

BofA GPS: Global Proprietary Signals

Anatomy of a bull market

Global Proprietary Signals

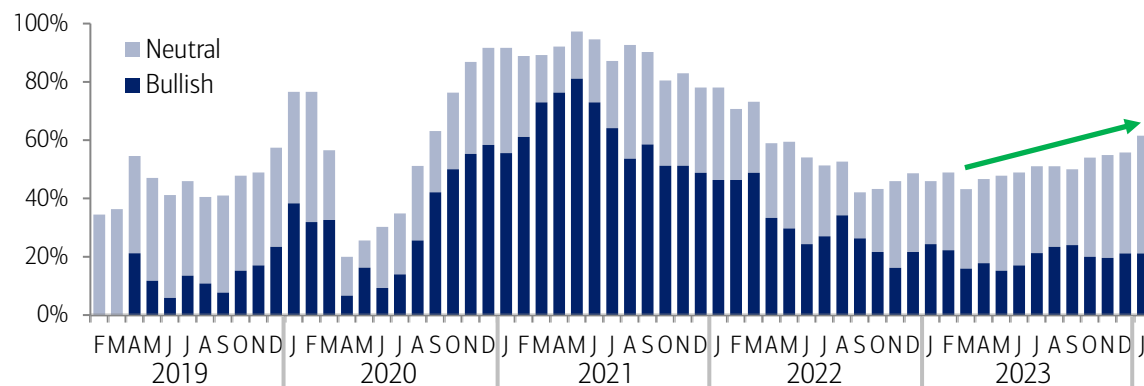
BofA Global Proprietary Signals is a compendium of 80+ proprietary indicators across different economies/strategies/markets/asset classes that reflects the insights of BofA Global Research analysts.

A cluster of inflections

The new year has ushered in renewed hopes for the global economy. After an elongated period of range-bound oscillations near the lows of September 2022, the breadth of *Bullish/Neutral* signals from our proprietary growth indicators has grown to 62%, the highest in 22 months. While growth concerns linger, the rise in *Bullish/Neutral Signals* does not rule out the potential for upside surprises. Especially, with monetary easing knocking on the doors, even the manufacturing economy could heave a sigh of relief later in the year.

Exhibit 1: Renewed hopes for the outlook of the global economy: 62% Bullish/Neutral signals now vs 43% in March

Proportion of growth indicators providing Bullish/Neutral signal



Source: BofA Predictive Analytics. Notes: Based on 52 growth indicators as of today.

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30 January 2024

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Data
Analytics



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Refer to important disclosures on page 29 to 31.

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Exhibit 2: The manufacturing economy should heave a sigh of relief once synchronized global monetary easing kicks in

Global central banks' policy stance versus Global Manufacturing PMI



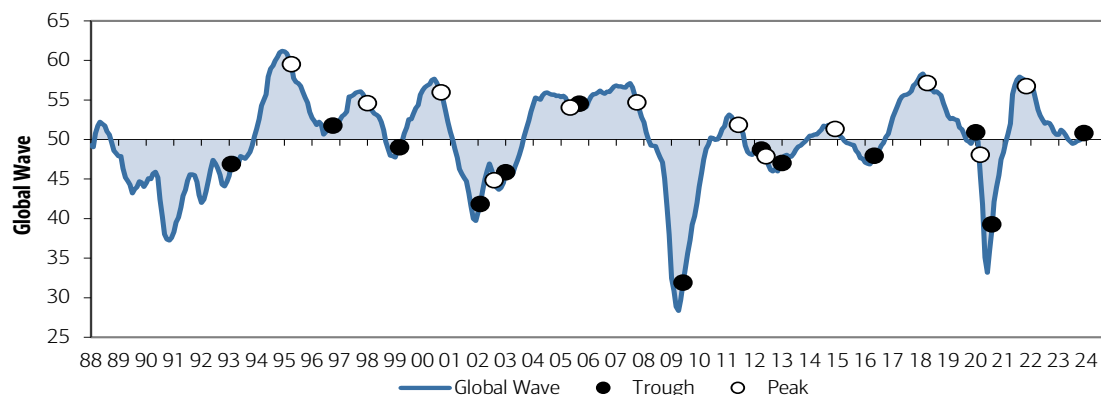
Source: Ned Davis Research, S&P Global, Haver

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To start with, the [Global Wave \(see note\)](#), which quantifies trends in global economic activity, has troughed after a record 25-month downturn in a positive signal for the global economic as well as earnings cycle. The move, backed by an improvement in all but one of the seven components, sets the stage for a sustained global upturn that last two years on average. Global equities returned 17% on average with a hit rate of 100% (ex-COVID episode) in the subsequent 12 months following the trough in the Global Wave.

Exhibit 3: The Global Wave has troughed after a record 25-month downturn

The Global Wave quantifies trends in global economic activity



Source: BofA Global Quantitative Strategy, MSCI, IBES, Haver, Bloomberg, OECD, IMF, ICE Bond Indices, National Statistics Database

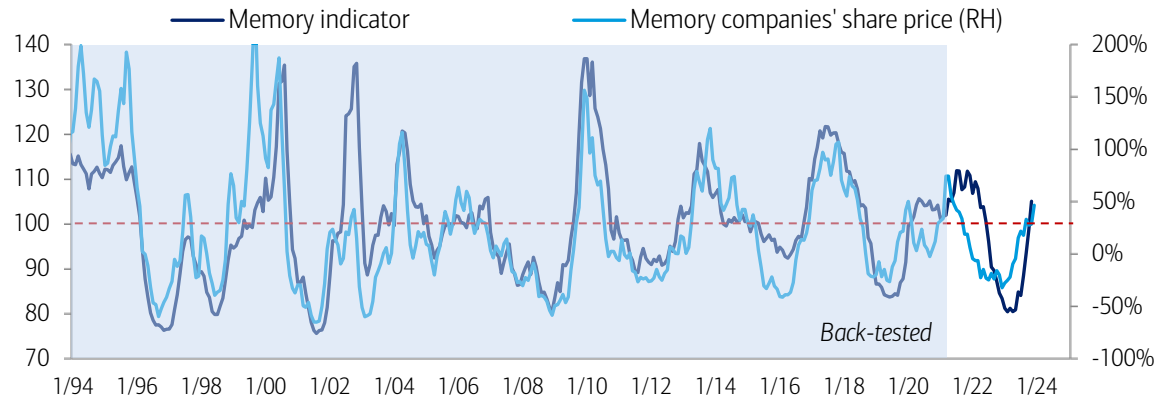
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As has been the case with many episodes in the past, semiconductors were one of the first to sense a regime shift, bottoming out in the first half of 2023 and marking a new upcycle in September. The uptrend stays on course, with the [Memory Indicator \(see note\)](#) touching the mid-cycle mark for the first time since 2022, driven

by higher NAND spot prices, DRAM/NAND billings, and Korea semis exports. The [Asia Fund Manager Survey \(see note\)](#) resonates the optimism, with net 69% of the panelists expecting an improvement in the semis cycle in the next 12 months.

Exhibit 4: The BofA Memory Indicator is now tracking above mid-cycle levels (100) after troughing in 2023

The BofA Memory Indicator is highly correlated with memory stocks performance



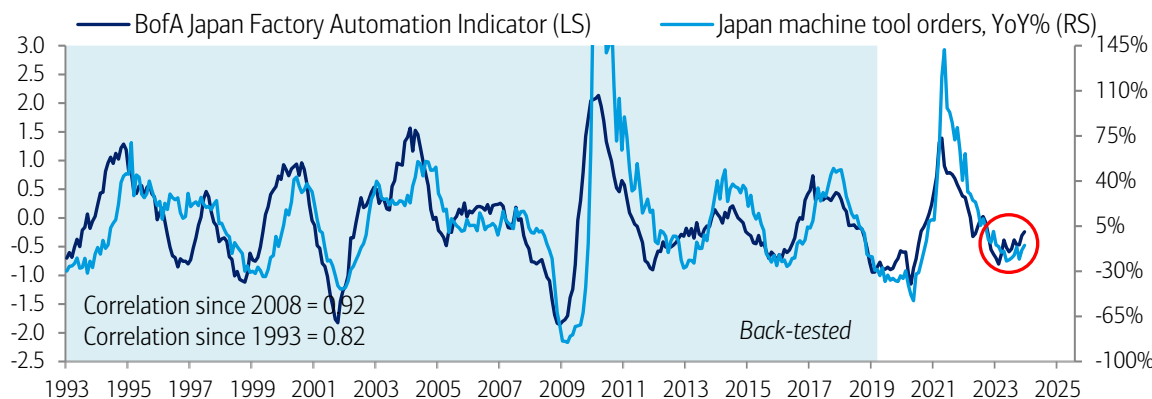
Source: Bloomberg, BofA Global Research. Notes: Memory companies share price is the average of Samsung, Hynix, Micron, and Nanya share price YoY changes.

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Now, the industrials cycle is also looking to break out: the [Industrial Momentum Indicator \(see note\)](#) leapt higher in the latest update, driven by fund managers' profit expectations, positioning, and copper prices, while the [Japan Factory Automation \(FA\) Indicator \(see note\)](#) picked up to a new cycle high (highest since September 2022), marking the first sign of coming out of the protracted bottoming process in the FA cycle.

Exhibit 5: The BofA Japan FA Indicator picked up to a new cycle high in December

BofA Japan FA Indicator vs Japan machine tool orders (YoY%)



Source: JMTBA, BofA Global Research

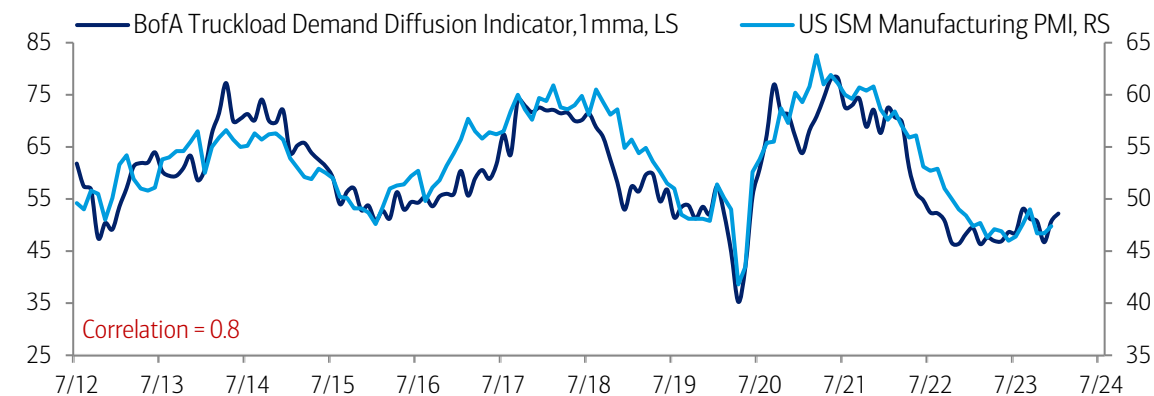
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The [Truckload Demand Indicator \(see note\)](#) for shippers' freight demand outlook is tracking near 17-month highs, albeit below the average freight recession level of 54.2, with higher rates signalling an improvement in demand from the recent trough. Similarly, the upward momentum in the [Industrial Real Estate Indicator \(see note\)](#) suggests that sector demand may improve starting in the spring and continue through 2024-25.

Exhibit 6: The Truckload Demand Indicator continues to tread above the threshold of 50

The Truckload Demand Indicator leads the US ISM Manufacturing Index with a correlation of 0.8 since inception



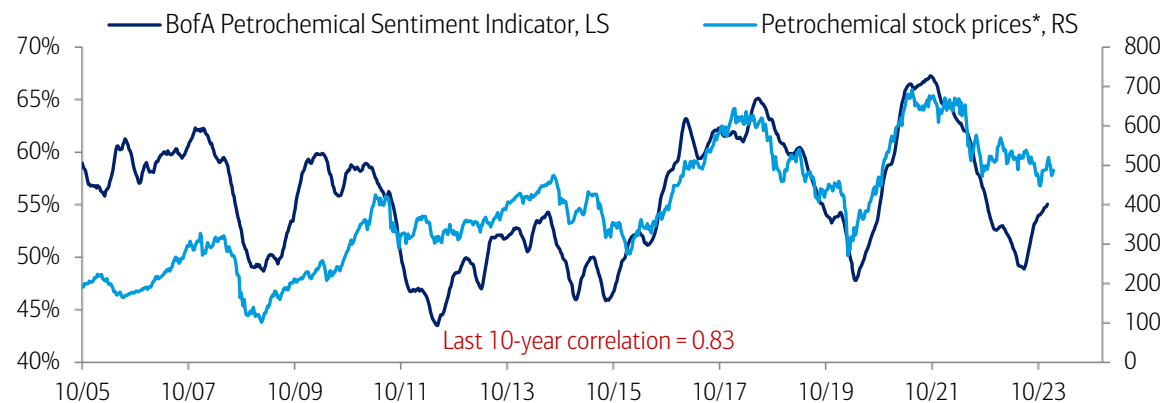
Source: BofA Global Research, ISM, Bloomberg

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Even in the materials space, which is muddled by the malaise in China, there are pockets of hope: the NLP-based [Petrochemical Sentiment Indicator \(see note\)](#) has inflected to an upcycle after bottoming in July 2023, as the sector emerges from destocking headwinds and rock-bottom margins.

Exhibit 7: The Petrochemical Sentiment Indicator, an NLP-based gauge of petrochem sentiment, has inflected to an upcycle

BofA Petrochemical Sentiment Indicator versus Petrochemical stock prices*



Source: BofA Global Research, S&P Global Platts, FactSet. Notes: *Petrochemical stock prices is an equal-weighted average index of the 31 petrochemical stocks under BofA Research coverage.

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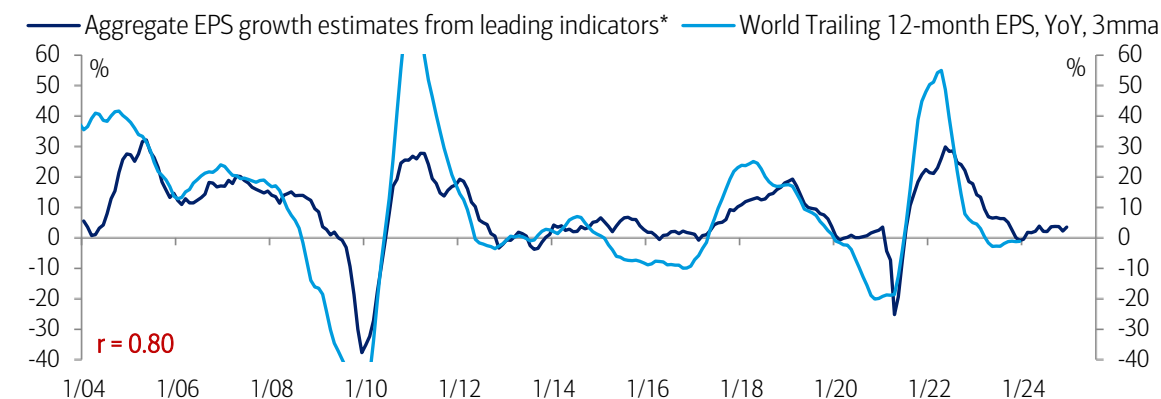
The [RENO Barometer \(see note\)](#), which gauges consumer spending at home improvement stores in the US, ticked up again, suggesting a sequential recovery in consumer spending at home improvement stores. So did the [Lodging Macro Activity Tracker \(see note\)](#), taking the tally to four consecutive positive monthly readings.

Earnings – the next frontier

The global earnings profile flatlined in 2023, but the outlook is relatively more encouraging, with leading indicators projecting a mid-single digit growth over the course of the next 12 months.

Exhibit 8: Leading indicators (aggregate) anticipate mid-single digit growth in global earnings in the next 12 months

*Global EPS growth projection: Based on Asian exports growth, global manufacturing PMI, global manufacturing new orders, global earnings revisions ratio, corporate guidance for the US, and BofA China Financial Conditions Indicator



Source: BofA Predictive Analytics, MSCI, IBES, FactSet

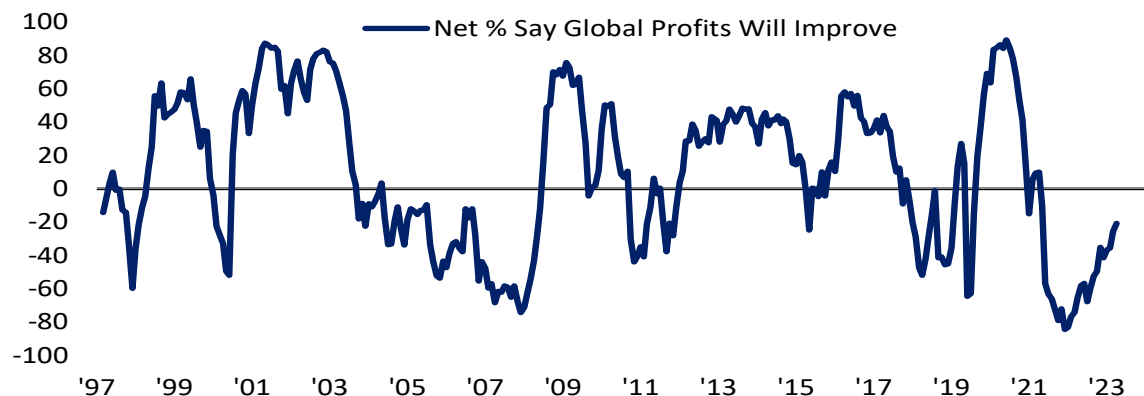
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1. Financial conditions in China, as gauged by the [China Financial Conditions Indicator \(see note\)](#), loosened in December, projecting world EPS growth at 18% in the year ahead with further upside in the event of a more coordinated and concentrated policy easing.
2. Corporate guidance in the US has moderated a notch but the *proportion of above-consensus issuances* (a volatile series) still suggests an above-par world EPS growth of 11% in the next 12 months.
3. The *global earnings revisions ratio* is hovering near the long-term average levels, estimating world EPS to grow 5% in the next 12 months.
4. Revival in exports from the major Asian trading nations (Japan, Korea, Singapore, and Taiwan) imply world EPS to grow 6% in the next 12 months.
5. Global manufacturing PMI, *headline as well as new orders*, is stuck below par, implying about -3% world EPS growth in the next 12 months, although the Industrial Momentum Indicator (see note) and the Truckload Demand Indicator spell out upside potential in the coming months.



Exhibit 9: Only net 21% of the Global FMS investors expect further weakness versus net 84% in September 2022

Net % of FMS investors saying global corporate profits will improve



Source: BofA Global Fund Manager Survey

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Investors are also warming up to the notion of earnings recovery, with only net 21% of the [Global Fund Manager Survey \(FMS\)](#) (see note) participants expecting further weakness versus net 84% in September 2022. It is common knowledge that the first leg of an upcycle is typically dominated by multiple re-ratings, with the earnings impact kicking in later on. To that end, while last year was the year of re-rating, we think earnings could take the spotlight this year and be the key driver for global equity markets.

Exhibit 10: Re-rating first, earnings later

Decomposing S&P 500 returns into price multiple changes and earnings growth

#	S&P 500 Trough Dates	Decomposing Year 1 returns (Months 1-12 from trough)			Decomposing Year 2 returns (Months 13-24 from trough)		
		Market returns (%)	Trailing P/E Change (%)	Trailing EPS growth (%)	Market returns (%)	Trailing P/E Change (%)	Trailing EPS growth (%)
1	10/22/1957	31%	49%	-18%	10%	-6%	15%
2	6/26/1962	33%	13%	20%	17%	6%	12%
3	10/7/1966	33%	35%	-2%	7%	-1%	7%
4	5/26/1970	44%	44%	0%	11%	2%	10%
5	10/3/1974	38%	53%	-15%	21%	-2%	23%
6	8/12/1982	58%	73%	-15%	2%	-22%	24%
7	12/4/1987	21%	-18%	40%	29%	30%	-1%
8	10/9/2002	34%	12%	22%	8%	-8%	16%
9	3/9/2009	69%	76%	-7%	16%	-10%	26%
10	3/23/2020	75%	111%	-37%	14%	-26%	40%
Average		44%	45%	-1%	13%	-4%	17%
11	10/12/2022	22%	25%	-3%			

Source: BofA Predictive Analytics, Robert Shiller, Bloomberg

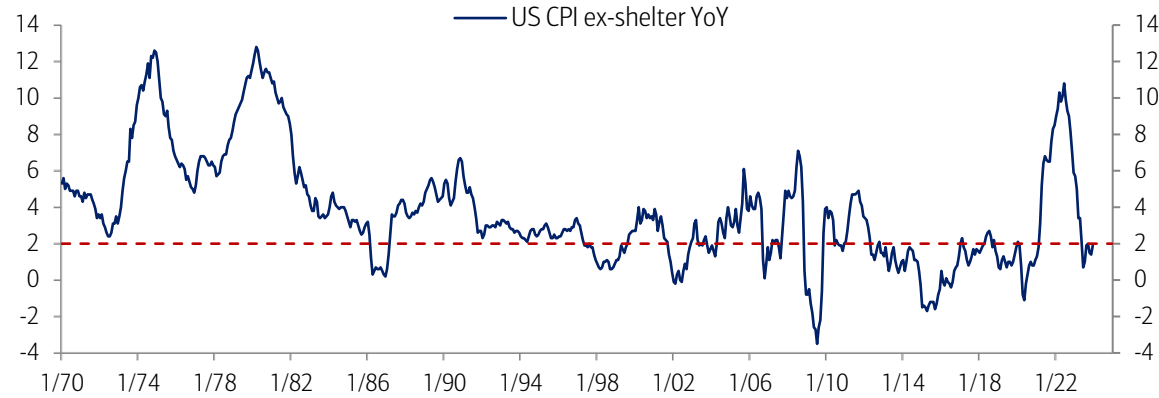
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Persistent and pervasive disinflation

Exhibit 11: US CPI ex-shelter has been running at or below the threshold of 2.0% YoY for 7 months now

US CPI ex-shelter YoY (65% weight in headline CPI)



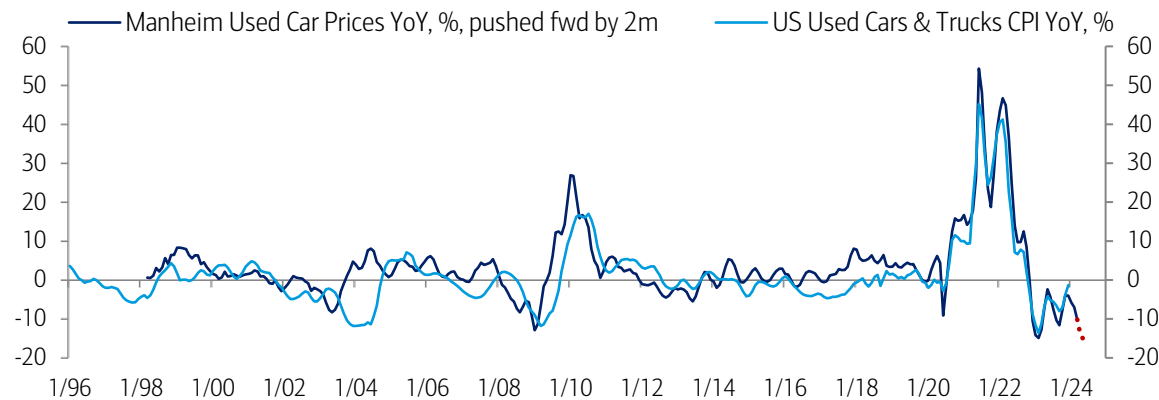
Source: BofA Predictive Analytics, BLS, Haver

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The rates market, on the other hand, was and will likely be primarily influenced by inflation dynamics. 46% of 74 US CPI components are already running below 2.0% YoY. Not only that, net 71% of investors expect global CPI YoY to go lower in the next 12 months. Yet, *higher inflation* still ranks among the biggest tail risks. Leading indicators, though, are unwavering in their projection for further disinflation.

Exhibit 12: Acceleration disinflation: base effects will likely see used car inflation fall to a new low in the coming months

Manheim used car prices YoY versus US used cars & trucks CPI YoY: dotted line shows projections if the index stays at today's level



Source: BofA Predictive Analytics, ISM, Manheim Auctions, Bloomberg, Haver

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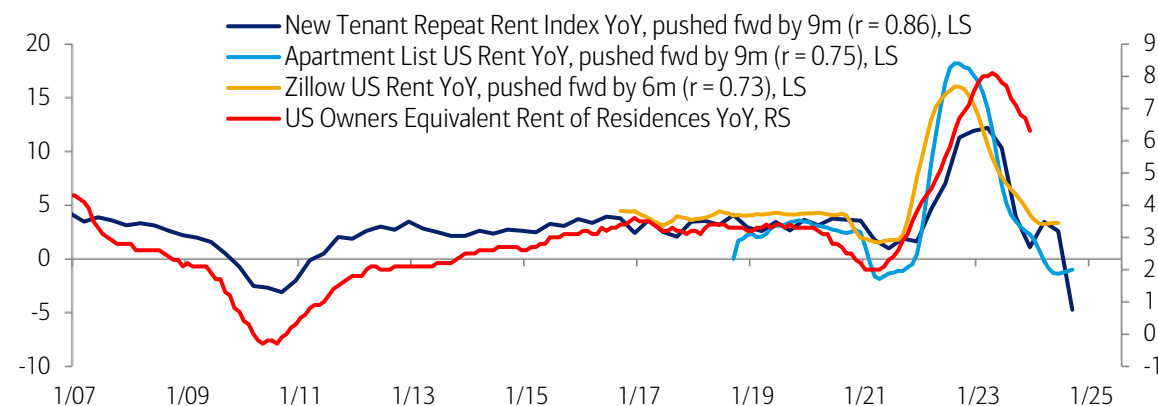
Commodity prices have resisted the Red Sea disruptions to stay relatively muted, allowing a further cool-off in price pressures. Food prices, in particular, have plugged, calling for a moderation in food inflation. Used car inflation surprised on the upside in December, but the Manheim Used Car Price Index predicates that a decline



is all but inevitable if we take base effects into consideration. Shelter is also headed for a steady disinflation, as informed by Apartment List, Zillow and the Cleveland Fed.

Exhibit 13: Shelter is headed for a steady disinflation, as informed by Apartment List, Zillow and the Cleveland Fed

Disinflationary impulse: Measures of asking rents versus US owners' equivalent rent of residences YoY (26% weight in headline CPI)



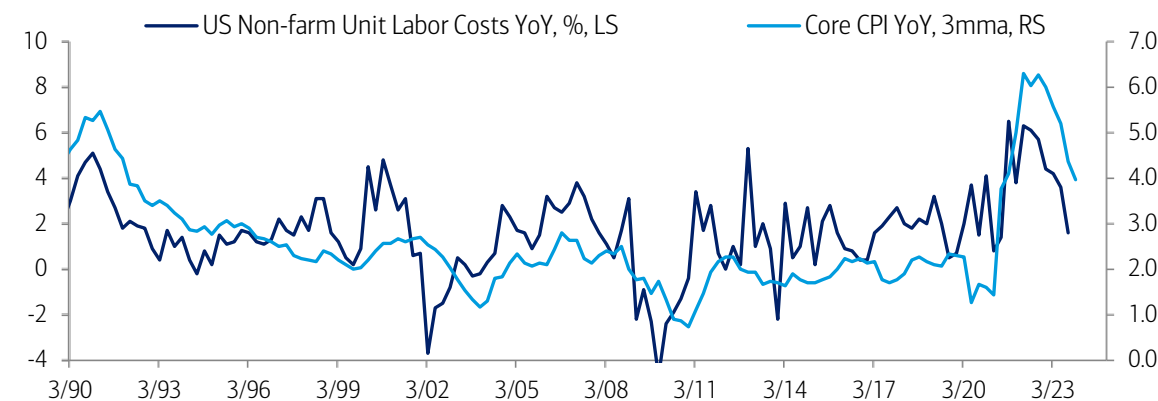
Source: BofA Predictive Analytics, BEA, Apartment List, Zillow Inc, Bloomberg, Adams, Brian, Lara Loewenstein, Hugh Montag, and Randal J. Verbrugge. 2022. "Disentangling Rent Index Differences: Data, Methods, and Scope." Federal Reserve Bank of Cleveland, Working Paper No. 22-38.

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Core services ex-shelter i.e. super-core inflation should also bow down to the diminishing wages pressures, as captured by the accelerated decline in unit labor costs as well advertised wages per the Indeed Wage Tracker.

Exhibit 14: Unit labor costs are on an accelerated decline

US unit labor costs versus US core CPI YoY



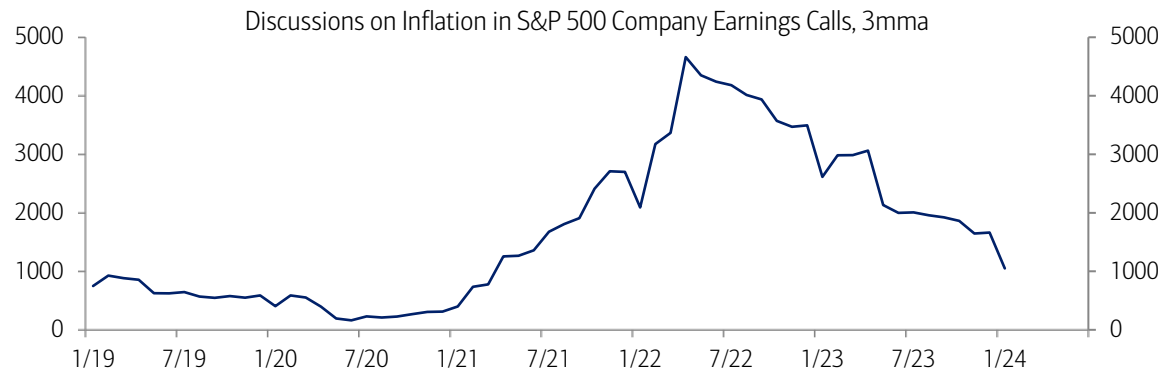
Source: BofA Predictive Analytics, BLS, Bloomberg

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No wonder, price pressures is no longer a significant topic of discussion among corporates as evident from the drop in references to inflation in earnings calls in the US.

Exhibit 15: Price pressures have lost a considerable portion of the corporate mindshare

Number of discussions on Inflation in S&P 500 Company Earnings Calls, 3mma



Source: BofA Predictive Analytics, Bloomberg

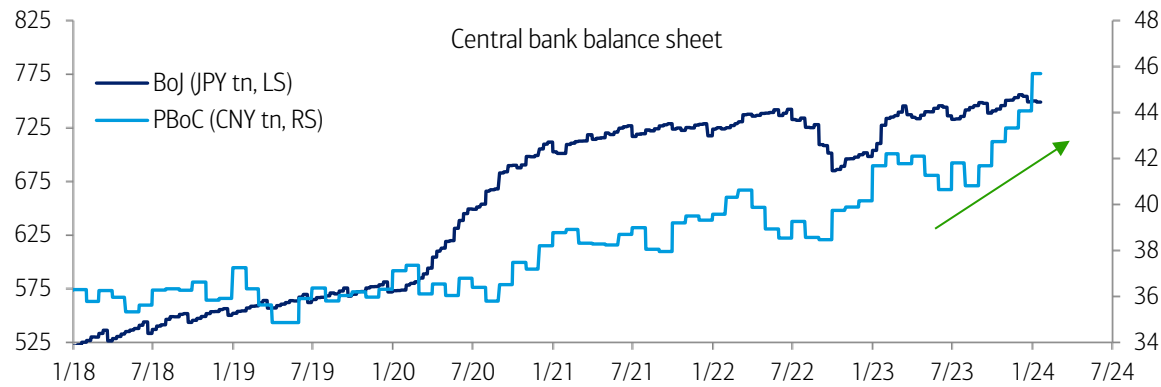
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The path to a global synchronized monetary easing cycle

The futures market expects five-to-six Fed rate cuts through the end of 2024 following the pivot in December, despite repeated attempts by officials to manage expectations. In our view, too, the quantum of cuts is getting more than its fair share of air time. What matters more is that the downtrend in inflation, the cornerstone of policy actions, persists. Which we think, will. Equity markets are also slated to get a reprieve from a liquidity perspective as the Fed winds down its balance sheet runoff exercise starting in March, drawing quantitative tightening to a close in July. Meanwhile, the PBoC and the BoJ keep on pumping liquidity. Particularly in China, [our house-view expects more policy actions \(see note\)](#) to support credit growth, following the larger-than-expected 50bp reserve requirement ratio (RRR) cut, including potential cuts in the 1-year loan prime rate by 15bps in 1Q and an additional 30bp by the the year end.

Exhibit 16: Light at the end of the tunnel: as QT by the Fed nears an end, the BoJ and the PBoC are still pumping liquidity

Central banks' balance sheet: Japan | China



Source: BofA Predictive Analytics, Bloomberg

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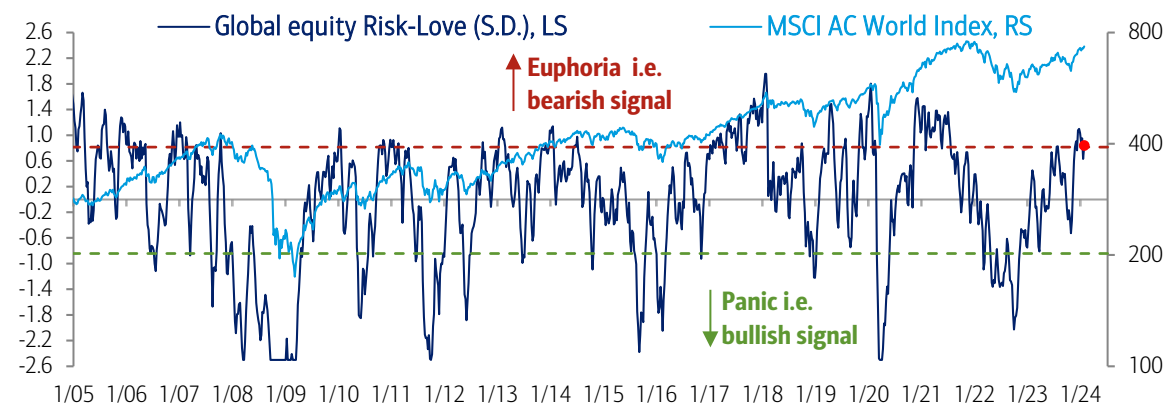


Euphoric sentiment is a concern, not a deal-breaker

The main, and perhaps the only, cause of concern is sentiment. Growth, inflation, policy, and liquidity are all lining up in investors' favor but it has induced a bit too much optimism, especially in the developed world, with sell side strategists' average recommended allocation climbing to its [highest level since May 2022 \(see note\)](#). In particular, [Global Equity Risk-Love \(see note\)](#) is in euphoria. While the buoyancy does open up the potential for a pullback in the near term, forward returns when sentiment hits euphoria are not appalling in a bull market. Especially when the market breadth is running at healthy levels, such as today's.

Exhibit 17: Global Equity Risk-Love is at the 81st percentile of its history since 1987

Global Risk-Love: our contrarian sentiment indicator for equities



Source: BofA Predictive Analytics, Bloomberg

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Of the 41 times that Risk-Love hit *euphoria* in the past 30 years, 36 started in bull regimes, while the rest were during bear markets. In the bull market episodes, the average returns for global equities over the next 6-months was lower than the base average of 3.3% but still positive at 2.4%, with a win ratio of 69%. Whereas, during bear markets, the average returns over the next 6-months was -8.2% with a win ratio of 0%.

Exhibit 18: Forward returns when sentiment hits euphoria are not appalling in a bull market

We define bull/bear markets based on the 200-day moving averages of the S&P 500 Index

Bull Market	Forward Returns		
	1M	3M	6M
Count	36	36	36
Average	0.4%	1.3%	2.5%
Median	0.8%	3.6%	3.8%
Hit Ratio	61%	69%	69%
Max	6.3%	12.6%	16.0%
Min	-9.4%	-13.6%	-12.4%

Bear Market	Forward Returns		
	1M	3M	6M
Count	5	5	5
Average	-1.6%	-3.5%	-8.2%
Median	-2.6%	-5.8%	-4.9%
Hit Ratio	40%	40%	0%
Max	1.1%	2.1%	-0.8%
Min	-4.9%	-8.3%	-20.6%

Source: BofA Predictive Analytics, MSCI, Bloomberg, FactSet

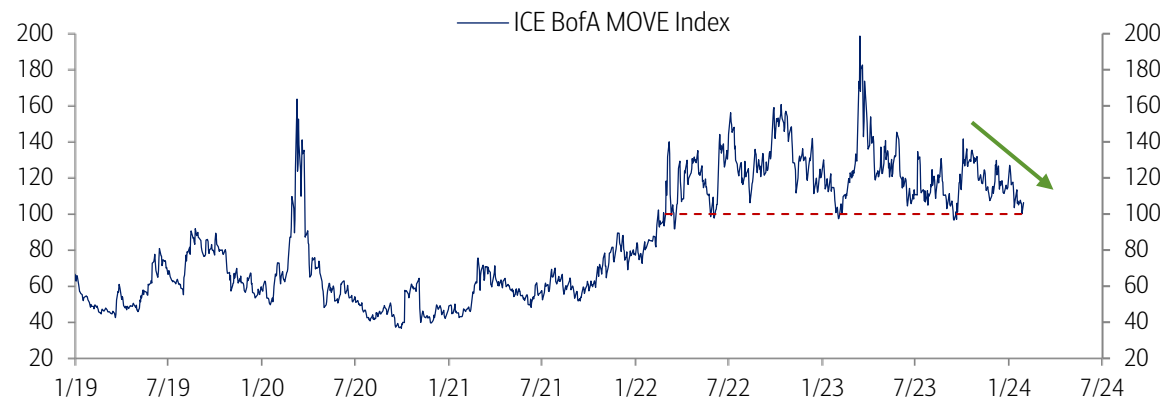
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Bottom line. The weight of the evidence suggests **another good year in the offing**. The encouraging concoction of a soft landing, a revival in earnings, persistent disinflation, supportive policy (*dawn of an easing cycle and dusk of liquidity withdrawal*), and robust market technicals should prevail over the headwinds of euphoric sentiment. Elevated bond volatility, which had been a concern so far, also seems to be settling down. What then could spoil the party now? A flare-up in inflation if the Red Sea crisis gets out of hand.

Exhibit 19: Bond volatility was a cause of concern but seemingly settling down now

Bond volatility: ICE BofA MOVE Index



Source: BofA Predictive Analytics, ICE Data Indices, LLC, Bloomberg

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Check inside for indicator signals.

See links to recent editions of the BofA Global Proprietary Signals below

[BofA GPS: Global Proprietary Signals: Slow is good 21 November 2023](#)

[BofA GPS: Global Proprietary Signals: The unbearable heaviness of higher rates 20 October 2023](#)

[BofA GPS: Global Proprietary Signals: The weight of the evidence 14 September 2023](#)



Exhibit 20: Macroeconomic Indicators

Please refer to the Glossary at the back of the report for a brief description of each of these indicators (and see links to macro indicator reports below, numbered in the global column)

#	Indicator	Predictor of	Latest Signal											
Global			Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
1.	Global EPS Growth Model (W) - M. Hartnett	Global EPS Growth	X	X	X	X	X	X	X	X	X	X	X	X
2.	Global Risk-Love Indicator (M) - R. Samadhiya	Global Equities	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	X
3.	EMFX Carry Sentiment Indicator (Q) - D. Hauner	Emerging Markets Currencies	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	✓	✓	✓	X
4.	WTI Crude Oil Directional Forecast (M) - F. Blanch	WTI Crude Oil	X	✓	✓	X	✓	X	✓	X	X	X	✓	X
5.	BofA Bull & Bear Indicator (W) - M. Hartnett	Global Cross-Asset Risk	⇔	⇔	⇔	⇔	⇔	⇔	⇔	✓	✓	⇔	⇔	⇔
6.	Global FMS Cash Indicator (M) - M. Hartnett	Global Equities	✓	✓	✓	✓	✓	✓	⇔	✓	⇔	⇔	⇔	⇔
7.	Global News Pulse (M) - N. Tupper	Global Equities	X	✓	✓	✓	✓	✓	✓	✓	⇔	⇔	⇔	⇔
8.	Global Breadth Rule (W) - M. Hartnett	Global Equities	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
9.	Global Flow Trading Rule (W) - M. Hartnett	Global Equities	⇔	⇔	⇔	⇔	⇔	⇔	⇔	✓	⇔	X	⇔	⇔
10.	EM Flow Trading Rule (W) - M. Hartnett	Emerging Markets Equities	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
11.	Emerging Monetary Mood Indicator (Q) - D. Hauner	EM Central Banks Policy Stance	X	X	X	X	X	X	⇔	✓	✓	✓	✓	⇔
12.	Global Wave (M) - N. Tupper	Global Equities	X	X	X	X	X	X	X	X	X	X	X	✓
13.	GFSI Risk Allocator (W) - B. Bowler	Cross-Market Gauge of Risk	⇔	X	X	X	⇔	⇔	⇔	X	⇔	⇔	⇔	✓
14.	CompassAlarm (Q) - D. Hauner	Emerging Markets Currencies	✓	✓	✓	⇔	⇔	⇔	X	⇔	⇔	⇔	⇔	✓

Americas			Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
15.	BofA Indicator of US Labor Market Momentum (M) - M. Gapen	US Labor Market	X	X	X	X	X	X	X	X	X	X	X	X
16.	Liquidity Premium Indicator (M) - O. Melentyev	US High Yield Market Liquidity	⇔	⇔	⇔	X	⇔	X	X	⇔	⇔	⇔	X	X
17.	BofA Brazil Activity Coincident Tracker (M) - D. Beker	Brazil Economic Cycle	X	X	⇔	⇔	⇔	X	⇔	X	⇔	⇔	X	X
18.	US Regime Indicator (M) - S. Subramanian	US Business Cycle	⇔	X	X	X	X	X	✓	✓	✓	✓	⇔	⇔
19.	US Composite Recession Indicator (M) - S. Juneau	US Recession	X	X	X	X	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
20.	US GDP Tracker (W) - M. Gapen	US GDP	⇔	⇔	⇔	⇔	⇔	✓	✓	✓	⇔	⇔	⇔	⇔
21.	BAC Aggregated Card Data (M) - A. Bhave	US Retail Sales	✓	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
22.	Sell Side Indicator (M) - S. Subramanian	US Equities	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
23.	BofA Indicator of US Financial Conditions (M) - M. Gapen	US Financial Conditions	X	X	X	X	X	X	X	X	X	X	⇔	⇔
24.	BofA Indicator of US Financial Stress (M) - M. Gapen	US Financial Stress	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
25.	US HY Default Rate Indicator (M) - O. Melentyev	US High Yield Default Probability	✓	⇔	⇔	X	⇔	✓	⇔	⇔	⇔	⇔	⇔	⇔



Exhibit 20: Macroeconomic Indicators

Please refer to the Glossary at the back of the report for a brief description of each of these indicators (and see links to macro indicator reports below, numbered in the global column)

#	Indicator	Predictor of	Latest Signal											
26.	Machine-learning Based Cycle Indicator (Q) - A. Bhawe	US Economic Cycle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
27.	BofA Indicator of US Labor Market Conditions (M) - M. Gapen	US Labor Market	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28.	Corporate Misery Indicator (Q) - S. Subramanian	S&P 500 EPS Growth	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Europe			Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
29.	European Composite Macro Indicator (M) - P. Strzelinska	European Business Cycle	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
30.	Euro Area GDP Tracker (M) - R. Segura-Cayuela	Euro Area GDP	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
31.	UK GDP Tracker (M) - R. Segura-Cayuela	UK GDP	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
32.	UK Consumer Confidence Indicator (M) - R. Segura-Cayuela	UK Consumer Spending	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
33.	NORBI Mood Indicator (M) - M. Rousakis	Norges Bank Policy Rate	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗
34.	Bank of England Mood Indicator (M) - R. Segura-Cayuela	Bank of England Policy Rate	✗	⇔	⇔	✓	✓	✓	✓	⇔	⇔	⇔	⇔	⇔
35.	Euro Area Procyclical Core Inflation (M) - R. Segura-Cayuela	Euro Area Inflation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
36.	European Momentum Conviction Indicator (M) - P. Strzelinska	Momentum Style	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
37.	European Credit Macro Indicator (M) - I. Angelakis	European Credit Spreads	⇔	✓	✓	✓	✓	✓	⇔	⇔	⇔	⇔	⇔	✓
38.	Riksheard Mood Indicator (M) - M. Rousakis	Riksbank Policy Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Asia Pac			Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
39.	Asia ex-Japan Risk-Love Indicator (M) - R. Samadhiya	Asian Equities	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	✓	✓	⇔	⇔
40.	AU Household Consumption Tracker (Q) - M. Fuchila	Australia Household Consumption								✗	✗	✗	✗	⇔
41.	BofA China Investment Compass (Q) - W. Wu	China Business Cycle	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
42.	BofA China ACT (M) - H. Qiao	China Economic Cycle	✓	⇔	✓	✓	✓	⇔	⇔	⇔	✓	✓	✓	⇔
43.	BofA China A-share Wax & Wane Indicator (W) - W. Wu	China A-share Equities	✓	✓	⇔	✓	✓	✓	✓	✓	✓	✓	✓	✓
44.	BofA China FCI (M) - H. Qiao	Liquidity in China	⇔	⇔	✓	✓	✓	⇔	⇔	⇔	⇔	⇔	⇔	✓
45.	BofA RBA Sentiment Indicator (M) - O. Levingston	RBA Policy Rate	✓	⇔	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: BofA Predictive Analytics

BofA GLOBAL RESEARCH

✓ denotes Bullish ⇔ denotes Balanced ✗ denotes Bearish

Note: D, W, B, M, Bm and Q in the parentheses denote frequency of update/publication of the indicator. D denotes daily, W denotes weekly,

B denotes biweekly, M denotes monthly, Bm denotes bimonthly and Q denotes quarterly.



Exhibit 21: Sectoral Indicators

Please refer to the Glossary at the back of the report for a brief description of each of these indicators (and see links to macro indicator reports below, numbered in the global column)

# Indicator	Predictor of	Latest Signal											
Global / Americas		Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
46. BofA Global EV Battery Value Chain Indicator (M) - J. Lee	Global EV Battery Revenue	X	X	X	X	X	X	X	X	X	X	X	X
47. Health Care Labor Tracker (M) - K. Fischbeck	US Health Care Earnings Outlook		X	X	X	X	X	X	X	X	X	X	X
48. S&P500 Energy Sector Directional Forecast (M) - F. Blanch	US Energy Sector Relative Price	X	✓	✓	X	✓	✓	✓	X	X	X	X	X
49. BofA Apple Indicator (Q) - W. Mohan	Apple's Revenue Growth	X	X	X	X	X	X	X	X	X	X	X	X
50. BofA Global Luxury Demand Indicator (M) - A. Wallace	Global Luxury Companies	✓	✓	✓	✓	✓	✓	✓	⇔	⇔	⇔	⇔	⇔
51. Industrial Momentum Indicator (M) - M. Feniger	Global Industrial Activity	✓	✓	⇔	X	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
52. Truckload Diffusion Indicator (B) - K. Hoexter	US Trucking Freight Outlook	X	X	X	X	X	⇔	⇔	⇔	⇔	⇔	⇔	⇔
53. Industrial Real Estate Indicator (M) - C. Bonnel	US Industrial Real Estate Demand	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
54. US Home Sales Indicator (M) - R. Jadosich	US Housing Demand												⇔
55. BofA US Discount Store Demand Indicator (M) - R. Ohmes	Spending at U.S. Discount Stores	X	X	X	⇔	⇔	✓	✓	✓	⇔	⇔	⇔	⇔
56. Flight Signals (Q) - A. Didora	US Domestic Airline Unit Revenue	⇔	⇔	⇔	X	X	X	X	X	⇔	⇔	⇔	⇔
57. Lodging Macro Activity Tracker (M) - S. Kelley	US Lodging Industry Revenue	X	X	X	X	X	⇔	⇔	✓	⇔	⇔	⇔	⇔
58. BofA Petrochemical Sentiment Indicator (M) - S. Byrne	Global Petrochemical Sentiment	X	X	X	X	X	X	X	X	X	X	X	✓
59. Fluid Power Distributor Indicator (B) - A. Obin	Global Fluid Power Outlook	✓	✓	✓	⇔	⇔	X	X	X	X	X	✓	✓
60. Internet Advertising Indicator (M) - J. Post	US Digital Advertising Revenue				⇔	⇔	✓	✓	✓	✓	✓	✓	✓
61. Managed Care Utilization (M) - K. Fischbeck	US Managed Care Earnings	✓	✓	⇔	⇔	⇔	⇔	⇔	✓	✓	✓	✓	✓
62. RENO Barometer (M) - E. Suzuki	US Home Improvement Spend	X	X	X	⇔	⇔	⇔	⇔	⇔	⇔	⇔	✓	✓
Europe		Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
63. Testing Growth Indicator (Q) - S. Sarli	Testing, Inspection & Certification	⇔	⇔	X	X	X	X	X	X	X	X	X	X
64. EMEA Staffing Indicator (Q) - S. Sarli	EMEA Staffing								X	X	X	X	X
65. Veolia Waste Volume Indicator (M) - A. Roncier	Veolia Waste Volume Growth								X	X	X	X	X
66. Chemical Conditions Tool (M) - M. Yates	European Chemical Sentiment							⇔	⇔	⇔	⇔	⇔	⇔
Asia Pac		Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
67. BofA Athletic Footwear Indicator (Q) - R. Leung	Global Athletic Footwear Revenue	X	X	X	X	X	X	X	X	X	X	X	X
68. BofA Asian Synthetic Rubber Indicator (Q) - J. Lee	Asian Synthetic Rubber Revenue	X	X	X	X	X	X	X	X	X	X	X	X



Exhibit 21: Sectoral Indicators

Please refer to the Glossary at the back of the report for a brief description of each of these indicators (and see links to macro indicator reports below, numbered in the global column)

# Indicator	Predictor of	Latest Signal													
69. BofA China Cement Indicator (M) - M. Zhao	China Cement Sector Outlook	X	X	X	X	X	X	X	X	X	X	X	X	X	X
70. BofA Korean Banks NII Indicator (Q) - J. Park	Korean Banks Net Interest Income			X	X	X	X	X	X	X	X	X	X	X	X
71. BofA Singapore Credit Growth Indicator (M) - A. Swaminathan	Singapore Credit Growth	⇔	⇔	⇔	⇔	⇔	⇔		X	X	X	X	X	X	X
72. BofA Malaysia Credit Growth Indicator (M) - A. Swaminathan	Malaysia Credit Growth	⇔	⇔	⇔	⇔	X	X	X	X	X	X	X	X	X	X
73. BofA Thailand Credit Growth Indicator (M) - A. Swaminathan	Thailand Credit Growth	X	X	X	X	X	X	X	X	X	X	X	X	X	X
74. BofA Philippines Credit Growth Indicator (M) - A. Swaminathan	Philippines Credit Growth	⇔	⇔	⇔	⇔	X	X	X	X	X	X	X	X	X	X
75. BofA Vietnam Credit Growth Indicator (M) - A. Swaminathan	Vietnam Credit Growth	X	X	X	X	X	X	X	X	X	X	X	X	X	X
76. BofA Athletic Apparel Indicator (Q) - R. Leung	Global Athletic Apparel Revenue	X	X	X	X	X	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
77. BofA India IT Services Indicator (M) - K. Tayal	India IT Services Revenue Growth													⇔	⇔
78. BofA India Loan Growth Indicator (M) - A. Swaminathan	India Banks Loan Growth	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
79. BofA Australian Bank Credit Loss (Q) - M. Dunder	Australian Banks Bad Debts	X	X	X	X	X	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
80. BofA China White Liquor Hydrometer (Q) - C. Luo	China White Liquor Revenue	X	X	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
81. Macau Macro Activity Tracker (M) - S. Kelley	Macau Gross Gaming Revenue					⇔	⇔	X	⇔	⇔	⇔	⇔	⇔	⇔	⇔
82. BofA Apple Supply Chain Indicator (Q) - R. Cheng	Apple Supply Chain	X	X	X	X	X	X	X	X	X	X	X	X	X	⇔
83. BofA Memory Indicator (M) - S. Woo	Semiconductor Memory Cycle	X	X	X	X	X	X	X	✓	✓	✓	✓	✓	✓	✓
84. Japan Factory Automation Indicator (M) - K. Hotta	Japan Factory Automation Cycle	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
85. BofA China Flight Signals (M) - N. Gee	China Airlines Unit Revenue	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
86. BofA Indonesia Credit Growth Indicator (M) - A. Swaminathan	Indonesia Credit Growth	⇔	⇔	⇔	⇔	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: BofA Predictive Analytics

BofA GLOBAL RESEARCH

✓ denotes Bullish ⇔ denotes Balanced X denotes Bearish

D, W, B, M, Bm and Q in the parentheses denote frequency of update/publication of the indicator. D denotes daily, W denotes weekly, B denotes biweekly, M denotes monthly, Bm denotes bimonthly and Q denotes quarterly.

The indicators above have different methodologies, risk considerations and assumptions, and reflect different time horizons. **The labels of 'bullish', 'balanced' or 'bearish' reflect the analysts' interpretation of their respective indicators. 'Bullish' in a broad sense means that the indicator currently suggests a positive outlook for the relevant economy/strategy/discipline/market/ asset class. Similarly, 'bearish' means that the indicator currently suggests a negative outlook for the relevant economy/strategy/discipline/market/asset class. When the analyst is of the view that the indicator does not currently suggest a clear directional signal (either**



bullish or bearish), it is labeled as 'balanced'. Investors should always refer to the most recent reports ([hyperlinks](#)) for full details and consider their own circumstances/objectives before making any investment decisions.

Disclaimer: Each of the indicators above is intended to be indicative metric only and may not be used for reference purposes or as a measure of performance for any financial instrument or contract, or otherwise relied upon by third parties for any other purpose, without the prior written consent of BofA Global Research. These indicators were not created to act as benchmarks.

The analysis of all the indicators in this report is back-tested and does not represent the actual performance of any account or fund. Back-tested performance depicts the hypothetical back-tested performance of a particular strategy over the time period indicated. In future periods, market and economic conditions will differ and the same strategy will not necessarily produce the same results. No representation is being made that any actual portfolio is likely to have achieved returns similar to those shown herein. In fact, there are frequently sharp differences between back-tested returns and the actual results realized in the actual management of a portfolio. Back-tested performance results are created by applying an investment strategy or methodology to historical data and attempts to give an indication as to how a strategy might have performed during a certain period in the past if the product had been in existence during such time. Back-tested results have inherent limitations including the fact that they are calculated with the full benefit of hindsight, which allows the security selection methodology to be adjusted to maximize the returns. Further, the results shown do not reflect actual trading or the impact that material economic and market factors might have had on a portfolio manager's decision-making under actual circumstances. Back-tested returns do not reflect advisory fees, trading costs, or other fees or expenses.

Glossary

Asia ex-Japan Risk-Love Indicator

Risk-Love is a contrary investor sentiment indicator. It tries to quantify investor emotions and help us understand swings in investor psychology. When at extremes, the indicator is valuable in anticipating reversals in investor mindset, and thus markets, going forward. We have constructed Risk-Love indicator for major Asian/emerging markets as well as for the world as a whole. We include data on positioning, investor surveys, volatility, spreads, correlations, hedging and market technicals measures. Since 1993, median 12m forward returns for Asia ex-Japan markets equities were 17% (in US dollar terms) when the Asia ex-Japan Risk-Love Indicator was in panic.

BAC US Aggregated Credit and Debit Card Data

The BAC US aggregated credit and debit card data is based on aggregated and anonymized transaction data. The data is utilized to predict US Retail Sales. Readers should be aware that although the BAC datasets utilized in our analysis represent a significant number of data points, they nevertheless present a degree of selection bias, including but not limited to income levels and geographies. In addition, the data are limited to debit and credit cards and does not include other payment methods such as cash or checks. For more information on the methodology, disclaimers and limitations regarding BAC US aggregated credit and debit card data please see the most recent BofA on USA report ([see linked report here](#)).

Bank of England Mood Indicator (BoEMI)

We apply Natural Language Processing techniques to quantify the degree of hawkish 'sentiment' in around 400 BoE publications since 1997. Backtesting the BoEMI, pre-2008 the correlation between the BoEMI and the shadow rate peaks at 0.73 where the BoEMI has an eight month lead. Between 2008 and 2018 the same correlation peaks at 0.57 where the BoEMI has an eleven month lead.

BofA Apple Indicator

The Apple Indicator is a tool for identifying directional trends in Apple's YoY revenue growth based on aggregated BAC U.S. credit and debit card spend on electronics and revenue growth for a representative set of 14 Apple supply chain companies based in Taiwan.

BofA Apple Supply Chain Indicator

The Apple Supply Chain Indicator is a tool for identifying directional trends in aggregate Apple supply chain YoY revenue growth, based on BAC aggregated credit and debit card spend on electronics, Korean exports of electronics & electronics products and Taiwan exports related to parts of electronics products.

BofA ASEAN Credit Growth Indicators (BofA Singapore Credit Growth Indicator, BofA Malaysia Credit Growth Indicator, BofA Indonesia Credit Growth Indicator, BofA Thailand Credit Growth Indicator, BofA Philippines Credit Growth Indicator, & BofA Vietnam Credit Growth Indicator)

The BofA ASEAN Credit Growth Indicators seek to identify directional trends and key turning points in credit growth across each of the ASEAN-6 countries – Singapore, Malaysia, Indonesia, Thailand, the Philippines, and Vietnam. With lead times ranging from 3-12 months, these indicators are intended to help gauge how banks' loan growth are likely to shape up over the next one to two quarters. The set of six indicators – one for each of the six countries – is calculated using 5-10 input variables for each country that have leading cyclical properties contributing to system credit growth. The inputs, consisting of a mix of macro/market variables, banking system data, and other BofA proprietary indicators,

can broadly be classified under four key categories – namely, system liquidity, business/retail expectations, rates and prices, and external factors. Our back-tested analysis indicates a 0.7-0.8 correlation between our set of BofA ASEAN Credit Growth Indicators and system credit growth across the entire backtested period.

BofA Asian Synthetic Rubber Indicator

The BofA Asian Synthetic Indicator is an aggregate of nine components (seven industry-specific and two macro) that drive the synthetic rubber business cycle. It tracks the directionality trends of the average YoY rubber revenue growth of the major listed synthetic rubber manufacturers in the Asia-Pacific region. The indicator leads the synthetic rubber revenues by six months with a correlation of 0.81 as well as the YoY change in aggregated average share prices by one quarter with a correlation of 0.80 since March 2004.

BofA Athletic Supply Chain Indicators (BofA Global Athletic Footwear Indicator & BofA Global Athletic Apparel Indicator)

The BofA Athletic Supply Chain Indicators seek to identify revenue growth trends in the global athletic footwear and apparel industry that has been a key driver of earnings and valuation. They track the revenue of key suppliers to gauge order trends for the overall industry and brands, given the relatively concentrated supply chain that continues to consolidate further. The BofA Global Athletic Footwear Indicator leads the sales-weighted average YoY revenue growth of major athletic footwear brands by two quarters with a correlation of 0.82 since 2014. The BofA Global Athletic Apparel Indicator leads the sales-weighted average YoY revenue growth of the major athletic apparel brands by three quarters, with a correlation of 0.83 since 2011.

BofA Australian Bank Credit Loss Indicator

The Australian Bank Credit Loss Indicator is a proprietary tool that seeks to identify turning points and directionality in the Australian banking system credit cycle.

BofA Brazil Activity Coincident Tracker

The BofA Brazil Activity Coincident Tracker is a monthly composite gauge of the underlying growth rate of the economy that helps to flag inflection points in the economic cycle based on the growth rates of consumer confidence, business confidence, auto sales, and narrow money supply. It provides a “sneak peek” into the trend of monthly GDP (proxied by the IBC-Br index) four weeks in advance with a correlation of 0.90 between September-2006 and February-2018 and of 0.95 between March-2018 and June-2020. The directionality hit ratio (i.e. % of correct prediction in GDP growth yoy change direction) is also high at 80%.

BofA Bull & Bear Indicator

The BofA Bull & Bear Indicator is a proprietary cross-asset barometer that uses fund flows, positioning data & market technicals to quantify investor sentiment. The indicator is max bullish when it reaches 10 and max bearish when it reaches 0. Sell risk assets when the Bull & Bear Indicator exceeds the “greed” threshold of 8.0. Buy risk assets when the Bull & Bear Indicator falls below the “fear” threshold of 2.0.

BofA China A-share Wax & Wane Indicator

The BofA China A-share Wax & Wane (W&W) Indicator gauges the China A-share market sentiment in the short term using fund flows, liquidity, positioning, leverage, and valuation data. Scaled between 0 and 100, a reading above 80 for this contrarian indicator denotes a ‘Very Bearish’ signal, while those between 60 and 80 count as a ‘Bearish’ signal. Similarly, a reading below 20 is a ‘Very Bullish’ signal and the range between 20 and 40 denotes a ‘Bullish’ signal. ‘Very Bullish’ and ‘Very Bearish’ signals had hit rates of 88-100% over a 3-6 month horizon, while ‘Bullish’/‘Bearish’ signals were found to be 60-70% accurate in the back-testing since Jan-2010.

BofA China ACT

The BofA China Aggregate Coincident Tracker (China ACT) is designed to gauge coincident growth momentum in aggregate demand of the Chinese economy. It is a composite indicator constructed by aggregating the YoY growth rate of seven monthly components with their respective weights. The components cover investment, government expenditure, exports, imports and household consumption (in goods and services). The correlations of BofA China-ACT with contemporaneous IP and GDP growth are 87% and 80% respectively during January 2002 to September 2016. In addition, BofA China-ACT displays a higher standard deviation than IP and GDP, and thus likely to better captures the short-term economic growth fluctuations.

BofA China Cement Outlook Indicator

The BofA China Cement Outlook Indicator tracks the market sentiment on cement based on a proprietary survey of 150 cement producers (accounting for c.18% of the national capacity) and 50 concrete stations about their 3-month price outlook and the relative cement inventory level. The indicator is scaled to a range of ± 1 , with +1 denoting the most positive case for a price hike in next 3 month (i.e. a higher likelihood of price hike in our view) and vice versa. We assign scores of +1/0/-1 to the survey responses of positive/neutral/negative about the participants' expectation of both demand and price over the next 3-months to arrive at the 3-month price outlook and calculate the inventory level from Digital Cement, relative to the past 24 months, scaled in the range of +1 to -1, with +1 being the lowest absolute level during the period. A weighting scheme of 50/25/25% is applied to the 3-month cement outlook/the 3-month concrete outlook/the relative cement inventory level to arrive at the indicator.

BofA China FCI

The BofA China FCI is designed to offer a simple measure of liquidity tightness in China to help calibrate future growth of the Chinese economy. It is the weighted-sum of nominal interest rate, CNY nominal effective exchange rate, and total social financing growth. The weights are estimated to optimize the explaining power of input variables on industrial production (IP) growth. In addition, it reliably leads our coincident indicator, BofA China Activity Coincident Tracker, by 6-7 months.

BofA China Flight Signals

The BofA China Flight Signals is a proprietary directionality indicator for the unit revenue (quarterly revenue per available tonne kilometer) of Chinese airlines, which is a key driver of Chinese airline ROEs and valuations. It tracks the unit revenue for the three largest Chinese airlines for the next 6 months using Chinese domestic unit revenue data, airline supply/demand data and other macro variables. The indicator leads quarterly average Chinese airline unit revenue by 6 months with a correlation of 0.83 since 2005.

BofA China Investment Compass

The BofA China Investment Compass is a four-phase framework that identifies the current state in the China investment cycle, based on GDP growth and liquidity (*defined as the quarterly average of the 3-month SHIBOR minus the 3-month benchmark time deposit rate*). The four phases are – **C1**: *recovering phase*, with accelerating GDP growth and loose liquidity; **C2**: *peaking phase*, with accelerating growth and tight liquidity; **C3**: *over-tightening phase*, with decelerating growth and tight liquidity; and **C4**: *stimulating phase*, with decelerating growth and loose liquidity. Chinese equities typically have low beta with flattish returns in C1, while C4 witnesses higher volatility. On the other hand, C2 typically coincides with a bull market, and C3 a bear market.



BofA China White Liquor Hydrometer

The BofA China White Liquor Hydrometer is a directionality indicator to track the revenue growth of the white liquor sector in China, defined as YoY growth of the rolling 12-month revenue for a total of 16 listed white liquor A-share companies, using a total of nine factors (two macro and seven industry-specific), which, in our view, drive the white liquor cycle. The indicator leads the China white liquor sector revenue growth by two quarters with a correlation of 0.85 since 2007.

BofA US Discount Store Demand Indicator

The BofA US Discount Store Demand Indicator provides an indication of BofA US discount stores company coverage same-store sales growth direction based on 13 factors spanning five different US consumer categories viz. US Spending & DPI, Earnings & Employment, Consumer Confidence & Borrowing, Housing & Mortgages and Cost of Living. The indicator is used to identify directional trends and major inflection points for US Discount Stores and has a correlation of 0.78 since 2008 with a one quarter lead.

BofA GFSI Risk Allocator

The Risk Allocator (RA) can help investors add or reduce exposure to risk assets based on how financial market stress is distributed across asset classes, as measured by the BofA Global Financial Stress Indicator (BofA GFSI™). Note that the GFSI is a broad gauge of risk, hedging demand and investment flows across geographies and asset markets. The RA uses the proportion of GFSI components that are in Bullish, Bearish or Neutral territory to infer a level of conviction when investing in risk assets. From 2005 to 2018, managing global equity beta by varying exposure (from 0 to 200%) using the GFSI's RA would have hypothetically generated 1.6x the Sharpe of global equities and reduced max drawdowns by more than half.

BofA Global EV Battery Value Chain Indicator

The BofA Global EV Battery Value Chain Indicator tracks the trends in the rapidly growing EV value chain sector. The indicator provides visibility into the EV-battery-related revenue growth of 26 major value chain names for the next quarter (correlation of 0.87 since 1Q 2017), with a focus on identifying the turning points. Constructed using 20 industry-specific factors that broadly fall under the categories of car sales, battery demand and supply, raw material prices, and analyst opinions, this directional indicator also has a correlation of 0.74 with the average YoY change in EV battery companies' share prices.

BofA Global Luxury Demand Indicator

The BofA Global Luxury Demand Indicator is a proprietary tool to gauge global luxury demand and constant currency revenue growth of the luxury companies under BofA coverage. It is constructed using the weighted average growth of 51 key data points.

BofA India Activity Indicator

The BofA India Activity Indicator, a comprehensive high-frequency indicator to gauge the growth momentum of the Indian economy and guide our views on RBI policy, includes seven components - real cash demand, real credit flow, traffic, industrial production, capex, auto sales and construction services - weighted by US Conference Board methodology. Our back tested BofA India Activity Indicator maps non-agricultural real GDP growth (old series) over time.

BofA India Loan Growth Indicator

The BofA India Loan Growth Indicator is a proprietary tool that seeks to identify inflection points and directionality in the Indian banking system credit cycle by tracking the aggregate growth in loans for all Scheduled Commercial Banks (SCBs) in India. The indicator has been fitted using a multiple linear regression model using six macroeconomic data inputs spanning interest rates, wage inflation, price inflation, industrial activity and money supply growth. It leads the actual SCB loan growth by eight months with a correlation of 79% since May-1999.

BofA Indicators of US Financial Stress and Conditions

The BofA Indicator of US Financial Stress is a tool for gauging the state of market functioning in the US, while the BofA Indicator of US Financial Conditions tracks the degree of tightness or looseness in US monetary policy. A principle components analysis was performed with 11 financial market variables that capture the monetary policy transmission mechanism effectively – viz. the foreign exchange value of the US dollar, the 30-day change in the US dollar, the US corporate AAA yields less the 10-year US Treasury yield, the US corporate BBB yields less US corporate AAA yields, the US corporate high yield less US corporate BBB yields, the 10-year US Treasury yield less 2-year US Treasury yield, the 10-year US Treasury yield less global government bond yields, a modified TED spread, the 2-year swap spread, the 30-day change in the S&P500 index, and the ratio of volatility of financial stocks to industrial stocks – each with daily observations spanning from 1990 to present. The resulting first principal component reflects financial stress events in the US and is referred to as the BofA Indicator of US Financial Stress, while the second principal component reflects the degree of US monetary policy tightness and is referred to as the BofA Indicator of US Financial Conditions. Values were normalized with a mean of zero and standard deviation of one, with readings above zero indicating periods in which financial stress is higher than normal or financial conditions are tighter than normal compared to the three-decade span of data and vice-versa.

BofA Indicators of US Labor Market Conditions and Momentum

The BofA Indicator of US Labor Market Conditions is a tool for gauging US labor market activity, while the BofA Indicator of US Labor Market Momentum tracks the rate of change of US labor market activity. A principal components analysis was performed with 14 labor market variables on monthly US labor market data starting from January 1994. The resulting primary principal component, which corresponds with level-based indicators of labor market activity such as the U3 unemployment rate and long-term unemployment, is referred to as the BofA Indicator of US Labor Market Conditions, while the secondary principal component, which corresponds with indicators of the rate of change in labor market conditions such as six-month percent changes in private payroll employment and temporary help services employment, is referred to as the BofA Indicator of US Labor Market Momentum. Readings above zero for the Conditions Indicator suggest above-average conditions, while those below zero mark below-average conditions. Similarly, for the Momentum Indicator, readings above zero indicate above-average positive momentum, while those below zero indicate deteriorating labor market conditions. Additionally, the Conditions Indicator typically rises with positive readings of the Momentum Indicator and vice-versa.

BofA Internet Advertising Indicator

The Internet Advertising Indicator is a proprietary macro tool designed to identify inflection points and momentum in US digital advertising revenues. It is an aggregate of six, equally weighted inputs that capture US consumer health and activity, US corporate sentiment, and US/global economic outlook. The indicator has a high correlation to US Internet ad revenue growth published by the Interactive Advertising Bureau (0.81 since 2003), as well as that from Google Properties (0.89 since 2017), Meta (0.81 since 2017), and a basket of stocks under our coverage (0.87 since 2017).



BofA Korean Banks Net Interest Income (NII) Indicator

The BofA Korean Banks Net Interest Income Indicator is a directional tool to identify inflection points in the aggregated YoY NII growth of the Korean banks under our coverage. It is an equal-weighted average of five factors in standardized form, namely, Korea leading composite index growth (YoY), Korea industrial production growth (YoY), Korea retail (household) delinquency rate, Korea credit card delinquency rate, and Korea loan rate changes. On a back-tested basis since 2Q07, it has a correlation of 0.84 with the coverage banks' NII growth (YoY) with a lead of one quarter and a correlation of 0.67 with the KRX Bank Index growth (YoY).

BofA Leading Industrial Real Estate Indicator

The BofA Leading Industrial Real Estate Indicator gauges the demand cycles of industrial real estate over the next 12 months with a focus on identifying the near-term inflection points of demand. It is based on ten variables across four key categories, viz. consumption, trade/supply chains, construction, and jobs, that have a leading relationship with industrial real estate demand. Each variable is equally weighted within each category so that the four categories make up a quarter of the total weighting of our indicator. This directional indicator has strong historical correlations with net absorption (90%), annual net effective rent growth (78%) and REIT SS (same store) NOI (net operating income) growth (85%) since 2007.

Lodging Macro Activity Tracker

Lodging Macro Activity Tracker (LMAT) is a macro tool that can be used to predict the current and near-term RevPAR environment. The LMAT consists of two components, 1) a demand component that is an average of the year-over-year growth of 11 macro factors across the U.S. with high correlations to traditional U.S. Lodging metrics, and 2) a supply component, which tracks expected U.S. hotel room supply growth. The LMAT has a 94% correlation with RevPAR on a 3-month leading basis since 2009.

Macau Macro Activity Tracker

Macau Macro Activity Tracker (MMAT) is intended to provide a gauge of Chinese economic and financial activity and how it may impact Macau gross gaming revenues (GGR). It is an average of the year-over-year growth of 12 data series across China with high correlations to Macau GGR. The MMAT has a ~90% coincident correlation with monthly Macau GGR growth since 2009. A subset of the MMAT leads overall Macau GGR and these leading components are ~90% correlated with Macau GGR growth since 2009 on a 3-month forward basis.

BofA Memory Indicator

The BofA Memory Indicator identifies the current phase of the semiconductor memory cycle by gauging the earnings momentum (YoY growth in revenue and operating profit) of the four key memory companies. This monthly indicator, constructed using seven components (DRAM spot price, DRAM ASP, DRAM billings, NAND spot price, NAND ASP, NAND billings, and Korea semis exports) that fall under three broad categories of data – memory prices, billings, and exports, provides a read ahead of the companies' quarterly earnings results. It has a correlation of 0.93 / 0.78 / 0.75 with these companies' revenues (1Q09-4Q20) / operating profits (1Q10-4Q20) / share-price performance (since 1991).

BofA Petrochemical Sentiment Indicator

The BofA Petrochemical Sentiment Indicator tracks the sentiment on petrochemicals based on Natural Language Processing of all S&P Global Platts' Polymerscan reports (*a leading publication on global plastic and resins including polyethylene, polypropylene, and polyvinyl chloride*) published since October 27, 2004. A smoothed version (12-month

moving average) of the indicator has a correlation above 0.70 with 18 out of 30 stocks under our coverage over the last five years, including 7 with a correlation of 0.80+. A higher reading denotes a more positive sentiment and vice-versa.

CompassAlarm

The indicator seeks to estimate probability of pressures on EM currencies over the upcoming six months based on various macro/market indicators. Pressure is defined as a 2.5 standard deviation move vs historical average. The indicator would have predicted correctly 60% of the pressure episodes over the past 15 years. Moreover, most of the model errors are episodes of no pressures given alarm, with a very tiny fraction of pressure given no alarm.

Corporate Misery Indicator

The Corporate Misery Indicator is our macro-based predictor of the profits cycle and is based on the CPI, Average Hourly Earnings, and the Coincident Indicators. Our theory is that corporate profits are a function of how many units a company sells and their margin per unit. Implicitly, these factors incorporate productivity because enhanced productivity will result in either better margins or more units sold for the same inputs. When the indicator declines, it implies that profits are being squeezed. This has historically coincided with a decelerating profits cycle. Based on its history since 1978, subsequent to the indicator's peaks, EPS growth in the next 12-mth declined in 78% of cases.

EM Flow Trading Rule

The BofA EM Flow Trading Rule is a contrarian indicator. When investor flows into EM funds become overly bullish, EM equities become vulnerable to short-term tactical pull-backs and vice versa. Sell EM equities when inflows into EM equity funds represent more than 1.5% of AUM over four weeks. Buy EM equities when redemptions from EM equity funds are greater than 3.0% of AUM over four weeks.

Emerging Monetary Mood Indicator (EMMI)

The indicator data-mines EM central banks statement to gauge the attitude of monetary authorities, by country and for EM as a whole. EMMI is positively correlated and leads policy rates in most EM.

EMFX Carry Sentiment Indicator

The indicator uses information contained in various positioning and survey data to gauge sentiment on EM carry. Chances of a selloff over subsequent month are an increasing function of "exuberance" as measured by the indicator. When the indicator is at the 80th percentile, chances of a selloff are 60% in the subsequent month.

Euro Area GDP Tracker

This is a nowcasting model that seeks to provide a timely measure of GDP growth in the course of a quarter for the euro area and its main economies. In other words, it attempts to replicate national accounts, but a faster and timelier way. We use this indicator to monitor the risks to our, ECB and consensus forecasts.

Euro Area Procyclical core Inflation

It measures core inflation including only those components that react to the cycle. Procyclical core is a very good leading indicator for core inflation 12 months ahead.

European Composite Macro Indicator

European Composite Macro Indicator quantifies the trend in European economic activity in order to identify the phase of the cycle and act as a timing indicator for style investing in European equities. It consists of six inputs: OECD EU Leading Indicator, German IFO, 12m change in Pan European BY, Producer Price Inflation, Pan European Consensus GDP



Forecasts and Global EPS Revision Ratio. The Style Cycle strategy which marries the phase indicated by European CMI and the styles preferences, gained since its inception in 2004, on the top stocks 99.2% and on the bottom stocks 55.9%.

European Credit Macro Indicator

The European Credit Macro Indicator is an aggregation of selected macroeconomic data. We find that country specific OECD Leading Indicators, PMIs from Germany and the EZ, along with data from the ECB on loan demand and 3m EPS Revision Ratio from Germany best capture trends in credit markets. From these, we construct an indicator that can be used as a tool to determine whether patterns seen in credit land are consistent with the prevailing macroeconomic backdrop and to identify turning points in macroeconomic trends. Our work highlights that a negative reading of our Indicator tended to be associated with positive excess returns and tighter spreads over the next 12 months; both in IG and HY credit.

European Momentum Conviction Indicator

The BofA European Momentum Conviction Indicator is a tactical indicator that helps in dynamic Momentum allocation by significantly reducing skewness risk and identifying potential momentum crashes of 10% or more. It aims to identify episodes where volatility of a cross-sectional approach to Momentum investing is too high to support consistent returns or when trends might break. The indicator is constructed using three sets of inputs: Momentum Volatility Risk, Implied Volatility for Equities, and Trend Reversal Risk, which are combined using an equal-weighted scheme and scaled from 0-100 to arrive at the final indicator, with values close to 100 denoting a bull signal or those close to 0 denoting a bear signal for Momentum style investing.

Flight Signals

BofA Flight Signals is intended to be an indicator of how domestic PRASM could trend over a 6 month horizon. Key inputs into the indicator include airline bookings data, domestic US capacity, fuel prices, BAC credit and debit card spend on Airlines and macro data. The primary analytics method used is called principal component analysis, and our indicator has a historical correlation of 0.73 with domestic PRASM and directionality hit rate of 70% since 4Q06.

Fluid Power Distributor Indicator

The Global Fluid Power Distributor Indicator is based on a survey of 50 industrial distributors from North America, EMEA, and Asia Pacific focusing on fluid power (hydraulics and pneumatics). The indicator tries to gauge sentiment through demand trends, pricing, and inventory levels. An indicator value greater than 50 marks improving sentiment, while below 50 marks deteriorating sentiment. To calculate the indicator value, we assign a value of +1 to responses of “better” demand, “too low” inventory levels, and “improving” pricing. “Same”, “normal”, and “flat” are assigned a value of 0, and “worse”, “too high”, and “declining” are assigned -1. We divide the sum of these values by the number of survey respondents, multiply by 50, and add 50 to get a value relative to our 50.0 baseline.

Global Breadth Rule

The BofA Global Breadth Rule is a contrarian indicator of equity market breadth. When an overwhelming majority of equity markets around the world become oversold, we turn bullish as equities tend to trough and rebound on the back of overdone pessimism. Buy global equities when a net 88% of markets in the MSCI All Country World Index are trading below both their 200-day moving average and 50-day moving average. Sell global equities when a net 88% of markets in the MSCI All Country World Index are trading above both their 200-day moving average and 50-day moving average.

Global EPS Growth Model

The BofA Global EPS Growth Model is composed of Asian export growth, global PMI, US Treasury yield curve & Chinese financial conditions and predicts the year-on-year change in 12-month forward IBES consensus EPS for MSCI ACWI.

Global Flow Trading Rule

The BofA Global Flow Trading Rule combines cross-asset flows with a validating filter for macro conditions to generate buy & sell signals for global equities. When flows into global equity & HY bond funds become overly bullish especially against a backdrop of weaker PMI, risk assets become vulnerable to short-term tactical pullbacks and vice versa. Sell global equities when average inflows to global equity funds and global HY bond funds exceed 1.0% of AUM over four weeks and ISM is trending lower. Buy global equities when average redemptions from global equity funds and global HY bond funds exceed 1.0% of AUM over four weeks and ISM is trending higher.

Global FMS Cash Indicator

The BofA Global FMS Cash Rule is a contrarian trading signal designed to take advantage of the predictive value of FMS cash balance data for future equity returns. Buy equities when the FMS average cash balance rises to 4.5% or higher. Sell equities when the FMS average cash balance falls to 3.5% or lower.

Global News Pulse

The Global News Pulse tries to quantify whether significant news globally is trending positively or negatively. The Global News Pulse has had a 79% correlation with the MSCI All Country World Index (ACWI) over the last 15 years, according to our backtesting.

Global Risk-Love Indicator

Risk-Love is a contrary investor sentiment indicator. It tries to quantify investor emotions and help us understand swings in investor psychology. When at extremes, the indicator is valuable in anticipating reversals in investor mindset, and thus markets, going forward. We have constructed Risk-Love indicator for major Asian/emerging markets as well as for the world as a whole. We include data on positioning, investor surveys, volatility, spreads, correlations, hedging and market technicals measures. The Global Risk-Love indicator has 35 factors. Buy when it is low and sell when it is extremely high. Since 1988, median 12m forward returns for emerging markets equities were 15% (in US dollar terms) when the EM Risk-Love Indicator was in panic.

Global Wave

Global Wave quantifies global trends in economic activity in order to predict equity market performance and rotation within equities. The Global Wave consists of seven indices including Global Industrial Confidence, Global Consumer Confidence, Global Capacity Utilisation, Global Unemployment, Global Producer Prices, Global Credit Spreads, and Global Earnings Revision Ratio. Since 1988, the MSCI ACWI has returned 14.4% post troughs in the Global Wave, and -1.2% post peaks in the Global Wave, on average.

Industrial Momentum Indicator

It is a tool for identifying major inflection points for Industrials spanning the US, European, and Japanese Machinery, Transportation, Multi-Industry, and Aerospace & Defense sectors. It is based on BofA's Truckload Diffusion Indicator, Global Fund Manager Survey, and the copper price.



Japan Factory Automation Indicator

The indicator is an aggregation of nine components (five macro and four industry-specific) that drive the factory automation cycle. It has a 0.92 correlation since 2008 with the Japan machine tool orders data series on a 3 month forward basis. The indicator leads YoY (%) growth in sector revenue and operating profit by two quarters with a 0.9 correlation since June 2007.

Liquidity Premium Tracker

Liquidity Premium Tracker combines the 10year treasury yields (US, EU, and Japan), the 10year-2year US treasury yield curve, high yield fund flows, and single A-rated investment grade (IG) spreads to track the US high yield liquidity premium.

Machine-learning Based Cycle Indicator

The business cycle indicator takes a big-data approach, classifying the US cycle into three phases that correspond to economic booms, soft patches and recessions. It is derived by running a machine-learning algorithm on over 55 years of monthly data covering 124 economic and financial variables. Since November 1962, the correlation between the machine-learning recession indicator and the official NBER indicator has been 82%.

Managed Care Utilization

The monthly Managed Care Utilization Tracker measures utilization through a proprietary hospital volume surveys and industry data.

NORBI Mood Indicator

NORBI, an acronym which stands for NORges Bank mood Indicator, gauges the hawkishness of the monetary policy assessments of Norges Bank by applying Natural Language Processing techniques. It quantifies the hawkish 'sentiment' in the statements accompanying a monetary policy decision (akin to press releases) with score between 0 and 1 that represents the fraction of sentences that our algorithm determines are 'hawkish'. Post the Global Financial Crisis, the YoY change in NORBI exhibits peak correlation of 0.68 with the YoY change in the policy rate and 0.74 with the YoY change in the 1-year swap with a 7-period lead.

RENO Barometer

The BofA RENO barometer is a proprietary indicator meant to gauge the outlook for consumer spending at home improvement stores. Inputs for the barometer include: Real-time spending metrics, such as aggregated BAC credit and debit card data; Economic drivers, such as residential investment; National household financial health, such as home prices; and Opinions on housing, such as consumer confidence. The BofA RENO barometer is comprised of 14 factors, which in aggregate had an 85% historical correlation with the average same-store sales growth of major US home improvement companies from February 2009 to September 2018, according to our backtested analysis.

Riksheard Mood Indicator

Riksheard applies Natural Language Processing techniques to Riksbank policy meeting minutes to assess the hawkishness of the Riksbank Monetary Policy Committee that tends to have a bearing into the potential future path of the Swedish policy interest rate. It quantifies the hawkish 'sentiment' in the statements with score between 0 and 1 that represents the fraction of sentences that our algorithm determines are 'hawkish'. Riksheard leads the policy interest rate by 2-months with a peak correlation of 0.47 pre-2008 and 0.54 post-2010.

S&P500 Energy Sector Directional Forecast

S&P500 Energy Sector Directional Forecast tracks the monthly performance of the S&P500TR Energy sector index relative to the S&P500 TR broad market index using the same set of 10 fundamental and 9 macro/financial variables as used in the WTI Crude Oil Directional Forecast Indicator. We employ a number of linear and non-linear forecasting techniques: predictive regression approaches using fixed, dynamic as well as no correlation filters, Principal Component Regression (PCR), Partial Least Squares (PLS), regularized regressions (Lasso and Ridge), decision tree frameworks (random forest and gradient boost). On their own, the best performing models based on the last 12 monthly forecasts were Random Forest, Lasso and PCR with hit rates of 75% and higher - decision tree frameworks were found to be better at capturing turning points in energy sector outperformance, but regularized regressions performed better over the full sample period. Given their unique set of benefits and varying relative accuracies over time, we average out the forecasts across all models to arrive at our aggregate signal.

Sell Side Indicator

The Sell Side Indicator is based on the average recommended equity allocation of Wall Street strategists as of the last business day of each month. We have found that Wall Street's consensus equity allocation has been a reliable contrary indicator. In other words, it has historically been a bullish signal when Wall Street was extremely bearish, and vice versa. The Sell Side Indicator has had stronger predictive power (R-square: 26%) over 12-month S&P 500 returns than many other popular market timing models like the Fed Model, valuation frameworks, money growth, etc.

Testing Growth Indicator

The Testing Growth Indicator for each testing, inspection & certification (TIC) company is a tool to gauge organic revenue growth rates and trends in the next six months, based on global macro indicators.

Truckload Diffusion Indicator

The Truckload Diffusion Indicator is a result of a survey of nearly 1,000 truck shippers. It is a sentiment indicator, with the Indicator focused on shippers outlook for demand for the next 0-3 months (with the other questions focused on truck pricing, supply, and shipper's inventory levels). We look to discern the trends in the Transportation sector, given trucking represents two-thirds of all tonnage moved in the US and more than 80% of all revenue spent on transportation.

UK Consumer Confidence Indicator

An online survey of around 4000-5000 consumers a month. Six questions are repeated each month, allowing us to produce a consumer confidence indicator and wage growth indicators. We rotate other questions depending on the issues in focus.

UK GDP Tracker

Uses soft and hard data to 'nowcast' UK GDP growth.

US Composite Recession Indicator

The composite recession indicator is a weighted average of multiple univariate recession probit models based on an array of both financial and economic data. It consolidates these signals to gauge the risk of a downturn in the US economy. We find that it increases ahead of recessions and think it has value when that increase is sustained. Since 1975, we find that the indicator rises and remains above a reading of 30% an average of 12 months prior to a recession.

US GDP Tracker

The US GDP tracker is a nowcasting model that monitors quarterly US real GDP growth in real time using the higher frequency monthly US economic data. The US GDP tracker utilizes a bottoms-up framework that mimics the Bureau of



Economic Analysis's (BEA) methodology, with GDP components estimated using source data generally from government agencies like the Census Bureau and Bureau of Labor Statistics. Since 2012, the average absolute forecast error for the advance estimate of GDP is 0.5% qoq saar.

US High Yield Default Rate Indicator

The US High Yield Default Rate Indicator attempts to estimate the next-12-month value of Moody's US high yield issuer weighted default rate, which is defined as the number of companies defaulting over a given 12mo time horizon divided by the total number of issuers rated HY by this agency. The indicator consists of four factors - Fed lending survey, issuers with plunging bonds, the degree of dispersion, and low quality issuance. The indicator explains 87% of the variation in the next-12mo issuer-weighted HY default rates.

US Regime Indicator

We aggregate top-down variables that capture earnings and economic growth expectations, inflation, credit conditions and other variables, to yield the following four signals on the business cycle: Early Cycle – below-average but improving trends in macro indicators, Mid Cycle – above-average and improving trends in macro indicators, Late Cycle – above-average but deteriorating trends in macro indicators, and Recession – below-average and deteriorating trends in macro indicators. Based on its history since 1990, the indicator tends to identify outperforming investment styles with 75% to 100% success rate.

WTI Crude Oil Directional Forecast

WTI Crude Oil Directional Forecast uses a dynamic signal-based approach to forecast WTI crude oil returns. We combine 10 fundamental and 9 macro/financial variables to project weekly crude returns using a number of linear and non-linear forecasting techniques: a fixed-threshold correlation filter with a predictive regression approach, a dynamic-threshold correlation filter with a predictive regression approach, Principal Component Analysis (PCA), Partial Least Squares (PLS), regularized regressions (Lasso and Ridge), and decision tree frameworks (random forest and gradient boost). Although the most accurate predictions are derived from the OLS model with a static correlation filter (hit rate of 0.55 over the last 10 years coupled with rolling 1-y hit rates in excess of 0.5 throughout most of the out of sample period), we aggregate the outputs of all the models to arrive at our final forecast.

Disclosures

Important Disclosures

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster ^{R1}
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

^{R1} Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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