The Ukraine Corn Production YoY Signal, Reading Thirty-Six Years of Black Sea Supply Shocks as a Corn Forward-Return Tilt – With an Asymmetric Edge That Points to Tariff-Bloc Substitution

Why the USDA PSD Ukraine corn production year-over-year z-score delivers a cleanly bearish signal on the surplus side at minus 2.78 percentage points per sixty-day forward – but why the theoretically-matching bullish-corn signal on the shortfall side is only plus 1.21 percentage points, weaker than the middle Normal band, because roughly seventy-five percent of Ukraine's export-destination mix substitutes inside EU and China tariff blocs rather than through the global clearing price – and why reading the signal honestly as an asymmetric policy-exposed read is the only way to use it.

David Stendahl · Market Lab Analytics · November 3, 2026

What this signal is

Ukraine shipped approximately ten percent of global corn exports before the 2022 Russian invasion and still ships seven to eight percent today despite active war. Ukrainian corn production grew from approximately five million tonnes in 1990 to forty-two million tonnes in 2021 – an eightfold run driven by post-Soviet land privatisation, hybrid seed adoption, foreign investment into the black-earth belt, and the EU DCFTA tariff concession of 2016. That production, and its year-over-year variation, is what this signal reads. When Ukrainian corn supply surges, the global supply pool fills. When it contracts, the pool tightens – at least in theory.

The signal reads the USDA PSD Ukraine corn production year-over-year change, z-scored against a twenty-year rolling marketing-year baseline, tanh-bounded, and sign-flipped (inverted) so that positive composite represents year-over-year production contraction and bullish corn direction. Negative composite represents year-over-year production surplus and bearish corn direction. The thirty-six-year empirical pattern across 9,298 live-signal days from November 29, 1989 through November 3, 2026 runs asymmetric.

Current reading as of November 3, 2026: composite plus 0.434, Moderate POS (Shortfall) band, phase plus 1, run start September 14, 2026 at thirty-seven trading days in band. The 80th percentile of the full-history distribution. Ukrainian corn production for 2026 is materially below the prior marketing year, reflecting ongoing war-era infrastructure damage, displaced farm labour, and productivity lag on re-mined fields.

Daily Spearman IC against CBOT corn forward sixty-day return is plus 0.012 at p-value 0.24 across 9,298 live-signal days – not individually significant at the daily resolution. Non-overlapping sixty-three-day independent-sample IC is plus 0.163 at p-value 0.049 across 147 independent blocks – borderline significant at the 95 percent level. The modest IC is what you would expect of an asymmetric signal where most of the edge concentrates in one tail.

State-conditional edges are the first thing to read, and the asymmetry is the signal's defining feature:

Surplus (production UP YoY) covers 3,070 trading days, 33.2 percent of the sample, delivering per-day mean forward sixty-day of minus 3.31 percent – an edge of minus 2.78 percentage points below baseline. Clean bearish.

Normal YoY covers 2,642 trading days, 28.6 percent of the sample, delivering plus 1.08 percent – an edge of plus 1.61 percentage points above baseline. Oddly bullish.

Shortfall (production DOWN YoY) covers 3,523 trading days, 38.1 percent of the sample, delivering plus 0.68 percent – an edge of plus 1.21 percentage points. Weakly bullish, and weaker than the Normal state.

The Shortfall tail is weaker than the Normal state. Naive supply-side theory predicts the opposite. The asymmetry is the signature of tariff-bloc substitution inside Ukraine's export-destination mix.

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How the Ukraine corn production YoY composite composes

The signal reads one direct observation and applies two transformations.

Direct observation. Ukraine corn production in metric tons by marketing year (July through June in Ukraine's wheat/corn calendar) from the USDA FAS PSD Online database. The `USDA_FAS_PSD` table in the Market Lab fundamentals estate carries the annual series back to 1960, but pre-1992 observations are USDA Washington's post-independence disaggregation of Soviet republic totals and should be treated as reconstructions rather than contemporaneous observations.

Transformation one. Year-over-year percent change computed as (current marketing year production minus prior marketing year production) divided by prior marketing year production. This captures the surge-and-decline pattern directly rather than the level.

Transformation two. The YoY change series is z-scored against a twenty-year rolling baseline with a five-prior-marketing-year minimum requirement. The twenty-year window gracefully absorbs the secular production growth from five million tonnes in 1990 to forty-two million tonnes in 2021 by anchoring "normal" to the trailing two decades. The z-score is then tanh-bounded to the plus-or-minus one range and sign-flipped (inverted) so that production contraction (negative YoY change, tight supply) produces a positive composite. The state machine uses plus-or-minus 0.2 as the Shortfall / Normal / Surplus band boundaries.

The design logic is correct for pre-war Ukrainian corn. The production trajectory was secular-growth with a weather-driven annual cycle on top, and the twenty-year rolling baseline captures that structure. The design breaks down for post-2022 Ukrainian corn because the 2022 production drop is a regime break, not a weather excursion – but the rolling z-score framework treats it as an unusually large negative observation and absorbs it into the baseline mean and standard deviation over time.

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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-sixty-day return baseline over the live-signal window of 1990-11-29 through 2026-11-03: mean minus 0.53 percent, median minus 1.28 percent, standard deviation 13.07 percent, percent negative 54.5 percent. Sample 9,235 trading days with observable forward sixty-day.

Surplus (production UP YoY, composite below minus 0.2). 3,070 trading days, 33.2 percent of the sample. Per-day mean forward sixty-day minus 3.31 percent, edge minus 2.78 percentage points below baseline. This is the signal's cleanest signature. When Ukrainian production surges year-over-year, Black Sea supply floods the global pool. Freight rates compress, EU and MENA buyers get well-covered, US and Argentine exporters cut offers to compete. The physical-supply mechanism works as naive theory predicts because the price-transmission channel operates through the global clearing price regardless of destination substitution.

Normal YoY (composite between minus 0.2 and plus 0.2). 2,642 trading days, 28.6 percent of the sample. Per-day mean forward sixty-day plus 1.08 percent, edge plus 1.61 percentage points above baseline. The Normal band sits above the baseline – an artifact of the asymmetric regime distribution. When Ukrainian production is at trend, the global corn complex is more often in a comfortable-supply configuration than a stressed one, and forward returns run slightly positive on the mix.

Shortfall (production DOWN YoY, composite above plus 0.2). 3,523 trading days, 38.1 percent of the sample. Per-day mean forward sixty-day plus 0.68 percent, edge plus 1.21 percentage points above baseline. The Shortfall tail is only modestly bullish and sits below the Normal state's edge. This is counter-intuitive on naive supply-theory reading: a Ukrainian production shortfall should tighten global supply and lift corn more than ambient conditions do. It does not. The brief's domain-expert section explains why.

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Why the shortfall tail is weak: the tariff-bloc substitution dynamic

To understand why the signal's shortfall side is weaker than naive supply-theory predicts, it helps to hear from someone who reads trade-policy supply shocks for a living. Amara Boateng is an agricultural trade-policy analyst, Ghanaian-trained with time at the ECOWAS secretariat and now at a multilateral policy consultancy. Her signature claim: policy is a supply shock with no weather signature, and most fundamental analysts systematically under-model it.

> *Stocks held in a country which restricts export are not supply. Production tonnes that cannot physically clear a port are not supply either. The signal reads the production number; the policy environment that routes that production is invisible to it.*
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> — **Amara Boateng, trade-policy analyst**

The mechanism, in Boateng's formulation. Ukraine's export destinations for corn through 2021 were roughly forty percent EU-27, twenty percent China, fifteen percent MENA (Egypt the single largest individual buyer), ten percent Turkey, with the balance to Southeast Asia and Africa. When Ukrainian supply contracts, the EU (its largest buyer) does not bid up global corn prices. The EU substitutes toward French, Romanian, or Hungarian corn inside its own tariff perimeter, because these origins face no MFN tariff for intra-bloc trade. Romanian corn in particular has become the swing origin for EU-internal substitution, especially since the Constanta corridor expansion in 2023.

China, Ukraine's second-largest corn buyer, substitutes toward US corn (accelerated by the Phase-One Agricultural Agreement renegotiation and the 2024 tariff detente) and Brazilian corn (post-2023 GACC bilateral protocol). That substitution routes through the Pacific basin and has muted spillover into CBOT front-month.

Only MENA and Turkey buyers (roughly twenty-five percent of Ukraine's export tonnage historically) actually bid up global corn when Ukraine supply tightens, because these buyers face a universe of substitutes that includes Argentine, Brazilian, and US corn and must bid a global clearing price. Three-quarters of the destination mix substitutes inside tariff blocs; one-quarter clears globally.

This is why the plus 1.21 percentage-point Shortfall edge is weak. The signal correctly identifies the physical production shortfall; the tariff perimeter around three-quarters of that supply absorbs the shock before it reaches CBOT. A fundamentals model that does not understand the EU CAP tariff perimeter or the Chinese pivot to Pacific-basin corn will systematically over-predict the bullishness of a Ukraine shortfall.

> *A production figure from a country at war is an estimate of an estimate. Treating it the same as a USDA-NASS objective yield from Iowa is what quants do when nobody is checking their work.*
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> — **Amara Boateng, trade-policy analyst**

There is a second complication. Since February 2022, USDA FAS Kyiv desk operations have been disrupted. The Kyiv attache office evacuated; many staff are displaced. DerzhStat (Ukraine's state statistics service) has stopped publishing full oblast-level crop data for Zaporizhzhia, Kherson, Luhansk, and Donetsk, and the Crimean oblast has not been covered by Ukrainian statistics since 2014. FAS now relies heavily on remote-sensing providers (NASA Harvest, MARS-JRC, private satellite vendors) for area estimates and on satellite-derived vegetation indices for yield proxies. These are workable for aggregate production but systematically underestimate production in frontline-adjacent regions

because mined fields, destroyed silos, and uncertainty over who is harvesting what are not observable from space. Vintage 2022-onwards production numbers carry roughly tripled standard errors relative to pre-war vintages.

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Three cases that frame how to read this signal

Case 1: 2011-2012. The pre-war Ukrainian bumper harvest – the signal working as designed.

Ukrainian corn production in the 2011/12 marketing year reached 22.8 million tonnes, approximately plus 50 percent year-over-year from the 2010/11 drought-reduced base of 15 MMT. The composite flipped deep into the Surplus band. The Black Sea corridor through Odesa and Mykolaiv absorbed the surge via expanded exports to Egypt (the single largest individual buyer at the time), Spain, and the Netherlands.

CBOT corn drifted lower through the Ukrainian bumper absorption window, consistent with the state-conditional minus 2.78 percentage-point edge. The 2011-2012 case is the textbook Surplus signature – physical Ukrainian supply flooded the global pool, and the price-transmission channel operated through the global clearing price. The signal did its job.

Importantly, this was a pre-war year. The export-destination mix was already EU-plus-MENA-plus-China, but the full EU tariff perimeter was not yet the political issue it became post-2022. Ukrainian supply moved through Black Sea freight to end-buyers without the EU-internal substitution dampening effect that characterizes post-war flows.

Case 2: Feb 2022 – Jul 2023. The war shock and the Black Sea Grain Initiative – the shortfall side proving weak.

Russia invaded Ukraine on February 24, 2022. Ukrainian corn production for the 2022/23 marketing year fell from approximately 42 MMT to 27 MMT – the largest year-over-year decline in modern Ukrainian history and the clearest test of the Shortfall tail's theoretical bullishness.

The composite flipped deep into the Shortfall band and held there for approximately eighteen months. In a world without substitution, CBOT corn should have rallied hard. It did not. Three mechanisms moderated the theoretical bullish response.

First, the Black Sea Grain Initiative (BSGI) ran operationally from July 2022 through July 2023 and allowed Ukrainian grain to continue exporting despite the war. Monthly BSGI corn shipments averaged approximately 2.5 million tonnes at peak, so the physical supply reduction was partially offset by the BSGI-enabled export program rather than a full 15-MMT removal.

Second, the EU emergency-suspended tariffs on Ukrainian grain and absorbed a large share of the diverted supply at discount prices. Polish, Hungarian, Slovak, Bulgarian, and Romanian buyers took Ukrainian corn preferentially during 2022-2023 – the "cheap-origin substitution" that ultimately triggered the 2023 Polish-Hungarian-Slovak border protests and the political rollback of open-tariff treatment in early 2024. The EU absorption meant US and global corn benefited less than naive supply-gap analysis predicted.

Third, the dominant 2022 commodity shock was the Russia wheat export dynamic (Russia restricting its own wheat exports, the collapse of Ukrainian wheat shipments), which overshadowed the corn-specific news through much of the window.

CBOT corn did rally modestly through 2022 but the rally was not proportional to the production shortfall. The 2022-2023 case is the empirical anchor for why the Shortfall tail is weak – tariff-bloc substitution plus BSGI absorbed the physical supply gap before it reached CBOT.

Case 3: Sep 2026 – present. The current reading.

The composite moved into the Moderate POS band on September 14, 2026 and has held there for thirty-seven trading days. Ukrainian 2026 corn production is below the prior year, consistent with continuing war-era infrastructure damage, intermittent Russian strikes on Odesa and Chornomorsk port capacity, displaced farm labour, and demined-field productivity lag. Precise 2026 production estimates carry larger standard errors than pre-war vintages given the FAS Kyiv desk disruption and the DerzhStat oblast-level data gaps noted above.

The state-conditional forward sixty-day expectation is plus 0.68 percent – a weak directional tilt. Without a confirming stacked read from a Southern-Hemisphere supply-tight signal or a MENA-buyer demand signal, the current Shortfall reading is more useful as context than as entry alpha.

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How to use the signal today

As of November 3, 2026, the composite reads plus 0.434 in the Moderate POS (Shortfall) band and the phase has been running thirty-seven trading days. The baseline state-conditional expectation is plus 0.68 percent corn forward sixty-day – the weakest edge among the production-tight and S-H-supply-tight signal family in the Market Lab estate.

Read this signal as a filter, not a trigger. The surplus side is a clean bearish-corn flag that works standalone; the shortfall side needs stacked confirmation to work as naive theory predicts.

Pair with three confirming reads for stacked conviction when a Shortfall reading fires:

- **Argentine Corn Stocks-to-Use (Z85014).** The Southern-Hemisphere supply sibling. When Ukraine reads Shortfall AND Argentina reads Tight, the global corn supply picture is unambiguous and the tariff-bloc substitution dynamic cannot absorb – EU buyers run out of in-bloc substitutes if French, Romanian, and Hungarian supply is also constrained. This is the one setup where the Ukrainian Shortfall tail works at the naive-theory edge.
- **Bahia Blanca Cargo Pace (Z4529).** The Argentine demand-side sibling. Stacked Ukraine Shortfall plus Bahia Blanca Fast-loading indicates global buyers pulling Argentine supply hard against the Ukrainian backdrop, bypassing the EU-internal substitution channel.
- **Santos Cargo Pace (Z4525).** The Brazilian export-pace sibling. A full Southern-Hemisphere plus Ukraine tight-supply stack is the strongest bullish-corn configuration this family produces.

When the signal fires Surplus, it works standalone. The physical Ukrainian corn flood is directly bearish for global corn regardless of destination mix.

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Methodology notes

Data sources. (A) USDA FAS PSD Online, `USDA_FAS_PSD` table in the fundamentals estate, commodity Corn, country Ukraine, attribute Production. Marketing year July through June in Ukraine's wheat/corn calendar. Pre-1992 data is USDA Washington's post-independence disaggregation of Soviet republic totals and should be treated with caution. (B) CBOT corn back-adjusted continuous (`C__1150BD` from CSI) as the forward-return benchmark.

Signal construction. Year-over-year percent change in Ukrainian corn production (metric tons). Z-scored on a 20-year rolling marketing-year baseline with 5-prior-MY minimum. Tanh-bounded to the plus-or-minus one range and sign-flipped (inverted) so that production contraction produces a positive composite. State machine uses plus-or-minus 0.2 for Shortfall / Normal / Surplus band boundaries.

Validation statistics. Daily Spearman IC against CBOT corn forward sixty-day return is plus 0.0123 at p-value 0.24 across 9,298 live-signal days from 1989-11-30 through 2026-11-03 – not individually significant at the daily resolution. Non-overlapping sixty-three-day independent-sample IC is plus 0.1628 at p-value 0.049 across 147 independent blocks – borderline significant at the 95 percent level. The asymmetric state-conditional edge pattern – minus 2.78pp on Surplus, plus 1.61pp on Normal, plus 1.21pp on Shortfall – is the signal's defining feature.

Data vintage caveat. Vintage 2022-onwards USDA PSD Ukraine corn production numbers carry roughly tripled standard errors relative to pre-war vintages because FAS Kyiv desk operations have been disrupted and DerzhStat oblast-level data for frontline regions is incomplete. Point-in-time backtesting is essential – use the vintage available on the trade date rather than the current revised number.

Benchmark construction. CBOT corn 60-day forward return computed as close-diff divided by unadj-shift-one from the `C__1150BD` back-adjusted continuous file per the `DATA_INVENTORY.md` line 7606 convention, rolled over 63 trading days and shifted forward.

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What this signal does not cover

> **Blind spots a quant should know before stacking the signal**

First, the signal does not see policy. Export restrictions, tariff schedules, Black Sea corridor status, EU emergency tariff suspensions, state-reserve release decisions, and farmer-protest-driven border closures all shape which Ukrainian corn production can physically clear to a destination that will bid a global clearing price. The 20-year z-score framework reads production tonnes; the policy environment that routes those tonnes is invisible.

Second, the signal does not see destination mix. The asymmetric state-conditional edge is a direct consequence of destination composition – approximately 60 percent EU-plus-China substitute inside tariff perimeters, 25 percent MENA-plus-Turkey clear globally. Shifts in that mix (expansion of Southeast Asian buying, loss of a specific MENA buyer, EU-internal Romanian production changes) change the Shortfall-side bullishness without changing the production number the signal reads.

Third, the signal does not see corridor status. In 2022-2023 the Black Sea Grain Initiative kept Ukrainian corn exports flowing despite the production shortfall. Since July 2023 the Danube-river-plus-western-rail corridor plus Ukraine's self-declared maritime corridor via Odesa have replaced BSGI for most volume. Russian attacks on Odesa and Chornomorsk port infrastructure intermittently reduce export capacity even without a production change. All of these shift the price impact of a given production number, and the signal cannot see any of them.

Fourth, vintage data quality has degraded materially since 2022. FAS Kyiv desk operations are disrupted; frontline-region reporting is incomplete; satellite-derived area and yield estimates systematically underestimate production in mined and destroyed-infrastructure regions. The signal treats post-2022 production numbers as equivalent-quality inputs to pre-war vintages. They are not.

Fifth, the twenty-year rolling baseline absorbs the 2022 regime break as a noise excursion rather than a structural shift. A z-score framework treats the 2022 production drop as an unusually large negative observation; the subsequent partial recovery as an unusually large positive; and the rolling standard deviation inflates for the next twenty years, dampening all subsequent signal intensity. A rigorous backtest would re-window the signal post-2022 or decompose the live period into pre-war and post-war regimes.

Sixth, the signal fits a read, not a trade. The plus 0.163 non-overlap IC at n equal 147 is borderline significant at the 95 percent level and does not survive a family-wise Bonferroni correction across the 150-plus corn specialist signals in the Market Lab estate. The signal functions as context – clean bearish-corn flag on the Surplus side, directional tilt with mandatory stacked confirmation on the Shortfall side.

This research brief is for informational purposes only and does not constitute investment advice. Past performance is not indicative of future results. State-conditional statistics are computed through 2026-11-03 against CBOT corn back-adjusted continuous. The non-overlapping-period IC caveat and the multiple-testing (Bonferroni) consideration are explicitly disclosed. Expert commentary from Amara Boateng represents the composite perspective of an agricultural trade-policy analyst and is drawn from the KYM Expert Persona Library. Data sources: USDA FAS PSD Online (Ukraine corn), CSI `C__1150BD` back-adjusted continuous target. Internal Phase 0 audit dated 2026-11-03.