

RESEARCH INSIGHT

When commodity shocks stop staying local

28 September 2026

Issue 008

LB Research
www.lb-research.com



Executive summary



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Commodity stress becomes systemic when shocks cross commodity groups.

Key findings

- Cross-group spillovers rise from 32.2% to 49.4%.
- The largest increases appear across metals and energy links.
- Energy shifts towards a net transmitting role.

Key metrics

Low regime	32.2%
High regime	49.4%
Increase	+17.2 pp
Current	55.3%
Peak	65.2%

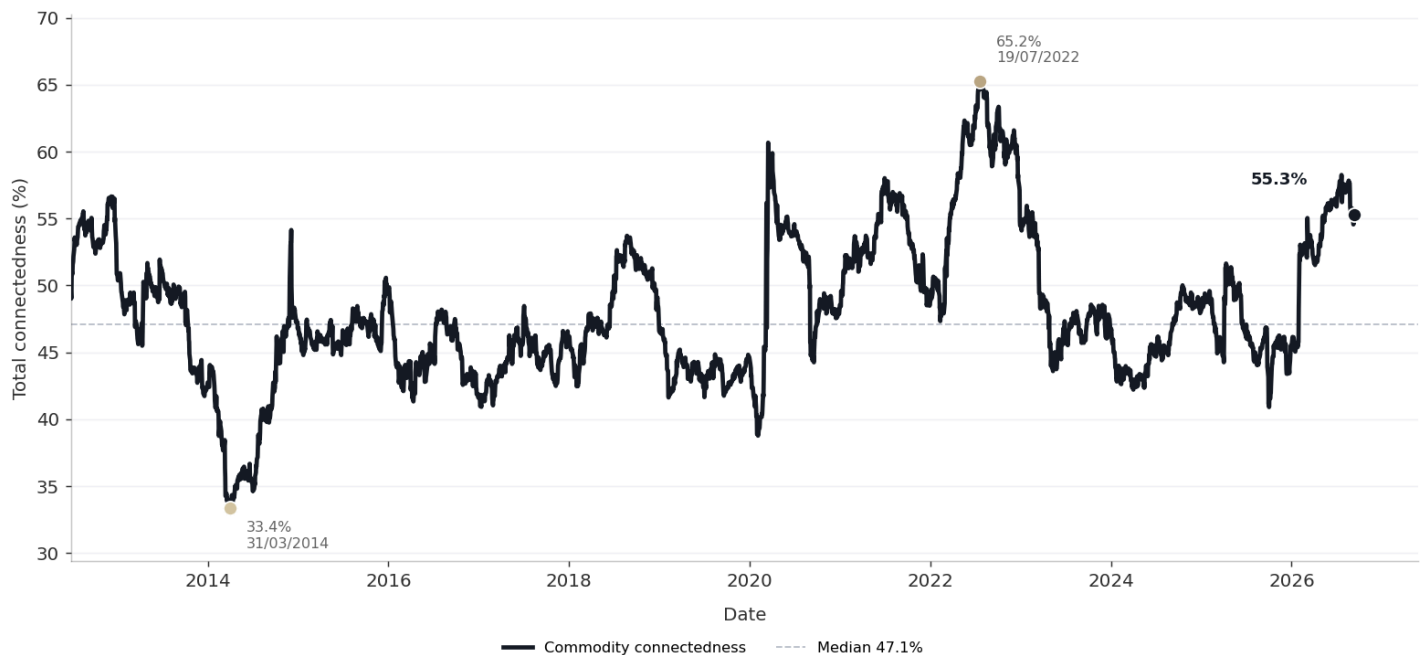
Why it matters

Higher connectedness means shocks travel across more commodity groups, creating a broader transmission system.

When commodity connectedness rises

Commodity connectedness changes sharply through time

System-wide spillovers move through distinct regimes, reaching their highest level in 2022 before rising again into 2026



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Source: Yahoo Finance via yfinance. Author analysis — Laura Brennan

Figure 1. Total commodity connectedness through time.

Commodity connectedness changes materially through time. The index ranges from **33.4%** at its 2014 low to **65.2%** at the 2022 peak, compared with a long-run median of **47.1%**.

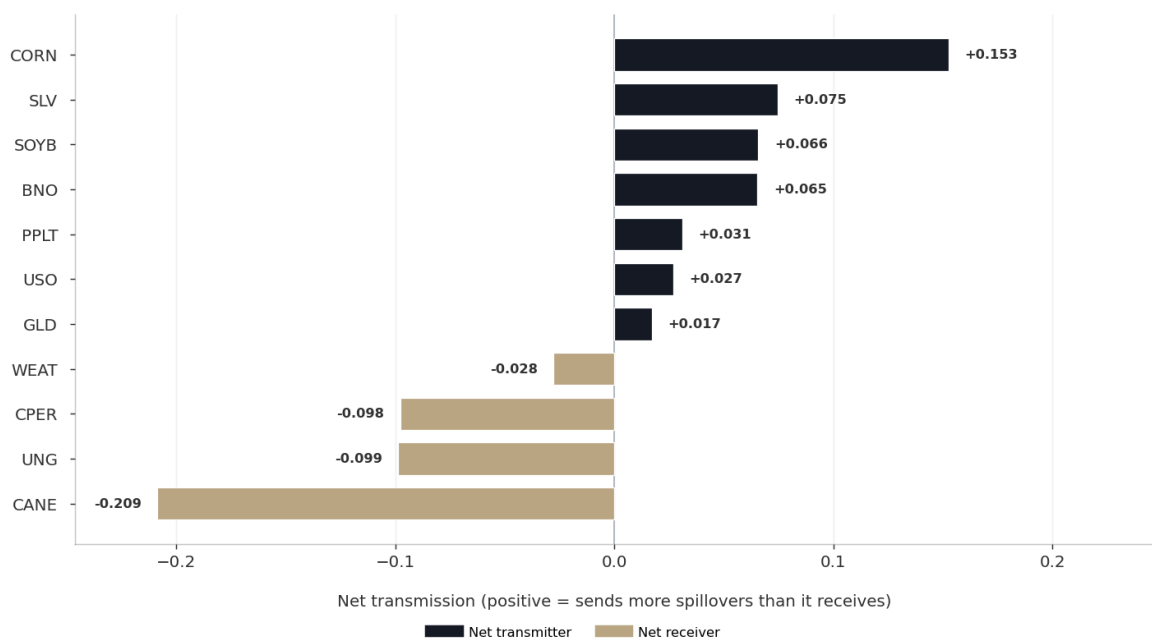
The latest reading is **55.3%**, leaving the system below its previous peak but materially above its historical median.

The result establishes that commodity transmission is strongly state-dependent. Some periods remain relatively segmented, while others move into a substantially more integrated system in which shocks have more routes through which to propagate.

The source of commodity shocks rotates

The commodity transmitting shocks is not fixed

Corn is currently the strongest net transmitter, while sugar, natural gas and copper receive more spillovers than they send



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Source: Yahoo Finance via yfinance. Author analysis — Laura Brennan

Figure 2. Current net transmission across commodity markets.

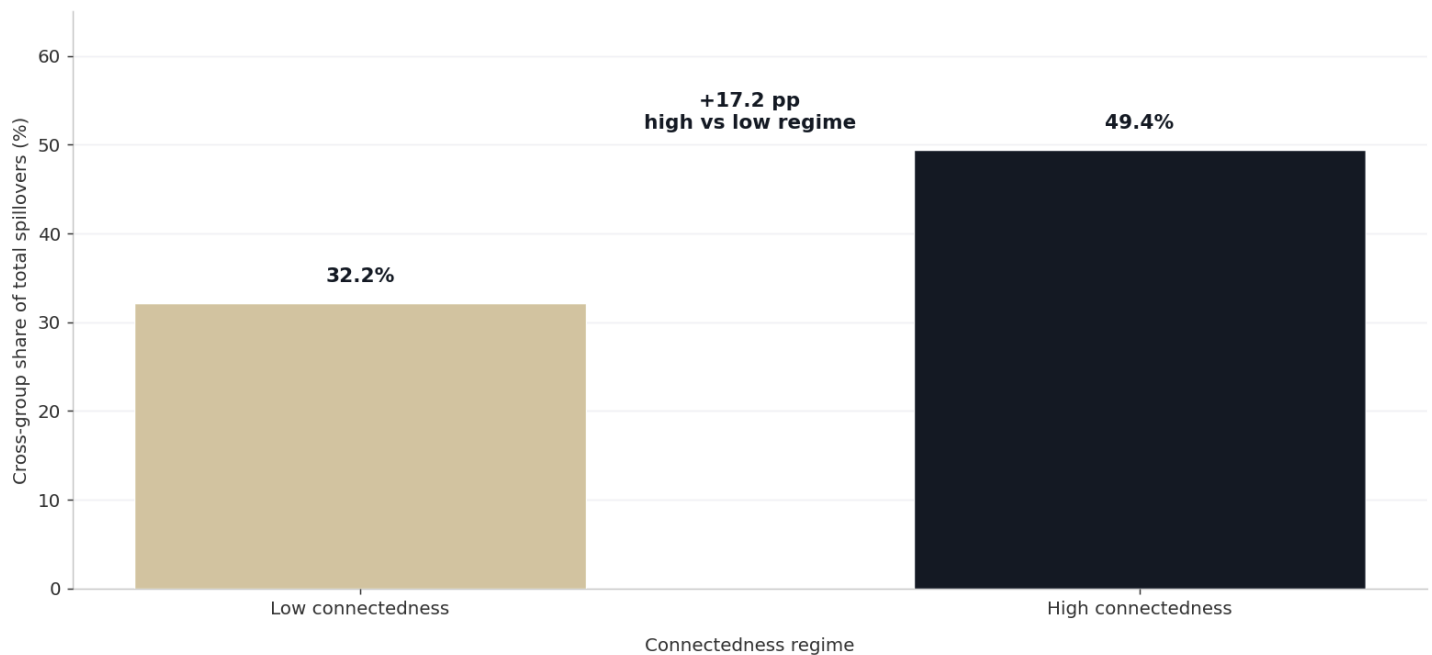
Commodity transmission is highly uneven. **Corn is currently the strongest net transmitter at +0.153**, followed by silver, soybeans and Brent crude. At the other end, **sugar is the largest net receiver at -0.209**, while natural gas and copper also absorb more spillovers than they send.

The result shows that systemic importance is not fixed to one commodity group. Energy does not automatically dominate transmission, and the commodities carrying shocks can change materially with the state of the network. **The source of commodity-system risk rotates through time.**

The network becomes less contained

High connectedness becomes cross-group connectedness

The share of spillovers crossing commodity families rises from 32.2% to 49.4% as the system moves into a high-connectedness regime



Source: Yahoo Finance via yfinance. Author analysis — Laura Brennan

Figure 3. Cross-group spillover share in low- and high-connectedness regimes.

When commodity connectedness is low, **32.2%** of total spillovers cross commodity groups. In the high-connectedness regime, that rises to **49.4%**, an increase of **17.2 percentage points**.

The result shows that higher connectedness is not simply stronger transmission within existing commodity families. **A much larger share of shocks begins crossing the boundaries between them.**

The transmission map broadens under stress

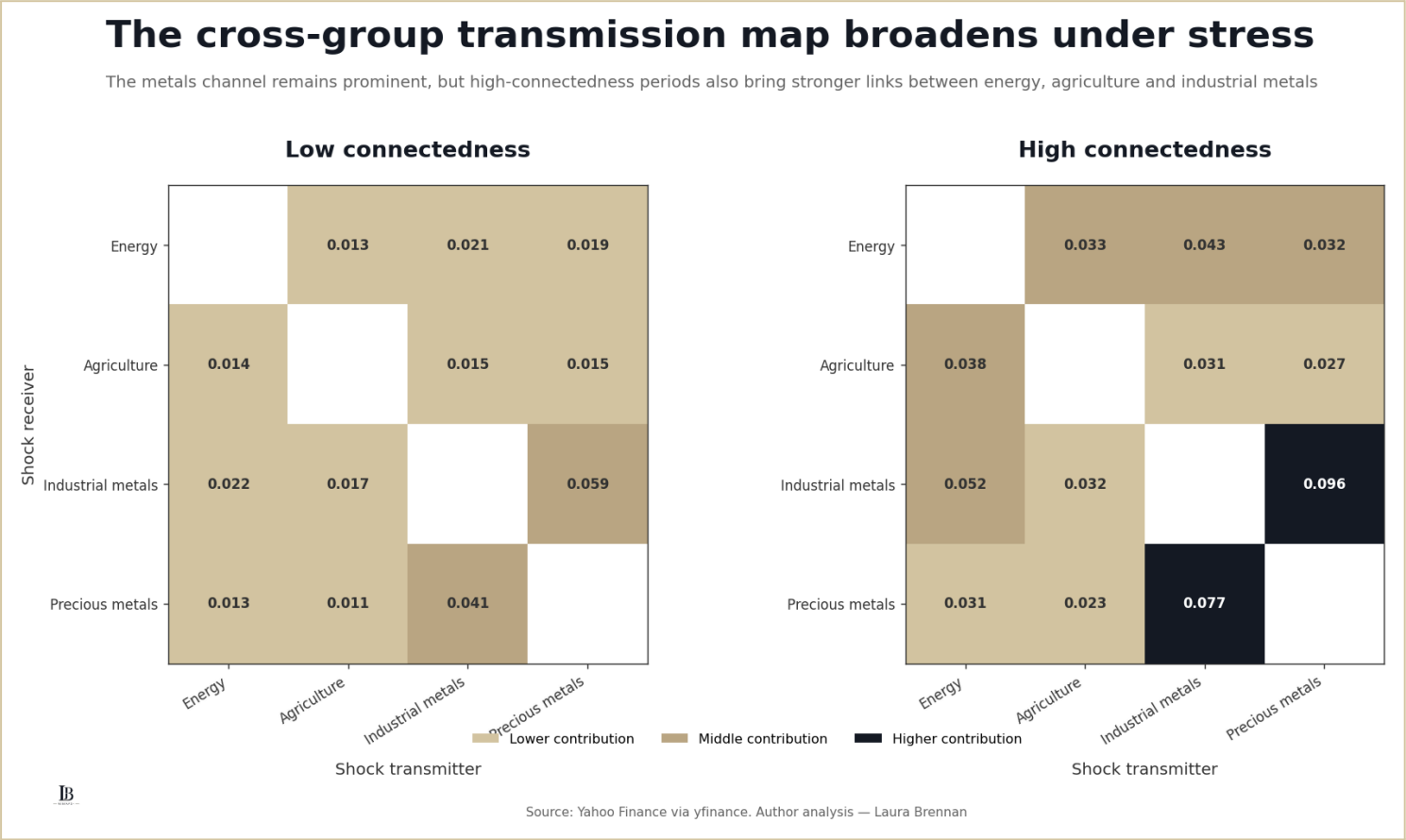


Figure 4. Cross-group commodity transmission in low- and high-connectedness regimes.

In low-connectedness periods, cross-group transmission remains relatively contained, with the strongest links concentrated around the metals channel.

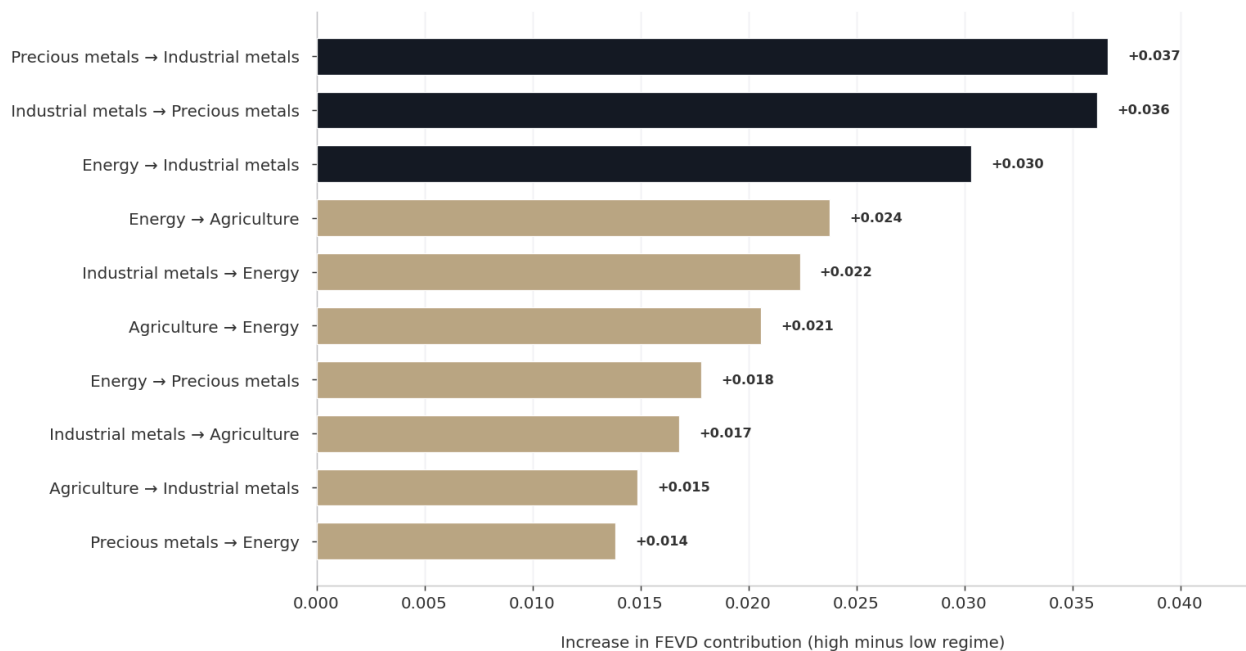
In high-connectedness regimes, the map broadens materially. **Energy, agriculture and industrial metals all become more strongly linked**, while precious metals remain an important source of transmission.

The important point is that higher connectedness changes the architecture of the system, not just the strength of individual links. **Stress turns a more segmented commodity network into a broader transmission system.**

Stress opens new routes

Stress opens new routes for commodity shocks

The largest increases include energy-to-agriculture and energy-to-metals links alongside the already important precious-metals and copper channel



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Source: Yahoo Finance via yfinance. Author analysis — Laura Brennan

Figure 5. Largest increases in cross-group transmission between low- and high-connectedness regimes.

The largest changes occur across the **metals channel**. Precious metals → industrial metals rises by **0.037**, while the reverse direction increases by **0.036**.

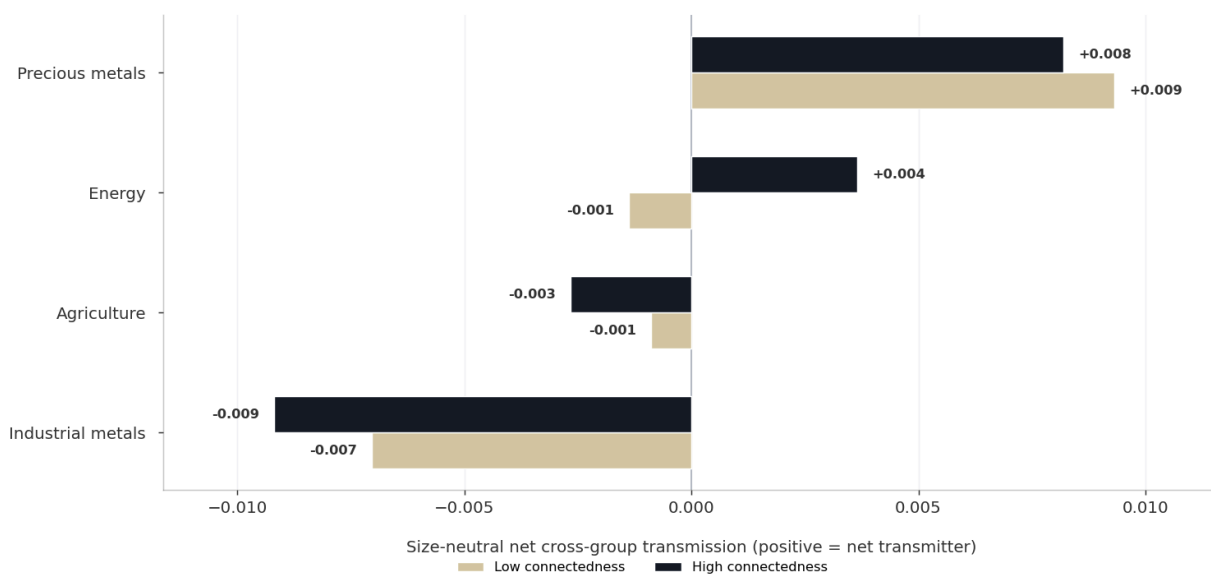
Energy also becomes more important. Transmission from **energy → industrial metals rises by 0.030** and **energy → agriculture by 0.024**.

The result shows that high connectedness does more than strengthen existing relationships. It creates a broader set of economically important routes through which disturbances can spread. **Commodity stress becomes systemic as shocks gain more paths across the network.**

Energy changes role as connectedness rises

Energy shifts towards transmission when connectedness is high

Precious metals remain a net source of cross-group spillovers, while energy moves from a slight receiver to a net transmitter as connectedness rises



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Source: Yahoo Finance via yfinance. Author analysis — Laura Brennan

Figure 6. Size-neutral net cross-group transmission in low- and high-connectedness regimes.

Precious metals remain a net source of cross-group spillovers in both regimes.

Energy behaves differently. It moves from a slight net receiver in the low-connectedness regime to a **net transmitter** when connectedness is high.

Agriculture becomes a somewhat larger net receiver, while industrial metals remain the strongest receiving group.

The result shows that rising connectedness changes not only how far shocks travel, but also which commodity groups send them and which absorb them. **The direction of systemic transmission changes with the regime.**

Methodology

Data

Sample period

04 January 2012–11 September 2026

Universe

11 exchange-traded commodity exposures across four groups:

Energy

USO, BNO, UNG

Agriculture

CORN, WEAT, SOYB, CANE

Industrial metals

CPER

Precious metals

GLD, SLV, PPLT

The common sample retains dates with observations available across the full universe.

Data source

Yahoo Finance, accessed through yfinance.

Daily adjusted closing prices are converted into **log returns**.

Connectedness framework

Rolling estimation

Connectedness is estimated over a **120-observation rolling window**.

Each window uses a **VAR(1)** with no deterministic trend.

Forecast-error variance decomposition

Directional spillovers are estimated using a **generalised FEVD** with a **10-step forecast horizon**.

The decomposition is row-normalised so each receiver's variance contributions sum to one.

Directional measures

For each commodity:

FROM measures spillovers received from the rest of the system.

TO measures spillovers transmitted to the rest of the system.

NET = TO – FROM

Positive NET identifies a net transmitter.

Negative NET identifies a net receiver.

Total connectedness

The total connectedness index is the average off-diagonal FEVD contribution across the system, expressed as a percentage.

Regime comparison

Rolling connectedness values are classified using the empirical distribution of the total connectedness index.

The **low-connectedness regime** contains the bottom 20% of rolling observations.

The **high-connectedness regime** contains the top 20%.

For each regime, FEVD matrices are averaged across all qualifying rolling windows.

Cross-group transmission is then aggregated across four commodity families:

Energy, agriculture, industrial metals and precious metals.

To avoid larger groups dominating mechanically, group-to-group transmission is normalised by the number of possible directed commodity pairs.

Own-variable effects are excluded.

Reported outputs include cross-group spillover shares, group-level net transmission and changes in directional transmission between regimes.

The purpose is to identify whether higher connectedness changes only the strength of spillovers, or the routes through which they travel.

Research workflow

Step	Description
Data	Daily adjusted prices for 11 exchange-traded commodity exposures
Returns	Daily log returns
Rolling window	120 observations
Model	VAR(1), no deterministic trend
Spillover measure	Generalised forecast-error variance decomposition
FEVD horizon	10 steps
Normalisation	Row-normalised variance contributions
Total connectedness	Average off-diagonal FEVD contribution
Directional measures	TO, FROM and NET spillovers
Commodity groups	Energy, agriculture, industrial metals and precious metals
Low regime	Bottom 20% of rolling connectedness
High regime	Top 20% of rolling connectedness
Group transmission	Mean contribution per possible directed commodity pair
Cross-group share	Share of total spillovers occurring between commodity groups
Regime comparison	High-minus-low changes in directional transmission

Interpretation

Higher commodity connectedness means that spillovers are no longer concentrated within individual commodity groups.

The rise in cross-group transmission shows that shocks increasingly move between energy, agriculture and metals rather than remaining contained within one part of the system.

The regime comparison also shows that transmission roles change. Precious metals remain an important source of cross-group spillovers, while energy shifts towards a net transmitting role as connectedness rises.

The result is structural rather than causal. It identifies how the routes available to shocks change with the state of the commodity network, not a single historical shock path.

Research implications

The evidence in this report shows that commodity spillover structure changes materially across connectedness regimes.

Key observations

- Total connectedness ranges from **33.4%** to **65.2%** across the sample.
- The current reading is **55.3%**, above the long-run median of **47.1%**.
- Cross-group spillovers rise from **32.2%** to **49.4%** in high-connectedness regimes.
- Precious metals remain an important cross-group transmitter.
- Energy shifts from a slight net receiver to a **net transmitter** as connectedness rises.
- The strongest increases occur across **metals** and **energy-linked** transmission routes.

Together, the results suggest that commodity stress becomes more systemic when shocks stop remaining inside individual commodity groups.

Monitoring connectedness alongside price moves can therefore help distinguish between a local commodity shock and one with a much broader **cross-market transmission risk**.

References

Data

Yahoo Finance, accessed through yfinance.

11 exchange-traded commodity exposures across energy, agriculture, industrial metals and precious metals.

Data through **11 September 2026**.

Methodology

Pesaran, M. H. and Shin, Y. (1998). "Generalized impulse response analysis in linear multivariate models." *Economics Letters*, 58(1), 17–29.

Diebold, F. X. and Yilmaz, K. (2012). "Better to give than to receive: Predictive directional measurement of volatility spillovers." *International Journal of Forecasting*, 28(1), 57–66.

Diebold, F. X. and Yilmaz, K. (2014). "On the network topology of variance decompositions: Measuring the connectedness of financial firms." *Journal of Econometrics*, 182(1), 119–134.

Software

Python, pandas, NumPy, statsmodels, matplotlib, NetworkX and yfinance.

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