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DATA AND ANALYTICS

Markets and Macro Quarterly

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IN BRIEF

- **US stocks no longer tell you what Tokyo will do next morning.** When US energy stocks rose during the New York day, Japan's Nikkei 225 tended to rise at the next open; over the last 12 months that link fell from +0.42 to −0.06, the largest 12-month drop on record. Section 4.4
- **A "safe" part of the stock market has been behaving like a bond.** Consumer Staples shares have been falling when interest rates rise, more sharply than in 99% of their history since 1999; part of this is a more volatile market rather than a lasting change. Section 4.2
- **Treasuries stopped cushioning stock falls.** Since the Fed began raising rates in 2022, the S&P 500 and the 10-year yield went from moving clearly together (+0.36) to about no relation (−0.10), so falling stocks no longer bring rising bond prices. Section 4.7

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- **Bonds and foreign holdings now tend to lose at the same time.** Rising US rates now come with a stronger dollar (−0.08 before, +0.31 since 2021), so when rates jump, bonds fall and the stronger dollar shrinks the value of unhedged foreign holdings. Section 4.7
- **Real estate stocks now track mortgage rates far more closely.** The link went from weak (−0.11 to 2020) to strong (−0.62 in 2021–23, −0.51 since). Section 4.8
- **Expected, not found: a turning point at the pandemic.** The data date the stock-bond turn to 1 April 2022 and the rate-dollar turn to 30 March 2022, when the Fed began raising rates. Section 4.7
- **Expected, not found: economic data that warns ahead of US stock moves.** None of the indicators tested leads US stocks once clustered calm and stormy spells are allowed for; across the study, 1,280 of 1,956 findings of the ordinary test no longer held. Section 4.9
- **Expected, not found: energy as an early signal.** Of 23 energy leads tested, only one kind held: the price of oil gives about two months' notice of the next US consumer price figure. Section 4.3
- **Expected, not found: relationships breaking in a turbulent year.** Over the last 1, 3 and 6 months nothing moved outside its own history by more than chance alone would produce (139 flags against 119 by chance). Section 4.2
- **Explore your own ideas for free:** every relation in this paper, and any pair of your own, can be measured in Gyre's free Covariance Calculator at gyreresearch.com/covariance.

ABOUT GYRE RESEARCH

Gyre Research *develops and supports the* ***Gyre Investment Analytics Hub****: performance, risk, compliance, reconciliation and more, unified for the portfolio managers and analysts who run the book and the operations team that supports them. gyreresearch.com · team@gyreresearch.com*

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Introduction

What this analysis is, and what it is not

What it is

- A study of how 183 economic and market series move together: 45 daily market series (the S&P 500 and its sectors, interest rates, currencies, commodities, volatility and stock indexes abroad), 3 weekly series (jobless claims, the 30-year mortgage rate and financial conditions) and 135 monthly and quarterly economic series from the US and other large economies, from 1999 to 31 October 2026.
- It asks four questions: which series move together most and least; which relationships have changed, recently or since 2020; which series move first and give notice of another; and which readings are unusual today.
- The method was written down before any result was computed, and every finding is tested against what chance alone would produce, with tests that allow for the way financial data clusters in calm and stormy spells.
- Every relationship in it can be checked, and any pair of your own explored, in Gyre's free Covariance Calculator at gyreresearch.com/covariance.

What it is not

- Not investment advice, and not a recommendation to buy or sell anything.
- Not a test of a trading strategy: it measures relationships, not profits after costs. Testing whether an unusual gap between two stocks is worth betting on is the job of Pairs-Trade Analysis, in preparation.
- Not an explanation of causes: two series moving together does not mean one drives the other.
- Not a forecast: relationships change, and this issue shows several that did. A relationship that held for twenty years can stop.
- Not a model of the whole economy: it covers these series only. Section 5 sets out what the data cannot tell you.

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Section 1

Why covariance matters in finance

- **Risk is a matrix, not a list.** A portfolio's variance is the sum of every holding's variance and every pair's covariance. With 20 holdings there are 20 variances and 190 covariances: most of the risk is in the pairs.
- **Diversification only works between assets that do not move together.** Two assets with correlation 0.9 add little protection; a correlation near zero or below adds a lot.
- **Hedges are covariances.** A hedge ratio is a beta: the covariance of the position with the hedge divided by the hedge's variance.
- **Relations change, and they change fastest when it matters.** Correlations between risky assets tend to rise in sell-offs, just when diversification is needed. Some of that rise is mechanical (higher volatility alone raises a measured correlation); some is real.
- **Macro data arrives late and is revised.** A relation between a market and an economic release is only usable from the day the figure is published, and at the value first published.

1.1 How a lead works

- **A lead is measured against the release, not the month described.** Oil's change in January is set against the producer price index released in March, which describes February: a lag of 2 release months is a lead of 1 month of the period described.
- **The usable time is to publication.** From the end of the oil month to the release is 44 days at the median (331 releases since 1999): about 6 weeks.

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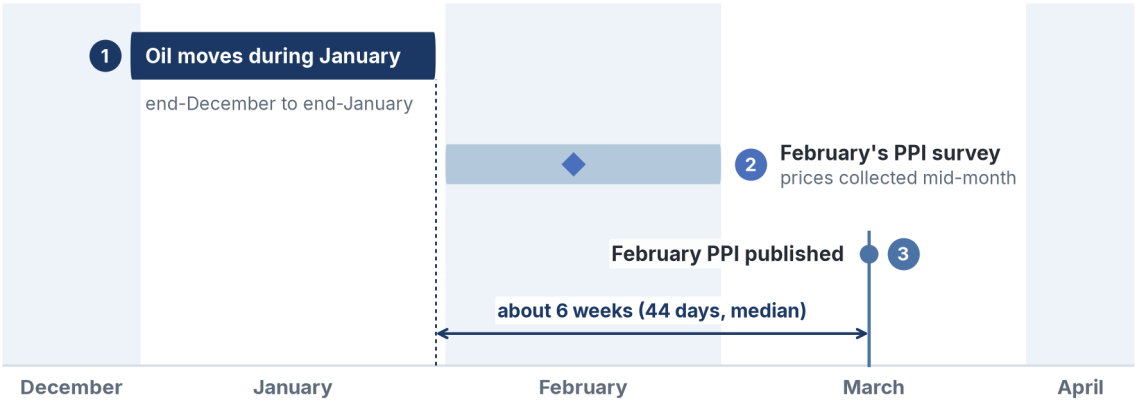


Figure 1a. From an oil move to the producer price release. Days: the median of the index's own release dates. Source: FRED, Federal Reserve Bank of St. Louis; sector series calculated by Gyre Research.

FOLLOWER ↓ / LEADER →	WTI crude oil DCOILWTICO	Brent crude oil DCOILBRENTEU	US Energy sector rebuilt from index members
Producer prices (PPI) PPIACO	not found lag 2 months r +0.48 → +0.60 ~6 weeks to publication	not found lag 2 months r +0.54 → +0.51 ~6 weeks to publication	not found lag 2 months r +0.62 → +0.51 ~6 weeks to publication
Consumer prices (CPI) CPIAUCSL	**FOUND** lag 2 months **r +0.44 → +0.35** ~7 weeks to publication	**FOUND** lag 2 months **r +0.47 → +0.30** ~7 weeks to publication	not found lag 2 months r +0.42 → +0.38 ~7 weeks to publication
Retail sales (nominal) RSAFS	not found lag 2 months r +0.33 → +0.31 ~6 weeks to publication	not found lag 2 months r +0.44 → +0.25 ~6 weeks to publication	not found lag 2 months r +0.46 → +0.37 ~6 weeks to publication
US goods exports BOPGEXP	not found lag 3 months r +0.40 → +0.37 ~10 weeks to publication	not found lag 3 months r +0.46 → +0.36 ~10 weeks to publication	not found lag 3 months r +0.28 → +0.32 ~10 weeks to publication

r: found in the years to 2020 → confirmed in 2021-2026. Lag: months from the leader's month to the follower's release month.
Weeks: from the end of the leader's month to publication, the median of the follower's own release dates since 1999.

Figure 1b. Lead map: which of three energy leaders lead four US releases. Found = the pre-registered test found the lead in the years to 2020 and confirmed it in 2021–2026. Not found shows lag 2 (lag 3 for exports). Source: FRED, Federal Reserve Bank of St. Louis; sector series calculated by Gyre Research.

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Section 2

How to use the calculator

Open the free calculator at gyreresearch.com/covariance: no sign-in, any two series, any frequency.

- Pick two series: a stock or ETF by ticker or name, or one of more than 850,000 FRED economic series.
- Pick a frequency (daily to annual) and a look-back. The menu offers only the look-backs both series can fill; security prices start 2023-12-01, FRED series reach back decades.
- The calculator measures each series the standard way by default: percent change for prices and quantities, change in level for rates and other series in percent.
- Read the result: the covariance (in the two series' units), the correlation (-1 to 1), R squared, and both betas, with their standard error when there are fewer than 30 observations, and notes on anything that limits the reading (a shortened window, series measured at different times of day, levels that trend).

2.1 The analyst: is the story in the data?

- **Test a macro thesis before writing it.** "Rising real yields hurt technology stocks": pick DFII10 and a technology stock or sector fund, weekly or monthly, 5 to 10 years. The correlation says whether the relation exists; the beta says how large it is; the window says whether it is recent or long-standing.
- **Find what a company really moves with.** A stock against oil, the dollar, the 10-year yield and credit spreads in turn: the strongest is its true macro driver, which is not always its sector label.
- **Check that a relation is not two trends.** Run it on changes (the default), never on levels: two rising series always look related as levels.
- **Cite it.** Every result names its data source; a pair, frequency and window can be shared as a link and reproduced by anyone.

2.2 The portfolio manager: what does the book really hold?

- **Diversification check before adding a position.** The correlation of the candidate with the portfolio's largest exposure (or with SPY): near 1 adds concentration, near 0 or below adds diversification.

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- **Hidden factor exposure.** Each holding against the 10-year yield, the dollar, oil or credit spreads: several holdings with large betas to the same series are one bet, whatever their sectors.
- **Stress view.** The same pair over a calm and a volatile window (for example 2024 against 2020): correlations usually rise in sell-offs, so the diversification that shows in calm data is the most a book can count on, not the least.
- **Benchmark fit.** A fund or ETF held in the book against its benchmark (for example a sector fund against SPY): the beta is the market exposure it actually carries, the R squared how much of its movement the market explains.

2.3 The trader: what has changed, and how much to hedge

- **Hedge ratio.** The beta of the position on its hedge instrument, over a look-back that matches the holding period (1 to 3 months for a short-term trade); size the hedge as position value times beta.
- **Relative-value pairs.** Two related names (KO and PEP, XOM and CVX): the correlation says whether the pair is still a pair; the beta gives the ratio to trade them in.
- **Regime check.** The same pair over 1 month, 3 months and 1 year: a short-window reading far from the long one is the kind of aberration this paper tests for, and the first sign that a hedge or a pair has stopped working.
- **Macro event read.** A sector against the series behind the next release (payrolls, CPI, claims), monthly, to see how strongly the sector has moved with that figure.

Section 3

The study: data and method

3.1 Data

- **Markets, daily (45 series):** the S&P 500 and its 11 sectors, each rebuilt cap-weighted from each day's index members and weights (1999 to now); US Treasury yields from 3 months to 30 years, the 10y-2y and 10y-3m curves, the 10-year real yield, breakeven inflation, the 5y5y forward inflation rate, the 10-year term premium, the Baa credit spread; VIX, oil and gold volatility, economic policy uncertainty; the broad dollar and 11 currencies; WTI, Brent, natural gas; the Nikkei 225, Bitcoin and Ether.

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- **Macro, monthly (108 series):** for the US, euro area, Germany, France, Italy, the UK, Japan, Canada, China, India and Brazil, every indicator of growth, inflation, employment, confidence, rates, credit, trade and markets that FRED publishes monthly and current; global food, energy and metal prices.
- **Quarterly, long history only (30 series):** real GDP, fixed investment, house prices, US government debt to GDP.
- All economic data from FRED, only series it marks free to publish (Source: FRED, Federal Reserve Bank of St. Louis; each series' own source in Appendix A); sector returns calculated by Gyre Research.

3.2 Method (fixed before any result)

- **Measurement:** daily changes for markets; monthly changes for macro; release-dated, first-published values for every lead and lag test, each change taken within the release that first published it.
- **Windows:** two baselines (the pair's whole history; the last 12 months, 252 trading days) and three recent windows (6 months, 3 months, 1 month).
- **Two correlations:** Pearson and Spearman (rank); a finding counts only when both agree.
- **Aberration:** today's reading beyond the pair's own 1st or 99th percentile of the same measurement in its history; tested again within periods of similar volatility.
- **Leads and lags:** each series' own momentum removed first; a lead counts only if it passes a false-discovery test in 1999–2020 (or the pair's first common month to 2020) and is confirmed again in 2021–2026, years not used to find it.
- **Discovery periods differ by pair:** the monthly test starts at each pair's first common month, as pre-registered.
- **Significance, honestly measured:** market changes cluster in calm and stormy spells, and macro changes stay autocorrelated, so the ordinary correlation test finds too much. Every p-value here allows for both (a Newey-West test); a finding is also checked against a stricter multiple-testing rule valid under any dependence (Benjamini-Yekutieli), a bootstrap interval of its correlation, and, for three families, a family-wide check (Romano-Wolf). Section 4.9 shows what this changed.
- **Chance:** every result states how many findings chance alone would produce.
- **Checked:** 24 pairs equal the public calculator's figures and 6 pairs equal a hand calculation from FRED's own download (section 4.6).

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Section 4

Results

4.1 Strongest and weakest

A ranking, not a test: the 20 largest and the 20 closest to zero of 990 market pairs, on the last 252 trading days, Pearson and Spearman of the same sign.

#	PAIR	R	RANK R	DAYS	BUILT FROM THE OTHER (READING)
1	10-year Treasury yield / 10-year term premium (model)	+0.95	+0.94	1	term premium is a model of yields
2	10-year Treasury yield / 30-year Treasury yield	+0.92	+0.92	1	
3	Broad dollar index / USD per euro	−0.92	−0.88	1	the dollar index includes it
4	Bitcoin / Ether	+0.90	+0.91	1	
5	10-year Treasury yield / 10-year real yield	+0.90	+0.89	1	nominal and real 10-year
6	10-year real yield / 10-year term premium (model)	+0.88	+0.87	1	term premium is a model of yields
7	30-year Treasury yield / 10y-3m curve	+0.86	+0.86	1	
8	10-year Treasury yield / 10y-3m curve	+0.86	+0.85	1	one is a spread of the other
9	30-year Treasury yield / 10-year term premium (model)	+0.86	+0.85	1	term premium is a model of yields
10	USD per euro / Swiss franc per USD	−0.86	−0.83	1	
11	S&P 500 / Information Technology	+0.86	+0.83	1	the sector is in the index
12	Broad dollar index / USD per pound	−0.84	−0.80	1	the dollar index includes it
13	S&P 500 / VIX	−0.84	−0.81	1	
14	10y-3m curve / 10-year term premium (model)	+0.83	+0.82	1	term premium is a model of yields

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#	PAIR	R	RANK R	DAYS	BUILT FROM THE OTHER (READING)
15	30-year Treasury yield / 10-year real yield	+0.83	+0.82	1	
16	2-year Treasury yield / 10-year term premium (model)	+0.83	+0.81	1	term premium is a model of yields
17	Broad dollar index / peso per USD	+0.82	+0.80	1	the dollar index includes it
18	USD per euro / USD per pound	+0.82	+0.79	1	
19	Broad dollar index / USD per Australian dollar	−0.82	−0.79	1	the dollar index includes it
20	2-year Treasury yield / 10-year Treasury yield	+0.81	+0.79	1	

Table 4. The 20 strongest. r: Pearson; rank r: Spearman; days: one-day or two-day changes. The last column is a reading of the results, not a test: where one series is built from the other, they move together by construction. Source: FRED, Federal Reserve Bank of St. Louis; sector series calculated by Gyre Research.

#	PAIR	R	RANK R	DAYS
1	Gold volatility / won per USD	−0.00	−0.05	2
2	Economic policy uncertainty (model) / yen per USD	−0.00	−0.00	2
3	Baa credit spread / rupee per USD	−0.00	−0.03	2
4	10y-3m curve / Nikkei 225	+0.00	+0.02	2
5	5y5y forward inflation / Economic policy uncertainty (model)	−0.00	−0.12	2
6	Real Estate / 10y-2y curve	−0.00	−0.02	2
7	Health Care / US natural gas	+0.01	+0.05	2
8	2-year Treasury yield / Nikkei 225	+0.01	+0.00	2
9	rupee per USD / Bitcoin	−0.01	−0.05	2
10	Consumer Staples / yen per USD	−0.01	−0.08	2
11	Communication Services / Consumer Staples	+0.01	+0.02	1
12	VIX / US natural gas	+0.01	+0.18	2
13	10y-2y curve / WTI crude oil	+0.01	+0.04	1
14	Communication Services / Economic policy uncertainty (model)	−0.01	−0.04	2

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#	PAIR	R	RANK R	DAYS
15	US natural gas / Nikkei 225	+0.01	+0.01	2
16	Communication Services / 10y-2y curve	+0.01	+0.03	2
17	3-month Treasury yield / 5y5y forward inflation	+0.01	+0.02	1
18	Utilities / Gold volatility	−0.01	−0.01	1
19	10y-3m curve / Bitcoin	+0.01	+0.03	2
20	10-year term premium (model) / Nikkei 225	−0.01	−0.01	2

Table 5. The 20 weakest. Two days: the two series are measured at different times of day, so two-day changes are used.

PAIR	GROUPS	R	RANK R
S&P 500 / VIX	US equities / Volatility	−0.84	−0.81
Information Technology / VIX	US equities / Volatility	−0.70	−0.64
Consumer Discretionary / VIX	US equities / Volatility	−0.66	−0.69
Energy / Brent crude oil	US equities / Commodities	+0.58	+0.60
S&P 500 / USD per Australian dollar	US equities / Currencies	+0.58	+0.56
Energy / WTI crude oil	US equities / Commodities	+0.57	+0.62
Industrials / VIX	US equities / Volatility	−0.57	−0.54
Oil volatility / WTI crude oil	Volatility / Commodities	+0.55	+0.49
Oil volatility / Brent crude oil	Volatility / Commodities	+0.52	+0.47
10-year breakeven inflation / Brent crude oil	Rates and credit / Commodities	+0.51	+0.45
Information Technology / USD per Australian dollar	US equities / Currencies	+0.51	+0.49
VIX / USD per Australian dollar	Volatility / Currencies	−0.49	−0.47

Table 6. Descriptive: the 12 strongest pairs between different asset groups (252 days, headline change).

4.2 Recent aberrations

Chance: 139 single flags against 118.8 from chance alone (5,940 tests × 2%). Strict (both baselines, at least two windows): 0.

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WINDOW	MEASURED AGAINST	PAIRS	FLAGS	VOLATILITY-EXPLAINED	STRICT
21 days	its own history	990	19	5	0
21 days	gap to its 12-month value	990	31	4	0
63 days	its own history	990	23	7	0
63 days	gap to its 12-month value	990	13	1	0
126 days	its own history	990	50	18	0
126 days	gap to its 12-month value	990	3	1	0

Table 7. Flags by window and baseline. Volatility-explained: the flag does not hold within periods of similar volatility. Every flag in Appendix D.

Descriptive: the Consumer Staples sector against rates. 8 of the flags are Consumer Staples against rate series, every one below the pair's own 1st percentile: staples moved against rates more strongly than in 99% of their own history in these windows. Not strict, so not a finding.

RATE SERIES	WINDOW	NOW	1ST TO 99TH PERCENTILE	EXPLAINED BY
30-year Treasury yield	21 days	−0.67	−0.64 to +0.80	–
30-year Treasury yield	63 days	−0.50	−0.49 to +0.71	–
10y-3m curve	21 days	−0.81	−0.69 to +0.81	–
10y-3m curve	63 days	−0.57	−0.49 to +0.73	–
5y5y forward inflation	63 days	−0.43	−0.38 to +0.65	–
5y5y forward inflation	126 days	−0.27	−0.25 to +0.62	–
10-year term premium (model)	21 days	−0.69	−0.68 to +0.81	–
10-year term premium (model)	63 days	−0.53	−0.50 to +0.71	–

Table 8. Consumer Staples against rates, all flagged rows.

For your consideration. No relation broke strictly from its own history, so hedges and diversification sized on the past year still hold on this evidence. The one coherent exception is Consumer Staples, which has recently moved against rising yields more strongly than in 99% of its history since 1999. Against the 30-year yield, a volatility-adjusted check (Forbes and Rigobon) reads the one-month reading as partly a change in the relation and partly the market's higher volatility, and the three-month reading as the

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market's higher volatility, not a change in the relation. The signal is weaker than the raw correlation suggests, but a defensive sleeve held for stability may still be carrying rate risk.

Are they tradeable? We don't know yet, and this issue doesn't claim it.

- A pair being unusual today says nothing about whether it will return to normal, or how fast.
- 139 flags against 119 expected by chance means most of them are probably noise; we cannot yet tell which flags are the real ones.
- Testing exactly this, “unusually wide, bet on a return to normal”, is the subject of a new Gyre analytic in preparation, Pairs-Trade Analysis (gyreresearch.com/pairs-trade): how often a gap closes, how long it takes, and whether that pays after costs against SPY.

4.3 Leads and lags

Daily: 148 leads

Chance: under no effect at all, the chance that this test finds even one lead is at most 0.25% (39,600 pair-lags); it found 148.

- **Mostly measurement timing:** 140 of 148 are a one-day lag between series measured at different times of day (a 4 pm US close moves the next day's noon exchange rate or the next Tokyo session).
- **Same measurement time: 8 leads, all small:** largest |r| 0.12 to 2020 (median 0.11), at most 0.21 in 2021–2026.

LEADER TIME → FOLLOWER TIME	LEADS	LAG 1 DAY	LAGS 2–5	LAGS 6–20
US 4 pm close → New York noon	95	95	0	0
US 4 pm close → Tokyo	15	15	0	0
US 4 pm close → US afternoon	11	11	0	0
US afternoon → New York noon	10	10	0	0
New York noon → New York noon	8	8	0	0
New York noon → Tokyo	5	5	0	0
US 4 pm close → London	2	2	0	0
US afternoon → London	1	1	0	0

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LEADER TIME → FOLLOWER TIME	LEADS	LAG 1 DAY	LAGS 2–5	LAGS 6–20
US afternoon → Tokyo	1	1	0	0

Table 9. Daily leads by measurement time and lag.

LEADER → FOLLOWER	LAG (DAYS)	FOUND IN (TO 2020)	CONFIRMED IN 2021–2026
Broad dollar index → won per USD	1	+0.12 (3,726)	+0.21 (1,452)
peso per USD → won per USD	1	+0.11 (5,302)	+0.15 (1,452)
real per USD → won per USD	1	+0.11 (5,302)	+0.10 (1,452)
USD per euro → won per USD	1	−0.11 (5,302)	−0.21 (1,452)
Swiss franc per USD → won per USD	1	+0.08 (5,302)	+0.16 (1,452)
rupee per USD → won per USD	1	+0.07 (5,301)	+0.09 (1,452)
Swiss franc per USD → yuan per USD	1	+0.06 (5,311)	+0.08 (1,452)
USD per Australian dollar → yuan per USD	1	−0.06 (5,310)	−0.07 (1,452)

Table 10. The 8 same-time leads. r (n).

For your consideration. None of the daily leads is large enough to trade after costs. The one-day pattern across markets matters for hedging across time zones: a move at the US close is matched in Tokyo and in the New York noon exchange rates a session later, so a hedge checked the same day can look mismatched when it is not.

Monthly: macro releases and markets

Chance: under no effect at all, the chance that this test finds even one lead is at most 0.25%; it found 13.

(i) Construction: 9 leads into monthly averages

GS10 and FEDFUNDS are monthly averages of daily series. A daily move shows in the average partly in its own month and partly in the next, so any market series that moves with rates leads the average by one month. A reading of the results, not a test.

LEADER → FOLLOWER	LAG	FOUND IN (TO 2020)	CONFIRMED IN 2021–2026
yen per USD → 10-year yield (monthly avg.)	1	+0.33 (287)	+0.59 (68)
10-year real yield → 10-year yield (monthly avg.)	1	+0.51 (214)	+0.76 (68)

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LEADER → FOLLOWER	LAG	FOUND IN (TO 2020)	CONFIRMED IN 2021–2026
10-year Treasury yield → 10-year yield (monthly avg.)	1	+0.69 (287)	+0.81 (68)
10-year Treasury yield → 10-year yield (monthly avg.)	2	+0.44 (287)	+0.27 (68)
2-year Treasury yield → 10-year yield (monthly avg.)	1	+0.51 (287)	+0.70 (68)
30-year Treasury yield → 10-year yield (monthly avg.)	1	+0.59 (287)	+0.77 (68)
30-year Treasury yield → 10-year yield (monthly avg.)	2	+0.44 (287)	+0.24 (68)
10-year term premium (model) → 10-year yield (monthly avg.)	1	+0.67 (287)	+0.73 (68)
10-year term premium (model) → 10-year yield (monthly avg.)	2	+0.41 (287)	+0.24 (68)

Table 1. Monthly leads into monthly averages. Lag in release months; r (n); Source: FRED, Federal Reserve Bank of St. Louis; sector series calculated by Gyre Research.

(ii) Energy: 2 leads

LEADER → FOLLOWER	LAG	FOUND IN (TO 2020)	CONFIRMED IN 2021–2026
Brent crude oil → Consumer prices	2	+0.47 (391)	+0.30 (66)
WTI crude oil → Consumer prices	2	+0.44 (406)	+0.35 (66)

Table 2. Oil and Energy-sector leads. Figure 1b shows the timing. Lag in release months; r (n).

For your consideration. Oil gives some notice of the next consumer price print: its monthly change leads US CPI by two release months, and that lead held again after 2020. It is the only energy lead left once the test allows for clustered volatility and autocorrelation; energy stocks and producer prices no longer pass, and even oil-to-CPI does not survive the strictest family-wide check. A book exposed to inflation surprises can treat oil as a tendency worth watching ahead of the CPI release, not as a signal. This was tested against the published figures only, not against inflation-linked bonds or breakevens, where it may already be priced.

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(iii) Others: 2 leads

LEADER → FOLLOWER	LAG	FOUND IN (TO 2020)	CONFIRMED IN 2021–2026
10y-3m curve → German 10-year yield	2	+0.48 (74)	+0.27 (62)
10-year term premium (model) → German 10-year yield	2	+0.44 (74)	+0.32 (62)

Table 3. Other monthly leads. Lag in release months; r (n).

Coincident (lag 0): 0 pairs. No macro release passes the test against the same month's market move.

For your consideration. No confirmed monthly lead points into US stocks: in this test, macro releases gave no advance notice of stock or sector returns. They belong in risk budgeting and scenario analysis, not in market timing.

Quarterly

Chance: at most 0.25% under no effect; found 0, not confirmed 66.

Detection limit: 2021–2026 holds 11–23 quarters per pair, so only large leads can be confirmed. A lead found to 2020 but not confirmed is reported as "not confirmed", never as found.

No quarterly lead passes both the test to 2020 and the confirmation in 2021–2026; the 66 found to 2020 but not confirmed are in Appendix D.

4.4 Changes over the last 12 months

Chance: 38 notable changes of 181 tracked relations (the 20 strongest and every daily lead, monthly and quarterly lead); chance alone gives 18.1. Notable: the 12-month change is beyond the relation's own 5th or 95th percentile of 12-month changes.

- **The strongest relations held:** 0 of the 20 strongest changed notably.
- **The overnight link weakened:** 16 of the notable changes are one-day leads from US markets into the next Tokyo session (9) or the Australian dollar (7); every one is weaker than 12 months ago (median +0.42 to +0.10).

LEADER → FOLLOWER (1 DAY)	12 MONTHS AGO	NOW	CHANGE	PCT.
Energy → Nikkei 225	+0.42	−0.06	−0.48	0.0
Health Care → Nikkei 225	+0.36	−0.04	−0.39	1.0

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LEADER → FOLLOWER (1 DAY)	12 MONTHS AGO	NOW	CHANGE	PCT.
Communication Services → Nikkei 225	+0.53	+0.17	−0.36	1.3
Consumer Staples → Nikkei 225	+0.21	−0.12	−0.34	4.3
Energy → USD per Australian dollar	+0.36	+0.03	−0.33	1.3
Materials → USD per Australian dollar	+0.41	+0.10	−0.32	0.3
Consumer Discretionary → USD per Australian dollar	+0.41	+0.10	−0.31	0.3
Industrials → USD per Australian dollar	+0.46	+0.15	−0.31	1.0
Real Estate → Nikkei 225	+0.32	+0.03	−0.29	4.0
Information Technology → USD per Australian dollar	+0.43	+0.15	−0.28	2.3
Financials → Nikkei 225	+0.46	+0.20	−0.26	3.0
S&P 500 → USD per Australian dollar	+0.45	+0.20	−0.25	2.3
10-year breakeven inflation → Nikkei 225	+0.20	−0.05	−0.25	3.8
Industrials → Nikkei 225	+0.54	+0.30	−0.24	3.0
Consumer Discretionary → Nikkei 225	+0.48	+0.27	−0.21	3.0
VIX → USD per Australian dollar	−0.36	−0.11	+0.25	100.0

Table 11. US close to Tokyo and the Australian dollar: the notable 12-month changes. r over 252 days; pct.: the change's percentile among the relation's own 12-month changes. Every notable change in Appendix D.

For your consideration. Positions that rely on US moves carrying into the next Tokyo session or the Australian dollar (overnight hedges, relative-value pairs) have had a much weaker link over the past 12 months. Sizing them on longer history overstates the protection or the signal.

4.5 A post-run observation

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NOT A PRE-REGISTERED TEST

Oil against next-month first-published consumer prices, raw correlation (no momentum removed), lag 2 release months:

1986–1998: +0.50 (n 154)

1999–2020: +0.55 (n 264)

1986–2020: +0.52 (n 418)

The pre-registered test (momentum removed, each change taken within one release) found this lead: +0.44 (406) to 2020, +0.35 (66) in 2021–2026.

4.6 Validation

24 of 24 pairs pass: the study's correlation equals the public calculator's to within 2e−12 (the bar is 1e−9); 6 pairs also equal a hand calculation from FRED's own download (largest difference 4e−14). Monthly changes, 2010-01 to 2025-12, lag 0.

PAIR	N	CALC.	STUDY	DIFF.	BY HAND
INDPRO / PAYEMS	192	0.841916	0.841916	3e−16	0.841916
UNRATE / CIVPART	191	-0.762988	-0.762988	2e−16	-0.762988
CPIAUCSL / CPILFESL	191	0.663603	0.663603	0	–
FEDFUNDS / GS10	192	0.188207	0.188207	6e−17	–
HOUST / PERMIT	192	0.251883	0.251883	6e−17	–
M2SL / BUSLOANS	192	0.584991	0.584991	2e−16	–
RSAFS / DGORDER	192	0.339313	0.339313	0	–
TCU / INDPRO	192	0.995997	0.995997	8e−16	–
PSAVERT / TOTALSL	192	-0.149666	-0.149666	0	–
FRAPRMNTO01GPSAM / ITAPRMNTO01GPSAM	193	0.828047	0.828047	4e−14	0.828047
GBRPRINTO01GPSAM / JPNPRMNTO01GPSAM	193	0.148533	0.148533	2e−12	–

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PAIR	N	CALC.	STUDY	DIFF.	BY HAND
DEUSLRTTO01GPSAM / FRASLRTTO01GPSAM	193	0.439433	0.439433	2e−13	–
BSCICP02DEM460S / CSCICP02DEM460S	192	0.531715	0.531715	1e−16	0.531715
LRHUTTTTDEM156S / LRHUTTTTFRM156S	192	0.029336	0.029336	2e−17	–
IRLTLT01DEM156N / IRLTLT01FRM156N	192	0.887171	0.887171	1e−13	–
IR3TIB01DEM156N / IR3TIB01CAM156N	192	0.500032	0.500032	0	–
XTEXVA01DEM667S / XTEXVA01JPM667S	192	0.295428	0.295428	3e−16	0.295428
SPASTT01DEM661N / SPASTT01JPM661N	192	0.661345	0.661345	2e−16	–
CANPRMNTO01GPSAM / CANSLRTTO01GPSAM	193	0.806517	0.806517	4e−13	–
PCEPILFE / CPILFESL	191	0.848693	0.848693	4e−16	–
JTSJOL / UNRATE	191	-0.383272	-0.383272	2e−16	–
CES0500000003 / PAYEMS	192	-0.878959	-0.878959	1e−15	–
LRUNTTTTCAM156S / IRLTLT01CAM156N	192	-0.170991	-0.170991	2e−12	–
HPIPONM226S / MORTGAGE30US	192	0.156516	0.156516	1e−16	0.156516

Table 12. Validation run 770045. Source: FRED, Federal Reserve Bank of St. Louis; sector series calculated by Gyre Research.

4.7 What changed after 2020

When the turn came: this section compares 1999–2020 with 2021–2026, a split fixed before the data were seen. A break test that lets the data choose the dates (Bai and Perron) puts the stock-yield turn at 1 April 2022 and the yield-dollar turn at 30 March 2022: both came when the Fed began raising rates in 2022, not at the turn of 2021.

Chance: under no change at all, the chance that this test finds even one change is at most 0.25% (102,773 tests); it found 400. A change counts when the 1999–2020 and 2021–2026 correlations differ beyond the false-discovery bar and the rank correlations agree.

Significance is not size: with about 68 months since 2021, no change in a monthly relation passes the test once its errors allow for clustered volatility and autocorrelation (section 3.2); every change below is between daily market series.

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FAMILY	TESTS	FOUND	SIGN FLIPS	|ΔR| ≥ 0.3	0.2–0.3	0.1–0.2	< 0.1
Markets, daily	990	400	180	70	122	200	8
Macro and markets, monthly	10,638	0	0	0	0	0	0
Daily leads	39,600	0	0	0	0	0	0
Monthly leads	179,820	0	0	0	0	0	0

Table 13. Changes found, by family and by size of the change in r. Found: changes that pass the test.

Stocks and bond yields: the old relation is gone

- **The headline change:** the S&P 500's correlation with the 10-year Treasury yield went from +0.36 (1999–2020) to −0.10 (2021–2026); Real Estate from +0.19 to −0.34. The change passes every test, but the S&P 500's value since 2021 is close to zero (95% interval −0.21 to +0.01): before 2021 stocks and yields moved together, so Treasuries offset stock moves; since 2021 they are roughly unrelated. Real Estate now moves clearly against yields.
- **It is broad:** 19 of the 20 largest market changes are a stock sector or the index against a rate.

PAIR	1999–2020	2021–2026	CHANGE	SIGN
Real Estate / 10-year Treasury yield	+0.19	−0.34	−0.53	FLIP
Real Estate / 10-year term premium (model)	+0.18	−0.34	−0.52	FLIP
Real Estate / 30-year Treasury yield	+0.18	−0.31	−0.49	FLIP
S&P 500 / 10-year Treasury yield	+0.36	−0.10	−0.46	FLIP
Real Estate / 2-year Treasury yield	+0.21	−0.25	−0.46	FLIP
Materials / 10-year Treasury yield	+0.33	−0.13	−0.45	FLIP
Health Care / 10-year Treasury yield	+0.24	−0.21	−0.45	FLIP
S&P 500 / 10-year term premium (model)	+0.33	−0.09	−0.42	FLIP
Industrials / 10-year Treasury yield	+0.35	−0.06	−0.42	FLIP
Health Care / 10-year term premium (model)	+0.21	−0.21	−0.42	FLIP
Materials / 10-year term premium (model)	+0.30	−0.12	−0.42	FLIP
Utilities / 10-year Treasury yield	+0.11	−0.30	−0.41	FLIP

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PAIR	1999–2020	2021–2026	CHANGE	SIGN
Health Care / 30-year Treasury yield	+0.23	−0.18	−0.41	FLIP
Materials / 30-year Treasury yield	+0.32	−0.09	−0.41	FLIP
S&P 500 / 30-year Treasury yield	+0.33	−0.08	−0.41	FLIP
Consumer Discretionary / 10-year Treasury yield	+0.30	−0.11	−0.41	FLIP
Real Estate / 10-year real yield	+0.00	−0.40	−0.40	FLIP
Real Estate / 10y-3m curve	+0.11	−0.29	−0.40	FLIP
10-year Treasury yield / Broad dollar index	−0.08	+0.31	+0.39	FLIP
Communication Services / Energy	+0.57	+0.18	−0.39	

Table 14. The 20 largest of 400 changes among daily market pairs. FLIP: the correlation changed sign. Source: FRED, Federal Reserve Bank of St. Louis; sector series calculated by Gyre Research.

For your consideration. The core assumption of a balanced book, that Treasuries rise when stocks fall, has not held since the Fed began raising rates in 2022 (the data date the turn to 1 April 2022): the S&P 500's correlation with the 10-year yield fell from clearly positive to about zero, so Treasuries have stopped offsetting stock moves. Diversification sized on correlations from before 2022 is overstated; duration and equity risk should be measured together, and other diversifiers weighed against the current relation, not the long history.

The 10-year yield and the dollar

The 10-year yield and the broad dollar index went from −0.08 to +0.31: before 2021 unrelated, since then rising together. 9 rate-dollar pairs changed.

PAIR	1999–2020	2021–2026	CHANGE	SIGN
10-year Treasury yield / Broad dollar index	−0.08	+0.31	+0.39	FLIP
10-year term premium (model) / Broad dollar index	−0.05	+0.32	+0.37	FLIP
30-year Treasury yield / Broad dollar index	−0.13	+0.23	+0.36	FLIP
10-year breakeven inflation / Broad dollar index	−0.36	−0.01	+0.36	
2-year Treasury yield / Broad dollar index	+0.00	+0.32	+0.31	

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PAIR	1999–2020	2021–2026	CHANGE	SIGN
10y-3m curve / Broad dollar index	−0.05	+0.21	+0.26	FLIP
3-month Treasury yield / Broad dollar index	−0.01	+0.19	+0.20	FLIP
Baa credit spread / Broad dollar index	+0.14	−0.03	−0.17	FLIP
10-year real yield / Broad dollar index	+0.18	+0.35	+0.17	

Table 15. Rates against the broad dollar index: every changed pair.

For your consideration. Rising US yields have come with a stronger dollar since 2021, so long US duration and unhedged foreign assets now tend to lose at the same time. For a US-based investor they are no longer independent bets; currency hedging decisions and duration decisions should be taken together.

Leads that changed

No lead changed between 1999–2020 and 2021–2026: of 39,600 daily and 179,820 monthly lead tests, none passes once the test allows for clustered volatility and autocorrelation.

4.8 New since 2021

Chance: under no effect at all, the chance that this test finds even one relation is at most 0.25% (89,488 tests); it found 95: 94 relations and 1 lead. Found in 2021–2023, confirmed in 2024–2026, and absent (or of the other sign) in 1999–2020.

New relations: 94

88 among daily market pairs, 6 monthly. Most are rates against stocks, the dollar or currencies: the same shift as section 4.7, seen from the other side.

PAIR	DATA	1999–2020	2021–23	2024–2026
Consumer prices / Core consumer prices	monthly	+0.33	+0.56	+0.64
Financial conditions index / Baa credit spread	monthly	+0.72	+0.47	+0.57
Consumer sentiment / Financial conditions index	monthly	−0.22	−0.49	−0.49
Consumer prices / Core PCE prices	monthly	+0.30	+0.59	+0.46
yen per USD / won per USD	daily	+0.03	+0.18	+0.45
Real Estate / 10-year real yield	daily	+0.00	−0.38	−0.43
Copper / Baa credit spread	monthly	−0.34	−0.41	−0.42

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PAIR	DATA	1999–2020	2021–23	2024–2026
Real Estate / 10-year Treasury yield	daily	+0.19	−0.30	−0.41
Real Estate / 30-year Treasury yield	daily	+0.18	−0.25	−0.40
Real Estate / 10y-3m curve	daily	+0.11	−0.22	−0.40
Real Estate / 10-year term premium (model)	daily	+0.18	−0.30	−0.39
yen per USD / Canadian dollar per USD	daily	+0.03	+0.21	+0.37
Retail sales / Producer prices	monthly	+0.42	+0.35	+0.37
yen per USD / USD per Australian dollar	daily	−0.07	−0.39	−0.36
Utilities / 10-year real yield	daily	−0.04	−0.36	−0.34
Utilities / 10-year Treasury yield	daily	+0.11	−0.28	−0.33
Utilities / 10y-3m curve	daily	+0.01	−0.21	−0.32
2-year Treasury yield / Broad dollar index	daily	+0.00	+0.31	+0.32
Real Estate / 2-year Treasury yield	daily	+0.21	−0.22	−0.31
Utilities / 30-year Treasury yield	daily	+0.10	−0.24	−0.31

Table 16. The 20 largest new relations by |r| in 2024–2026. – : no data before 2021. Every one in Appendix D.

Mortgage rates and Real Estate stocks: −0.11 before 2021, −0.62 in 2021–23, −0.51 since 2024 (monthly). It is not counted among the new relations: with three years of monthly data, the 2021–23 reading ($p = 0.014$) does not clear the family-wide bar once the test allows for autocorrelation; the reading since 2024 is clearly negative ($p = 0.006$).

For your consideration. Real-estate stocks now trade largely as a rate position (mortgage rate against Real Estate −0.51 since 2024, −0.11 before 2021). REIT holdings belong in a book's interest-rate exposure, and their hedge ratio should come from the post-2021 relation, not the longer history.

New leads: 1

1 monthly, on short samples (n 17–18); the largest |r| is 0.71. 36 leads already found to 2020 were found again.

LEADER → FOLLOWER	LAG	2021–23	2024–2026
Money supply (M2) → 10y-2y curve	17 mo.	−0.71 (18)	−0.36 (17)

Table 17. New leads. Lag in days (d) for daily leads, release months (mo.) for monthly ones. r (n).

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Confirmation going forward

600 candidates were named on data to 2026-10-31 (158 daily market pairs; 282 monthly pairs; 125 daily leads; 35 monthly leads). Each month they are tested again on the data after that date only: a candidate is confirmed when the new data give the same sign, dropped when they give the opposite sign. Nothing is chosen again after the first naming.

4.9 What the stricter test changed

The same data and the same correlations, judged twice: first with the ordinary test, which assumes every day or month is independent and equally calm, then with tests that allow for clustered volatility and autocorrelation. Of 1,956 findings the ordinary test reported, 1,280 no longer pass. The other way, 29 results pass only under the stricter test (1 lead, 8 changes after 2020, 19 new relations, 1 new lead); none of them was reported in the earlier draft.

RESULTS	FOUND BY THE ORDINARY TEST	NO LONGER PASS	INTERVAL INCLUDES 0	NOT ROBUST TO DEPENDENCE
Values our notes rest on	16	1	1	0
Daily leads	342	194	43	39
Monthly leads	78	66	7	6
Quarterly leads	3	3	0	0
Changed after 2020: daily market pairs	541	149	166	161
Changed after 2020: monthly pairs	618	618	298	0
Changed after 2020: daily leads	120	120	24	0
Changed after 2020: monthly leads	40	40	13	0
New since 2021: daily market pairs	79	4	5	19
New since 2021: monthly pairs	21	21	3	0
New since 2021: daily leads	93	62	26	14

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RESULTS	FOUND BY THE ORDINARY TEST	NO LONGER PASS	INTERVAL INCLUDES 0	NOT ROBUST TO DEPENDENCE
New since 2021: monthly leads	5	2	0	3

Table 18. The ordinary test against the stricter tests, by part of the study. Interval: a 95% bootstrap interval of the correlation; not robust to dependence: passes the false-discovery rule but not Benjamini-Yekutieli.

What still holds: the stock-yield and rate-dollar sign flips since 2021, the overnight links into Tokyo and the Australian dollar, the absence of any macro lead into US stocks, oil's lead over consumer prices. What does not: most monthly leads, every quarterly lead, every change in a monthly relation or a lead after 2020, and most energy leads.

Section 5

What the data cannot tell you

- **Not investment advice:** the notes headed "For your consideration" describe measured relations and what they imply for risk; no trade was tested, and nothing in this paper is a recommendation to buy or sell.
- **Gaps:** no PMI (proprietary for every country); no current monthly CPI for the UK, Japan, Canada, China, India or Brazil; no monthly unemployment for China, India, Brazil or the euro area; no German total production; no services trade, capital flows, current account, deficit or productivity series that are monthly and current. Italy and UK wages are published only as year-on-year growth, which the method excludes.
- **Sector history is rebuilt:** each company carries its current sector label back in time; Real Estate was part of Financials until 2016 and Communication Services was formed in 2018. In 1999 8.0% of the index weight had no sector label (3.3% in 2005, 2.0% in 2010, 0.1% in 2020).
- **Two price histories are joined** to reach back to 1999.
- **Measurement times differ:** stocks close at 4 pm New York, Treasury yields are afternoon quotes, the Federal Reserve's exchange rates are noon New York, Brent is London, the Nikkei is Tokyo, crypto trades around the clock; pairs across these are measured on two-day changes.
- **Exchange rates are published weekly,** so their latest week lags the other series.

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- **Model estimates, not prices:** the term premium and the policy uncertainty index.
- **Revisions:** correlations use today's revised values; leads and lags use the values first published.
- **First-published values start at different dates:** from 1927 to 2023 by series (Appendix B). A lead test can only start there.
- **Missing changes:** WTI closed below zero on 2020-04-20, so its 2 daily changes touching that day are missing; Brazil's share price index rounds to zero in 1980–1988, so 105 monthly changes there are missing.
- **Indexes centred on zero:** CFNAI (53.45% of its values since 1999 at or below zero) and NFCI (90.84% of its values since 1999 at or below zero) are measured as change in level, not percent change.
- **Duplicate series kept once:** the French and Italian 3-month interbank rates equal the German one since 1999; it is kept once, as the euro area 3-month interbank rate.
- **Readings:** the labels construction and timing are readings of the results, not tests.
- **Corrected:** a first run's monthly and quarterly lead tests mixed index bases across rebasings; it was corrected before publication.
- **First prints left out:** 3 first-published values that FRED corrected in its next release (BRABCCICP02STSAM 2018-10; CSCICP02BRM460S 2019-06; XTEXVA01CNM667S 2014-10) are left out of the lead tests.
- **Correlation is not causation,** and a past relation is not a forecast.

Appendix

A. The series

SERIES	WHAT	AS	SERIES	WHAT	AS
(Gyre)	S&P 500 (cap-weighted, rebuilt)	%	CP0000EZ19M086NEST	HICP, core HICP, EA	%
(Gyre)	Communication Services sector	%	CP0000DEM086NEST	HICP, core HICP, DE	%
(Gyre)	Consumer Discretionary sector	%	CP0000FRM086NEST	HICP, core HICP, FR	%
(Gyre)	Consumer Staples sector	%	CP0000ITM086NEST	HICP, core HICP, IT	%

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SERIES	WHAT	AS	SERIES	WHAT	AS
(Gyre)	Energy sector	%	TOTNRGFOODEA20MI15XM	HICP, core HICP, EA	%
(Gyre)	Financials sector	%	00XEFDDEM086NEST	HICP, core HICP, DE	%
(Gyre)	Health Care sector	%	00XEFDFRM086NEST	HICP, core HICP, FR	%
(Gyre)	Industrials sector	%	00XEFDITM086NEST	HICP, core HICP, IT	%
(Gyre)	Information Technology sector	%	LRHUTTTTDEM156S	Unemployment, participation, DE	Δ
(Gyre)	Materials sector	%	LRHUTTTTFRM156S	Unemployment, participation, FR	Δ
(Gyre)	Real Estate sector	%	LRHUTTTTITM156S	Unemployment, participation, IT	Δ
(Gyre)	Utilities sector	%	LRHUTTTTGBM156S	Unemployment, participation, GB	Δ
DGS3MO	3-month Treasury yield	Δ	LRHUTTTTJPM156S	Unemployment, participation, JP	Δ
DGS2	2-year Treasury yield	Δ	LRUNTTTTCAM156S	Unemployment, participation, CA	Δ
DGS10	10-year Treasury yield	Δ	LRACTTTTJPM156S	Unemployment, participation, JP	Δ
DGS30	30-year Treasury yield	Δ	LRACTTTTCAM156S	Unemployment, participation, CA	Δ
T10Y2Y	10y-2y curve	Δ	LCEAMN01ITM659S	Wages, IT	–
T10Y3M	10y-3m curve	Δ	LCEAMN01GBM659S	Wages, GB	–
DFII10	10-year real yield	Δ	JPNLCEAMN01GPSAM	Wages, JP	=
T10YIE	10-year breakeven inflation	Δ	LCEAMN01CAM657S	Wages, CA	=
T5YIFR	5y5y forward inflation	Δ	CSCICP02DEM460S	Consumer confidence, DE	Δ
THREEFYTP10	10-year term premium (model)	Δ	CSCICP02FRM460S	Consumer confidence, FR	Δ

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SERIES	WHAT	AS	SERIES	WHAT	AS
BAA10Y	Baa credit spread	Δ	CSCICP02ITM460S	Consumer confidence, IT	Δ
VIXCLS	VIX	%	CSCICP02GBM460S	Consumer confidence, GB	Δ
OVXCLS	Oil volatility	%	CSCICP02JPM460S	Consumer confidence, JP	Δ
GVZCLS	Gold volatility	%	CSCICP02CNM460S	Consumer confidence, CN	Δ
USEPUINDXD	Economic policy uncertainty (model)	%	CSCICP02BRM460S	Consumer confidence, BR	Δ
DTWEXBGS	Broad dollar index	%	IR3TIB01DEM156N	Short rates, EA	Δ
DEXUSEU	USD per euro	%	IR3TIB01JPM156N	Short rates, JP	Δ
DEXJPUS	yen per USD	%	IR3TIB01CAM156N	Short rates, CA	Δ
DEXCHUS	yuan per USD	%	IR3TIB01CNM156N	Short rates, CN	Δ
DEXUSUK	USD per pound	%	INDIR3TIB01STM	Short rates, IN	Δ
DEXCAUS	Canadian dollar per USD	%	IRLTLT01DEM156N	German 10-year yield	Δ
DEXINUS	rupee per USD	%	IRLTLT01FRM156N	10-year yields, FR	Δ
DEXBZUS	real per USD	%	IRLTLT01ITM156N	10-year yields, IT	Δ
DEXMXUS	peso per USD	%	IRLTLT01GBM156N	10-year yields, GB	Δ
DEXKOUS	won per USD	%	IRLTLT01JPM156N	10-year yields, JP	Δ
DEXSZUS	Swiss franc per USD	%	IRLTLT01CAM156N	10-year yields, CA	Δ
DEXUSAL	USD per Australian dollar	%	INDIRLTLT01STM	10-year yields, IN	Δ
DCOILWTICO	WTI crude oil	%	XTEXVA01DEM667S	Exports (US $), DE	%
DHHNGSP	US natural gas	%	XTEXVA01FRM667S	Exports (US $), FR	%
DCOILBRENTEU	Brent crude oil	%	XTEXVA01ITM667S	Exports (US $), IT	%
NIKKEI225	Nikkei 225	%	XTEXVA01GBM667S	Exports (US $), GB	%
CBBTCUSD	Bitcoin	%	XTEXVA01JPM667S	Exports (US $), JP	%

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SERIES	WHAT	AS	SERIES	WHAT	AS
CBETHUSD	Ether	%	XTEXVA01CAM667S	Exports (US $), CA	%
INDPRO	US industrial production	%	XTEXVA01CNM667S	Exports (US $), CN	%
TCU	Capacity utilization	Δ	XTEXVA01INM667S	Exports (US $), IN	%
RSAFS	Retail sales	%	XTEXVA01BRM667S	Exports (US $), BR	%
DGORDER	Durable goods orders	%	SPASTT01DEM661N	Share prices, DE	%
CFNAI	Chicago Fed activity index	Δ	SPASTT01FRM661N	Share prices, FR	%
CPIAUCSL	Consumer prices	%	SPASTT01ITM661N	Share prices, IT	%
CPILFESL	Core consumer prices	%	SPASTT01GBM661N	Share prices, GB	%
PCEPILFE	Core PCE prices	%	SPASTT01JPM661N	Share prices, JP	%
PPIACO	Producer prices	%	SPASTT01CAM661N	Share prices, CA	%
UNRATE	US unemployment rate	Δ	SPASTT01CNM661N	Share prices, CN	%
PAYEMS	US payrolls	%	SPASTT01INM661N	Share prices, IN	%
ICSA	Jobless claims	%	SPASTT01BRM661N	Share prices, BR	%
JTSJOL	Job openings	%	PFOODINDEXM	World food prices	%
CIVPART	Labour force participation	Δ	PNGASEUUSDM	European natural gas	%
CES0500000003	Average hourly earnings	%	PNGASJPUSDM	Japan natural gas	%
UMCSENT	Consumer sentiment	%	PCOPPUSDM	Copper	%
FEDFUNDS	Fed funds (monthly avg.)	Δ	PWHEAMTUSDM	Wheat	%
GS10	10-year yield (monthly avg.)	Δ	GDPC1	US real GDP	%
BUSLOANS	Business loans	%	CLVMNACSCAB1GQDE	Real GDP, DE	%

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SERIES	WHAT	AS	SERIES	WHAT	AS
TOTALSL	Consumer credit	%	CLVMNACSCAB1GQFR	Real GDP, FR	%
M2SL	Money supply (M2)	%	CLVMNACSCAB1GQIT	Real GDP, IT	%
PSAVERT	Saving rate	Δ	NGDPRSAXDCGBQ	Real GDP, GB	%
HOUST	Housing starts	%	JPNRGDPEXP	Real GDP, JP	%
PERMIT	Building permits	%	NGDPRSAXDCCAQ	Real GDP, CA	%
HPIPONM226S	US house prices	%	NGDPRSAXDCBRQ	Real GDP, BR	%
MORTGAGE30US	30-year mortgage rate	Δ	NGDPRNSAXDCINQ	Real GDP, IN	%
NFCI	Financial conditions index	Δ	CLVMEURSCAB1GQEA19	Real GDP, EA	%
BOPGEXP	US goods exports	%	NFIRSAXDCUSQ	Fixed investment, US	%
BSCICP02DEM460S	Business confidence, DE	Δ	NFIRSAXDCDEQ	Fixed investment, DE	%
BSCICP02FRM460S	Business confidence, FR	Δ	NFIRSAXDCFRQ	Fixed investment, FR	%
BSCICP02ITM460S	Business confidence, IT	Δ	NFIRSAXDCITQ	Fixed investment, IT	%
BSCICP02GBM460S	Business confidence, GB	Δ	NFIRSAXDCGBQ	Fixed investment, GB	%
CHNBSCICP02STSAM	Business confidence, CN	Δ	NFIRSAXDCJPQ	Fixed investment, JP	%
BRABCCICP02STSAM	Business confidence, BR	Δ	NFIRSAXDCCAQ	Fixed investment, CA	%
FRAPRMNTO01GPSAM	Industrial production (GP), FR	=	NFIRSAXDCBRQ	Fixed investment, BR	%
ITAPRMNTO01GPSAM	Industrial production (GP), IT	=	NFIRNSAXDCINQ	Fixed investment, IN	%
GBRPRINTO01GPSAM	Industrial production (GP), GB	=	QUSN628BIS	House prices (BIS), US	%

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SERIES	WHAT	AS	SERIES	WHAT	AS
JPNPRMNTO01GPSAM	Industrial production (GP), JP	=	QDEN628BIS	House prices (BIS), DE	%
CANPRMNTO01GPSAM	Industrial production (GP), CA	=	QFRN628BIS	House prices (BIS), FR	%
INDPRINTO01GPSAM	Industrial production (GP), IN	=	QITN628BIS	House prices (BIS), IT	%
BRAPRINTO01GPSAM	Industrial production (GP), BR	=	QGBN628BIS	House prices (BIS), GB	%
DEUSLRTTO01GPSAM	Retail volume (GP), DE	=	QCAN628BIS	House prices (BIS), CA	%
FRASLRTTO01GPSAM	Retail volume (GP), FR	=	QCNN628BIS	House prices (BIS), CN	%
ITASLRTTO01GPSAM	Retail volume (GP), IT	=	QINN628BIS	House prices (BIS), IN	%
GBRSLRTTO01GPSAM	Retail volume (GP), GB	=	QBRN628BIS	House prices (BIS), BR	%
JPNSLRTTO01GPSAM	Retail volume (GP), JP	=	QXMN628BIS	House prices (BIS), EA	%
CANSLRTTO01GPSAM	Retail volume (GP), CA	=	GFDEGDQ188S	US federal debt to GDP	Δ
BRASLRTTO01GPSAM	Retail volume (GP), BR	=			

Table 19. Every series in the study's own list, daily, then monthly, then quarterly. As: % = percent change, Δ = change in level, = = as published (already a growth rate), – = left out (published only as year-on-year growth). Source: FRED, Federal Reserve Bank of St. Louis; sector series calculated by Gyre Research.

Sources

Source: FRED, Federal Reserve Bank of St. Louis. Each FRED series' original source, as FRED lists it; † = FRED's terms ask for this source to be cited.

SOURCE	SERIES
Bank for International Settlements	QUSN628BIS†, QDEN628BIS†, QFRN628BIS†, QITN628BIS†, QGBN628BIS†, QCAN628BIS†, QCNN628BIS†, QINN628BIS†, QBRN628BIS†, QXMN628BIS†

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SOURCE	SERIES
Board of Governors of the Federal Reserve System (US)	DGS3MO, DGS2, DGS10, DGS30, DFII10, THREEFYTP10, DTWEXBGS, DEXUSEU, DEXJPUS, DEXCHUS, DEXUSUK, DEXCAUS, DEXINUS, DEXBZUS, DEXMXUS, DEXKOUS, DEXSZUS, DEXUSAL, INDPRO, TCU, FEDFUNDS, GS10, BUSLOANS, TOTALSL, M2SL
Chicago Board Options Exchange	VIXCLS†, OVXCLS†, GVZCLS†
Coinbase	CBBTCUSD†, CBETHUSD†
Davis, Steven J.	USEPUINDXD
Eurostat	CP0000EZ19M086NEST†, CP0000DEM086NEST†, CP0000FRM086NEST†, CP0000ITM086NEST†, TOTNRGFOODEA20MI15XM†, 00XEFDDEM086NEST†, 00XEFDFRM086NEST†, 00XEFDITM086NEST†, CLVMNACSCAB1GQDE†, CLVMNACSCAB1GQFR†, CLVMNACSCAB1GQIT†, CLVMEURSCAB1GQEA19†
Federal Reserve Bank of Chicago	CFNAI†, NFCI†
Federal Reserve Bank of St. Louis	T10Y2Y†, T10Y3M†, T10YIE†, T5YIFR†, BAA10Y†
Freddie Mac	MORTGAGE30US†
Gyre Research (calculated)	S&P 500, Communication Services, Consumer Discretionary, Consumer Staples, Energy, Financials, Health Care, Industrials, Information Technology, Materials, Real Estate, Utilities
International Monetary Fund	PFOODINDEXM†, PNGASEUUSDM†, PNGASJPUSDM†, PCOPPUSDM†, PWHEAMTUSDM†, NGDPRSAXDCGBQ†, NGDPRSAXDCCAQ†, NGDPRSAXDCBRQ†, NGDPRNSAXDCINQ†, NFIRSAXDCUSQ†, NFIRSAXDCDEQ†, NFIRSAXDCFRQ†, NFIRSAXDCITQ†, NFIRSAXDCGBQ†, NFIRSAXDCJPQ†, NFIRSAXDCCAQ†, NFIRSAXDCBRQ†, NFIRNSAXDCINQ†
JP. Cabinet Office	JPNRGDPEXP†
Nikkei Industry Research Institute	NIKKEI225†

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SOURCE	SERIES
Organization for Economic Co-operation and Development	BSCICP02DEM460S†, BSCICP02FRM460S†, BSCICP02ITM460S†, BSCICP02GBM460S†, CHNBSCICP02STSAM†, BRABCCICP02STSAM†, FRAPRMNTO01GPSAM†, ITAPRMNTO01GPSAM†, GBRPRINTO01GPSAM†, JPNPRMNTO01GPSAM†, CANPRMNTO01GPSAM†, INDPRINTO01GPSAM†, BRAPRINTO01GPSAM†, DEUSLRTTO01GPSAM†, FRASLRTTO01GPSAM†, ITASLRTTO01GPSAM†, GBRSLRTTO01GPSAM†, JPNSLRTTO01GPSAM†, CANSLRTTO01GPSAM†, BRASLRTTO01GPSAM†, LRHUTTTTDEM156S†, LRHUTTTTFRM156S†, LRHUTTTTITM156S†, LRHUTTTTGBM156S†, LRHUTTTTJPM156S†, LRUNTTTTCAM156S†, LRACTTTTJPM156S†, LRACTTTTCAM156S†, LCEAMN01ITM659S†, LCEAMN01GBM659S†, JPNLCEAMN01GPSAM†, LCEAMN01CAM657S†, CSCICP02DEM460S†, CSCICP02FRM460S†, CSCICP02ITM460S†, CSCICP02GBM460S†, CSCICP02JPM460S†, CSCICP02CNM460S†, CSCICP02BRM460S†, IR3TIB01DEM156N†, IR3TIB01JPM156N†, IR3TIB01CAM156N†, IR3TIB01CNM156N†, INDIR3TIB01STM†, IRLTLT01DEM156N†, IRLTLT01FRM156N†, IRLTLT01ITM156N†, IRLTLT01GBM156N†, IRLTLT01JPM156N†, IRLTLT01CAM156N†, INDIRLTLT01STM†, XTEXVA01DEM667S†, XTEXVA01FRM667S†, XTEXVA01ITM667S†, XTEXVA01GBM667S†, XTEXVA01JPM667S†, XTEXVA01CAM667S†, XTEXVA01CNM667S†, XTEXVA01INM667S†, XTEXVA01BRM667S†, SPASTT01DEM661N†, SPASTT01FRM661N†, SPASTT01ITM661N†, SPASTT01GBM661N†, SPASTT01JPM661N†, SPASTT01CAM661N†, SPASTT01CNM661N†, SPASTT01INM661N†, SPASTT01BRM661N†
U.S. Bureau of Economic Analysis	PCEPILFE, PSAVERT, GDPC1
U.S. Bureau of Labor Statistics	CPIAUCSL, CPILFESL, PPIACO, UNRATE, PAYEMS, JTSJOL, CIVPART, CES0500000003
U.S. Census Bureau	RSAFS, DGORDER, BOPGEXP
U.S. Department of Housing and Urban Development	HOUST, PERMIT
U.S. Employment and Training Administration	ICSA
U.S. Energy Information Administration	DCOILWTICO, DHHNGSP, DCOILBRENTEU

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SOURCE	SERIES
U.S. Federal Housing Finance Agency	HPIPONM226S
U.S. Office of Management and Budget	GFDEGDQ188S
University of Michigan	UMCSENT†

Table 20. Sources.

Appendix

B. First-published values: coverage

The first release FRED holds for each monthly and quarterly series (its vintage history): a lead test on first-published values starts here.

SERIES	FIRST RELEASE	SERIES	FIRST RELEASE
INDPRO	1927-02-28	CSCICP02GBM460S	2013-07-01
TCU	1996-12-16	CSCICP02JPM460S	2013-07-01
RSAFS	2001-07-13	CSCICP02CNM460S	2013-07-01
DGORDER	1999-08-25	CSCICP02BRM460S	2013-07-01
CFNAI	2011-06-23	IR3TIB01DEM156N	2013-07-01
CPIAUCSL	1972-08-22	IR3TIB01JPM156N	2013-07-01
CPILFESL	1997-01-14	IR3TIB01CAM156N	2013-07-01
PCEPILFE	2000-08-28	IR3TIB01CNM156N	2013-08-21
PPIACO	1997-01-09	INDIR3TIB01STM	2018-09-05
UNRATE	1960-04-12	IRLTLT01DEM156N	2013-07-01
PAYEMS	1955-06-07	IRLTLT01FRM156N	2013-07-01
ICSA	2009-06-04	IRLTLT01ITM156N	2013-08-01
JTSJOL	2010-09-08	IRLTLT01GBM156N	2013-07-01
CIVPART	1997-03-07	IRLTLT01JPM156N	2013-07-01
CES0500000003	2011-04-01	IRLTLT01CAM156N	2013-07-01

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SERIES	FIRST RELEASE	SERIES	FIRST RELEASE
UMCSENT	1998-08-28	INDIRLTLT01STM	2018-09-05
FEDFUNDS	1997-01-07	XTEXVA01DEM667S	2013-07-01
GS10	1997-01-07	XTEXVA01FRM667S	2013-07-01
BUSLOANS	1997-01-10	XTEXVA01ITM667S	2013-07-01
TOTALSL	1997-01-08	XTEXVA01GBM667S	2013-07-01
M2SL	1980-02-15	XTEXVA01JPM667S	2013-07-01
PSAVERT	1997-03-03	XTEXVA01CAM667S	2013-07-01
HOUST	1960-08-18	XTEXVA01CNM667S	2013-07-01
PERMIT	1999-09-17	XTEXVA01INM667S	2013-10-01
HPIPONM226S	2012-06-21	XTEXVA01BRM667S	2013-07-01
MORTGAGE30US	2010-06-24	SPASTT01DEM661N	2013-07-01
NFCI	2011-06-02	SPASTT01FRM661N	2013-08-21
BOPGEXP	1997-02-19	SPASTT01ITM661N	2013-07-01
BSCICP02DEM460S	2013-07-01	SPASTT01GBM661N	2013-07-01
BSCICP02FRM460S	2013-08-01	SPASTT01JPM661N	2013-07-01
BSCICP02ITM460S	2013-07-01	SPASTT01CAM661N	2013-07-01
BSCICP02GBM460S	2013-07-01	SPASTT01CNM661N	2013-07-01
CHNBSCICP02STSAM	2018-10-09	SPASTT01INM661N	2013-07-01
BRABCCICP02STSAM	2018-10-09	SPASTT01BRM661N	2013-07-01
FRAPRMNTO01GPSAM	2018-09-13	PFOODINDEXM	2015-12-07
ITAPRMNTO01GPSAM	2018-09-05	PNGASEUUSDM	2015-12-07
GBRPRINTO01GPSAM	2018-09-13	PNGASJPUSDM	2015-12-07
JPNPRMNTO01GPSAM	2018-09-05	PCOPPUSDM	2015-12-07
CANPRMNTO01GPSAM	2018-09-05	PWHEAMTUSDM	2015-12-07
INDPRINTO01GPSAM	2018-09-05	GDPC1	1992-01-29
BRAPRINTO01GPSAM	2018-09-05	CLVMNACSCAB1GQDE	2016-08-12

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SERIES	FIRST RELEASE	SERIES	FIRST RELEASE
DEUSLRTTO01GPSAM	2018-09-05	CLVMNACSCAB1GQFR	2016-04-29
FRASLRTTO01GPSAM	2018-09-05	CLVMNACSCAB1GQIT	2016-08-12
ITASLRTTO01GPSAM	2018-09-05	NGDPRSAXDCGBQ	2021-08-30
GBRSLRTTO01GPSAM	2018-09-05	JPNRGDPEXP	2017-02-12
JPNSLRTTO01GPSAM	2018-09-05	NGDPRSAXDCCAQ	2022-01-24
CANSLRTTO01GPSAM	2018-09-05	NGDPRSAXDCBRQ	2021-09-20
BRASLRTTO01GPSAM	2018-09-05	NGDPRNSAXDCINQ	2022-01-31
CP0000EZ19M086NEST	2015-03-18	CLVMEURSCAB1GQEA19	2016-04-29
CP0000DEM086NEST	2012-07-15	NFIRSAXDCUSQ	2022-02-07
CP0000FRM086NEST	2012-07-15	NFIRSAXDCDEQ	2021-10-18
CP0000ITM086NEST	2012-07-15	NFIRSAXDCFRQ	2021-08-30
TOTNRGFOODEA20MI15XM	2023-09-19	NFIRSAXDCITQ	2021-11-01
00XEFDDEM086NEST	2012-07-15	NFIRSAXDCGBQ	2021-08-30
00XEFDFRM086NEST	2012-07-15	NFIRSAXDCJPQ	2021-09-13
00XEFDITM086NEST	2012-07-15	NFIRSAXDCCAQ	2022-01-24
LRHUTTTTDEM156S	2013-07-01	NFIRSAXDCBRQ	2021-09-20
LRHUTTTTFRM156S	2013-07-01	NFIRNSAXDCINQ	2022-01-31
LRHUTTTTITM156S	2013-07-01	QUSN628BIS	2014-11-21
LRHUTTTTGBM156S	2013-07-01	QDEN628BIS	2014-11-21
LRHUTTTTJPM156S	2013-07-01	QFRN628BIS	2014-11-21
LRUNTTTTCAM156S	2013-07-01	QITN628BIS	2014-11-21
LRACTTTTJPM156S	2013-07-01	QGBN628BIS	2014-11-21
LRACTTTTCAM156S	2013-07-01	QCAN628BIS	2014-11-21
JPNLCEAMN01GPSAM	2018-09-05	QCNN628BIS	2014-11-21
LCEAMN01CAM657S	2013-07-01	QINN628BIS	2014-11-21
CSCICP02DEM460S	2013-07-01	QBRN628BIS	2014-11-21

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SERIES	FIRST RELEASE	SERIES	FIRST RELEASE
CSCICP02FRM460S	2013-08-01	QXMN628BIS	2014-11-21
CSCICP02ITM460S	2013-07-01	GFDEGDQ188S	2012-12-06

Table 21. First release per series, read from the first-release store at build time.

Appendix

C. Method reference

- **Pre-registration:** analytics/backtest_methodology.md section 15 in Gyre Research's repository, written and committed before any result.
- **Commits:** each code below identifies one dated entry in Gyre's version history (a "commit") that cannot be changed afterwards. Together they show that each part of the method was written down before the results it governs were computed; we can show any entry on request.
  - 9208deda0: the study plan itself (section 15): which series, which tests, and what counts as a finding.
  - 4d031480d: corrections to the plan before the first run (15.9): how the data reaches the study, identical series counted once, leads tested in both directions.
  - 2c385d774: leads of up to six quarters, and the test on quarterly data (15.9.8).
  - a9fa03425: how values at or below zero are handled, where a percent change has no meaning (15.9.9).
  - 95d31f206: the count of chance findings measured from 1999, the study's start (15.9.10).
  - 0a4c45838: the comparison of before and after 2020, and what is new since 2021 (15.10).
  - ecadeb316: changes within a release, values revised after their first publication (15.11, method version 2).
  - ad39bca4a and e7ec5e5ea: the named first-published values left out (15.11).
  - 86d0ee586 and 26ea63e69: the stricter significance test this issue uses throughout, and how it is computed (15.13, 15.14, method version 3).
  - 66d9baaf5: the check that separates a real change in a relation from a more volatile market, used for Consumer Staples (15.16).
  - 7889563c8: the break test that dates the 2022 turns (15.18).

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- **Implementation readings:** analytics/macro_correlation/macro_correlation.md section 3, written before any result.
- **This paper's data:** study run 781173, the record of this computation in Gyre's run log (store run 12, method version 3, data to 2026-10-31); validation run 770045, the run that checked the study's values against the data providers' own downloads (section 4.6).

Appendix

D. Full result lists

Every aberration flag

PAIR	FLAGS: WINDOW (DAYS) AND BASELINE
Brent crude oil / Ether	63h, 126hv
WTI crude oil / Brent crude oil	21h, 21g, 63g
yuan per USD / WTI crude oil	63g
yuan per USD / peso per USD	21g
yuan per USD / Nikkei 225	21g, 63g
rupee per USD / Brent crude oil	126h
rupee per USD / WTI crude oil	126hv
won per USD / Ether	126hv
USD per pound / WTI crude oil	63g
10-year Treasury yield / Oil volatility	21g
10-year Treasury yield / VIX	21g
2-year Treasury yield / VIX	21g
30-year Treasury yield / Nikkei 225	21h, 21g, 63g
30-year Treasury yield / Oil volatility	21g
Communication Services / Canadian dollar per USD	63h, 63g
Communication Services / yuan per USD	63g

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PAIR	FLAGS: WINDOW (DAYS) AND BASELINE
Communication Services / yen per USD	21g
Communication Services / 2-year Treasury yield	21gv
Communication Services / 3-month Treasury yield	63g
Communication Services / Industrials	63h, 126h
Communication Services / Information Technology	126h
Communication Services / Utilities	126hv
Communication Services / VIX	63h, 126h
Consumer Discretionary / 10-year real yield	21g
Consumer Discretionary / 10-year Treasury yield	21g
Consumer Discretionary / 2-year Treasury yield	21g
Consumer Discretionary / 30-year Treasury yield	21gv
Consumer Discretionary / Consumer Staples	21h
Consumer Discretionary / Energy	21hv
Consumer Discretionary / Financials	21hv
Consumer Discretionary / Real Estate	126h
Consumer Discretionary / 10y-3m curve	21gv
Consumer Staples / real per USD	126h
Consumer Staples / yuan per USD	126hv
Consumer Staples / peso per USD	126hv
Consumer Staples / 30-year Treasury yield	21h, 63h
Consumer Staples / Financials	63g
Consumer Staples / Industrials	126h
Consumer Staples / Information Technology	21h, 126h
Consumer Staples / Materials	126hv
Consumer Staples / Gold volatility	126h

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PAIR	FLAGS: WINDOW (DAYS) AND BASELINE
Consumer Staples / Nikkei 225	126h
Consumer Staples / 10y-3m curve	21h, 63h
Consumer Staples / 5y5y forward inflation	63h, 126h
Consumer Staples / 10-year term premium (model)	21h, 63h
Consumer Staples / VIX	21h, 126h
Energy / Bitcoin	63h
Energy / Health Care	21h
Energy / Industrials	126hv
Energy / Information Technology	63h, 126hv
Energy / Materials	126hv
Energy / Nikkei 225	126hv
Energy / VIX	21hv, 126hv
Financials / Information Technology	126h
Financials / Nikkei 225	63hv, 126h
Financials / 10-year breakeven inflation	63hv, 126hv
Financials / 5y5y forward inflation	126h
Financials / VIX	21h, 63hv, 126h, 126g
Health Care / Industrials	63hv, 126h
Health Care / Information Technology	126h
Health Care / Gold volatility	63hv, 126h
Health Care / Nikkei 225	21hv, 63hv, 126h, 126g
Health Care / VIX	126h
Industrials / 10y-3m curve	21g
Industrials / 10-year breakeven inflation	126h
Information Technology / WTI crude oil	63h

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PAIR	FLAGS: WINDOW (DAYS) AND BASELINE
Information Technology / Canadian dollar per USD	126gv
Information Technology / 10-year real yield	21g
Information Technology / 10-year Treasury yield	21g
Information Technology / 30-year Treasury yield	21g
Information Technology / Real Estate	126h
Information Technology / Utilities	126hv
Information Technology / 10y-3m curve	21g
Information Technology / 10-year term premium (model)	21g
Materials / Nikkei 225	63gv
Real Estate / Nikkei 225	63hv, 126h
Real Estate / 10-year breakeven inflation	63h, 126h
Real Estate / VIX	126h
Utilities / 2-year Treasury yield	63h
Utilities / 3-month Treasury yield	63h, 63g
Oil volatility / Brent crude oil	126hv
Oil volatility / Canadian dollar per USD	63h, 126h
Oil volatility / yen per USD	21g
S&P 500 / WTI crude oil	63h
S&P 500 / 10-year real yield	21g
S&P 500 / 10-year Treasury yield	21g
S&P 500 / 2-year Treasury yield	21g
S&P 500 / 30-year Treasury yield	21g
S&P 500 / Communication Services	126h
S&P 500 / Consumer Staples	21h, 126h
S&P 500 / Energy	126hv

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PAIR	FLAGS: WINDOW (DAYS) AND BASELINE
S&P 500 / Financials	21hv, 126h
S&P 500 / Health Care	126h
S&P 500 / Real Estate	126h
S&P 500 / Utilities	126hv
S&P 500 / 10y-3m curve	21g
10y-2y curve / Nikkei 225	21h, 21g, 63g
10y-3m curve / Nikkei 225	21h, 21gv
10-year breakeven inflation / Brent crude oil	21h, 21g
10-year breakeven inflation / Oil volatility	126hv
10-year term premium (model) / Nikkei 225	21g, 63g

Table 22. All 139 flags, 101 pairs. h = against the pair's own history; g = against its gap to the 12-month value; v = volatility-explained. None is strict.

Quarterly leads not confirmed

LEADER → FOLLOWER	LAG	FOUND IN (TO 2020)	CONFIRMED IN 2021–2026
House prices (BIS), US → Bitcoin	6	−0.41 (18)	+0.19 (16)
House prices (BIS), IT → Real GDP, EA	2	−0.46 (15)	no data
Real GDP, DE → Real GDP, IT	3	+0.56 (14)	+0.23 (19)
US natural gas → Real GDP, IT	2	+0.43 (16)	+0.35 (21)
House prices (BIS), FR → Real GDP, IT	4	+0.46 (16)	no data
10y-2y curve → Real GDP, IT	1	−0.67 (16)	−0.20 (22)
Real GDP, FR → WTI crude oil	3	−0.35 (14)	−0.25 (17)
House prices (BIS), FR → real per USD	1	+0.52 (18)	no data
House prices (BIS), EA → real per USD	4	−0.38 (17)	−0.49 (15)
Real GDP, FR → won per USD	3	+0.61 (14)	+0.29 (17)
House prices (BIS), FR → won per USD	5	+0.54 (16)	no data
House prices (BIS), EA → peso per USD	5	+0.42 (16)	−0.35 (14)

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LEADER → FOLLOWER	LAG	FOUND IN (TO 2020)	CONFIRMED IN 2021–2026
Real GDP, DE → Swiss franc per USD	4	+0.57 (13)	−0.37 (18)
Real GDP, FR → Swiss franc per USD	1	+0.58 (16)	+0.03 (19)
Real GDP, IT → Swiss franc per USD	1	+0.59 (15)	+0.02 (22)
US federal debt to GDP → Swiss franc per USD	4	−0.58 (28)	−0.18 (19)
House prices (BIS), EA → Swiss franc per USD	5	+0.55 (16)	+0.05 (14)
House prices (BIS), EA → USD per Australian dollar	5	−0.49 (16)	−0.11 (14)
Real GDP, FR → USD per euro	1	−0.64 (16)	−0.12 (19)
Real GDP, IT → USD per euro	1	−0.57 (15)	−0.09 (22)
US federal debt to GDP → USD per pound	4	+0.35 (28)	+0.22 (19)
Real GDP, EA → 10-year Treasury yield	6	−0.46 (10)	−0.20 (17)
Real GDP, DE → 10-year Treasury yield	6	−0.38 (11)	+0.06 (16)
Real GDP, FR → 10-year Treasury yield	3	−0.46 (14)	+0.40 (17)
House prices (BIS), FR → 10-year Treasury yield	2	+0.60 (18)	no data
Real GDP, DE → 2-year Treasury yield	6	−0.30 (11)	+0.26 (16)
Real GDP, FR → 2-year Treasury yield	3	−0.45 (14)	+0.57 (17)
Real GDP, EA → 30-year Treasury yield	6	−0.51 (10)	−0.25 (17)
Real GDP, DE → 30-year Treasury yield	6	−0.39 (11)	−0.05 (16)
House prices (BIS), FR → 30-year Treasury yield	2	+0.64 (18)	no data
US federal debt to GDP → Broad dollar index	4	−0.47 (28)	−0.24 (19)
2-year Treasury yield → US real GDP	1	+0.18 (115)	−0.22 (23)
3-month Treasury yield → US real GDP	1	+0.18 (115)	−0.42 (22)
Real GDP, FR → Consumer Staples	4	+0.74 (13)	+0.49 (16)
US federal debt to GDP → Financials	3	+0.36 (29)	+0.21 (20)
Real GDP, DE → Health Care	6	−0.41 (11)	−0.25 (16)
House prices (BIS), EA → Health Care	5	−0.55 (16)	−0.15 (14)
US federal debt to GDP → Industrials	3	+0.40 (29)	+0.01 (20)

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LEADER → FOLLOWER	LAG	FOUND IN (TO 2020)	CONFIRMED IN 2021–2026
Real GDP, FR → Real Estate	5	−0.42 (12)	−0.07 (15)
Real GDP, FR → Nikkei 225	3	−0.49 (14)	−0.18 (17)
US federal debt to GDP → Nikkei 225	3	+0.37 (29)	−0.28 (20)
Baa credit spread → House prices (BIS), FR	1	−0.74 (18)	no data
Real GDP, DE → House prices (BIS), FR	4	−0.55 (10)	no data
Real GDP, IT → House prices (BIS), FR	2	−0.43 (11)	no data
peso per USD → House prices (BIS), FR	6	+0.47 (18)	no data
House prices (BIS), IT → House prices (BIS), FR	3	−0.51 (15)	no data
5y5y forward inflation → House prices (BIS), FR	6	−0.33 (18)	no data
Real GDP, DE → House prices (BIS), US	6	−0.63 (9)	+0.47 (13)
US real GDP → House prices (BIS), US	5	−0.38 (22)	−0.29 (15)
House prices (BIS), EA → House prices (BIS), US	5	−0.59 (14)	+0.15 (11)
Ether → House prices (BIS), EA	2	+0.43 (13)	+0.07 (19)
US real GDP → House prices (BIS), EA	3	−0.62 (18)	+0.34 (19)
Materials → House prices (BIS), EA	2	+0.40 (18)	−0.41 (19)
VIX → House prices (BIS), EA	2	−0.54 (18)	+0.55 (19)
US federal debt to GDP → S&P 500	3	+0.27 (29)	+0.29 (20)
House prices (BIS), EA → 10y-2y curve	3	−0.49 (18)	−0.13 (16)
Real GDP, IT → 10y-3m curve	2	−0.60 (14)	−0.17 (21)
Real GDP, FR → 10-year breakeven inflation	3	−0.41 (14)	−0.36 (17)
Real GDP, IT → 10-year breakeven inflation	6	−0.31 (10)	+0.19 (17)
Real GDP, DE → 5y5y forward inflation	6	−0.50 (11)	+0.10 (16)
Real GDP, FR → 5y5y forward inflation	3	−0.44 (14)	−0.11 (17)
Real GDP, IT → 5y5y forward inflation	6	−0.49 (10)	+0.33 (17)
House prices (BIS), FR → 5y5y forward inflation	2	+0.55 (18)	no data
Real GDP, FR → 10-year term premium (model)	3	−0.55 (14)	+0.09 (17)

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LEADER → FOLLOWER	LAG	FOUND IN (TO 2020)	CONFIRMED IN 2021–2026
House prices (BIS), FR → 10-year term premium (model)	2	+0.55 (18)	no data
House prices (BIS), IT → Economic policy uncertainty (model)	3	−0.39 (18)	no data

Table 23. Found to 2020, not confirmed in 2021–2026. Lag in quarters; r (n).

Every new relation since 2021

PAIR	DATA	1999–2020	2021–23	2024–2026
Consumer prices / Core consumer prices	monthly	+0.33	+0.56	+0.64
Financial conditions index / Baa credit spread	monthly	+0.72	+0.47	+0.57
Consumer sentiment / Financial conditions index	monthly	−0.22	−0.49	−0.49
Consumer prices / Core PCE prices	monthly	+0.30	+0.59	+0.46
yen per USD / won per USD	daily	+0.03	+0.18	+0.45
Real Estate / 10-year real yield	daily	+0.00	−0.38	−0.43
Copper / Baa credit spread	monthly	−0.34	−0.41	−0.42
Real Estate / 10-year Treasury yield	daily	+0.19	−0.30	−0.41
Real Estate / 30-year Treasury yield	daily	+0.18	−0.25	−0.40
Real Estate / 10y-3m curve	daily	+0.11	−0.22	−0.40
Real Estate / 10-year term premium (model)	daily	+0.18	−0.30	−0.39
yen per USD / Canadian dollar per USD	daily	+0.03	+0.21	+0.37
Retail sales / Producer prices	monthly	+0.42	+0.35	+0.37
yen per USD / USD per Australian dollar	daily	−0.07	−0.39	−0.36
Utilities / 10-year real yield	daily	−0.04	−0.36	−0.34
Utilities / 10-year Treasury yield	daily	+0.11	−0.28	−0.33
Utilities / 10y-3m curve	daily	+0.01	−0.21	−0.32
2-year Treasury yield / Broad dollar index	daily	+0.00	+0.31	+0.32
Real Estate / 2-year Treasury yield	daily	+0.21	−0.22	−0.31

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PAIR	DATA	1999–2020	2021–23	2024–2026
Utilities / 30-year Treasury yield	daily	+0.10	−0.24	−0.31
10-year Treasury yield / Broad dollar index	daily	−0.08	+0.32	+0.30
Utilities / 10-year term premium (model)	daily	+0.08	−0.28	−0.29
10y-2y curve / Baa credit spread	daily	+0.03	+0.25	+0.29
10-year Treasury yield / USD per pound	daily	−0.00	−0.31	−0.28
10-year term premium (model) / Broad dollar index	daily	−0.05	+0.35	+0.28
Materials / 10-year real yield	daily	+0.08	−0.24	−0.27
Health Care / 10-year real yield	daily	+0.09	−0.25	−0.26
Health Care / 30-year Treasury yield	daily	+0.23	−0.11	−0.26
Health Care / 10y-3m curve	daily	+0.12	−0.10	−0.26
10-year term premium (model) / USD per pound	daily	−0.01	−0.33	−0.25
Consumer Staples / 10-year Treasury yield	daily	+0.19	−0.13	−0.25
Health Care / 10-year Treasury yield	daily	+0.24	−0.18	−0.25
Health Care / 10-year term premium (model)	daily	+0.21	−0.19	−0.24
Consumer Staples / 10y-3m curve	daily	+0.09	−0.11	−0.24
10-year Treasury yield / yuan per USD	daily	−0.00	+0.24	+0.24
30-year Treasury yield / Broad dollar index	daily	−0.13	+0.23	+0.24
Consumer Staples / 10-year real yield	daily	+0.07	−0.21	−0.24
10y-3m curve / Broad dollar index	daily	−0.05	+0.20	+0.23
Utilities / 2-year Treasury yield	daily	+0.15	−0.23	−0.23
10y-3m curve / USD per pound	daily	+0.01	−0.21	−0.22
Consumer Staples / 10-year term premium (model)	daily	+0.16	−0.15	−0.22
10-year term premium (model) / yuan per USD	daily	+0.00	+0.28	+0.22
30-year Treasury yield / USD per euro	daily	−0.03	−0.21	−0.22
2-year Treasury yield / Canadian dollar per USD	daily	−0.05	+0.18	+0.22

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PAIR	DATA	1999–2020	2021–23	2024–2026
2-year Treasury yield / yuan per USD	daily	−0.00	+0.28	+0.22
Real Estate / yen per USD	daily	+0.14	−0.14	−0.22
30-year Treasury yield / USD per pound	daily	+0.04	−0.21	−0.22
10y-3m curve / USD per euro	daily	−0.03	−0.20	−0.22
30-year Treasury yield / yuan per USD	daily	−0.01	+0.18	+0.21
peso per USD / Ether	daily	−0.07	−0.14	−0.21
Nikkei 225 / Ether	daily	+0.08	+0.15	+0.21
2-year Treasury yield / won per USD	daily	−0.05	+0.18	+0.20
10y-3m curve / yuan per USD	daily	−0.01	+0.12	+0.19
10-year Treasury yield / won per USD	daily	−0.09	+0.17	+0.19
10-year term premium (model) / won per USD	daily	−0.08	+0.22	+0.19
10-year term premium (model) / rupee per USD	daily	−0.05	+0.16	+0.18
Real Estate / Bitcoin	daily	+0.05	+0.24	+0.18
10-year Treasury yield / USD per Australian dollar	daily	+0.08	−0.22	−0.17
Consumer Staples / 2-year Treasury yield	daily	+0.19	−0.14	−0.17
Utilities / yen per USD	daily	+0.06	−0.11	−0.17
10-year Treasury yield / Canadian dollar per USD	daily	−0.13	+0.11	+0.17
2-year Treasury yield / USD per Australian dollar	daily	+0.02	−0.25	−0.16
10-year term premium (model) / Canadian dollar per USD	daily	−0.12	+0.13	+0.16
10-year real yield / real per USD	daily	+0.04	+0.20	+0.16
3-month Treasury yield / Broad dollar index	daily	−0.01	+0.20	+0.16
Health Care / 2-year Treasury yield	daily	+0.21	−0.17	−0.16
Real Estate / Swiss franc per USD	daily	−0.03	−0.28	−0.16
30-year Treasury yield / won per USD	daily	−0.10	+0.12	+0.16
USD per Australian dollar / Bitcoin	daily	+0.03	+0.25	+0.16

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PAIR	DATA	1999–2020	2021–23	2024–2026
peso per USD / Bitcoin	daily	−0.02	−0.13	−0.15
real per USD / Bitcoin	daily	−0.01	−0.11	−0.15
10y-3m curve / rupee per USD	daily	−0.03	+0.11	+0.15
Real Estate / Ether	daily	+0.07	+0.26	+0.15
10y-3m curve / USD per Australian dollar	daily	+0.01	−0.11	−0.15
10-year Treasury yield / rupee per USD	daily	−0.07	+0.13	+0.15
10-year term premium (model) / USD per Australian dollar	daily	+0.05	−0.24	−0.15
USD per pound / Ether	daily	+0.03	+0.17	+0.14
3-month Treasury yield / USD per pound	daily	−0.01	−0.17	−0.14
S&P 500 / 10-year real yield	daily	+0.11	−0.27	−0.14
Industrials / 10-year real yield	daily	+0.11	−0.22	−0.14
30-year Treasury yield / rupee per USD	daily	−0.09	+0.08	+0.13
Consumer Staples / Swiss franc per USD	daily	+0.01	−0.14	−0.13
30-year Treasury yield / USD per Australian dollar	daily	+0.11	−0.13	−0.13
Utilities / Bitcoin	daily	+0.03	+0.16	+0.12
yen per USD / real per USD	daily	−0.07	+0.16	+0.12
Broad dollar index / Bitcoin	daily	−0.03	−0.22	−0.12
3-month Treasury yield / yuan per USD	daily	+0.01	+0.21	+0.12
USD per pound / Bitcoin	daily	+0.01	+0.19	+0.11
2-year Treasury yield / rupee per USD	daily	−0.04	+0.12	+0.11
yen per USD / rupee per USD	daily	−0.02	+0.18	+0.11
Utilities / Ether	daily	+0.05	+0.18	+0.10
Consumer Discretionary / 10-year real yield	daily	+0.08	−0.26	−0.10
won per USD / Bitcoin	daily	−0.00	−0.13	−0.10
Canadian dollar per USD / Bitcoin	daily	−0.05	−0.24	−0.09

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Table 24. All 94 new relations, largest first. – : no data before 2021.

Every notable 12-month change

RELATION	LAG	12 MONTHS AGO	NOW	CHANGE	PCT.
Energy → Nikkei 225	1	+0.42	−0.06	−0.48	0.0
Health Care → Nikkei 225	1	+0.36	−0.04	−0.39	1.0
Communication Services → Nikkei 225	1	+0.53	+0.17	−0.36	1.3
Consumer Staples → Nikkei 225	1	+0.21	−0.12	−0.34	4.3
Energy → USD per Australian dollar	1	+0.36	+0.03	−0.33	1.3
Materials → USD per Australian dollar	1	+0.41	+0.10	−0.32	0.3
Consumer Discretionary → USD per Australian dollar	1	+0.41	+0.10	−0.31	0.3
Industrials → USD per Australian dollar	1	+0.46	+0.15	−0.31	1.0
Real Estate → Nikkei 225	1	+0.32	+0.03	−0.29	4.0
Information Technology → USD per Australian dollar	1	+0.43	+0.15	−0.28	2.3
Financials → Nikkei 225	1	+0.46	+0.20	−0.26	3.0
S&P 500 → USD per Australian dollar	1	+0.45	+0.20	−0.25	2.3
10-year breakeven inflation → Nikkei 225	1	+0.20	−0.05	−0.25	3.8
Industrials → Nikkei 225	1	+0.54	+0.30	−0.24	3.0
VIX → peso per USD	1	+0.26	+0.03	−0.23	0.0
Materials → USD per pound	1	+0.23	+0.02	−0.22	2.0
VIX → won per USD	1	+0.11	−0.11	−0.22	1.4
Industrials → USD per pound	1	+0.27	+0.06	−0.21	2.0
Consumer Discretionary → Nikkei 225	1	+0.48	+0.27	−0.21	3.0
Energy → USD per pound	1	+0.16	−0.05	−0.21	4.3
S&P 500 → rupee per USD	1	−0.08	−0.28	−0.20	2.3

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RELATION	LAG	12 MONTHS AGO	NOW	CHANGE	PCT.
Information Technology → rupee per USD	1	−0.02	−0.18	−0.16	2.7
Health Care → rupee per USD	1	−0.07	−0.22	−0.15	3.7
Real Estate → real per USD	1	−0.18	−0.00	+0.17	95.7
Financials → real per USD	1	−0.22	−0.05	+0.18	95.7
Consumer Discretionary → real per USD	1	−0.25	−0.07	+0.19	97.7
Information Technology → won per USD	1	−0.17	+0.03	+0.19	97.7
Information Technology → real per USD	1	−0.22	−0.02	+0.20	95.0
rupee per USD → won per USD	1	−0.14	+0.06	+0.20	95.0
Energy → real per USD	1	−0.24	−0.04	+0.20	98.3
S&P 500 → real per USD	1	−0.25	−0.04	+0.22	97.7
Materials → peso per USD	1	−0.28	−0.04	+0.24	98.3
VIX → USD per Australian dollar	1	−0.36	−0.11	+0.25	100.0
Materials → 10-year breakeven inflation	1	−0.09	+0.16	+0.25	96.9
10-year real yield → Swiss franc per USD	1	−0.12	+0.14	+0.26	99.2
Materials → real per USD	1	−0.29	−0.02	+0.27	99.7
Energy → peso per USD	1	−0.25	+0.03	+0.28	98.0
Industrials → real per USD	1	−0.28	−0.01	+0.28	100.0

Table 25. Notable changes, 2025-10-31 to 2026-10-23. Lag in days for daily leads.

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