BofA GPS: Global Proprietary Signals

The unbearable heaviness of higher rates

20 October 2023

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.

When the facts change

While some of the concerns that led to the summer pullback are dissipating, we see an accumulation of other risks. A shake-up of rates not seen in decades including a push-out of the easing cycle, a fade of the tailwinds of disinflation and anemic growth outlook outside the US. Not to forget, the overhang of the quantitative tightening. As the negative impulse of these factors result in a breakdown of market breadth, we find it prudent to shift to a defensive stance.

Bulls meet bears

Coming into the seasonally weak August-September period, investor sentiment was confident, with global equity markets having recouped more than 75% of losses from 2021-22. But the summer pullback has drained much of the froth, making the asset class much more palatable. Global Equity Risk-Love, our contrarian sentiment indicator for equities, has slid to the 33rd percentile of history from the 81st percentile in July, as investors grapple with the ramifications of a higher-for-longer interest rate regime. Retail sentiment, in particular, was running exceptionally high at the 98th percentile of its 36-year history but has since ebbed (30th percentile). The Bull & Bear Indicator (1.9), a cross-asset barometer of risk, dropped to a 5-month low on poor equity breadth, and outflows from EM debt, HY bonds and global equity funds.

Poor seasonality was the other concern in terms of market performance. In fact, the last 10 days of September mark the worst 10-day period of the year (average S&P 500 return of -1.1% at a hit rate of 40%). The good news is that these headwinds turn into tailwinds, stepping into the final quarter, with an average rise of 4.5% at a hit rate of 80% in global equities since 1987.

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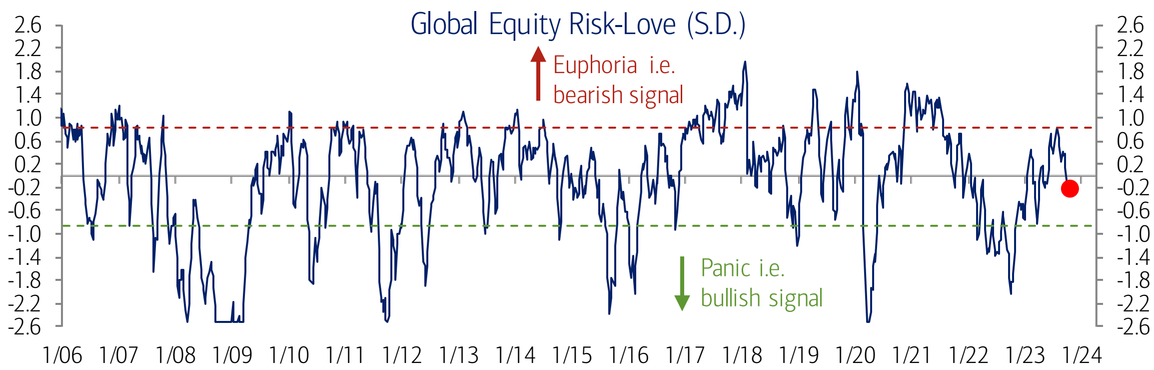
Exhibit 1: Investor sentiment: the pre-summer froth has mostly been ingested but not enough to be a contrarian
Global Risk-Love has slid to the 33rd percentile of history, as investors take stock of higher-for-longer rates outlook



Source: BofA Predictive Analytics

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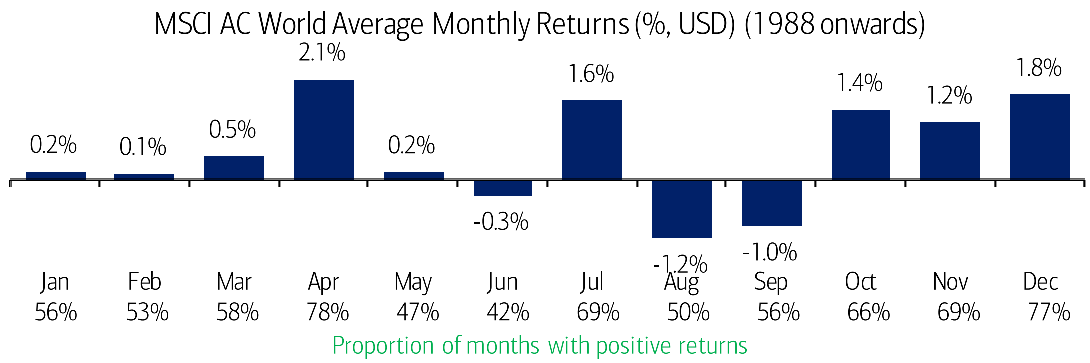
Exhibit 2: Stepping into the final quarter, seasonality headwinds turn into tailwinds
Seasonality Trends in MSCI AC World Index (1988 onwards)



Source: BofA Predictive Analytics, MSCI, FactSet

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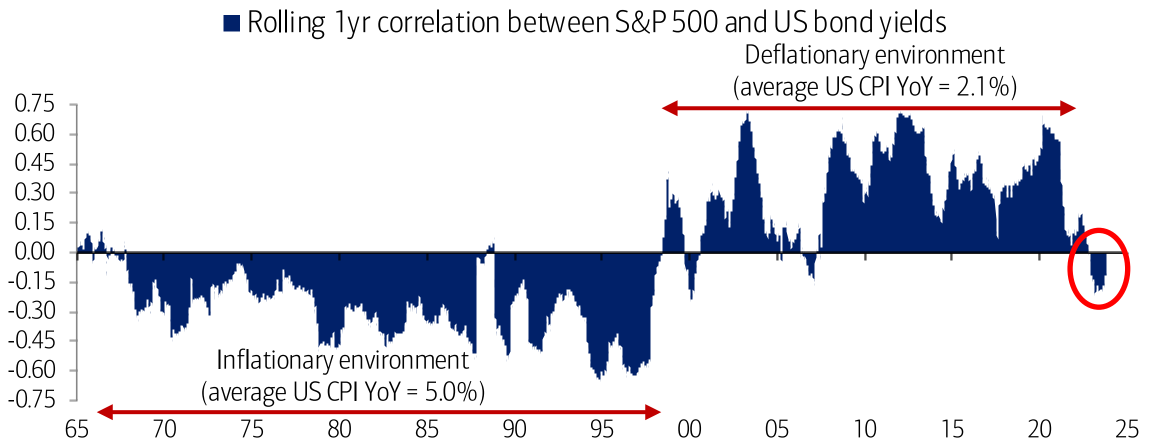
Are restrictive rates the new regime?

While sentiment and seasonality made the setup vulnerable, the primary trigger behind the correction, in our view, was the unanticipated surge in bond yields since the widening of the 10-year bond yield target band by the Bank of Japan in July. Why? Because the stock-bond relation is a function of the operating environment.

Since 1998, equity markets have risen with bond yields on perceptions of stronger growth momentum. It was a disinflationary setup, with the US CPI averaging 2% YoY, thanks to globalization, China's entry into the WTO, the arrival of Amazon, and fewer unions, among other things. But the return of inflation in 2021 has broken this two-decade old relationship: the correlation reversed in the past year, presaging tough times ahead for equities if bond yields climb higher.

Exhibit 3: Back to inflationary settings: tough times ahead for equities if bond yields keep climbing higher
Rolling 1yr correlation between S&P 500 and US bond yields



Source: BofA Predictive Analytics, Bloomberg. Notes: Based on daily returns

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A logical follow-up question would be: how did equities rally so hard in the first seven months of the year (S&P500: 19% till July) given that the 10-year rate has trended up from 3.9% at the start of the year to 5.0% today. This calls for closer scrutiny. As we all know, financial markets are, in general, averse to uncertainty, because it clouds the ability of market participants to price securities properly. Accordingly, the collapse in bond volatility allowed stocks to prosper till July, as investors took comfort in the resilience of the economy to absorb a higher cost of capital. But a combination of higher yields and rising bond volatility is a no go, which is why the resurgence in bond volatility in September keeps us on alert.

Exhibit 4: Keep a close tab on bond volatility to see if it is rising: higher bond yields plus higher volatility is a no go
Bond volatility: ICE BofA MOVE Index

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

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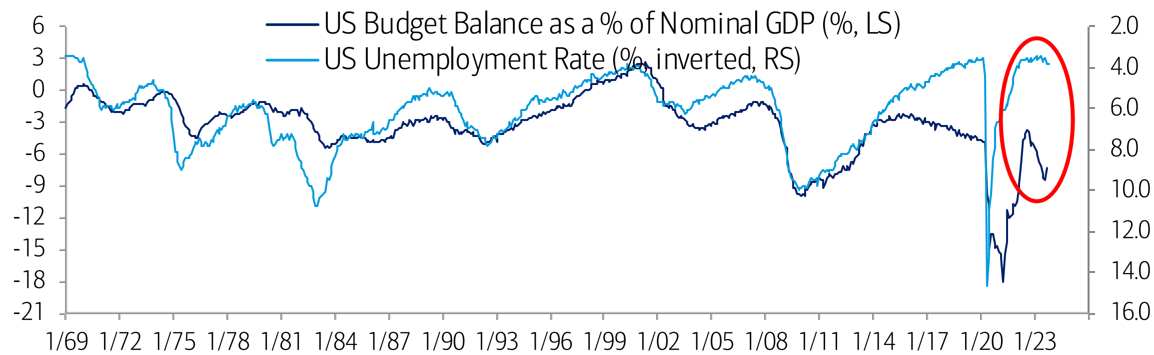
Which brings us to the original question: Are rates still a hurdle? Our rates strategists believe that while the rise in 10-year rates will be slower in the range of 4.75-5% or above, the capacity for a sharp fall is limited without economic deterioration. Lest we forget, one of the factors contributing to the rapid rise in rates is the daunting supply-demand imbalance on account of the recession-like fiscal easing in the US. Given that fiscal policy is unlikely to materially change in the near or medium term, the supply of treasuries is expected to remain elevated, constraining the potential for significant downside moves.

Exhibit 5: The US fiscal policy is uncharacteristically easy considering record low unemployment rates
Recession-like fiscal easing in the US



Source: BofA Predictive Analytics, Bloomberg

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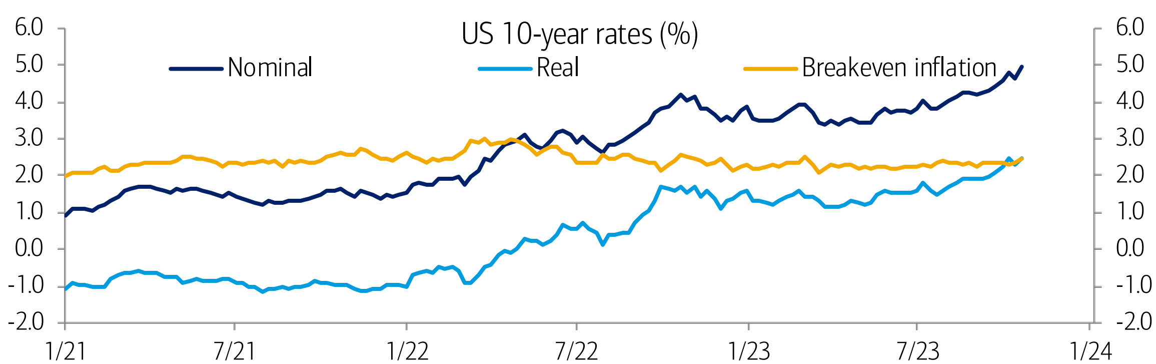
Sticky but lower

Outsized inflation surprises are a story of the past now; market moves in recent months have, instead, been dictated by real components. However, by no means are we out of the woods: the Atlanta Fed sticky CPI is still lurking above 5%, and our house-view expects only a glacial decline in core inflation (our economists project a fall from 4.1% today to 3.0% by December 2024).

Exhibit 6: A 'real' problem: market moves in recent months have been dictated by real components
What's driving the nominal interest rate in the US?



Source: BofA Predictive Analytics, Bloomberg

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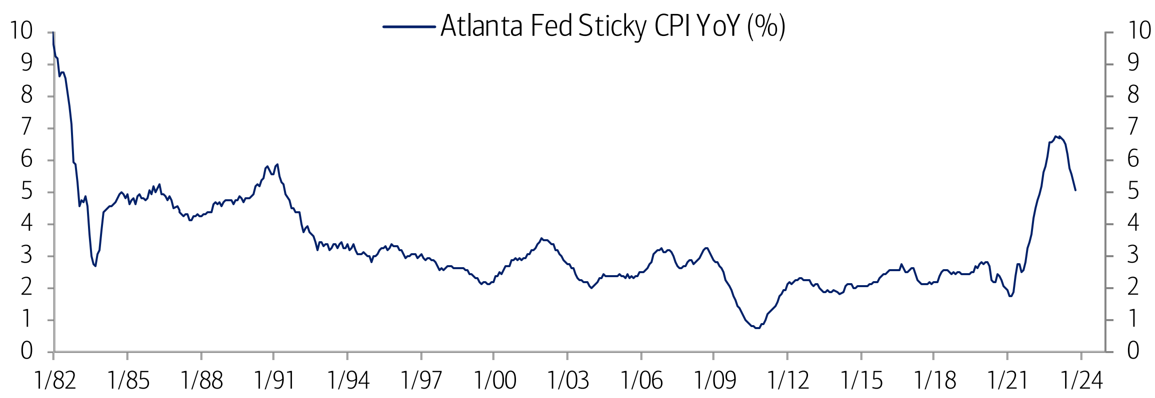
Exhibit 7: There is still more wood to chop: the path ahead is long, and unlikely to be a smooth sail
Atlanta Fed Sticky CPI YoY



Source: BofA Predictive Analytics, FRB Atlanta, Bloomberg

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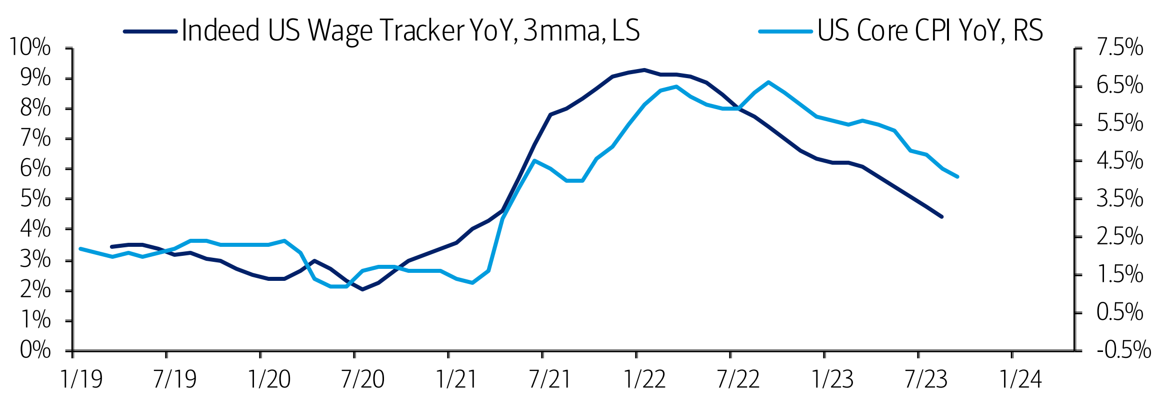
On a positive note, core CPI ex-shelter is already at the threshold of 2.0% (the first time since March 2021), although primarily driven by broad-based goods deflation as core services ex-shelter continues to be sticky (see note). The latter may be a reflection of labor market strength, but a moderation is in the works. Advertised wages have decelerated considerably not just in the US, but also in Europe, per the Indeed Wage Tracker, presaging a cool-off in wage inflation.

Exhibit 8: Deceleration in advertised wages, as informed by the Indeed Wage Tracker, presage a cool-off in wage inflation
Wage growth: labor market rebalance in action



Source: BofA Predictive Analytics, Indeed, Bloomberg

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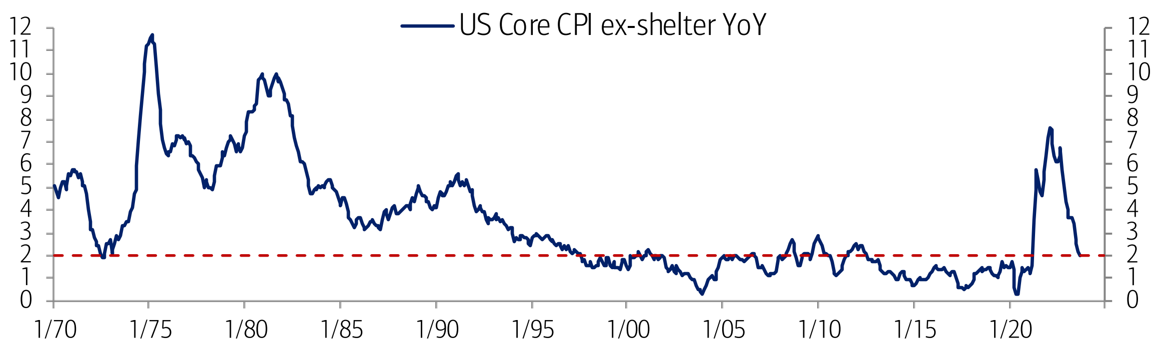
Exhibit 9: Core CPI ex-shelter touched the threshold of 2.0% in September for the first time since March 2021
US core CPI ex-shelter YoY (45% weight in headline CPI)



Source: BofA Predictive Analytics, BLS, Haver

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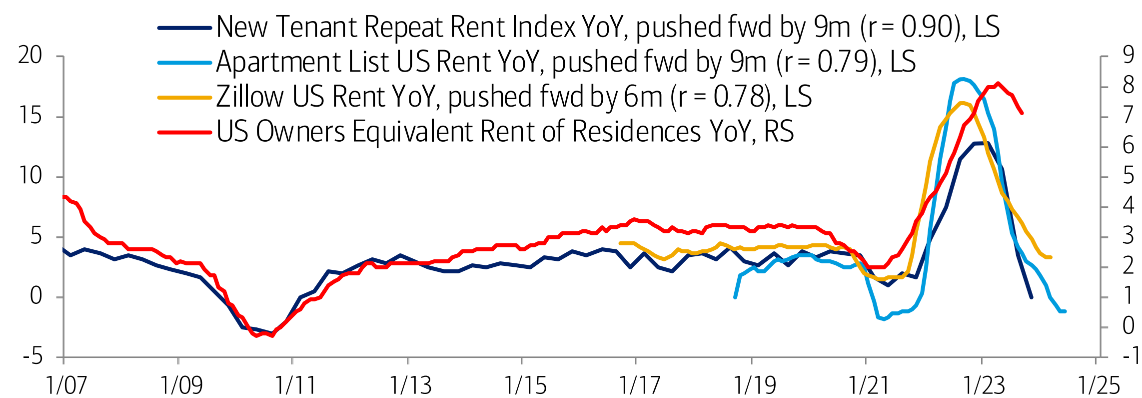
On the other hand, shelter CPI sprung a surprise in September. While we remain of the view that the odds are in favor of further disinflation, as informed by Apartment List, Zillow and the Cleveland Fed, the path ahead is long, and unlikely to be a smooth sail. Commodity prices have also reversed some of the prior gains, easing the upside pressure on headline inflation, but tensions in the Middle East risk a flare up.

Exhibit 10: Despite the September surprise, we think that moderating asking rents call for a cool-off in shelter inflation
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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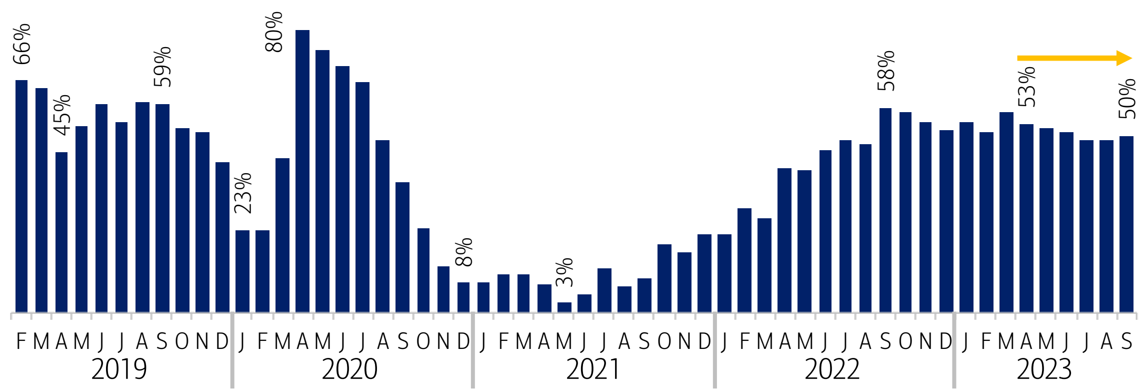
A non-recessionary, asynchronized slowdown

An overwhelming consensus has rebuffed hard landing concerns but the outlook for the global economy is still tepid at best. Net 50% of Global Fund Manager Survey participants expect global growth to weaken in the next 12 months. Our proprietary growth indicators also convey a *below-trend* outlook, with 50% *Bearish* signals now. Worth noticing, while the breadth of the slowdown is quite pervasive, the magnitude, so far, is not pronounced.

Exhibit 11: A below-trend outlook for global growth: 50% Bearish signals
Proportion of growth indicators providing 'Bearish' signal



Source: BofA Predictive Analytics. Note: Based on 50 growth indicators as of today.

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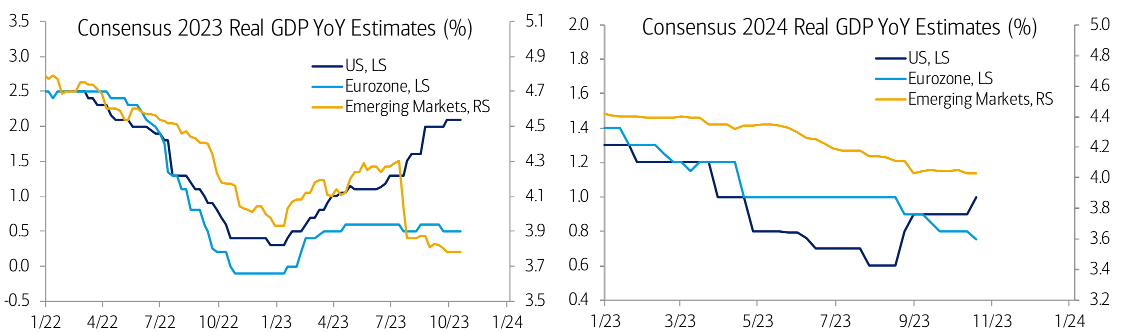
The Global Wave, which quantifies trends in global economic activity, improved for the second month in a row on positive contributions from five of its seven components, namely industrial confidence, consumer confidence, unemployment, producer prices and credit spreads. Yet, the improvement was not enough to generate a trough, keeping the signal negative for the twenty-third month, the longest on record. The Industrial Momentum Indicator, which predicts the manufacturing economy, paused following three months of gains, failing to 'break out' of its recent range with no strong sense of direction.

Exhibit 12: An asynchronous slowdown in store
Consensus 2023-24 GDP growth estimates for the US, Europe, and Emerging Markets



Source: BofA Predictive Analytics, Bloomberg. Notes: Based on Bloomberg consensus.

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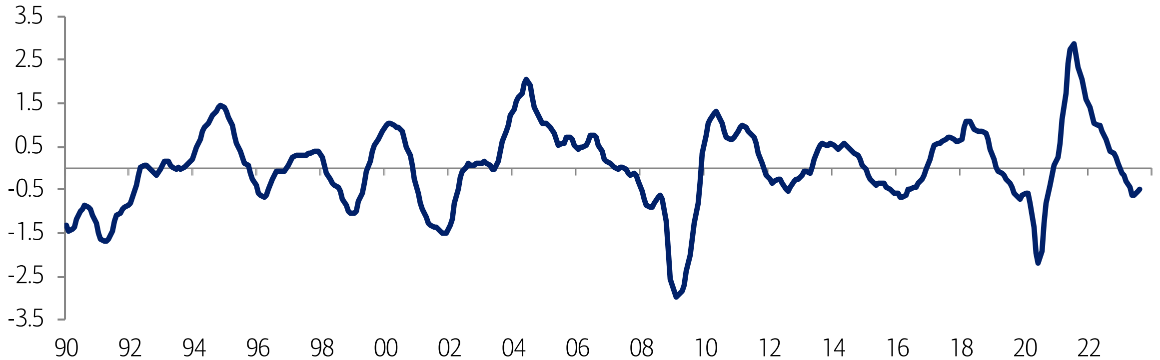
Our house-view also is that a mild global slowdown with less synchronized growth dynamics is in store. Anemic growth is the base case for Europe, as ratified by the European Composite Macro Indicator, which stays put in the *Recession* phase. The energy shock and the policy tightening are driving a protracted slowdown with almost no quarterly growth until the spring of 2024, with exposure to China creating yet another axis of weakness for the region. Indeed, the second largest economy in the world has underwhelmed one and all with one weak print after another. The bi-monthly BofA China Consumer Survey senses further potential moderation in sentiment post the Golden Week holiday as income remain subdued. And while the worst may be behind us, a comprehensive plan to restore confidence remains elusive as yet.

The US economy, on the other hand, has been exceptionally strong, prompting an upshift in the consensus 2023 GDP growth expectations from 0.3% at the start of the year to 2.1% now. The resilience is apparent in our indicators too. The US Regime Indicator stepped into the *Recovery* phase after six months in *Downturn*, on the back of improvements in five out of eight inputs. The Internet Advertising Indicator stayed on course on an uptrend, suggesting an improved demand outlook for digital ad spend. Yet, despite the unanticipated strength, a slowdown is almost inevitable. Excess savings have been depleted at the same time as the rapid tightening of financial conditions, suppressing both consumption and investment.

Exhibit 13: The US Regime Indicator stepped into the *Recovery* phase after six months in *Downturn*
US Regime indicator (January 1990 – August 2023)



Source: BofA US Equity & Quant Strategy, Refinitiv, BLS, Federal Reserve, ICE Data Indices, LLC, ISM. Notes: Phase 1 – Early Cycle; Phase 2 – Mid Cycle; Phase 3 – Late Cycle; Phase 4 – Recession

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Drudging along

The outlook for global earnings is stuck at boring mid-single digit growth through the course of the next 12 months, with a similar regional dispersion as the GDP estimates. Analysts have been raising their 2023 EPS growth estimates for the US in recent weeks, while chipping those away for Europe and Emerging Markets.

1. Corporate guidance in the US is still running high, with the *proportion of above-consensus issuances* (a volatile series) implying an outsized world EPS growth of 20% in the next 12 months.
2. *Financial conditions in China*, as gauged by the China Financial Conditions Indicator, project similarly optimistic profit growth of 17% in the year ahead. In the event of a more coordinated and concentrated policy easing, the projections could get even rosier.
3. The *3-month global earnings revisions ratio* is hovering near the long-term average levels, estimating world EPS to grow 6% in the next 12 months.
4. *Shrinking exports from the major Asian trading nations* (Japan, Korea, Singapore, and Taiwan) project the next 12-month EPS growth at -3%.

5. *Global manufacturing PMI* is just below-par (49.1) implying -2% world EPS growth in the next 12 months.

6. So is *global manufacturing PMI new orders*, projecting the next 12-month world EPS growth at -5%.

Exhibit 14: Leading indicators (aggregate) anticipate global earnings to grow 4% YoY 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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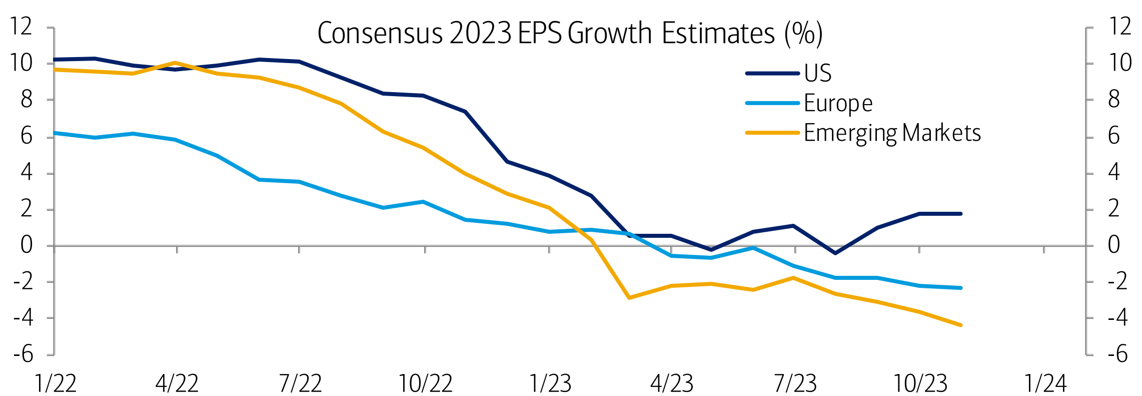
Exhibit 15: Regional dispersion on display for EPS estimates as well
Consensus 2023 EPS growth estimates for the US, Europe, and Emerging Markets



Source: BofA Predictive Analytics, IBES, FactSet, Refinitiv. Notes: Based on IBES consensus.

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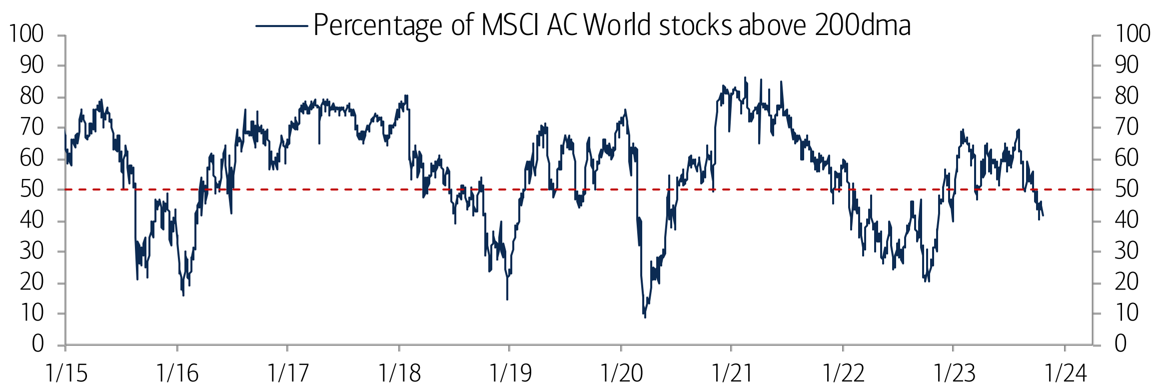
Bottom line. More often than not, subdued sentiment against the backdrop of a resilient US economy and favorable seasonality make for a strongly bullish stance. Not today. The positive impulse has been enfeebled by striking developments in the bond market not seen in decades, as well as a breakdown in market technicals. The breadth of global stocks at new 52-week lows surged to a YTD high of 10% on October 3 alongside three 80% down days for the NYSE recently (September 21 | September 26 | October 2). The proportion of global stocks trading above 200-day moving averages slipped below 50, while prior supports in the S&P 500 have now been transformed into resistances. In addition, quantitative tightening may have taken a backseat in the current scheme of things, but it is still very much in vogue, adding to risks for assets. Adding the fading winds of disinflation and the shake-up in rates to the mix makes us reorient to a defensive stance.

Investors could be presented with a tactical buying opportunity should sentiment crater to washed out levels, but we are not there now. Watch this space.

Exhibit 16: The summer pullback has all but broken the market technicals
Breadth of global stocks trading above 200-day moving average: now below 50



Source: BofA Predictive Analytics, MSCI, Bloomberg

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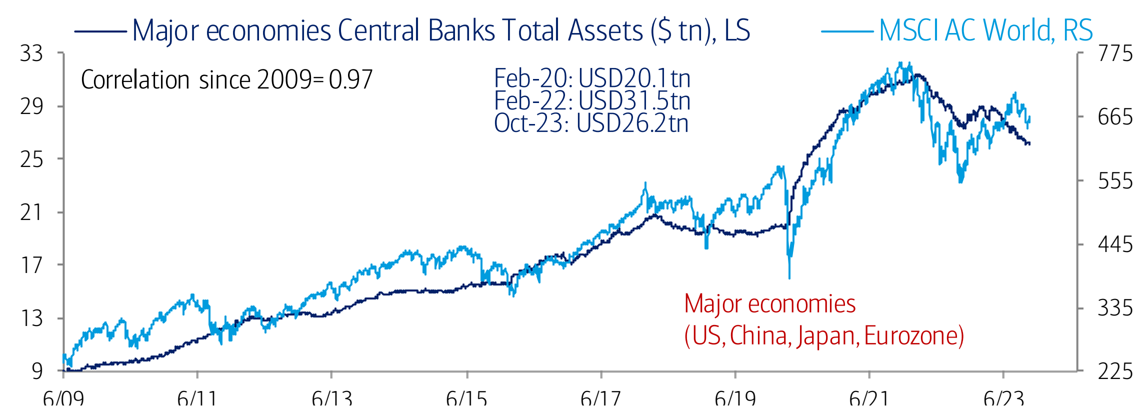
Exhibit 17: Quantitative tightening may have taken a backseat in recent months, but is still very much in vogue
Unsupportive policy: major economies central banks' balance sheet



Source: BofA Predictive Analytics, MSCI, 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: The weight of the evidence 14 September 2023
BofA GPS: Global Proprietary Signals: After the rally 04 August 2023
BofA GPS: Global Proprietary Signals: Small steps pointed in the right direction 10 July 2023

Exhibit 18: 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	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23
	Global													
1	Global Wave (M) - *N. Tupper*	Global Equities	X	X	X	X	X	X	X	X	X	X	X	X
2	Global EPS Growth Model (W) - *M. Hartnett*	Global EPS Growth	✓	⇔	⇔	X	X	X	X	X	X	X	X	X
3	WTI Crude Oil Directional Forecast (M) - *F. Blanch*	WTI Crude Oil	X	✓	✓	X	X	✓	✓	X	✓	X	✓	X
4	GFSI Risk Allocator (W) - *B. Bowler*	Cross-Market Gauge of Risk	X	X	X	X	⇔	X	X	X	⇔	⇔	⇔	X
5	Global Risk-Love Indicator (M) - *R. Samadhiya*	Global Equities	✓	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
6	Global Breadth Rule (W) - *M. Hartnett*	Global Equities	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
7	EM Flow Trading Rule (W) - *M. Hartnett*	Emerging Markets Equities	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
8	EMFX Carry Sentiment Indicator (Q) - *D. Hauner*	Emerging Markets Currencies	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
9	CompassAlarm (Q) - *D. Hauner*	Emerging Markets Currencies	✓	✓	✓	✓	✓	✓	✓	⇔	⇔	⇔	X	⇔
10	BofA Bull & Bear Indicator (W) - *M. Hartnett*	Global Cross-Asset Risk	✓	✓	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	✓
11	Global FMS Cash Indicator (M) - *M. Hartnett*	Global Equities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	⇔	✓
12	Global Flow Trading Rule (W) - *M. Hartnett*	Global Equities	X	X	✓	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	✓
13	Global News Pulse (M) - *N. Tupper*	Global Equities	X	X	X	X	X	✓	✓	✓	✓	✓	✓	✓
14	Emerging Monetary Mood Indicator (Q) - *D. Hauner*	EM Central Banks Policy Stance	X	X	X	X	X	X	X	X	X	X	⇔	✓

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

26	[US GDP Tracker]() (W) - *M. Gapen*	US GDP	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	✓	✓	✓
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		Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23
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. Wood*	UK GDP	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
32	UK Consumer Confidence Indicator (M) - *R. Wood*	UK Consumer Spending	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
33	Bank of England Mood Indicator (M) - *R. Wood*	Bank of England Policy Rate	✓	✓	✓	✓	✗	⇔	⇔	✓	✓	✓	✓	⇔
34	European Credit Macro Indicator (M) - *I. Angelakis*	European Credit Spreads	✗	✗	⇔	⇔	⇔	✓	✓	✓	✓	✓	⇔	⇔
35	Euro Area Procyclical Core Inflation (M) - *R. Segura-Cayuela*	Euro Area Inflation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
36	European Momentum Conviction Indicator (M) - *P. Strzelinska*	Momentum Style	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
37	NORBI Mood Indicator (M) - *M. Rousakis*	Norges Bank Policy Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
38	RIksheard Mood Indicator (M) - *M. Rousakis*	Riksbank Policy Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	Asia Pac		Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23
39	AU Household Consumption Tracker (Q) - *M. Fuchila*	Australia Household Consumption												✗
40	Asia ex-Japan Risk-Love Indicator (M) - *R. Samadhiya*	Asian Equities	✓	✓	✓	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
41	BofA China Investment Compass (Q) - *W. Wu*	China Business Cycle	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
42	BofA China ACT (M) - *H. Qiao*	China Economic Cycle	✗	✗	✗	✓	✓	⇔	✓	✓	✓	⇔	⇔	⇔
43	BofA China FCI (M) - *H. Qiao*	Liquidity in China	✓	✓	✓	⇔	⇔	⇔	✓	✓	✓	⇔	⇔	⇔
44	BofA China A-share Wax & Wane Indicator (W) - *W. Wu*	China A-share Equities	✓	✓	✓	✓	✓	✓	⇔	✓	✓	✓	✓	✓
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 19: 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		**Oct-22**	**Nov-22**	**Dec-22**	**Jan-23**	**Feb-23**	**Mar-23**	**Apr-23**	**May-23**	**Jun-23**	**Jul-23**	**Aug-23**	**Sep-23**
46 BofA Petrochemical Sentiment Indicator (M) - *S. Byrne*	Global Petrochemical Sentiment	X	X	X	X	X	X	X	X	X	X	X	X
47 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
48 Fluid Power Distributor Indicator (B) - *A. Obin*	Global Fluid Power Outlook	✓	⇔	⇔	⇔	✓	✓	✓	⇔	⇔	X	X	X
49 Health Care Labor Tracker (M) - *K. Fischbeck*	US Health Care Earnings Outlook						X	X	X	X	X	X	X
50 S&P500 Energy Sector Directional Forecast (M) - *F. Blanch*	US Energy Sector Relative Price	X	✓	✓	✓	X	✓	✓	X	✓	✓	✓	X
51 Flight Signals (Q) - *A. Didora*	US Domestic Airline Unit Revenue	✓	✓	✓	✓	⇔	⇔	⇔	X	X	X	X	X
52 BofA Apple Indicator (Q) - *W. Mohan*	Apple's Revenue Growth	X	X	X	X	X	X	X	X	X	X	X	X
53 BofA Global Luxury Demand Indicator (M) - *A. Wallace*	Global Luxury Companies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	⇔
54 Industrial Momentum Indicator (M) - *M. Feniger*	Global Industrial Activity	X	⇔	✓	✓	✓	✓	⇔	X	⇔	⇔	⇔	⇔
55 Truckload Diffusion Indicator (B) - *K. Hoexter*	US Trucking Freight Outlook	X	X	X	⇔	X	X	X	X	X	⇔	⇔	⇔
56 Industrial Real Estate Indicator (M) - *C. Bonnel*	US Industrial Real Estate Demand					⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
57 RENO Barometer (M) - *E. Suzuki*	US Home Improvement Spend	⇔	⇔	⇔	X	X	X	X	⇔	⇔	⇔	⇔	⇔
58 Internet Advertising Indicator (M) - *J.Post*	US Digital Advertising Revenue								⇔	⇔	✓	✓	✓
59 Managed Care Utilization (M) - *K. Fischbeck*	US Managed Care Earnings	✓	✓	✓	✓	✓	✓	⇔	⇔	⇔	⇔	⇔	✓
60 BofA US Discount Store Demand Indicator (M) - *R. Ohmes*	Spending at U.S. Discount Stores	X	X	X	X	X	X	X	⇔	⇔	✓	✓	✓
61 Lodging Macro Activity Tracker (M) - *S. Kelley*	US Lodging Industry Revenue	X	X	X	X	X	X	X	X	X	⇔	⇔	✓

Europe		**Oct-22**	**Nov-22**	**Dec-22**	**Jan-23**	**Feb-23**	**Mar-23**	**Apr-23**	**May-23**	**Jun-23**	**Jul-23**	**Aug-23**	**Sep-23**
62 Testing Growth Indicator (Q) - *S. Sarli*	Testing, Inspection & Certification	⇔	⇔	⇔	⇔	⇔	⇔	X	X	X	X	X	X
63 EMEA Staffing Indicator (Q) - *S. Sarli*	EMEA Staffing												X
64 Veolia Waste Volume Indicator (M) - *A. Roncier*	Veolia Waste Volume Growth												X
65 Chemical Conditions Tool (M) - *M. Yates*	European Chemical Sentiment											⇔	⇔

Asia Pac		**Oct-22**	**Nov-22**	**Dec-22**	**Jan-23**	**Feb-23**	**Mar-23**	**Apr-23**	**May-23**	**Jun-23**	**Jul-23**	**Aug-23**	**Sep-23**
66 BofA Apple Supply Chain Indicator (Q) - *R. Cheng*	Apple Supply Chain	X	X	X	X	X	X	X	X	X	X	X	X
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 19: 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
70	BofA Korean Banks NII Indicator (Q) - *J. Park*	Korean Banks Net Interest Income							✗	✗	✗	✗	✗	✗
71	BofA Singapore Credit Growth Indicator (M) - *A. Swaminathan*	Singapore Credit Growth	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	X	X
72	BofA Malaysia Credit Growth Indicator (M) - *A. Swaminathan*	Malaysia Credit Growth	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	X	X	X	X
73	BofA Thailand Credit Growth Indicator (M) - *A. Swaminathan*	Thailand Credit Growth	✓	✓	✓	✓	X	X	X	X	X	X	X	X
74	BofA Philippines Credit Growth Indicator (M) - *A. Swaminathan*	Philippines Credit Growth	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	X	X	X	X
75	BofA Vietnam Credit Growth Indicator (M) - *A. Swaminathan*	Vietnam Credit Growth	⇔	⇔	⇔	⇔	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	X	X	X	X	⇔	⇔	⇔
77	BofA Australian Bank Credit Loss (Q) - *M. Dunger*	Australian Banks Bad Debts	X	X	X	X	X	X	X	X	X	⇔	⇔	⇔
78	BofA India Loan Growth Indicator (M) - *A. Swaminathan*	India Commercial Banks Loan Growth	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔	⇔
79	BofA China White Liquor Hydrometer (Q) - *C. Luo*	China White Liquor Revenue	X	X	X	X	X	X	⇔	⇔	⇔	⇔	⇔	⇔
80	Macau Macro Activity Tracker (M) - *S. Kelley*	Macau Gross Gaming Revenue									⇔	⇔	X	⇔
81	BofA Memory Indicator (M) - *S. Woo*	Semiconductor Memory Cycle	X	X	X	X	X	X	X	X	X	X	X	✓
82	Japan Factory Automation Indicator (M) - *K. Hotta*	Japan Factory Automation Cycle	X	X	X	X	X	X	✓	✓	✓	✓	✓	✓
83	BofA China Flight Signals (M) - *N. Gee*	China Airlines Unit Revenue	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
84	BofA Indonesia Credit Growth Indicator (M) - *A. Swaminathan*	Indonesia Credit Growth	⇔	⇔	✓	✓	⇔	⇔	⇔	⇔	✓	✓	✓	✓

Source: BofA Predictive Analytics

BofA GLOBAL RESEARCH

✓ denotes Bullish ⇔ denotes Balanced ✗ 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 fund 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 smoothened 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 for 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.

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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%

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