position management

The EA holds at most one position per magic number and uses a **stop-and-reverse** scheme:

- On a **long signal**: any open short is closed first, then a long is opened if none exists.
- On a **short signal**: any open long is closed first, then a short is opened if none exists.

Protective exits are volatility-scaled using the Average True Range over `AtrPeriod` bars:

- **Stop loss** = entry price ± (`AtrStopMult` × ATR).
- **Take profit** = entry price ± (`AtrTargetMult` × ATR).

Longs enter at the Ask with SL below and TP above; shorts enter at the Bid with SL above and TP below. A position is otherwise closed only by its SL/TP or by an opposite stop-and-reverse signal.

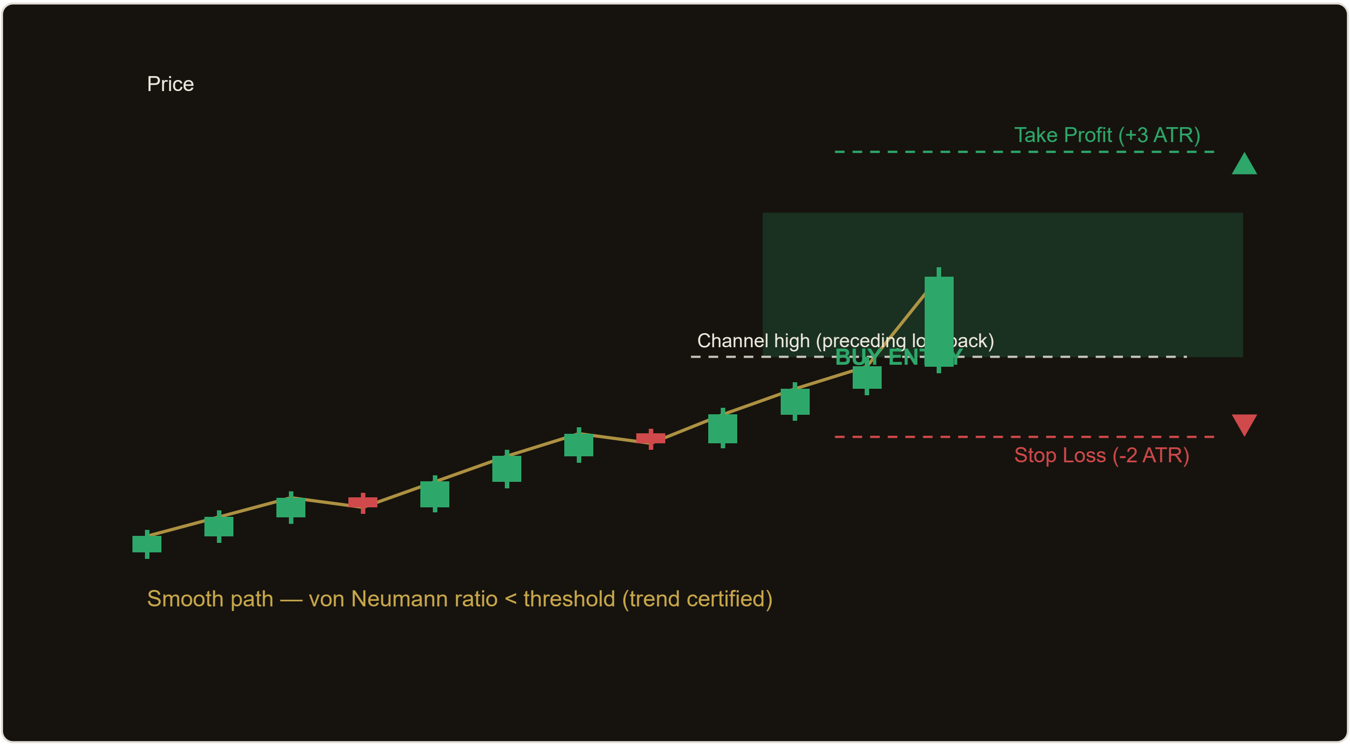
Worked example — long entry

Over the last 40 closes the von Neumann ratio reads `0.72`, comfortably below the default threshold of `1.10` — the path is smooth. Net displacement over the last 30 bars is positive (up bias). The just-closed bar prints a close above the highest high of the preceding 8-bar channel. All three conditions align, so the EA buys at the Ask, places the stop 2×ATR below and the target 3×ATR above.

Why "smooth" matters. Breakouts that occur inside choppy, mean-reverting price action frequently reverse. By requiring VNR to be low, the EA restricts its breakouts to conditions where recent price has behaved like a persistent glide rather than a saw-tooth — the environment in which continuation is most plausible.

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
VnrPeriod	`40`	Window (in closes) over which the von Neumann ratio is measured. Range 20–120, step 5.
PersistThreshold	`1.10`	VNR must be *below* this value to trade; lower is a stricter "smooth trend" gate. Range 0.60–1.80, step 0.05.
TrendPeriod	`30`	Net-displacement window (bars) used to set the trade direction. Range 10–100, step 5.
TriggerLookback	`8`	Number of bars before the trigger bar whose high/low channel must be cleared for a breakout. Range 3–30, step 1.
AtrPeriod	`14`	ATR period used for stop-loss and take-profit sizing. Range 5–50, step 1.
AtrStopMult	`2.0`	Stop-loss distance as a multiple of ATR. Range 0.5–6.0, step 0.1.
AtrTargetMult	`3.0`	Take-profit distance as a multiple of ATR. Range 0.5–10.0, step 0.1.
Lots	`0.10`	Order volume in lots. Range 0.01–1.0, step 0.05.
Magic	`4271`	Magic number identifying this EA's positions; one position is held per magic.

Recommended Settings

The defaults are a balanced starting point for liquid FX majors on intraday-to-swing timeframes. Consider the following when tuning:

- **Timeframe:** designed for a single timeframe — the chart it runs on. H1 is a sensible default; H4 or D1 suit slower, cleaner trends.
- **Smoothness gate (`PersistThreshold`):** lower it (e.g. 0.80–0.95) to demand smoother, more persistent trends and trade less often; raise it (e.g. 1.30–1.50) to participate in more breakouts at the cost of choppier conditions.
- **VnrPeriod:** longer windows react more slowly and smooth out short bursts of noise; shorter windows adapt faster but are noisier.
- **Breakout tightness (`TriggerLookback`):** smaller values fire earlier on shallow channels; larger values require a more decisive escape.
- **Risk (`AtrStopMult` / `AtrTargetMult`):** the defaults give a 1:1.5 risk-to-reward. Keep the target multiple above the stop multiple to preserve a positive reward skew.

> **Tip.** Because entries are volatility-scaled through ATR, the same parameter set adapts its stop and target distances automatically as market volatility changes — no manual re-sizing per instrument is required. Always validate on the Strategy Tester with your broker's spread before going live.

> **Position sizing.** The `Lots` value is fixed and does not scale to account equity. Choose a lot size appropriate to your balance and risk tolerance, and test thoroughly on a demo account first.

How to Install on MetaTrader 5

1. Copy `VonNeumannRatioTrend.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

Trading foreign exchange, CFDs, and other leveraged financial instruments involves substantial risk of loss and is not suitable for all investors. The strategies and tools described in this document are provided for **educational purposes only** and do not constitute financial advice, investment recommendations, or solicitation to trade. Always consult a qualified financial adviser before making trading decisions. Past backtest performance is not indicative of future results.