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Empirical Mode Regime Shift

Expert Advisor Documentation

PLATFORM	TYPE	TIMEFRAME	WEBSITE
MetaTrader 5 (MT5)	Trend-Following / Regime Detection	H1 (any timeframe)	www.algobot.live

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Overview

Empirical Mode Regime Shift is a trend-following Expert Advisor built on John Ehlers' Empirical Mode Decomposition (EMD). Rather than reacting to raw price, it first decomposes the market into a fast **cycle** component and a slower **trend** component, then classifies the market into one of three regimes — *uptrend*, *downtrend*, or *consolidation* — and trades only when the regime genuinely flips.

The core idea is that a two-pole band-pass filter isolates the dominant swing oscillation of price while rejecting both the very slow drift and the tick-level noise. When the market merely oscillates, the average of that cycle hugs zero; when a real trend develops, the cycle spends more time on one side of zero and its mean drifts away. The EA's distinguishing feature is that the trigger levels are **adaptive**: instead of fixed thresholds, it averages the market's own recent cycle peaks and valleys, so the bands expand and contract with volatility and require no per-symbol tuning.

Because the trend estimate must clear the market's own recent swing amplitude before a trade is committed, the strategy filters out the whipsaws that plague fixed-threshold trend systems in choppy conditions, while still catching genuine regime changes early thanks to the near-zero-lag band-pass. Long and short logic are exact mirrors, and every protective stop and target is ATR-scaled so risk travels with volatility.

> **In one sentence:** Empirical Mode Regime Shift band-passes price into a cycle, measures whether that cycle's average has drifted beyond the market's own adaptive peak/valley bands, and reverses onto the new side each time the regime flips — with ATR-based stops and targets.

How It Works

1. Band-pass the price (isolate the cycle)

Each completed bar feeds its median price, `(High + Low) / 2`, into Ehlers' two-pole band-pass filter tuned to the dominant `CyclePeriod` with a fractional `Bandwidth`. The filter isolates the swing oscillation and discards both slow drift and fast noise:

```
beta  = cos(2*pi / N)
gamma = 1 / cos(4*pi*delta / N)
alpha = gamma - sqrt(gamma^2 - 1)
BP    = 0.5*(1-alpha)*(P - P[2]) + beta*(1+alpha)*BP[1] - alpha*BP[2]
```

Here `N` is the `CyclePeriod` and `delta` is the `Bandwidth`. A smaller bandwidth means a narrower, tighter isolation of the cycle.

2. Trend-of-cycle

The trend estimate is simply the mean of the band-pass output `BP` over the last `CyclePeriod` bars. In a purely oscillating market this mean sits near zero because the cycle spends equal time above and below the line. When price begins to trend, the cycle becomes lopsided and the mean drifts away from zero — positive for an emerging uptrend, negative for a downtrend.

3. Adaptive peak / valley bands

This is the EMD signature. Over a longer `PeakWindow`, the EA locates every interior *peak* (a bar where `BP` is higher than its neighbours on both sides) and every interior *valley* (lower than both neighbours), then averages them. The trigger bands are a fraction of those averages:

```
upperBand = ThresholdFraction * avgPeak     (positive in a normal cycle)
lowerBand = ThresholdFraction * avgValley   (negative in a normal cycle)
```

If no interior turning point exists yet in the window, the EA falls back to the window's extreme value. Because the bands are derived from the market's own recent swing amplitude, they self-scale to volatility — wide bands in energetic markets, tight bands in quiet ones.

4. Regime classification

- **Uptrend (+1):** `trendOfCycle > upperBand` and `upperBand > 0`
- **Downtrend (-1):** `trendOfCycle < lowerBand` and `lowerBand < 0`
- **Consolidation (0):** anything in between — no trend trade

Entry logic — trade only on a regime flip

The EA acts only when the regime *changes*, and long/short rules are exact mirrors:

- **Flip up:** the regime turns to +1 having not been +1 on the previous bar → close any short and open a long.
- **Flip down:** the regime turns to -1 having not been -1 previously → close any long and open a short.
- **Consolidation holds:** when the regime cools to 0, the current position is *held* — the trend has merely paused, it has not reversed. No new trade is taken until a fresh flip occurs.

Exit logic — stop, target, and reversal

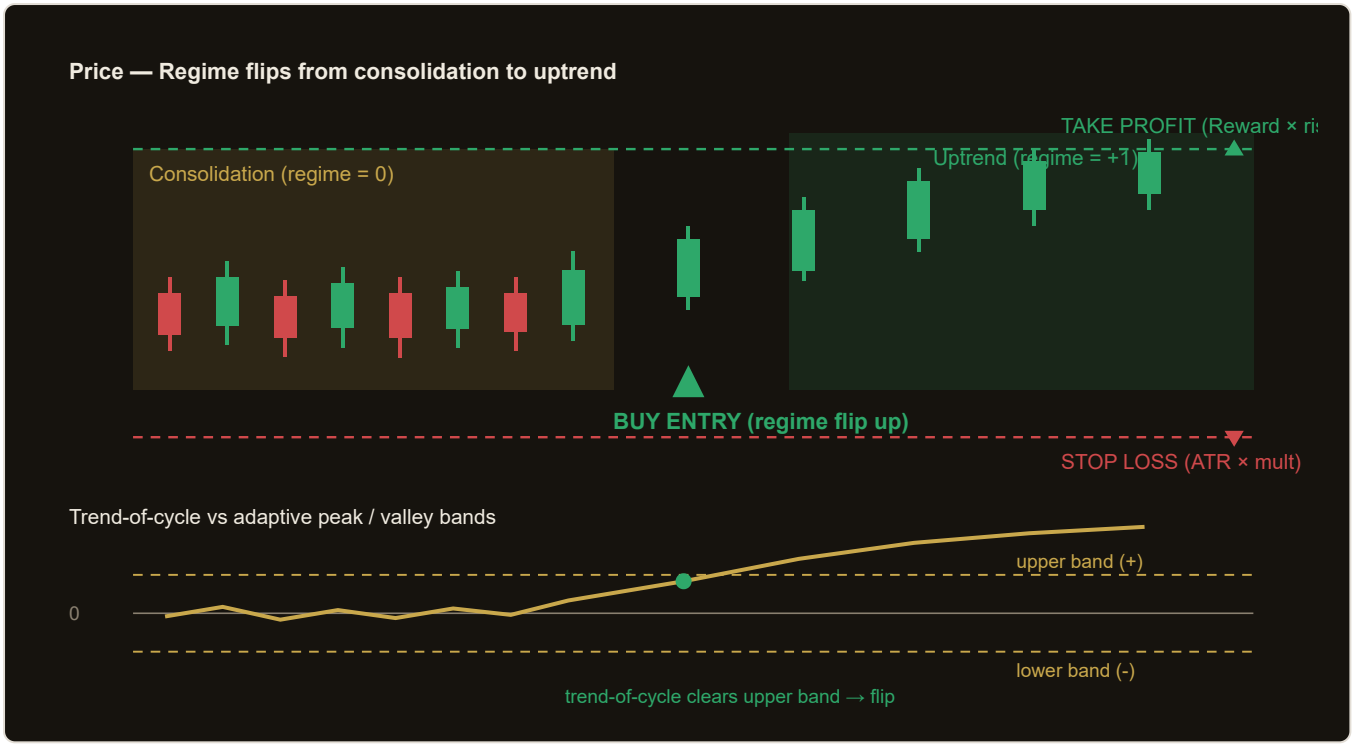
Positions leave the market in one of two ways:

- **ATR stop / target:** on entry the stop is placed `AtrStopMult × ATR` away from price, and the take-profit at `RewardRisk ×` that stop distance. With defaults, a 2.0× ATR stop and a 2.0 reward-to-risk give a target 4.0× ATR away.
- **Regime reversal:** if the opposite regime flips before the stop or target is hit, the existing position is closed and a new one is opened on the other side — the strategy is always aligned with the current regime.

> **Single-timeframe design.** Every bar query uses the chart's primary timeframe, so the EA runs entirely on whatever timeframe you attach it to. There is no multi-timeframe dependency to configure.

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
CyclePeriod	`20`	Dominant cycle length the band-pass is tuned to, and the window for the trend-of-cycle mean. Range 10–40, step 2.
Bandwidth	`0.30`	Band-pass fractional bandwidth. Smaller values narrow and tighten the cycle isolation. Range 0.10–0.60, step 0.05.
PeakWindow	`50`	Window over which band-pass peaks and valleys are averaged into the adaptive bands. Range 20–100, step 5.
ThresholdFraction	`0.50`	Fraction of the average peak/valley used as the regime trigger band. Higher = stricter (fewer, later signals). Range 0.20–0.90, step 0.05.
AtrPeriod	`14`	ATR lookback used to size the protective stop distance. Range 7–30, step 1.
AtrStopMult	`2.0`	Stop-loss distance as a multiple of ATR. Range 1.0–4.0, step 0.25.
RewardRisk	`2.0`	Take-profit distance as a multiple of the stop distance (reward-to-risk ratio). Range 1.0–5.0, step 0.5.
Lots	`0.10`	Fixed order volume in lots. Range 0.01–1.0, step 0.05.
Magic	`5271`	Magic number identifying this EA's positions so it manages only its own trades.

Recommended Settings

The strategy is symbol-agnostic thanks to its self-scaling adaptive bands, but the defaults are a sensible starting point on liquid FX majors.

- **Symbol:** Major FX pairs (e.g. EURUSD, GBPUSD, USDJPY) or liquid indices with clean cyclical behaviour.
- **Timeframe:** H1 is a good default; the band-pass and adaptive bands adapt to whatever timeframe you attach.
- **CyclePeriod / Bandwidth:** Keep near defaults (20 / 0.30) first; raise `CyclePeriod` for slower instruments, narrow `Bandwidth` for cleaner but slower cycle isolation.
- **ThresholdFraction:** Raise toward 0.60–0.70 to demand stronger regime confirmation (fewer whipsaws, later entries); lower toward 0.30–0.40 for earlier, more frequent signals.
- **Risk sizing:** Leave `AtrStopMult` at 2.0 and `RewardRisk` at 2.0, then tune `Lots` to your account so a single stop-out risks only a small fraction of equity.

Example configuration — EURUSD H1 (balanced)

CyclePeriod = 20, Bandwidth = 0.30, PeakWindow = 50, ThresholdFraction = 0.50, AtrPeriod = 14, AtrStopMult = 2.0, RewardRisk = 2.0, Lots = 0.10. This gives a stop of 2× ATR and a target of 4× ATR, entering only when the trend-of-cycle clears the market's own recent swing amplitude.

> **Tip:** Always run a backtest across several years and market conditions with your chosen symbol and timeframe before going live. Because the bands are adaptive, the same settings can behave differently across instruments — verify, then forward-test on a demo account.

How to Install on MetaTrader 5

1. Copy `EmpiricalModeRegimeShift.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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