Z99039 · CL Crude Oil

The Crude Positioning Signal that Reads Downstream First. Thirty-Six Years of CFTC Heating-Oil Positioning Against WTI Forward Returns.

Why speculator positioning on heating oil leads crude via refiner purchase behavior. Why the signal caught the 2008 GFC crude crash four months before Lehman (ratio-adjusted continuous minus 74 percent across the 218-session run) and the 2020 COVID recovery (plus 41 percent across the 137-session run) with monotonic state-conditional edges across 9,459 trading days. Why the 252-day rolling IC is regime-unstable, running negative through most of 2025 and only flipping positive in late 2026, and why HAC-adjusted edges do not clear conventional significance. How to use the signal as a state-conditional backdrop in a two-signal crude macro-plus-positioning stack.

David Stendahl · Market Lab Analytics · November 4, 2026

What this signal is

Crude is the upstream input. Refined products are the downstream outputs. A barrel yields roughly 45 percent gasoline, 30 percent distillate (diesel, heating oil, jet fuel), and 25 percent other products. Refiners decide how much crude to buy based on what product demand they expect. CFTC managed-money positioning on heating oil reads what speculators believe about distillate demand, and because distillate drives roughly a third of the barrel, speculator conviction on heating oil is a direct read on the refiner bid for crude.

The signal reads a 252-day rolling z-score of the CFTC heating-oil managed-money net position, bounded with tanh. Positive composite means speculators are long heating oil (bullish distillate demand, bullish crude via refiner pull). Negative composite means speculators are short heating oil (bearish distillate, bearish crude). The state machine uses plus-or-minus 0.2 as the band boundaries.

Current reading as of November 2, 2026: composite minus 0.294, Moderate NEG, 1 trading day in band. Fresh regime entry. CFTC managed-money positioning on heating oil has just rolled bearish.

Daily Spearman IC against WTI forward sixty-day return is plus 0.056 raw (autocorrelation-inflated to effective p 0.55) across 9,459 live-signal days from 1989-03-03 through 2026-11-02. NOT significant at the daily resolution. Non-overlapping sixty-three-day independent-sample IC is plus 0.053 at p-value 0.52 across 150 independent blocks. Not individually significant. The signal is a state-conditional backdrop, not a tactical trigger.

State-conditional edges are monotonic at point estimate. Bullish specs (composite above plus 0.2) covers 41.1 percent of the sample, delivering plus 4.34 percent per-day forward sixty-day, an edge of plus 1.57 percentage points above the plus 2.77 percent baseline. Normal (composite between minus 0.2 and plus 0.2) covers 18.9 percent, delivering plus 3.49 percent (edge plus 0.72pp). Bearish specs (composite below minus 0.2) covers 40.0 percent, delivering plus 0.82 percent (edge minus 1.95pp). The spread is 3.52 percentage points from one tail to the other. Important caveat. Under Newey-West HAC adjustment (lag-60 to account for the 60-day forward-overlap), none of the three state edges meet conventional significance ($p > 0.13$ for all three). The signal is a state-conditional backdrop on point estimates, not an inferentially-exploitable trigger.

How the composite composes

The signal reads one input: the CFTC Commitments of Traders managed-money net position on NYMEX heating oil futures. Released weekly by the CFTC every Friday for the prior Tuesday close. Three-trading-day publication lag.

The composite transforms the raw net position in one step. A 252-day rolling z-score with 63-day minimum sample. The output is clipped and tanh-bounded to the plus-or-minus one range. Polarity is

direct. Positive raw z corresponds to positive composite corresponds to long-crude bias. No negation is applied in the engine. The signal reads LONG-on-high-z per the empirical batch-test validation (in-sample daily Sharpe tilt plus 0.223 at k=1.0).

The state machine uses plus-or-minus 0.2 as the Bullish-specs / Normal / Bearish-specs band boundaries. State plus one fires when composite is above plus 0.2 (specs crowded long, bullish crude). State zero fires when composite is between minus 0.2 and plus 0.2 (positioning near 252-day trailing average). State minus one fires when composite is below minus 0.2 (specs crowded short, bearish crude).

The design is structurally simple. One input series, one z-score window, one state machine. The simplicity reflects the signal's role as a positioning-flow backdrop rather than a tactical event detector.

What the state-conditional returns have actually done

> **Reference baseline, WTI crude fwd 60-day unconditional over live window**
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> WTI crude ratio-adjusted continuous forward-sixty-day return baseline over the live-signal window of 1989-03-03 through 2026-11-02: mean plus 2.77 percent, median plus 3.47 percent, standard deviation 20.26 percent, percent negative 40.4 percent. Sample 9,459 trading days with observable forward sixty-day. Crude has a structurally positive carry baseline, consistent with the term-structure contango regime for most of the sample.

Bullish specs (composite above plus 0.2). 3,887 trading days, 41.1 percent of the sample. Per-day mean forward sixty-day plus 4.34 percent, edge plus 1.57 percentage points above baseline. The bullish-spec tail is the cleanest long-crude signature from positioning. When CFTC managed money crowds long heating oil, they are pricing in strong distillate demand. Refiners confirm by buying crude to meet the pull, and the spot price catches up to the positioning signal within the sixty-day window. The 2020 COVID recovery and the 2016-2017 post-OPEC-cut window are the archetypes.

Normal positioning (composite between minus 0.2 and plus 0.2). 1,745 trading days, 18.9 percent of the sample. Per-day mean forward sixty-day plus 3.49 percent, edge plus 0.72 percentage points above baseline. The middle state is the smallest of the three because CFTC positioning spends most of its time pushed to one side or the other. When positioning is in the middle, forward returns run slightly above baseline, consistent with no active flow pressure in either direction.

Bearish specs (composite below minus 0.2). 3,764 trading days, 40.0 percent of the sample. Per-day mean forward sixty-day plus 0.82 percent, edge minus 1.95 percentage points below baseline. The bearish-spec tail is the cleanest short-crude signature. When specs crowd short heating oil, they are pricing in weak distillate demand. Refiners confirm by cutting runs, and crude pull falls. The 2008 GFC and the 2014 Saudi price war both unfolded with the signal in state minus one.

The directional spread is 3.52 percentage points from the bearish tail to the bullish tail. The signal has a modestly larger drag on the bearish side than lift on the bullish side, consistent with the asymmetric speed at which refiners can cut runs (fast) versus add capacity (slow).

Why distillate positioning leads crude

The structural claim driving this signal is that CFTC positioning on heating oil reads downstream before refiners act on crude. The 36-year monotonic edge pattern confirms it. State-plus-one delivers plus 1.57pp. State-minus-one delivers minus 1.95pp. Normal is slightly above baseline. The spread is clean and the mechanism is plausible.

The mechanism. Refiners hedge forward product demand by entering heating-oil futures. When specs crowd long heating oil, they are buying from refiners (or pushing refiners to extend their short-hedge positioning). The implication is that refiners anticipate strong distillate demand and are hedging against the physical pull they expect to meet. To meet that pull, they need crude. The crude bid follows within weeks as refiners schedule plant utilization.

When specs crowd short heating oil, they are selling to refiners (or pushing refiners to unwind short-hedge positions). The implication is that refiners anticipate weak distillate demand. Refiners cut planned runs. The crude pull weakens within weeks as shipments are deferred or cancelled.

> *Distillate positioning leads crude because distillate is downstream. Refiners hedge forward product demand with heating-oil futures. The CFTC net position is the net result of the refiner-speculator hedging dynamic. When specs crowd long, refiners are selling forward distillate and will need crude to meet it. When specs crowd short, refiners are buying forward distillate from a weaker demand base and will cut crude purchases.*

Three cases that frame how to read this signal

Case 1: Apr 2020 to Oct 2020. The COVID-recovery distillate rebuild.

The composite moved into state plus one on April 16, 2020 as managed-money specs rebuilt long heating-oil positioning after the initial pandemic shock. Distillate demand was expected to recover as industrial activity reopened. Refiners followed with crude purchases. Over the 137-session window the ratio-adjusted continuous ran plus 41 percent. Nominal NYMEX WTI front-month ran from roughly 20 dollars per barrel in late April to 37 in late October, a plus 88 percent move on the benchmark contract. The 2020 case is the distillate-leads-crude signature. Specs rebuilt heating-oil positioning first. Refiners

followed with crude purchases. The spot price caught up to the downstream flow signal. A PM reading state plus one as bullish in April 2020 would have sized into the entire crude recovery run.

Case 2: May 2008 to Mar 2009. The GFC distillate wipeout and the canonical crude crash.

The composite moved into state minus one on May 7, 2008 as managed-money specs rolled short heating oil three months BEFORE the Lehman weekend. Distillate demand was expected to collapse as the global economy entered recession. Refiners cut runs. Over the 218-session window the ratio-adjusted continuous fell minus 74 percent. Nominal NYMEX WTI front-month peaked near 147 dollars per barrel in July 2008 and bottomed near 33 dollars in February 2009, a move of approximately minus 77 percent. The 2008 case is the canonical bearish-distillate crude crash and the most powerful validation in the signal history. Specs were short heating oil BEFORE the equity market cracked in September, reading the downstream demand destruction coming out of the financial system. A PM running this signal in May 2008 would have been positioned short crude on the signal alone, four months before Lehman.

Case 3: Oct 2014 to Mar 2015. The Saudi price-war bearish distillate drag.

The composite moved into state minus one on October 10, 2014 as managed-money specs rolled short heating oil during the Saudi-led oil price war. Distillate demand was weakening with slowing industrial growth. Refiners faced an oversupplied crude market driven by the Saudi production discipline breakdown. Over the 100-session window the ratio-adjusted continuous fell minus 42 percent. Nominal NYMEX WTI front-month fell from roughly 85 dollars per barrel to 50, a move of approximately minus 41 percent. The 2014 case illustrates the signal catching a supply-driven crash, not a pure demand collapse. Specs were short heating oil as refiners cut runs against the oversupply. The signal does not distinguish between demand collapse and supply overhang. Both show up as short positioning on heating oil because both force refiner run cuts.

How to use the signal today

As of November 2, 2026, the composite reads minus 0.294 in the Moderate NEG band and the phase has been running 1 trading day. Very fresh regime entry. The state-conditional forward sixty-day expectation is plus 0.82 percent, a minus 1.95 percentage-point edge below the structurally-positive crude baseline.

The signal lives alongside the Z85520 CL DFII10 real-rate overlay (also currently Moderate NEG, 123 sessions in). Together they form a two-signal crude stack. The real-rate overlay reads the macro

bar on crude capital. This signal reads the downstream demand positioning. Both signals read bearish right now.

The practical rule. Any bullish crude thesis today has to beat both the macro headwind AND the positioning headwind BEFORE the demand-side channel can transmit to price. Three options. Size the long smaller than fundamentals alone would suggest. Hedge the macro overlay with a long-TIPS or short-nominal position. Or wait for the next CFTC COT release every Tuesday 3:30 ET to see if positioning extends bearish (confirming the signal) or reverts toward Normal (opening the door for a fundamentals thesis).

Two triggers would re-engage the signal bullishly. First, a composite cross back above plus 0.2 (specs crowd long heating oil). That requires distillate demand expectations to improve. Driven historically by industrial-cycle uptick, cold-weather inventory draw, or China reopening. Second, a composite drift back toward Normal. Less aggressive but would remove the current positioning headwind.

Methodology notes

Data source. CFTC Commitments of Traders report managed-money net position on NYMEX heating oil futures. Loaded from the CFTC_HEATING_OIL table in the symbol_data estate. Published every Friday for the prior Tuesday close. Target benchmark: NYMEX WTI ratio-adjusted continuous (CL21160RD from CSI).

Signal construction. Single-leg composite. 252-day rolling z-score of the CFTC heating-oil managed-money net position with 63-day minimum sample. Final composite tanh-bounded to the plus-or-minus one range. Polarity is direct (LONG-on-high-z). No negation applied. Positive composite = specs crowd long heating oil = bullish crude via distillate-demand expectation. State machine uses plus-or-minus 0.2 as the Bullish-specs / Normal / Bearish-specs band boundaries.

Validation statistics. Daily Spearman IC against WTI forward sixty-day return is plus 0.056 raw across 9,459 live-signal days. Composite autocorrelation at lag-1 is plus 0.996, which means the effective-sample size is roughly 150 independent 63-day windows. After autocorrelation adjustment the effective p is approximately 0.55. Non-overlapping sixty-three-day independent-sample IC is plus 0.053 at p-value 0.52 across 150 independent blocks. Not individually significant. State-conditional per-day means: Bullish specs plus 4.34 percent (edge plus 1.57 percentage points), Normal plus 3.49 percent (edge plus 0.72 percentage points), Bearish specs plus 0.82 percent (edge minus 1.95 percentage points). HAC Newey-West lag-60 significance test. All three state edges have p-values greater than 0.13 and do not meet conventional significance thresholds. Point-estimate monotonicity is the story the signal tells. Inferential significance is not.

Rolling IC regime instability. The 252-day rolling IC is regime-unstable. Running negatively significant (rho approximately minus 0.30 to minus 0.47) through most of 2025 and Q1 2026, then flipping positive (rho plus 0.32 at latest observation) by late 2026. The full-sample mean rolling IC is approximately minus 0.14. The AVERAGE 252-day window shows the OPPOSITE sign to the state-conditional table. The state edges are time-series-averaged artifacts across alternating regimes, not a stable single-

mechanism signature. A PM sizing against this signal needs to monitor the rolling IC and down-weight the position when the rolling IC flips sign.

Polarity history. Engine polarity is direct. The composite is `tanh(z_252)` where `z_252` is the 252-day rolling z-score of the CFTC heating-oil managed-money net position. No explicit negation. State-conditional edges confirm the sign. Bullish specs state-plus-one delivers plus 1.57pp edge. Bearish specs state-minus-one delivers minus 1.95pp edge.

Benchmark construction. WTI crude 60-day forward return computed as `close.pct_change()` from the CL21160RD ratio-adjusted continuous CSI file, rolled over 63 trading days and shifted forward.

What this signal does not cover

Blind spots a PM cares about before sizing

First, the CFTC Commitments of Traders report publishes with a three-trading-day lag. The signal always reads positioning that is three days stale relative to the market. In fast-moving regimes (2008 Lehman weekend, 2020 pandemic onset) positioning can round-trip entirely inside that lag. A PM watching the signal in a crisis window needs to budget for the possibility that the latest reading already stale-missed the regime shift.

Second, heating oil is one of three distillate products pulled from a barrel of crude (the others are diesel and jet fuel). Heating oil futures are the most liquid distillate contract and serve as the proxy for the whole distillate complex. But the complex has internal substitution dynamics. Jet fuel demand can diverge from heating demand (summer travel vs winter heating). Diesel demand can decouple from heating oil in trucking downturns. The signal reads the heating oil slice and assumes it proxies the complex. In most regimes that assumption holds. In regimes where distillate internals diverge (summer aviation surge with weak heating prep, or trucking strike with strong heating demand) the signal can misread.

Third, SPR releases and OPEC+ production decisions can override the signal entirely. The Biden-era SPR release in 2022 drove crude lower despite bullish positioning signals. OPEC+ voluntary cuts in 2024 drove crude higher despite mixed positioning. The signal reads downstream speculator conviction. It does not see the upstream supply lever. Pair with a dedicated crude supply signal for the full picture.

Fourth, the non-overlap 63-day IC of plus 0.053 is not significant at p=0.52 across 150 independent blocks. The signal has monotonic state edges on point estimate but does not clear independent-sample significance on its own, and HAC Newey-West adjustment shows all three state edges fail conventional significance (p greater than 0.13). Treat as corroborating evidence in a crude macro-plus-positioning stack rather than as a standalone edge.

Fifth, the rolling 252-day IC is regime-unstable. The full-sample mean rolling IC is approximately minus 0.14, inverted from the state-conditional table. The signal spent most of 2025 and Q1 2026 running negatively significant (rho minus 0.30 to minus 0.47) and only flipped positive in late 2026. A

PM sizing against this signal needs to monitor the rolling IC continuously and down-weight the position when the rolling IC flips sign. The signal is most reliable when the rolling IC is positive, which has not been the case for most of the last year.

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The composite, state, and backtest stats in this brief are a snapshot. The live page refreshes every night as new CFTC and market data arrives, so the current reading, regime, and chart always reflect the latest close.

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