

Sector Rotation Monitor

A descriptive research showcase for seeing whether sector moves are broad, equal-weight participation or cap-weight concentration.

STATIC INTERFACE + LIVE DELAYED API

Research posture. CapFlow describes observed price and volume structure. It does not predict returns, recommend trades, or measure direct institutional fund flows.

Prepared as a self-contained reproduction guide. No private code, data, schemas, infrastructure, or documentation is used or required.

What CapFlow answers

Raw sector ETF performance can be dominated by a few large constituents. CapFlow asks a narrower question: **where is observed participation improving relative to the average S&P 500 stock?** It pairs each capitalization-weighted Select Sector SPDR with an Invesco equal-weight sector ETF, then compares the equal-weight fund with RSP.

Useful for

- Describing sector leadership
- Spotting broadening or narrowing
- Separating short impulse from long trend
- Inspecting score components

Not evidence of

- ETF creations or redemptions
- Institutional order flow
- Investor identity
- Future excess returns

Exact universe

SECTOR	CAP WEIGHT	EQUAL WEIGHT
Materials	XLB	RSPM
Communication Services	XLC	RSPC
Energy	XLE	RSPG
Financials	XLF	RSPF
Industrials	XLI	RSPN
Information Technology	XLK	RSPT
Consumer Staples	XLP	RSPS
Real Estate	XLRE	RSPR
Utilities	XLU	RSPU
Health Care	XLV	RSPH
Consumer Discretionary	XLY	RSPD

Benchmark: RSP, the Invesco S&P 500 Equal Weight ETF. Fund tickers and inception dates must be revalidated before any historical study.

Relative strength

For sector s , horizon h , and observation date t :

$$RS(s, h, t) = \text{Return}(\text{equal-weight sector}, h) - \text{Return}(RSP, h)$$

The showcase uses 5, 20, and 60 trading sessions, mixed 50%, 30%, and 20%. These are short descriptive horizons—not a validated forecasting model.

Chaikin Money Flow

$$MFM = ((\text{Close} - \text{Low}) - (\text{High} - \text{Close})) / (\text{High} - \text{Low})$$

$$CMF20 = \Sigma(MFM \times \text{Volume}) / \Sigma(\text{Volume})$$

CMF is a price-location and volume proxy. Volume can reflect market making, hedging, arbitrage, block transactions, and fund mechanics. It must not be described as measured capital inflow.

Equal-weight participation spread

$$EWSpread4W = \text{Return}(\text{equal-weight sector}, 20) - \text{Return}(\text{cap-weight sector}, 20)$$

A positive spread suggests the average constituent represented by the equal-weight fund outperformed the cap-weight vehicle during the window. It does not identify the cause.

Composite

$$\text{Score} = 0.55 \times z(\text{RS momentum}) + 0.25 \times z(\text{CMF20}) + 0.20 \times z(\text{EWSpread4W})$$

Each z-score is computed across all eleven sectors. Missing any required fund invalidates the snapshot; the system must not silently rank a smaller universe.

Transparent quadrant rules

12-WEEK RS	1-WEEK RS	PHASE	INTERPRETATION
Positive	Positive	Leading	Long trend and short impulse positive
Positive	Negative	Weakening	Long trend positive, short impulse negative
Negative	Positive	Improving	Long trend negative, short impulse positive
Negative	Negative	Lagging	Long trend and short impulse negative

Live API contract

```
{
  "schemaVersion": 1,
  "status": "live",
  "mode": "delayed-market-data",
  "generatedAt": "ISO-8601 retrieval timestamp",
  "dataAsOf": "oldest latest observation across required funds",
  "benchmark": "RSP",
  "provider": "Yahoo Finance chart API",
  "sectors": [{
    "name": "Information Technology",
    "capTicker": "XLK",
    "equalTicker": "RSPT",
    "score": 0.73,
    "phase": "Leading",
    "relativeStrength1w": 0.012,
    "relativeStrength4w": 0.028,
    "relativeStrength12w": 0.041,
    "cmf20": 0.14,
    "equalWeightSpread4w": 0.009
  }]
}
```

Fail closed. The API returns an unavailable response when any required symbol, adjusted close, OHLC field, volume window, or lookback is missing. The UI displays no substituted values.

Minimal Cloudflare Pages deployment

```
Browser
├─ GET /                → static HTML/CSS/JS
├─ GET /assets/...      → methodology PDF
└─ GET /api/snapshot
    └─ Pages Function
        ├─ Cloudflare Cache API (15-minute default)
        └─ Yahoo chart endpoint (server-side fetch)
```

No provider call is made directly from browser JavaScript. Yahoo is keyless; if a keyed provider is added later, store its credential as a Pages secret and access it only through `context.env`.

Recreation steps

1. Create a Pages project with a root `functions/` directory and static `public/` directory.
2. Implement the exact universe and pure calculation functions.
3. Add unit fixtures for returns, CMF, parser behavior, complete-universe failure, and phase mapping.
4. Implement `functions/api/snapshot.js`; fetch all symbols concurrently with bounded timeouts.
5. Cache only successful complete responses.
6. Render the snapshot in a static interface. Keep an honest, value-free fallback document.
7. Run local Wrangler development, syntax checks, unit tests, and a browser smoke test.
8. Deploy with Wrangler—not dashboard drag-and-drop, which does not deploy Pages Functions.

```
npx wrangler pages dev public
npx wrangler pages deploy public --project-name capflow
```

Refresh policy

The current default cache is 900 seconds. Browser responses may cache for 60 seconds. Failed live responses use `no-store`. Adjust frequency conservatively to reduce upstream throttling.

Required checks

1. Every configured ticker returns observations.
 2. All bars have date, OHLC, adjusted close, and volume.
 3. Prices are finite and positive; volume is nonnegative.
 4. No observation occurs after the declared data-as-of boundary.
 5. Fund pre-inception history is never fabricated or backfilled.
 6. Returns use adjusted close; CMF uses raw OHLC and volume.
 7. Every cross-sectional score contains exactly eleven sectors.
 8. Upstream failure produces a visible unavailable state.
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Research finding

Phase 0 decision: INCONCLUSIVE. The prior tested composite did not establish independent predictive power. The showcase is therefore intentionally descriptive. Do not relabel the score as alpha, forecast probability, recommendation, or measured institutional flow.

Known limitations

- Yahoo is an unofficial, delayed market-data source and may throttle or change.
 - ETF volume is not direct fund-flow evidence.
 - Eleven broad GICS sectors are coarse and highly correlated.
 - Sector taxonomies and ETF inception dates change over time.
 - Short horizons can emphasize reversal and noise.
 - Cross-sectional standardization always produces relative winners and losers, even when all sectors are weak.
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Confidentiality boundary

The implementation is independent. It must not import, copy, expose, or depend on any private code, caches, schemas, data, comments, tests, source registries, infrastructure, environment variables, or documentation.

CapFlow is a research demonstration. Delayed third-party data may be incomplete. Not investment advice.