CONFERENCE ON COMPLEX SYSTEMS 2026

Eigenvector Centrality Reveals Structural Undervaluation in U.S. Interstate Commerce Networks

Towards Complex Power Measures in U.S. Political Economy

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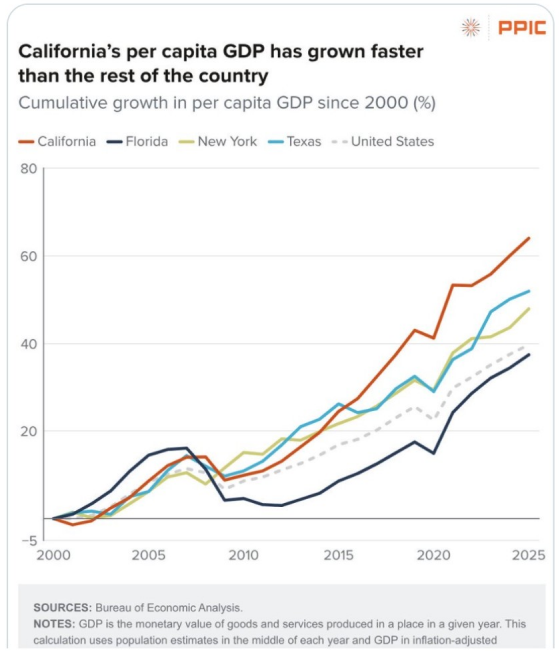
Who powers the nation's economy?

@GovPressOffice

California's economy powers the nation!

• In 2025, GDP was $4.3 TRILLION — 14% of the entire U.S. economy
• The state's economy has grown faster than the nation overall (90% vs. 69%)
• Nearly 3 million jobs added and number of businesses with paid employees up 52% since 2005. Both outpaced population growth (9.8%)
• Even on a per capita basis California's economy dominated — outperforming every other state!

(via @PPICNotes)



> "California isn't just keeping pace with the world—we're setting the pace. Our economy is thriving because we invest in people, prioritize sustainability, and believe in the power of innovation. And, while we celebrate this success, we recognize that our progress is threatened by the reckless tariff policies of the current federal administration. California's economy powers the nation, and it must be protected."
>
> Governor Gavin Newsom

These questions aren't new



"The welfare of a nation can, therefore, scarcely be inferred from a measurement of national income."

Simon Kuznets, report to Congress, 1934



Dependence arises when it is "extremely difficult and onerous ... to replace A as a market and a source of supply with other countries."

Albert O. Hirschman, National Power and the Structure of Foreign Trade, 1945

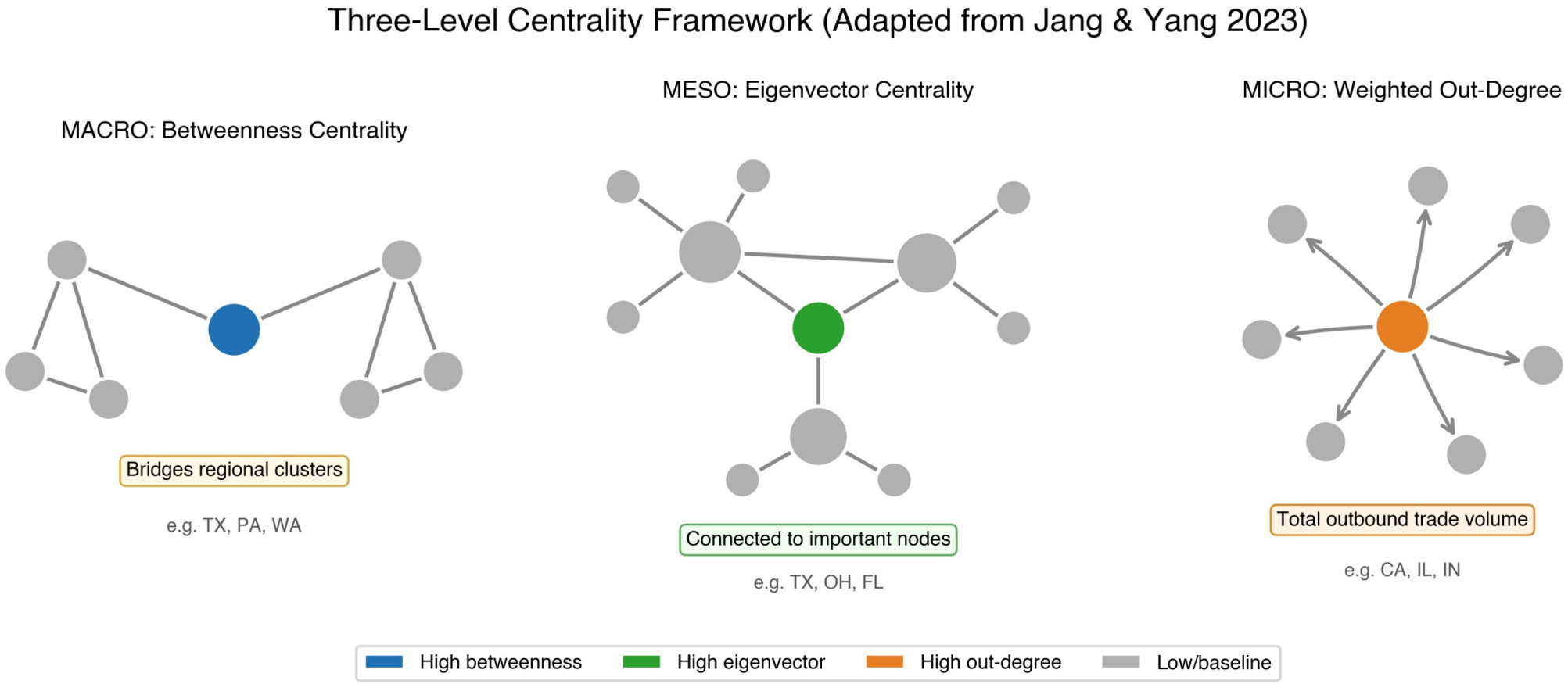


"Without an analysis of power, it is hard to understand inequality or much else in modern capitalism."

Angus Deaton, Nobel laureate, IMF Finance & Development, 2024

Photos: Kuznets, public domain; Hirschman, Institute for Advanced Study; Deaton, Bengt Nyman, CC BY-SA 4.0 (cropped, grayscale).

Where the method comes from



Bridge position

Trade prestige (in-flow)

Export reach

The raw data

Origin	Destination	Commodity (SCTG)	Shipment value	Weight factor	Weighted value
KY (21)	OH (39)	Plastics/Rubber (24)	$27,484	15.4	$423,254
TX (48)	CA (6)	Electronic Equipment (35)	$2,199	596.3	$1,311,264
MS (28)	TN (47)	Meat/Seafood (05)	$13,193	65.4	$862,822
IL (17)	WI (55)	Misc. Manufactured (40)	$2,529	2,278.1	$5,761,315
LA (22)	MS (28)	Chemical Products (23)	$3,652	30.1	$109,925
CA (6)	NV (32)	Chemical Products (23)	$40,741	57.5	$2,342,608
CA (6)	CA (6)	Mixed Freight (43)	$4,380	328.3	dropped: within state

Seven of 5,978,523 shipment records, 2017 Commodity Flow Survey Public Use File. Weighted value = shipment value × weight factor, summed by origin–destination pair.

The network: states, shipments, direction

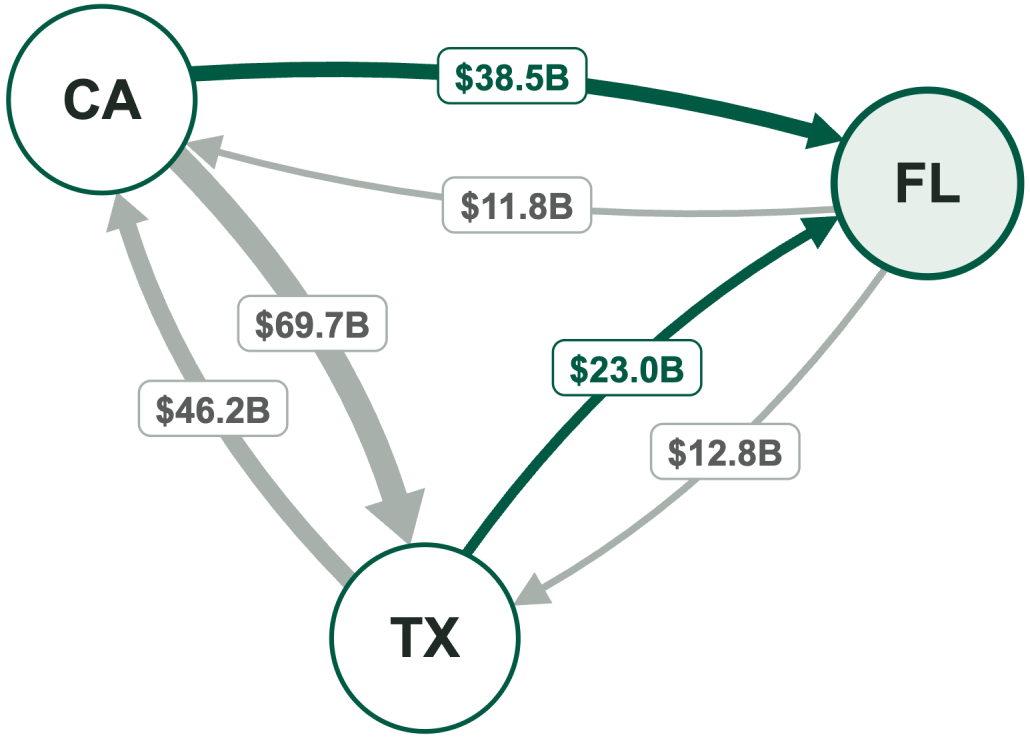
Node a state (50 + DC)

Edge goods shipped from one state to another, all commodities, 2017

Weight dollar value of those shipments

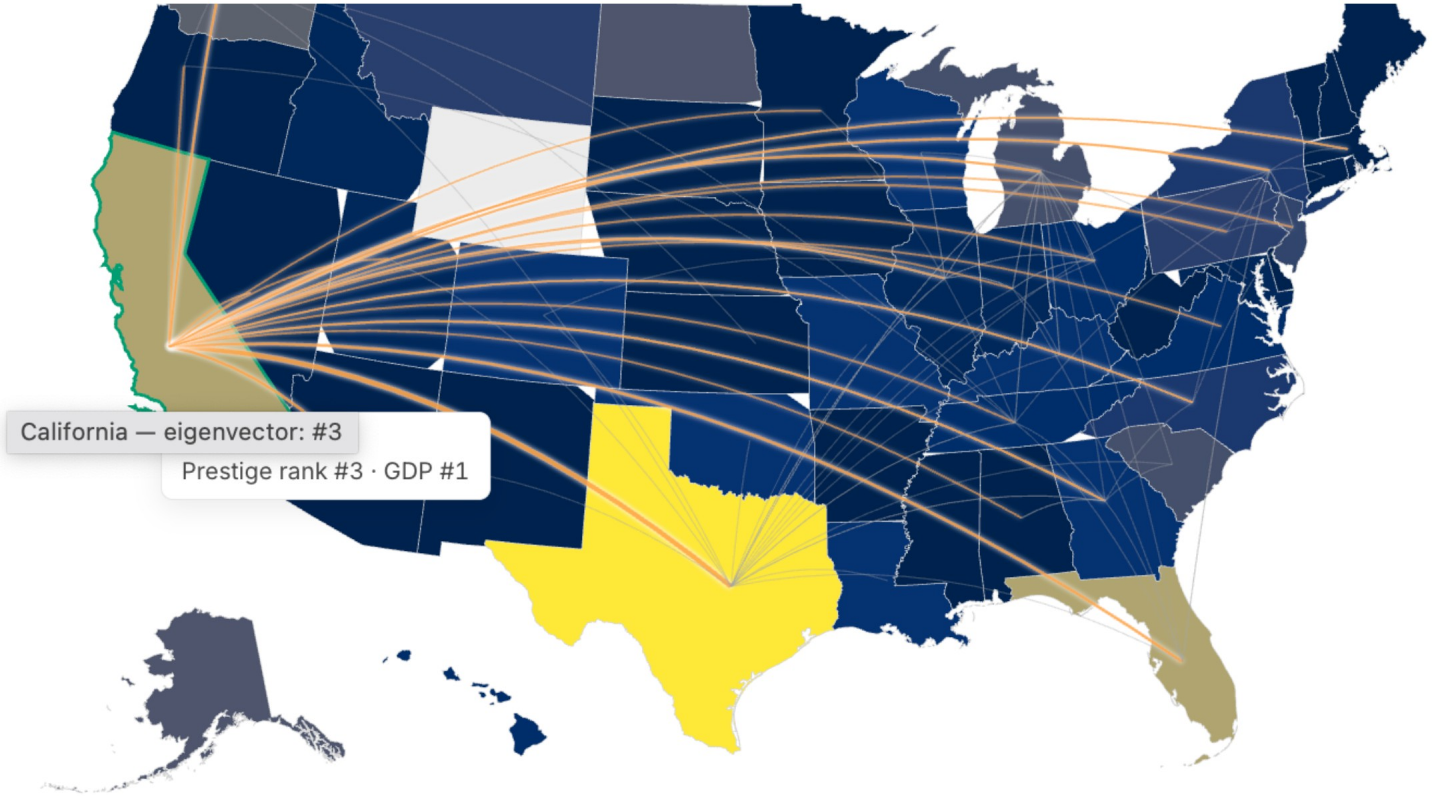
Direction origin → destination. CA → FL and FL → CA are two different edges

> **Trade prestige counts arrows in,** weighted by the sender's own prestige. Florida ranks 5th counting arrows in, 17th counting arrows out.



2017 Commodity Flow Survey · 3 of 51 states, 6 of 2,534 edges · arrow width = dollars · green = arrows into Florida

The network

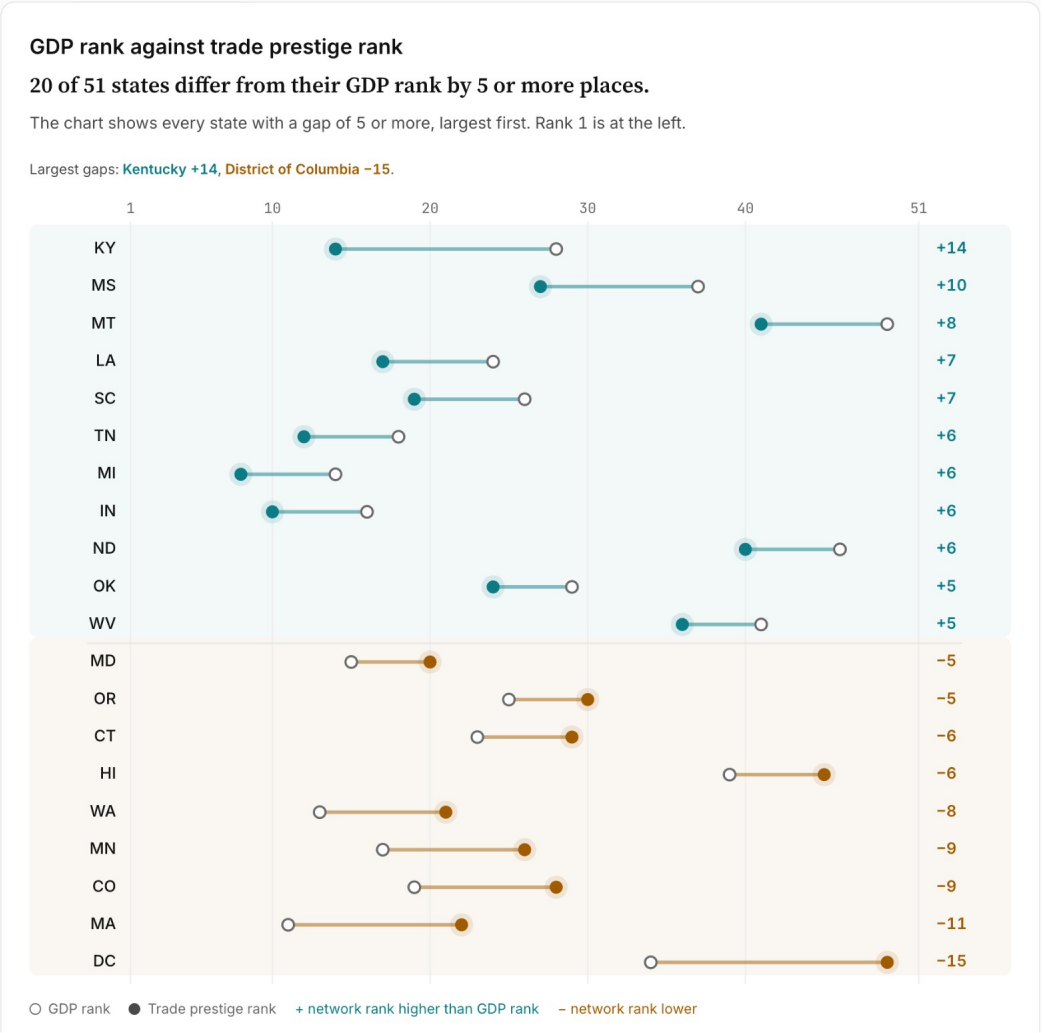


Network position is not economic size

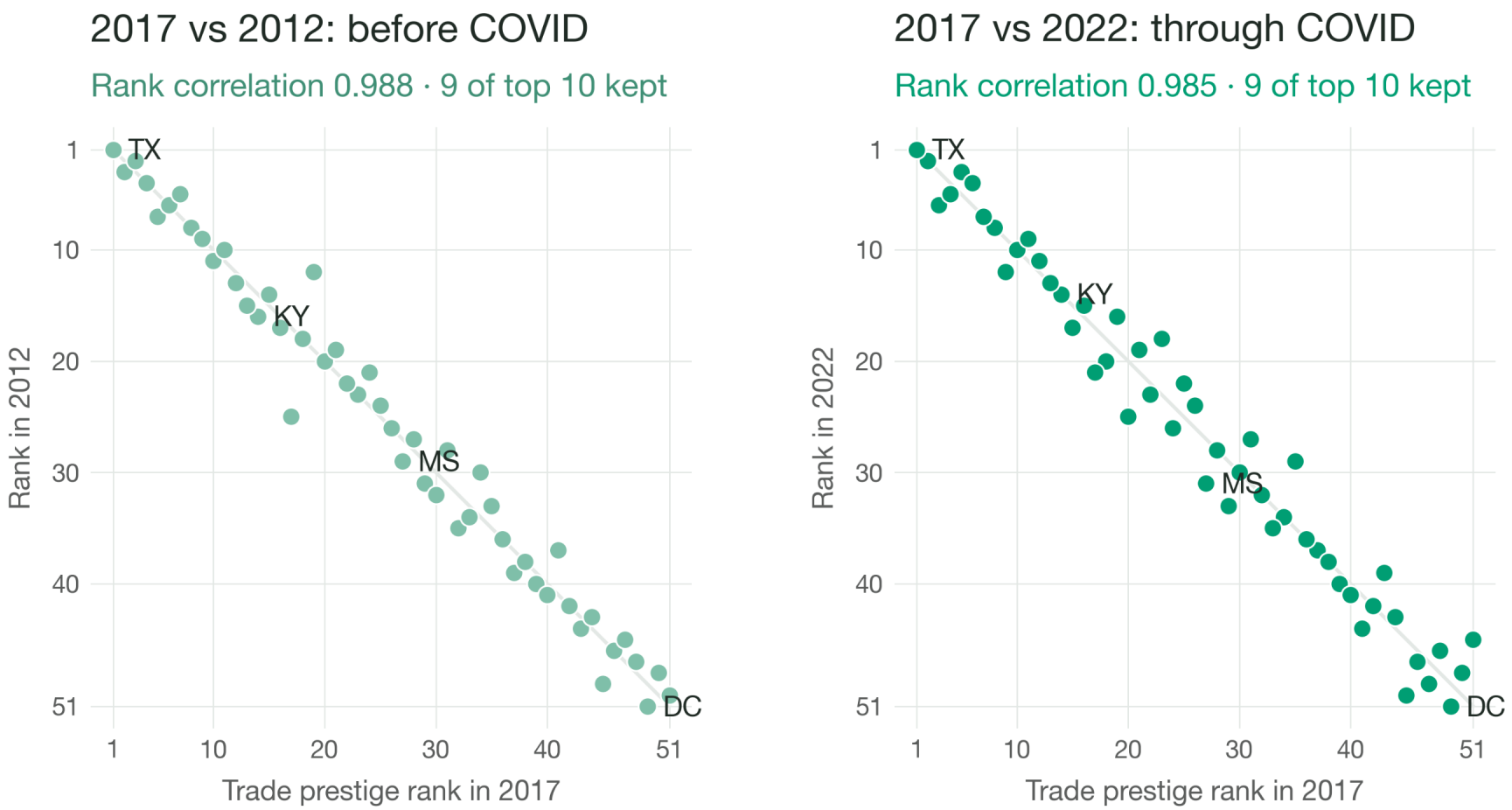
STRUCTURALLY UNDERVALUED

Network rank 5 or more places above GDP rank

11 states in 2017, led by Kentucky (+14) and Mississippi (+10)



Is the 2017 structure persistent, or a one-year snapshot?



Rank 1 at the top left. Dots on the diagonal kept their rank. Commodity Flow Survey 2012, 2017 and 2022, 50 states and DC.

A pre-registered test. Thresholds registered June 15, 2026, before the full 2022 run. Supported by a ResearchHub grant.

Two more results, briefly

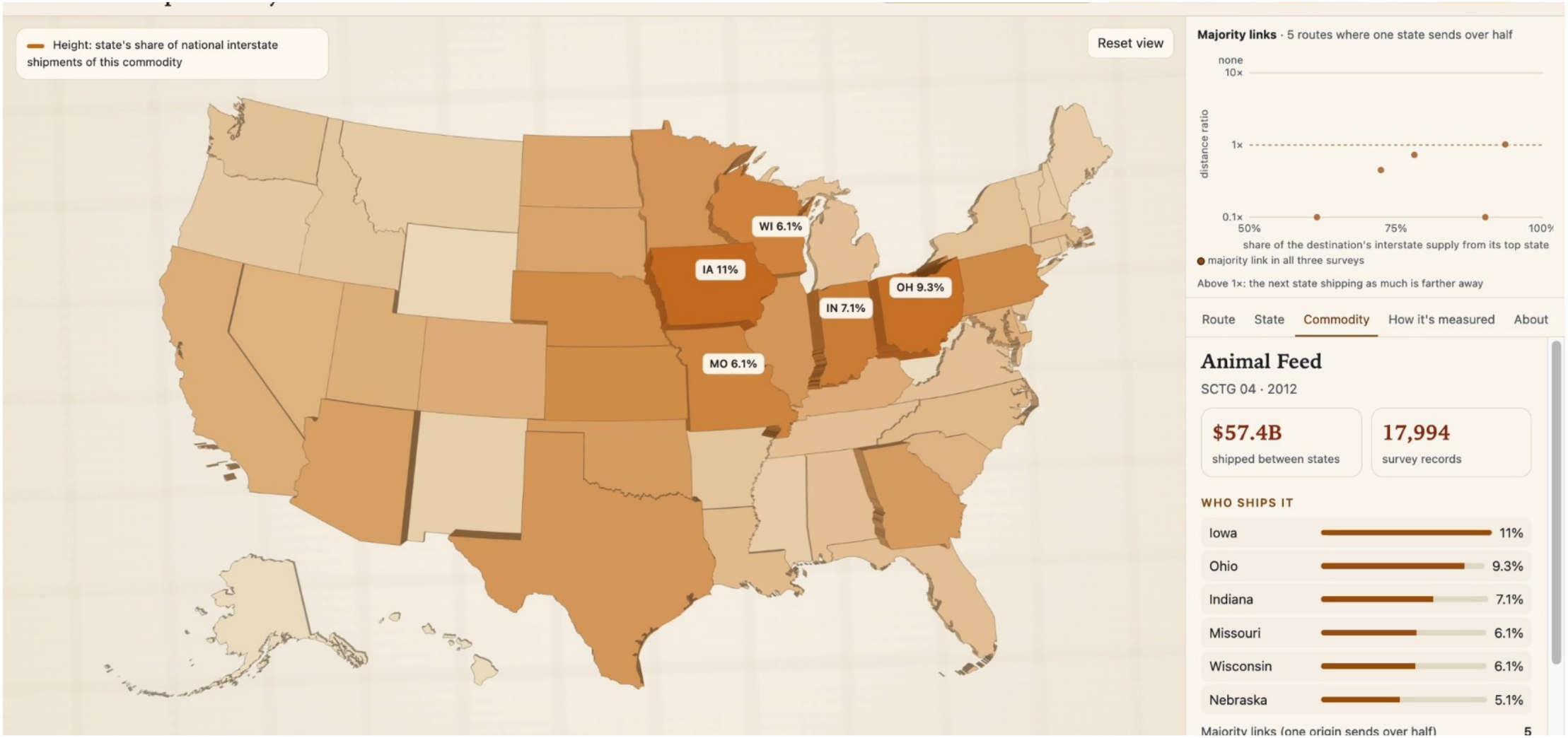
AN UNEXPECTED CORRELATION

7 of the 8 undervalued states named in the thesis have drawn **$170B+** in announced AI data-center investment since 2024. A correlation, not a cause: worth exploring.

BOUNDARY SENSITIVITY

Add the rest of the world as a 52nd node: trade prestige rankings hold **(0.982)**; bridge position rankings do not **(0.816)**.

Next: who leans on whom



Open problems and research directions

Integration

Economic complexity: does network position add to what it predicts?

Fiscal, political and money layers on the same 51 states

Rank and null models

Hub change ≈ 1 random displacement; bridges 12 to 15

What does brokerage churn mean?

Functional dependency

Reconstructability analysis (Klir lineage)

Which suppliers are hard to replace?

Collaborators welcome · ustradeflow.systems · github.com/rsthornton/us-trade-centrality