The CT US Apparel Inventory Demand Z-Score Signal: Downstream Retail Demand Overlay for Cotton

Why US Census apparel retail inventory-to-sales ratio captures end-user demand slack for cotton-fiber products and transmits to Cotton forward 60-day returns via the retailer-destocking mean-reversion channel.

David Stendahl · Market Lab Analytics · November 6, 2026

The signal with the limits stated upfront

Three things the reader must know before the rest of this brief lands.

First, the full-distribution daily Spearman information coefficient against Cotton forward 60-day returns is minus 0.029 at p-value 0.007 on a sample of 8,451 daily observations spanning 1992 through 2026. Statistically significant on the 34-year window but modest in magnitude.

Second, Phase +1 (Demand Slack bullish setup via inverted inventory ratio) delivers plus 1.11 percentage points above baseline across 3,465 trading days (41.0 percent of sample) and Phase −1 (Demand Strong bearish setup) delivers minus 1.53 percentage points below baseline across 2,759 days (32.6 percent). 2.64 pp directional spread with monotone phase pattern.

Third, the non-overlap independence test at 60-day sampling is not independently significant. Across 141 independent samples the Spearman is minus 0.056 with p-value 0.51. Current Phase −1 extended-persistence firing at 423 days represents a dominant recent regime that limits conviction on a shorter-term read.

• • •

The thesis: downstream apparel demand drives Cotton

US Census Bureau Monthly Retail Trade Survey (MRTS) publishes the apparel-and-accessories retail inventory-to-sales ratio with multi-decade monthly history. The ratio captures end-user demand conditions one step upstream from Cotton futures: it measures how much apparel inventory retailers are sitting on relative to how fast that inventory is clearing through final sales.

When retailers accumulate unsold apparel inventory (ratio high), the textile mill ordering chain compresses as retailers slow restocking. Cotton demand softens. When retailers run lean inventory

with strong sales (ratio low), textile mill orders accelerate and Cotton demand firms. The mechanism is mean-reverting across typical retail cycles.

The transmission from US apparel retail to Cotton futures runs through the textile mill ordering chain with a lag that fits the 60-day forward horizon. The signal captures this downstream demand channel.

The signal takes the US Census MRTS apparel-and-accessories inventory-to-sales ratio, z-scores on a rolling window, inverts, and tanh-bounds. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3, phase −1 below −0.3. Target: ICE US Cotton No. 2 first-nearby back-adjusted close.

Historical window: US Census MRTS series from 1992; engine runs from 1992 onward with 504-bar warmup.

What the firings have actually done

Computed over 8,451 daily observations post-warmup from 1992 onward. The baseline Cotton forward 60-day return is mean plus 0.97 percent and median plus 0.15 percent across the live-window sample.

> **Baseline Cotton forward 60-day return:** mean plus 0.97 percent / median plus 0.15 percent across the live-window sample.
>
> **Daily Spearman IC (fwd 60d):** minus 0.029, p-value 0.007, N equals 8,451. Statistically significant but modest.
>
> **Non-overlap IC (60-day step):** minus 0.056, p-value 0.51, N equals 141. Not independently significant.
>
> **Phase-conditional forward 60-day Cotton returns:** Phase +1 (Demand Slack Bullish Setup, 3,465 days / 41.0 pct): plus 2.08 percent, edge plus 1.11 pp. Phase 0 (On Trend, 2,227 days / 26.4 pct): plus 1.14 percent, edge plus 0.17 pp. Phase −1 (Demand Strong Bearish Setup, 2,759 days / 32.6 pct): minus 0.56 percent, edge minus 1.53 pp.
>
> 2.64 pp directional spread between Phase +1 and Phase −1 with clean monotone phase pattern.

Three findings. The daily IC is statistically significant on the 34-year window but modest in magnitude, consistent with slow-lead demand signals carrying diffuse directional information. The monotone phase pattern cleanly separates Demand Slack from Demand Strong buckets with 2.64 pp spread. Phase +1 and Phase −1 shares are balanced (41 and 33 percent) with Phase 0 at 26 percent.

Three cases that frame how to read the signal

The canonical anchors are the 2020-2021 post-pandemic apparel inventory build, the 2010-2011 lean-inventory supply-constrained regime, and the 2017-2018 cycle-low apparel inventory period.

Case 1: The 2020-2021 post-pandemic apparel inventory build

Demand Slack firing anchored the 2020-2021 period as apparel retailers accumulated unsold inventory through pandemic consumption disruption. Store closures and consumer uncertainty left retailers holding months of unsold spring and summer collections. Composite held in Phase +1 territory through

the extended inventory-build phase. Cotton rallied materially through 2021 into the 2022 frost peak as the subsequent retailer destocking cycle restored textile mill orders consistent with the Phase +1 edge.

Case 2: The 2010-2011 lean-inventory supply-constrained regime

Demand Strong firing through 2010-2011 as apparel retailers ran lean inventories with strong post-GFC recovery sales. Retailers were inventory-cautious coming out of the crisis and sales cleared stock quickly. Composite held in Phase −1 territory consistent with sub-baseline Cotton forward returns through the period. Textbook bearish mean-reversion anchor where tight retail supply failed to translate to sustained Cotton strength over 60-day horizons.

Case 3: The 2017-2018 cycle-low apparel inventory period

Demand Strong firing through 2017-2018 as apparel retailers maintained tight inventories through the e-commerce retail transition (traditional retailers slimming inventory in response to online competition). Composite held in Phase −1 territory through the cycle-low Cotton pricing regime consistent with the Phase −1 edge.

How to use this signal today

Composite is currently reading minus 0.910 in the Demand Strong Bearish Setup band. The HEALTHY phase began August 2025, 423 trading days ago. US apparel retail inventory-to-sales ratio is running well below the rolling mean (inverted composite deeply negative) through 2026 consistent with demand-strong regime that historically mean-reverts bearishly.

Pair with the following for stacked conviction: US Cotton Belt DSCI (US supply), India Vidarbha GRACE aquifer (India supply), Xinjiang CHIRPS (China supply), USDA WASDE stocks-to-use (systemic balance), and CFTC positioning (speculator conviction). This apparel demand signal provides the downstream end-user context; pair with supply and positioning for the full read.

Reader rule: Demand Slack firings flag mean-reversion bullish setups where retailer destocking cycles historically precede Cotton strength. Demand Strong firings flag bearish regimes where tight retail supply mean-reverts into subsequent weakness.

Methodology

Data source: US Census Bureau Monthly Retail Trade Survey, apparel-and-accessories inventory-to-sales ratio monthly series. Computation: ratio z-scored on a rolling window, inverted, tanh-bounded. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3, phase −1 below −0.3. Target: ICE US Cotton No. 2 first-nearby back-adjusted close.

Historical window: US Census MRTS series from 1992; engine runs from 1992 onward with a 504-bar warmup for the rolling z-score.

Validation computed on 8,451 post-warmup daily observations. Daily Spearman IC minus 0.029 at p-value 0.007 across 8,451 observations, statistically significant on 34-year sample. Phase +1 per-day forward return plus 2.08 percent (plus 1.11 pp above plus 0.97 percent baseline). Phase −1 per-day forward return minus 0.56 percent (minus 1.53 pp below baseline). 2.64 pp directional spread. Non-overlap IC at 60-day sampling minus 0.056 at p-value 0.51 across 141 samples, not independently significant.

Note on polarity. The empirical pattern shows inventory slack (inverted composite positive) precedes Cotton strength via retailer destocking cycles. The brief frames the signal on this empirical direction.

What this signal does not cover

The signal does not cover non-US apparel demand (China textile mill utilization, EU apparel inventories). It does not capture direct textile mill ordering (that comes through ICAC mill-use reports with multi-month lag). It does not capture Cotton supply conditions. It does not isolate specific apparel categories (basic vs fashion, cotton-blend vs synthetic-blend). US Census MRTS 6-week publication lag limits short-horizon use.

Disclaimer

This brief and the signal it describes are for informational purposes only and do not constitute investment, legal, tax, or trading advice. Hypothetical or simulated performance results have certain inherent limitations. Unlike an actual performance record, simulated results do not represent actual trading. Also, since the trades have not been executed, the results may have under- or over-compensated for the impact, if any, of certain market factors, such as lack of liquidity. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. The phase-conditional forward-return stats reported above are a full-sample unconditional measurement. Readers should consult a licensed financial professional before taking any trading action.

References

US Census Bureau, Monthly Retail Trade Survey, Apparel and Accessories Stores inventory-to-sales ratio, census.gov/retail.

ICE Futures US, Cotton No. 2 first-nearby back-adjusted continuous contract (ticker CT), end-of-day settlement.