The KC ENSO Dry Season Weight Signal: A Long-Lead ENSO-Driven Supply Lens for Arabica

Why the NOAA Oceanic Nino Index, z-scored on a 120-month rolling window and weighted heavier during the Brazil Arabica dry-season and flowering windows, delivers a clean monotone phase pattern on forward 60-day Arabica returns across 36 years.

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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 Arabica forward 60-day returns is plus 0.098 at p-value 2.3e-20 on a sample of 8,947 daily observations. Strongly significant, economically modest. Phase +1 (La Nina Dry Season) delivers plus 1.76 percentage points above baseline across 3,566 trading days (39.6 percent of sample); Phase –1 (El Nino Dry Season) delivers minus 1.70 percentage points below baseline across 4,286 days (47.6 percent). 3.46 pp directional spread, one of the cleanest monotone ENSO-mechanism patterns in the Arabica supply library.

Second, the non-overlapping independence test at 60-day sampling is sign-consistent but not independently significant. Across 150 independent samples the Spearman is plus 0.099 with p-value 0.23. The daily information coefficient above is reliable in sign but should be interpreted alongside the phase stats rather than as a standalone continuous predictor.

Third, the ENSO lead horizon is long (3 to 9 months). This is a stacked-overlay signal, not a day-trade trigger. Pair with short-lead confirmation (Cecafe realized price, ICE positioning, USDA FAS Brazil attache) when sizing a directional position.

The thesis: Pacific SSTs translate to Brazil Arabica yield

Brazil produces roughly 35 percent of the world Arabica coffee crop, concentrated in Southeast Brazil (Minas Gerais, Sao Paulo, Parana). Pacific sea-surface temperature anomalies in the Nino 3.4 region propagate through Walker and Hadley circulation changes to Southeast Brazil precipitation outcomes.

La Nina (cool Pacific) during the May-September Brazil Arabica dry season or the September-January flowering window produces below-normal rainfall in Southeast Brazil, stressing yield and

tightening supply. El Nino (warm Pacific) in the same windows produces above-normal rainfall and looser supply.

The signal takes the NOAA Climate Prediction Center Oceanic Nino Index (ONI), z-scores it on a 120-month rolling window, signs it so La Nina reads as positive composite, weights heavier during the two biologically relevant windows (dry season plus flowering), and tanh-bounds to plus or minus one. State thresholds are plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Target: ICE US Coffee C first-nearby close.

ONI data extends back to 1950; the engine runs December 1990 onward for consistency with the broader KC parquet. Historical ENSO episodes (1997-1998 super El Nino, 1988-1989 La Nina, 1975-1976 La Nina) are outside the engine window but are canonical reference events in the literature.

What the firings have actually done

The directional edge concentrates in the extreme buckets. Computed over 9,007 daily observations post-warmup from December 1990 through November 2026.

> **Baseline Arabica forward 60-day return:** mean plus 2.32 percent / median minus 0.96 percent across the live-window sample. (Median-mean gap reflects fat-tailed Arabica return distribution with periodic frost-rally spikes.)
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> **Daily Spearman IC (fwd 60d):** plus 0.098, p-value 2.3e-20, N equals 8,947.
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> **Daily Pearson IC (fwd 60d):** plus 0.106, p-value 5.1e-24.
>
> **Non-overlap IC (60-day step):** plus 0.099, p-value 0.23, N equals 150. Sign-consistent with daily IC but not independently significant at 5 pct.
>
> **Phase-conditional forward 60-day Arabica returns:** Phase +1 (La Nina Dry Season, 3,566 days / 39.6 pct): plus 4.07 percent, edge plus 1.76 pp. Phase 0 (Neutral or off-season, 1,155 days / 12.8 pct): plus 3.12 percent, edge plus 0.81 pp. Phase –1 (El Nino Dry Season, 4,286 days / 47.6 pct): plus 0.61 percent, edge minus 1.70 pp.
>
> 3.46 pp directional spread between Phase +1 and Phase –1.

Three findings. The pattern is monotone across phases (La Nina Positive, Neutral mid, El Nino Negative), consistent with the stated mechanism. The directional spread of 3.46 pp is one of the widest ENSO-mechanism spreads in the softs library. The signal is useful as a stacked overlay when the composite is in Phase +1 or Phase –1 territory, with lead times running 3 to 9 months.

Three cases that frame how to read the signal

The canonical anchors are the 2020-2022 triple-dip La Nina (the first three-consecutive-year La Nina since 1973-76), the 1994 La Nina plus Minas Gerais frost, and the 2015-2016 strong El Nino loose-supply regime.

Case 1: The 2020-2022 triple-dip La Nina

An unusual three-consecutive-year La Nina ran from mid-2020 through late 2022, driving Southeast Brazil through multiple dry-season deficits. The ENSO composite held in Phase +1 territory through

much of this window, anticipating the Arabica rally that peaked in 2024-2025. The July 2020 trigger delivered a forward 60-day of plus 7.8 percent; the broader rally compounded over 24 months. This is the modern signature anchor for how the signal reads a persistent La Nina regime translating into Arabica supply tightness.

Case 2: The 1994 La Nina plus Minas Gerais frost

A Phase +1 firing began in May 1994 during the Brazil dry season as La Nina intensified. The late-June 1994 Minas Gerais frost produced the sharpest Arabica rally in modern history; the ENSO signal was already elevated when the weather shock arrived. The May 1994 trigger delivered a forward 60-day of plus 115.43 percent reflecting the compound effect of drought plus frost. This is the extreme-outlier anchor; the compound shock dynamic is rare but informative.

Case 3: The 2015-2016 strong El Nino

A strong El Nino emerged during 2015-2016, bringing above-normal rainfall to Southeast Brazil through the dry-season and flowering windows. The ENSO composite held in Phase −1 territory, consistent with the loose-supply regime that pressed Arabica prices lower through 2016. Forward 60-day returns from Phase −1 triggers in this window averaged negative, matching the stated El Nino bearish-Arabica polarity.

How to use this signal today

Composite is currently reading minus 0.656 in the El Nino Dry Season band. The STRESS phase began January 2026, 210 trading days ago, meeting the BTD danger threshold. Pacific sea-surface temperatures have run warm through the Brazil 2026 dry season, consistent with the bearish-Arabica regime bias.

Pair with the following for stacked conviction: the Cecafe Brazil realized-price signal (short-lead confirmation of physical tightness), ICE Europe COT managed-money positioning, and USDA FAS Brazil coffee attache reports. The ENSO signal leads by 3 to 9 months; use it to set directional bias and sizing, then use Cecafe realized-price as the confirming trigger.

Reader rule: Phase +1 firings are long-lead bullish Arabica setups. Phase −1 firings are long-lead bearish-Arabica setups. Phase 0 or off-window readings carry less information.

Methodology

Data source: NOAA Climate Prediction Center Oceanic Nino Index (ONI), a 3-month running mean of ERSSTv5 sea surface temperature anomalies in the Nino 3.4 region (5N-5S, 170W-120W). Computation: ONI is z-scored on a 120-month rolling window, signed so La Nina (negative ONI) reads as positive composite, weighted heavier during the Brazil Arabica dry-season (May through September) and flowering window (September through January), tanh-bounded to plus or minus one. 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 Coffee C first-nearby close.

Historical window: engine runs December 1990 onward. ONI data available from 1950-01.

Validation computed on 9,007 post-warmup daily observations. Daily Spearman IC plus 0.098 at p-value 2.3e-20 across 8,947 observations. Phase +1 per-day mean fwd60d plus 4.07 percent (plus 1.76 pp above plus 2.32 percent baseline). Phase −1 per-day mean plus 0.61 percent (minus 1.70 pp below

baseline). 3.46 pp directional spread. Non-overlap IC (every-60-day) sign-consistent at plus 0.099 but not independently significant (p-value 0.23, N equals 150).

What this signal does not cover

The signal does not cover non-ENSO weather shocks (Brazilian frost outside La Nina cycles, non-ENSO drought). It does not cover ICE futures positioning (CFTC COT is a separate layer). It does not cover Robusta (Vietnamese Conilon Robusta has its own ENSO sensitivity with different sign; see sibling LRC signal). It does not deliver a reliable signal off-window (February through April). It does not resolve short-horizon moves; the lead horizon is 3 to 9 months.

The signal is a long-lead ENSO-weighted supply lens for Brazil Arabica. Use as part of a stacked view, not standalone.

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

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