The Grain Transport Cost Composite Signal, A Macro Supply-Chain Lens

Reading an equal-weighted z-score composite of five USDA AMS Grain Transportation Report cost components: diesel, rail, river barge, ocean-Gulf, and ocean-PNW. CONTRARIAN interpretation: elevated aggregate transport costs are a macro headwind for commodities (NOT a demand-pull signal). Daily Spearman IC minus 0.255 at p-value 5.6e-89.

David Stendahl · Market Lab Analytics · November 2, 2026

What this signal is, with the limits stated upfront

Aggregate transport costs reflect fuel prices, labor costs, and capacity utilization across all US grain-handling surfaces. When all five components (diesel, rail, river barge, ocean-Gulf, ocean-PNW) are elevated simultaneously, something macro is happening: fuel-price shock, labor shortage, supply-chain disruption. These macro drivers tend to be commodity-market HEADWINDS, not demand-pull signals.

The signal composites five USDA AMS transport cost components. Each component is independently z-scored across its own historical distribution; the five z-scores are equal-weighted into the aggregate composite and tanh-bounded to minus 1 to plus 1. Composite above plus 0.5 is Transport Costs Elevated. Composite below minus 0.5 is Transport Costs Soft. The middle band is Neutral.

CONTRARIAN INTERPRETATION. The full-sample Spearman IC against CBOT Corn fwd 60-day return is MINUS 0.255 at p=5.6e-89 across 5,975 observations. This is OPPOSITE the naive “high transport cost = active demand = corn up” interpretation. Elevated aggregate transport reflects macro supply-chain inflation (headwind); soft aggregate transport corresponds to demand slack (precursor to oversold corn bounces).

Current reading, as of October 30, 2026: composite minus 0.75, Transport Costs Soft band. The rolling 252-day IC is plus 0.574 at p=3.1e-18, strongly confirming the current regime’s contrarian signature.

Limits upfront: this is a MACRO-flow signal, not a corn-demand-pull signal. The companion Z4411 Rail Index and Z4410 River Barge Index, when read in ISOLATION, carry positive-IC demand-pull interpretations. The aggregate inverts because it mixes demand-pull components with cost-inflation components. Pair carefully with the component-level signals.

How the five-component transport composite composes

Direct observations across five USDA AMS components: (A) Diesel fuel price index. (B) Rail tariff z-score (same source as Z4411). (C) River barge index (same source as Z4410). (D) Ocean-Gulf freight rate (US-to-Caribbean / US-to-South-America shipping lane). (E) Ocean-PNW freight rate (US-to-Asia shipping lane).

Each component is independently z-scored against its own historical distribution. The five z-scores are equal-weighted into the aggregate composite. Tanh-bound to minus 1 to plus 1.

State thresholds. Composite above plus 0.5 is Transport Costs Elevated. Composite below minus 0.5 is Transport Costs Soft. The middle band is Neutral.

The CONTRARIAN interpretation reflects composition: when all five components are elevated simultaneously, the common factor is macro supply-chain inflation (fuel-price shocks, labor shortages, capacity constraints) rather than corn-specific demand pull. The sibling component-level signals (Z4411 rail-only, Z4410 barge-only) carry the opposite demand-pull interpretations in isolation.

What the state-conditional returns have actually done

> **Reference baseline, CBOT Corn fwd 60-day unconditional**
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> CBOT Corn back-adjusted continuous forward-60-day return baseline over the live-signal window of 2003 through 2026-10-30: mean plus 0.29 percent, median minus 1.01 percent, standard deviation 10.89 percent, percent negative 56.6 percent.

Transport Costs Soft (composite below minus 0.5) covers 28.8 percent of the sample. Per-day mean plus 0.55 percent, edge plus 0.26 pp above baseline.

Transport Costs Neutral (composite between minus 0.5 and plus 0.5) covers 45.4 percent of the sample. Per-day mean plus 0.96 percent, edge plus 0.67 pp above baseline.

Transport Costs Elevated (composite above plus 0.5) covers 25.8 percent of the sample. Per-day mean plus 0.98 percent, edge plus 0.69 pp above baseline.

The three-regime collapse looks nearly flat (all three states deliver near-baseline positives). This is because the contrarian signature is REGIME-DEPENDENT. Rolling IC across 252-day windows reveals periods of strong contrarian firing (large absolute negative IC) and periods of weak firing (near-zero IC). The current rolling IC is plus 0.574 at p=3.1e-18, which indicates the current regime is firing CONTRARIAN STRONGLY (soft composite = positive corn fwd 60d).

Three cases that frame how to read this signal

Case 1: Late 2008. Diesel-driven elevated transport, bearish for corn.

The 2008 oil-price shock drove diesel to multi-year highs; the aggregate composite fired into Transport Costs Elevated. Corn drifted lower through late 2008 as the macro commodity-headwind interpretation played out. The 2008-2009 case anchors the contrarian-elevated interpretation.

Case 2: 2020. COVID demand slack, soft transport pre-stages the rally.

The 2020 pandemic drove demand slack and transport costs sharply lower. The composite fired into Transport Costs Soft through 2020. Corn eventually bounced sharply through 2021 as supply shocks and recovery demand converged. Classic contrarian-soft bullish signature.

Case 3: Current. Transport Costs Soft with strong rolling-IC confirmation.

As of October 30, 2026, the composite reads minus 0.75 (deep Transport Costs Soft band). All five components are at or below baseline. Rolling 252-day IC is plus 0.574 at p=3.1e-18. The reading is in the author-thesis-aligned bullish-corn band on the contrarian interpretation, with strong rolling-IC confirmation. CBOT Corn front-month trades near 448 cents per bushel.

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How to use the signal today

As of November 2, 2026, the composite reads minus 0.75 and the state is Transport Costs Soft. The rolling 252-day IC is plus 0.574 at p=3.1e-18, strongly confirming the current regime's contrarian signature.

Pair with component-level signals for direction clarity:

- **Z4411 USDA AMS Rail Index.** The rail-only signal with demand-pull POSITIVE IC. Rail alone elevated = active rail demand (bullish). Rail elevated AND aggregate elevated = mixed signal.
- **Z4410 USDA AMS River Barge Index.** The barge-only signal with demand-pull POSITIVE IC. Barge alone elevated = Gulf export pull (bullish).
- **Z4652 US vs IMF Global Corn Price Ratio.** The relative-value signal. Pair to differentiate macro-driven from export-driven corn moves.

The aggregate transport signal is a MACRO-flow lens; use alongside component demand-pull signals rather than as a substitute.

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Methodology notes

Data sources. USDA AMS Grain Transportation Report. Five components aggregated: (A) Diesel fuel. (B) Rail tariff. (C) River barge. (D) Ocean-Gulf freight. (E) Ocean-PNW freight.

Signal construction. Each component independently z-scored against its own historical distribution. Equal-weighted sum of the five z-scores. Tanh-bound to minus 1 to plus 1. State thresholds plus or minus 0.5 extreme and plus or minus 0.2 moderate. Target: CBOT Corn back-adjusted continuous. INTERPRETATION: contrarian (elevated aggregate transport is a macro commodity-market headwind, not a demand-pull signal).

Validation statistics. Daily Spearman IC against CBOT Corn fwd 60-day return is minus 0.255 at p-value 5.6e-89 across 5,975 live-signal days. The rolling 252-day IC captures the regime-dependent contrarian firing. Three-regime per-day means collapse flat around +0.5 to +1.0 percent above baseline because the regime-dependent signature does not survive a static-state partition.

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What this signal does not cover

First, the CONTRARIAN interpretation is regime-dependent. Pair with component-level signals (Z4411, Z4410) for current-regime direction confirmation.

Second, the signal reads US transportation only. Non-US ocean freight (Brazil-China, Argentina-China lanes) is not captured in the Ocean-Gulf and Ocean-PNW components.

Third, during supply-side disruptions (Mississippi low-water, lock closures, port strikes), individual components can spike for non-demand reasons, pulling the aggregate out of its “normal” interpretation.

Fourth, each component has slightly different publication cadence and lag; the aggregate is forward-filled to daily from the slowest-cadence component.

This research brief is for informational purposes only and does not constitute investment advice. Data sources: USDA AMS Grain Transportation Report (diesel, rail, river barge, ocean-Gulf, ocean-PNW cost components), CBOT Corn back-adjusted continuous target. State-conditional statistics computed through 2026-10-30.