BofA SECURITIES

Emerging Insight

EM FX has become more idiosyncratic since COVID

17 January 2024

GEM Fixed Income Strategy & Economics
Global

Mikhail Liluashvili
EEMEA Local Markets Strategist
MLI (UK)
+44 20 7996 1142
mikhail.liluashvili@bofa.com

David Hauner, CFA >>
Global EM FI/FX Strategist
MLI (UK)
+44 20 7996 1241
david.hauner@bofa.com

Claudio Irigoyen
Global Economist
BofAS

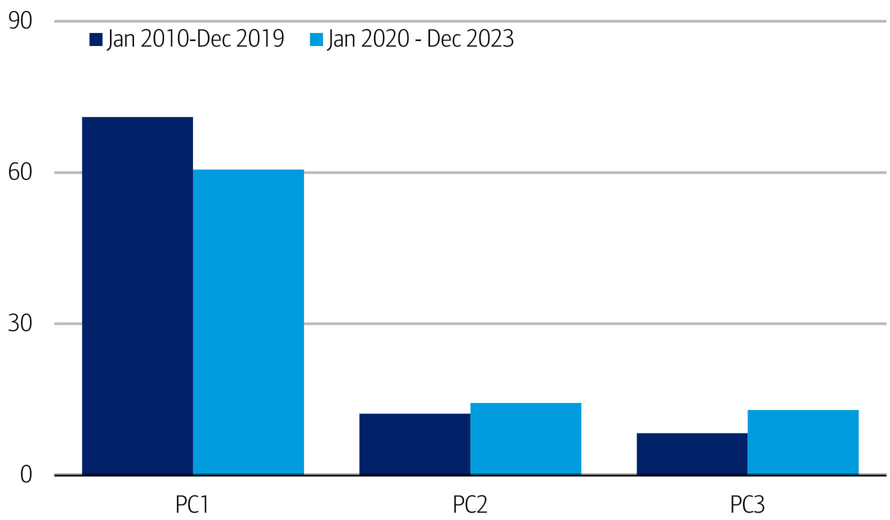
See Team Page for List of Analysts

Key takeaways

- EM FX more idiosyncratic now vs 2010-19. PC1 explains 61% of variance (71% in 2010-19). PC1+PC2 explain 75% (83% before)
- DXY + US 10y real are main EM FX drivers now. Global growth is less important after COVID: less weak EM FX in hard landing
- Hard landing: falling commodities + US rates support EM FX. EM monetary policy matters too. KRW is the real beta to EM FX now

By Mikhail Liluashvili and David Hauner

Chart of the day: EM FX has become more idiosyncratic since COVID (PCA on EM FX)
The chart shows the percentage of variance explained by each PC. The first PC reflects global factors.



Source: Bloomberg, MATLAB, BofA Global Research; We run principal component analysis on all major EM currency pairs against USD
BofA GLOBAL RESEARCH

Global growth is less important for EM FX now

PCA shows that the first PC explains about 61% of the variance after COVID, and about 71% in 2010-19. This means EM FX is more idiosyncratic now which is mainly driven by tight monetary policy in Brazil and Mexico. The importance of global growth has declined since the pandemic, which should provide some support to EM FX in case of a hard landing, as should falling oil prices and a rally in US rates in a hard landing scenario.

For a list of open trade recommendations and trade recommendations closed in the last 12 months, see Global Emerging Markets Weekly

Abbreviations

EM – emerging market

FX – foreign exchange

DXY – dollar index spot

ToT – terms-of-trade

PC – principal component (PC1 is first principal component)

PCA – principal component analysis

RV is relative value

Timestamp: 17 January 2024 05:00PM EST

PCA confirms structural shifts in EM FX after COVID

We run a principal component analysis (PCA) on major EM FX pairs against the USD. We use monthly frequency data and run PCA for: 1) January 2010-December 2019, and 2) January 2020-December 2023. For more details on methodology, see the Appendix. There have been a few notable structural changes in EM FX: 1) EM currencies have become more idiosyncratic and the first PC now explains the lower variation than pre-COVID, driven mainly by BRL and MXN; 2) the correlation sign between commodity prices and the first PC has changed; 3) global growth has become less important for EM FX after COVID. However, the broader dollar remains the main driver of EM FX and its first principal component.

The second finding is in line with the view expressed in our previous piece on EM FX. For details, see: Emerging Insight: Hard landing might be less bad than usual for EM FX 05 December 2023.

EM FX is more idiosyncratic now than pre-COVID…

The first PC explains only 60% of the EM FX variance since COVID. It used to capture as much as 71% before the shock (see Chart of the day). Moreover, the average correlation between individual currency pairs and the first PC was 81% before COVID and only 67% after (Exhibit 1 - Exhibit 2).

Exhibit 1: 2010-19: correlation of EM FX pairs to principal components
Many EM currencies were driven primarily by PC1, a proxy for global factors

	PC1	PC 2	PC 3
BRL	0.96	-0.16	-0.03
CLP	0.97	-0.03	-0.01
CNY	0.52	0.16	0.78
COP	0.97	-0.09	0.13
CZK	0.9	0.2	-0.29
HUF	0.96	-0.01	-0.13
INR	0.89	-0.3	-0.26
IDR	0.94	-0.26	-0.16
ILS	0.12	0.81	-0.38
KRW	0.43	0.65	0.43
MYR	0.97	-0.03	0.09
MXN	0.95	-0.16	0.13
PEN	0.96	-0.04	0.12
PHP	0.84	-0.29	0.38
PLN	0.94	0.14	-0.12
SGD	0.82	0.41	0.27
ZAR	0.96	-0.15	-0.16
TWD	0.6	0.69	-0.04
THB	0.67	0.41	-0.33
TRY	0.82	-0.39	0.27

Source: Bloomberg, Haver, MATLAB, BofA Global Research; the table shows correlation of USDXXX with principal components

BofA GLOBAL RESEARCH

Exhibit 2: 2020-23: correlation of EM FX pairs to principal components
EM FX has become more idiosyncratic after COVID driven by BRL and MXN

	PC1	PC2	PC3
BRL	-0.27	0.12	0.59
CLP	0.85	0.25	0.28
CNY	0.76	0.29	-0.53
COP	0.79	-0.17	0.33
CZK	0.49	0.83	0.16
HUF	0.89	0.05	0.32
INR	0.93	-0.29	-0.05
IDR	0.84	0.06	-0.03
ILS	0.76	0.04	-0.58
KRW	0.97	0.03	0.07
MYR	0.96	-0.07	-0.11
MXN	-0.47	0.76	0.33
PEN	0.17	-0.5	0.77
PHP	0.97	-0.15	0.06
PLN	0.81	0.15	0.45
SGD	0.32	0.88	0.19
ZAR	0.84	0.1	-0.28
TWD	0.9	0.11	-0.38
THB	0.91	-0.12	0.32
TRY	0.85	-0.44	-0.09

Source: Bloomberg, Haver, MATLAB, BofA Global Research; the table shows correlation of USDXXX with principal components

BofA GLOBAL RESEARCH

…driven primarily by BRL and MXN

The more idiosyncratic nature of EM FX performance is most evident in the performance of the Brazilian real and Mexican peso. which had almost a perfect correlation (0.96 and 0.95, respectively) with the first PC before COVID. However, in January 2020-December 2023, the correlation dropped to -0.27 and -0.47. If we exclude BRL and MXN, the average correlation between an EM FX pair and the first principal component has not changed much. The change was most likely driven by the significant tightening of monetary policy as well as high real rates and carry in Brazil and Mexico, which resulted in a divergent performance of these currency pairs from the rest of EM FX.

Best RV trade – long BRL/MXN

Our favorite EM RV trade is long BRL/MXN (current: 3.51, open: 3.52). Risks are fiscal slippage in Brazil and strong inflows into Mexico due to nearshoring. Idiosyncratic nature of MXN and BRL performance after COVID allows us to focus on local fundamentals. We find BRL is vastly undervalued and MXN slightly overvalued. Moreover, we are more optimistic than consensus on Brazil's fiscal outlook. In Mexico, starting the monetary easing as soon as 1Q24 and/or launching a reserve accumulation program would lead to MXN weakening. Presidential election in early June should increase volatility and add a risk premium to the peso. For the original report, please see LatAm FI & FX Strategy Viewpoint: Buy BRL/MXN – 2024 Macro Outlook Favors Brazil Over Mexico 28 November 2023.

Commodity prices have changed the correlation sign with the first PC

Another big difference between the pre- and post-COVID periods is the change in the correlation sign between commodity prices (oil and metals) and the first PC. This is consistent with the observation in our previous report (see: Emerging Insight: Hard landing might be less bad than usual for EM FX 05 December 2023). If higher commodity prices were associated with a weaker USD and stronger EM FX before COVID, the correlation sign changed to the opposite one in 2020-23. This is especially true for oil, as it has become highly correlated with US terms-of-trade (Exhibit 3 - Exhibit 4).

PC1 = DXY+ core rates now; before COVID: PC1 = DXY + global growth + rates

DXY is still the main driver of the first PC now – as it was before COVID. However, other drivers have altered. Before COVID, global nominal growth (in particular, EM export volumes and oil prices), together with US real rates, also had a strong correlation with the first component, but after COVID US and Eurozone rates became much more important drivers of the first PC.

Cointegration analysis: PC1 is DXY + US real rates in both periods

Cointegration analysis suggests that PC1 is driven by DXY and US real rates for both periods under consideration. Simple correlation analysis might be misleading since our principal components and most explanatory variables are not stationary. As a result, we conduct cointegration tests to find out whether there is a long-run relationship between principal components and explanatory variables. The first PC has strong cointegration with DXY for both periods. Moreover, PC1 is cointegrated with the US 5y5y real rate in 2010-19 and with 10y real rate (albeit weakly) in 2020-23.

PC2 = US rates + credit spreads now; 2010-19: same factors + global growth

The key drivers of the second PC have not changed much since COVID. Before the shock, nominal global growth (mainly), as well as US rates and US BAA credit spreads (to a much lesser extent), were strongly correlated with the second PC. Since COVID, nominal global growth has become much less correlated with the second PC, while the correlation of US rates to PC2 has increased.

Cointegration: PC2 is global growth + 5y breakeven (mainly) in 2010-19…

In 2010-19, PC2 was strongly cointegrated with EM exports (a good proxy for nominal global growth) and weakly so with US BAA 10y credit spreads and US 5y breakevens. This highlights that global nominal growth was an important driver of EM FX.

…and US credit spreads + US rates and VIX after COVID

However, in 2020-23, US BAA 10y credit spreads, the VIX index and, to some extent, US 5y breakevens became cointegrated with the second PC. Global nominal or real growth, and commodity prices are no longer cointegrated with PC2, highlighting the shifting relationship between global growth and EM FX.

PC3 mainly reflects idiosyncratic factors, in our view

There is no cointegration between PC3 and any of explanatory variables suggesting that it most likely reflects idiosyncratic factors. However, there are some changes in corelation trends. Since COVID, commodity prices (the EM export price) and nominal EM exports (which is a proxy for nominal global growth) have had the highest correlation with the third principal component. These variables are much less correlated with the first and second PC, suggesting commodity prices and global nominal growth are less important for EM DX now than in 2010-19. Before COVID, the third PC was strongly correlated with USDCNY, highlighting the importance of China.

KRW is the only real beta to EM FX now

Our cointegration analyses suggest that USDKRW is the only EM currency that has been a beta to EM FX after COVID because: 1) it has a strong correlation with the first PC; and 2) it is cointegrated with the first PC. No other currency satisfies these conditions. Based on the same conditions, USDPEN was the best proxy for EM FX before COVID. USDHUF and USDMYR could have also been considered as betas to EMFX, although their cointegration with EMFX was weaker than that of USDPEN.

Exhibit 3: 2010-19: US rates + DXY are most important for EM FX
Global growth was also important for PC1

	PC1	PC 2	PC 3
Brent crude oil	-0.88	-0.29	-0.02
Industrial metals	-0.84	-0.03	0.43
US BAA 10y spread	-0.41	0.69	-0.2
US 5y swap rate	0.29	-0.32	0.43
US 1y1y forward rate	0.63	-0.36	0.32
US 5y breakeven	-0.42	-0.51	0.06
US money market conditions	0.43	-0.14	0.62
US 5y5y real rate	-0.91	0	0.12
Dollar index	0.97	0.07	-0.07
US Economic Surprises	-0.06	0.28	0.25
US Swap 2s5s	-0.71	0.21	-0.09
VIX	-0.34	0.4	0.26
EU Swap 2s5s	-0.42	-0.02	0.15
USDCNY	0.54	0.16	0.77
Atlanta Fed GDP	0.05	-0.2	0.19
EUR Swap rate 5y	-0.84	0.2	0.35
China Economic surprises	-0.1	-0.02	0.31
US 2 year swap	0.67	-0.38	0.39
US 10 year swap	-0.34	-0.18	0.37
US 10y breakeven	-0.74	-0.32	0.06
US 10y real rate	0.19	0.02	0.43
US 5 year swap	0.29	-0.32	0.43
EM export volume	0.84	-0.48	-0.05
EM export price	-0.81	-0.38	-0.16
EM exports	-0.1	-0.81	-0.21

Source: Bloomberg, Haver, MATLAB, BofA Global Research; the table shows correlation of financial variables with principal components

BofA GLOBAL RESEARCH

Exhibit 4: 2020-23: US rates + DXY are again key drivers of EM FX
Importance of global nominal growth has declined after COVID

	PC1	PC2	PC3
Brent crude oil	0.43	-0.49	0.46
Industrial metals	0.06	-0.62	0.6
US BAA 10y spread	-0.13	0.83	-0.16
US 5y swap rate	0.88	-0.41	0.01
US 1y1y forward rate	0.88	-0.35	0.05
US 5y breakeven	0.04	-0.65	0.59
US money market conditions	0.66	-0.42	-0.2
US 5y5y real rate	0.41	-0.73	0.34
Dollar index	0.94	0.07	0.12
US Economic Surprises	-0.51	-0.21	-0.14
US Swap 2s5s	-0.88	0.01	0.07
VIX	-0.21	0.68	0.05
EU Swap 2s5s	-0.86	0.28	0.25
USDCNY	0.78	0.29	-0.5
Atlanta Fed GDP	-0.17	-0.38	0.03
EUR Swap rate 5y	0.9	-0.37	-0.04
China Economic surprises	-0.02	-0.29	-0.01
US 2 year swap	0.91	-0.35	-0.07
US 10 year swap	0.85	-0.46	0.05
US 10y breakeven	0.16	-0.69	0.54
US 10y real rate	0.92	-0.25	-0.22
US 5 year swap	0.88	-0.41	0.01
EM export volume	0.39	-0.65	0.54
EM export price	0.37	-0.5	0.7
EM exports	0.41	-0.56	0.67

Source: Bloomberg, Haver, MATLAB, BofA Global Research; the table shows correlation of financial variables with principal components

BofA GLOBAL RESEARCH

Hard landing: EM FX might weaken less than usual, but policy response matters

In a hard-landing scenario, falling commodity prices would support EM FX given the change in correlation after COVID. Moreover, the divergent performance of MXN and BRL after the pandemic shows that policy response from local central banks would also matter. In countries that preserve high real rates despite slowing growth, FX could gain significant support, especially if a potential global recession does not involve a major credit event. Finally, the lower importance of global nominal growth for EM FX after COVID means that slowing global nominal and real growth should have a smaller impact on EM currencies against the US than usual.

Appendix: PCA estimation approach

First, we gather historical data for average spot exchange rates against the USD from Haver Analytics for 20 EM currency pairs: USDBRL, USDCLP, USDCNY, USDCOP, USDCZK, USDHUF, USDINR, USDIDR, USDILS, USDKRW, USDMYR, USDMXN, USDPEN, USDPHP, USDPLN, USDSGD, USDZAR, USDTWD, USDTHB and USDTRY. Our framework uses monthly average exchange rate data. We then normalise this data to allow for comparison across currencies by taking logarithms of the data and calculating Z-scores.

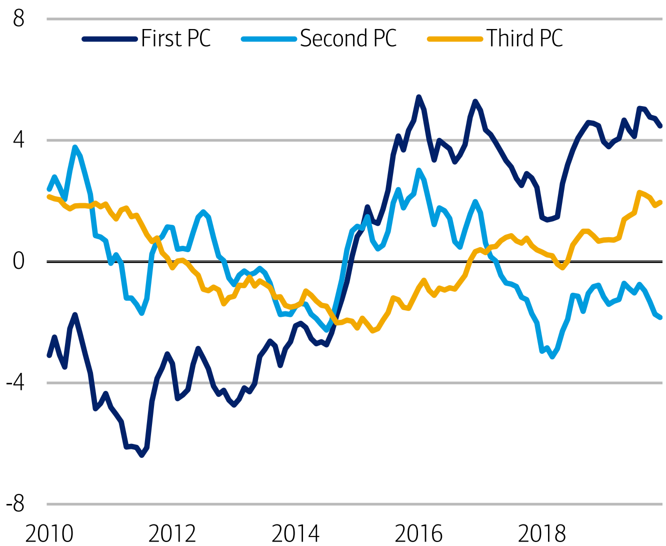
The next step is to use normalised data to run a principal component analysis (PCA) on MATLAB. We run PCA for two time periods: 1) January 2010-December 2019; and 2) January 2020-December 2023.

Principal component analysis returns the coefficients, also known as loadings, for the data matrix we defined. It also gives us the principal component scores, which are the representations of the data matrix in the principal component space. The rows of the score correspond to observations; in our case, the rows are a time series with monthly data. The columns of the score correspond to the components, which we call factors. The analysis also returns the percentage of the total variance explained by each principal component.

After that, we use factors to create a correlation matrix of principal components and macro as well as financial variables, which is presented in Exhibit 3 and Exhibit 4.

Exhibit 5: 2010-19: PC1 = DXY, PC2 = nominal global growth

PC3 most likely reflects idiosyncratic factors

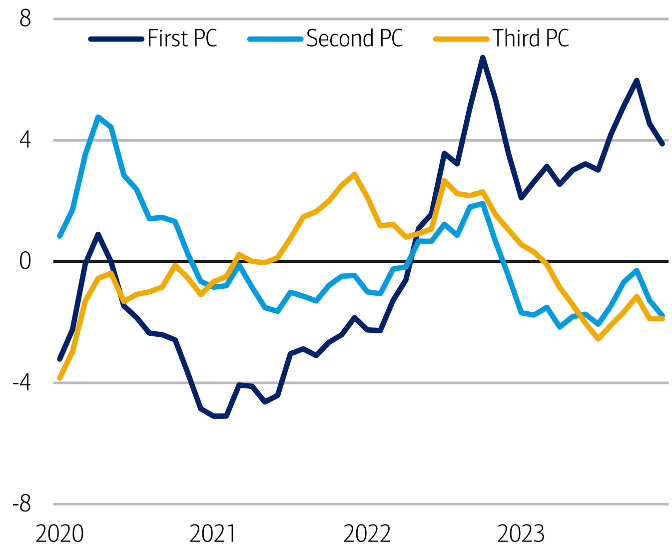


Source: Bloomberg, Haver, MATLAB, BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 6: 2020-23: PC1 = DXY, PC2=US rates + BAA credit spreads +VIX

PC3 most likely reflects idiosyncratic factors



Source: Bloomberg, Haver, MATLAB, BofA Global Research

BofA GLOBAL RESEARCH

News and Views

Brazil: IGP-10 increased 0.42% mom in January

David Beker
+55 11 2188 4371

Natacha Perez
+55 11 2188 4127

IGP-10 inflation increased 0.42% mom in January (from 0.62% in December), just below market expectations at 0.46%, reaching -3.2% yoy (from -3.6%). Wholesale inflation was the main contributor increasing 0.42% mom (from 0.81% mom previously), while agriculture prices went up by 2.22% mom (vs 1.82%). Consumer prices rose by 0.46% mom (vs 0.22%), with the main upward pressure being Food (1.41%, from 0.40%, mainly due to perishable items). Meanwhile, construction inflation increased 0.39% mom (from 0.01%).

- **To follow:** We expect inflation acceleration in the beginning of 2024, mainly in annual metrics due to base-effect.

Brazil: Core retail sales rose by 0.1% momsa in November

David Beker
+55 11 2188 4371

Natacha Perez
+55 11 2188 4127

November Core Retail Sales increased by 0.1%momsa (from -0.3% momsa in October), in line with market expectations. Six out of the eight categories registered marginal gains, with office supplies and computers (18.6% momsa, vs -7.1%) being the main positive highlight. In yoy terms, sales were up by 2.2%yoy (from 0.2% yoy). Meanwhile, broad sales, which includes Building Materials, Vehicles and wholesale food items, were up by 1.4% momsa (from 0.5% in October) – above market expectations of 0.5% momsa increase. In yoy terms, Broad sales remained at 1.5% yoy.

- **To follow:** We expect deceleration in activity throughout the end of 2023. Our preliminary forecast for November´s IBC-Br (Brazilian Central Bank monthly GDP proxy) is a 0.7% momsa decline.

Hungary: NBH to resume 100bp rate cut

Mai Doan
+442079959597

National Bank of Hungary (NBH) Deputy Governor Virag says that the central bank can resume cutting the base rate in 100bp steps in the next 1-3 months, adding that rates falling to “around 6-7 in the middle of the year is a very realistic path”. This explicit dovish bias follows the MPC’s consideration of 100bp already in the December meeting (but eventually the MPC unanimously voted for -75bp), and is likely strengthened the recent downside surprise in December CPI (5.5% yoy from 7.9%).

- **Steeper cuts ahead**: We revise our rates forecasts accordingly to 100bp easing steps in the coming months and now expect the base rate at 6% by Jun 2024, from 10.75% currently. We think there is less focus by the NBH on the HUF strength from now on, as the government has a clear priority for growth. The easing cycle in the latter part of this year is likely to be more cautious and dependent on major central banks and regional trends. We thus pencil in 5.50% for the base rate by YE2024 and keep YE2025 at 4.0%, and will reaccess this path after the 30 January rate decision.

Special Disclosures

Some of the securities discussed herein should only be considered for inclusion in accounts qualified for high risk investment.

Disclosures

Important Disclosures

BofA Global Research personnel (including the analyst(s) responsible for this report) receive compensation based upon, among other factors, the overall profitability of Bank of America Corporation, including profits derived from investment banking. The analyst(s) responsible for this report may also receive compensation based upon, among other factors, the overall profitability of the Bank's sales and trading businesses relating to the class of securities or financial instruments for which such analyst is responsible.
BofA Securities fixed income analysts regularly interact with sales and trading desk personnel in connection with their research, including to ascertain pricing and liquidity in the fixed income markets.

Other Important Disclosures

Prices are indicative and for information purposes only. Except as otherwise stated in the report, for any recommendation in relation to an equity security, the price referenced is the publicly traded price of the security as of close of business on the day prior to the date of the report or, if the report is published during intraday trading, the price referenced is indicative of the traded price as of the date and time of the report and in relation to a debt security (including equity preferred and CDS), prices are indicative as of the date and time of the report and are from various sources including BofA Securities trading desks.
The date and time of completion of the production of any recommendation in this report shall be the date and time of dissemination of this report as recorded in the report timestamp.

This report may refer to fixed income securities or other financial instruments that may not be offered or sold in one or more states or jurisdictions, or to certain categories of investors, including retail investors. Readers of this report are advised that any discussion, recommendation or other mention of such instruments is not a solicitation or offer to transact in such instruments. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor for information relating to such instruments.
Rule 144A securities may be offered or sold only to persons in the U.S. who are Qualified Institutional Buyers within the meaning of Rule 144A under the Securities Act of 1933, as amended.
SECURITIES OR OTHER FINANCIAL INSTRUMENTS DISCUSSED HEREIN MAY BE RATED BELOW INVESTMENT GRADE AND SHOULD THEREFORE ONLY BE CONSIDERED FOR INCLUSION IN ACCOUNTS QUALIFIED FOR SPECULATIVE INVESTMENT.
Recipients who are not institutional investors or market professionals should seek the advice of their independent financial advisor before considering information in this report in connection with any investment decision, or for a necessary explanation of its contents.
The securities or other financial instruments discussed in this report may be traded over-the-counter. Retail sales and/or distribution of this report may be made only in states where these instruments are exempt from registration or have been qualified for sale.
Officers of BofAS or one or more of its affiliates (other than research analysts) may have a financial interest in securities of the issuer(s) or in related investments.
This report, and the securities or other financial instruments discussed herein, may not be eligible for distribution or sale in all countries or to certain categories of investors, including retail investors.
Individuals identified as economists do not function as research analysts under U.S. law and reports prepared by them are not research reports under applicable U.S. rules and regulations. Macroeconomic analysis is considered investment research for purposes of distribution in the U.K. under the rules of the Financial Conduct Authority.
Refer to BofA Global Research policies relating to conflicts of interest.
"BofA Securities" includes BofA Securities, Inc. ("BofAS") and its affiliates. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor if they have questions concerning this report or concerning the appropriateness of any investment idea described herein for such investor. "BofA Securities" is a global brand for BofA Global Research.
Information relating to Non-US affiliates of BofA Securities and Distribution of Affiliate Research Reports:
BofAS and/or Merrill Lynch, Pierce, Fenner & Smith Incorporated ("MLPF&S") may in the future distribute, information of the following non-US affiliates in the US (short name: legal name, regulator): Merrill Lynch (South Africa): Merrill Lynch South Africa (Pty) Ltd., regulated by The Financial Service Board; MLI (UK): Merrill Lynch International, regulated by the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers (AMF). BofA Securities Europe SA ("BofASE") with registered address at 51, rue La Boétie, 75008 Paris is registered under no 842 602 690 RCS Paris. In accordance with the provisions of French Code Monétaire et Financier (Monetary and Financial Code), BofASE is an établissement de crédit et d'investissement (credit and investment institution) that is authorised and supervised by the European Central Bank and the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers. BofASE's share capital can be found at www.bofaml.com/BofASEdisclaimer; BofA Europe (Milan): Bank of America Europe Designated Activity Company, Milan Branch, regulated by the Bank of Italy, the European Central Bank (ECB) and the Central Bank of Ireland (CBI); BofA Europe (Frankfurt): Bank of America Europe Designated Activity Company, Frankfurt Branch regulated by BaFin, the ECB and the CBI; BofA Europe (Madrid): Bank of America Europe Designated Activity Company, Sucursal en España, regulated by the Bank of Spain, the ECB and the CBI; Merrill Lynch (Australia): Merrill Lynch Equities (Australia) Limited, regulated by the Australian Securities and Investments Commission; Merrill Lynch (Hong Kong): Merrill Lynch (Asia Pacific) Limited, regulated by the Hong Kong Securities and Futures Commission (HKSFC); Merrill Lynch (Singapore): Merrill Lynch (Singapore) Pte Ltd, regulated by the Monetary Authority of Singapore (MAS); Merrill Lynch (Canada): Merrill Lynch Canada Inc, regulated by the Canadian Investment Regulatory Organization; Merrill Lynch (Mexico): Merrill Lynch Mexico, SA de CV, Casa de Bolsa, regulated by the Comisión Nacional Bancaria y de Valores; Merrill Lynch (Argentina): Merrill Lynch Argentina SA, regulated by Comisión Nacional de Valores; BofAS Japan: BofA Securities Japan Co., Ltd., regulated by the Financial Services Agency; Merrill Lynch (Seoul): Merrill Lynch International, LLC Seoul Branch, regulated by the Financial Supervisory Service; Merrill Lynch (Taiwan): Merrill Lynch Securities (Taiwan) Ltd., regulated by the Securities and Futures Bureau; BofAS India: BofA Securities India Limited, regulated by the Securities and Exchange Board of India (SEBI); Merrill Lynch (Israel): Merrill Lynch Israel Limited, regulated by Israel Securities Authority; Merrill Lynch (DIFC): Merrill Lynch International (DIFC Branch), regulated by the Dubai Financial Services Authority (DFSA); Merrill Lynch (Brazil): Merrill Lynch S.A. Corretora de Títulos e Valores Mobiliários, regulated by Comissão de Valores Mobiliários; Merrill Lynch KSA Company: Merrill Lynch Kingdom of Saudi Arabia Company, regulated by the Capital Market Authority.
This information: has been approved for publication and is distributed in the United Kingdom (UK) to professional clients and eligible counterparties (as each is defined in the rules of the FCA and the PRA) by MLI (UK), which is authorized by the PRA and regulated by the FCA and the PRA - details about the extent of our regulation by the FCA and PRA are available from us on request; has been approved for publication and is distributed in the European Economic Area (EEA) by BofASE (France), which is authorized by the ACPR and regulated by the ACPR and the AMF; has been considered and distributed in Japan by BofAS Japan, a registered securities dealer under the Financial Instruments and Exchange Act in Japan, or its permitted affiliates; is issued and distributed in Hong Kong by Merrill Lynch (Hong Kong) which is regulated by HKSFC; is issued and distributed in Taiwan by Merrill Lynch (Taiwan); is issued and distributed in India by BofAS India; and is issued and distributed in Singapore to institutional investors and/or accredited investors (each as defined under the Financial Advisers Regulations) by Merrill Lynch (Singapore) (Company Registration No 198602883D). Merrill Lynch (Singapore) is regulated by MAS. Merrill Lynch Equities (Australia) Limited (ABN 65 006 276 795), AFS License 235132 (MLEA) distributes this information in Australia only to 'Wholesale' clients as defined by s.761G of the Corporations Act 2001. With the exception of Bank of America N.A., Australia Branch, neither MLEA nor any of its affiliates involved in preparing this information is an Authorised Deposit-Taking Institution under the Banking Act 1959 nor regulated by the Australian Prudential Regulation Authority. No approval is required for publication or distribution of this information in Brazil and its local distribution is by Merrill Lynch (Brazil) in accordance with applicable regulations. Merrill Lynch (DIFC) is authorized and regulated by the DFSA. Information prepared and issued by Merrill Lynch (DIFC) is done so in accordance with the requirements of the DFSA conduct of business rules. BofA Europe (Frankfurt) distributes this information in Germany and is regulated by BaFin, the ECB and the CBI. BofA Securities entities, including BofA Europe and BofASE (France), may outsource/delegate the marketing and/or provision of certain research services or aspects of research services to other branches or members of the BofA Securities group. You may be contacted by a different BofA Securities entity acting for and on behalf of your service provider where permitted by applicable law. This does not change your service provider. Please refer to the Electronic Communications Disclaimers for further information.
This information has been prepared and issued by BofAS and/or one or more of its non-US affiliates. The author(s) of this information may not be licensed to carry on regulated activities in your

jurisdiction and, if not licensed, do not hold themselves out as being able to do so. BofAS and/or MLPF&S is the distributor of this information in the US and accepts full responsibility for information distributed to BofAS and/or MLPF&S clients in the US by its non-US affiliates. Any US person receiving this information and wishing to effect any transaction in any security discussed herein should do so through BofAS and/or MLPF&S and not such foreign affiliates. Hong Kong recipients of this information should contact Merrill Lynch (Asia Pacific) Limited in respect of any matters relating to dealing in securities or provision of specific advice on securities or any other matters arising from, or in connection with, this information. Singapore recipients of this information should contact Merrill Lynch (Singapore) Pte Ltd in respect of any matters arising from, or in connection with, this information. For clients that are not accredited investors, expert investors or institutional investors Merrill Lynch (Singapore) Pte Ltd accepts full responsibility for the contents of this information distributed to such clients in Singapore.

General Investment Related Disclosures:

Taiwan Readers: Neither the information nor any opinion expressed herein constitutes an offer or a solicitation of an offer to transact in any securities or other financial instrument. No part of this report may be used or reproduced or quoted in any manner whatsoever in Taiwan by the press or any other person without the express written consent of BofA Securities.

This document provides general information only, and has been prepared for, and is intended for general distribution to, BofA Securities clients. Neither the information nor any opinion expressed constitutes an offer or an invitation to make an offer, to buy or sell any securities or other financial instrument or any derivative related to such securities or instruments (e.g., options, futures, warrants, and contracts for differences). This document is not intended to provide personal investment advice and it does not take into account the specific investment objectives, financial situation and the particular needs of, and is not directed to, any specific person(s). This document and its content do not constitute, and should not be considered to constitute, investment advice for purposes of ERISA, the US tax code, the Investment Advisers Act or otherwise. Investors should seek financial advice regarding the appropriateness of investing in financial instruments and implementing investment strategies discussed or recommended in this document and should understand that statements regarding future prospects may not be realized. Any decision to purchase or subscribe for securities in any offering must be based solely on existing public information on such security or the information in the prospectus or other offering document issued in connection with such offering, and not on this document.

Securities and other financial instruments referred to herein, or recommended, offered or sold by BofA Securities, are not insured by the Federal Deposit Insurance Corporation and are not deposits or other obligations of any insured depository institution (including, Bank of America, N.A.). Investments in general and, derivatives, in particular, involve numerous risks, including, among others, market risk, counterparty default risk and liquidity risk. No security, financial instrument or derivative is suitable for all investors. Digital assets are extremely speculative, volatile and are largely unregulated. In some cases, securities and other financial instruments may be difficult to value or sell and reliable information about the value or risks related to the security or financial instrument may be difficult to obtain. Investors should note that income from such securities and other financial instruments, if any, may fluctuate and that price or value of such securities and instruments may rise or fall and, in some cases, investors may lose their entire principal investment. Past performance is not necessarily a guide to future performance. Levels and basis for taxation may change.

Futures and options are not appropriate for all investors. Such financial instruments may expire worthless. Before investing in futures or options, clients must receive the appropriate risk disclosure documents. Investment strategies explained in this report may not be appropriate at all times. Costs of such strategies do not include commission or margin expenses.

BofA Securities is aware that the implementation of the ideas expressed in this report may depend upon an investor's ability to "short" securities or other financial instruments and that such action may be limited by regulations prohibiting or restricting "shortselling" in many jurisdictions. Investors are urged to seek advice regarding the applicability of such regulations prior to executing any short idea contained in this report.

This report may contain a trading idea or recommendation which highlights a specific identified near-term catalyst or event impacting a security, issuer, industry sector or the market generally that presents a transaction opportunity, but does not have any impact on the analyst's particular "Overweight" or "Underweight" rating (which is based on a three month trade horizon). Trading ideas and recommendations may differ directionally from the analyst's rating on a security or issuer because they reflect the impact of a near-term catalyst or event.

Certain investment strategies and financial instruments discussed herein may only be appropriate for consideration in accounts qualified for high risk investment.

Foreign currency rates of exchange may adversely affect the value, price or income of any security or financial instrument mentioned in this report. Investors in such securities and instruments effectively assume currency risk.

BofAS or one of its affiliates is a regular issuer of traded financial instruments linked to securities that may have been recommended in this report. BofAS or one of its affiliates may, at any time, hold a trading position (long or short) in the securities and financial instruments discussed in this report.

BofA Securities, through business units other than BofA Global Research, may have issued and may in the future issue trading ideas or recommendations that are inconsistent with, and reach different conclusions from, the information presented herein. Such ideas or recommendations may reflect different time frames, assumptions, views and analytical methods of the persons who prepared them, and BofA Securities is under no obligation to ensure that such other trading ideas or recommendations are brought to the attention of any recipient of this information.

In the event that the recipient received this information pursuant to a contract between the recipient and BofAS for the provision of research services for a separate fee, and in connection therewith BofAS may be deemed to be acting as an investment adviser, such status relates, if at all, solely to the person with whom BofAS has contracted directly and does not extend beyond the delivery of this report (unless otherwise agreed specifically in writing by BofAS). If such recipient uses the services of BofAS in connection with the sale or purchase of a security referred to herein, BofAS may act as principal for its own account or as agent for another person. BofAS is and continues to act solely as a broker-dealer in connection with the execution of any transactions, including transactions in any securities referred to herein.

Copyright and General Information:

Materials prepared by BofA Global Research personnel are based on public information. Facts and views presented in this material have not been reviewed by, and may not reflect information known to, professionals in other business areas of BofA Securities, including investment banking personnel. BofA Securities has established information barriers between BofA Global Research and certain business groups. As a result, BofA Securities does not disclose certain client relationships with, or compensation received from, such issuers. To the extent this material discusses any legal proceeding or issues, it has not been prepared as nor is it intended to express any legal conclusion, opinion or advice. Investors should consult their own legal advisers as to issues of law relating to the subject matter of this material. BofA Global Research personnel's knowledge of legal proceedings in which any BofA Securities entity and/or its directors, officers and employees may be plaintiffs, defendants, co-defendants or co-plaintiffs with or involving issuers mentioned in this material is based on public information. Facts and views presented in this material that relate to any such proceedings have not been reviewed by, discussed with, and may not reflect information known to, professionals in other business areas of BofA Securities in connection with the legal proceedings or matters relevant to such proceedings.

This information has been prepared independently of any issuer of securities mentioned herein and not in connection with any proposed offering of securities or as agent of any issuer of any securities. None of BofAS any of its affiliates or their research analysts has any authority whatsoever to make any representation or warranty on behalf of the issuer(s). BofA Global Research policy prohibits research personnel from disclosing a recommendation, investment rating, or investment thesis for review by an issuer prior to the publication of a research report containing such rating, recommendation or investment thesis.

Any information relating to the tax status of financial instruments discussed herein is not intended to provide tax advice or to be used by anyone to provide tax advice. Investors are urged to seek tax advice based on their particular circumstances from an independent tax professional.

The information herein (other than disclosure information relating to BofA Securities and its affiliates) was obtained from various sources and we do not guarantee its accuracy. This information may contain links to third-party websites. BofA Securities is not responsible for the content of any third-party website or any linked content contained in a third-party website. Content contained on such third-party websites is not part of this information and is not incorporated by reference. The inclusion of a link does not imply any endorsement by or any affiliation with BofA Securities. Access to any third-party website is at your own risk, and you should always review the terms and privacy policies at third-party websites before submitting any personal information to them. BofA Securities is not responsible for such terms and privacy policies and expressly disclaims any liability for them.

All opinions, projections and estimates constitute the judgment of the author as of the date of publication and are subject to change without notice. Prices also are subject to change without notice. BofA Securities is under no obligation to update this information and BofA Securities ability to publish information on the subject issuer(s) in the future is subject to applicable quiet periods. You should therefore assume that BofA Securities will not update any fact, circumstance or opinion contained herein.

Certain outstanding reports or investment opinions relating to securities, financial instruments and/or issuers may no longer be current. Always refer to the most recent research report relating to an issuer prior to making an investment decision.

In some cases, an issuer may be classified as Restricted or may be Under Review or Extended Review. In each case, investors should consider any investment opinion relating to such issuer (or its security and/or financial instruments) to be suspended or withdrawn and should not rely on the analyses and investment opinion(s) pertaining to such issuer (or its securities and/or financial instruments) nor should the analyses or opinion(s) be considered a solicitation of any kind. Sales persons and financial advisors affiliated with BofAS or any of its affiliates may not solicit purchases of securities or financial instruments that are Restricted or Under Review and may only solicit securities under Extended Review in accordance with firm policies.

Neither BofA Securities nor any officer or employee of BofA Securities accepts any liability whatsoever for any direct, indirect or consequential damages or losses arising from any use of this information.

Research Analysts

Global Economics

Claudio Irigoyen
Global Economist
BofAS
+1 646 855 1734
claudio.irigoyen@bofa.com

Antonio Gabriel
Global Economist
BofAS
antonio.gabriel@bofa.com

Global EM FI/FX Strategy

David Hauner, CFA >>
Global EM FI/FX Strategist
MLI (UK)
+44 20 7996 1241
david.hauner@bofa.com

Asia FI/FX Strategy & Economics

Helen Qiao
China & Asia Economist
Merrill Lynch (Hong Kong)
+852 3508 3961
helen.qiao@bofa.com

Claudio Piron
Emerging Asia FI/FX Strategist
Merrill Lynch (Singapore)
+65 6678 0401
claudio.piron@bofa.com

Jojo Gonzales ^^
Research Analyst
Philippine Equity Partners
jojo.gonzales@pep.com.ph

Abhay Gupta
Emerging Asia FI/FX Strategist
Merrill Lynch (Singapore)
abhay.gupta2@bofa.com

Pipat Luengnaruemitchai
Emerging Asia Economist
Kiatnakin Phatra Securities
pipat.luen@kkpfg.com

Miao Ouyang
China & Asia Economist
Merrill Lynch (Hong Kong)
miao.ouyang@bofa.com

Xiaoqing Pi
China Economist
Merrill Lynch (Hong Kong)
xiaoqing.pi@bofa.com

Benson Wu
China & Korea Economist
Merrill Lynch (Hong Kong)
benson.wu@bofa.com

Ting Him Ho, CFA
Asia Economist
Merrill Lynch (Hong Kong)
tinghim.ho@bofa.com

Janice Xue
Emerging Asia FI/FX Strategist
Merrill Lynch (Hong Kong)
janice.xue@bofa.com

Chun Him Cheung, CFA
Emerging Asia FI/FX Strategist
Merrill Lynch (Hong Kong)
chunhim.cheung@bofa.com

Kai Wei Ang
Asia & ASEAN Economist
Merrill Lynch (Singapore)
kaiwei.ang@bofa.com

EEMEA Cross Asset Strategy, Econ

Mai Doan
CEE Economist
MLI (UK)
+44 20 7995 9597
mai.doan@bofa.com

Zumrut Imamoglu
Turkey & Israel Economist
MLI (UK)
zumrut.imamoglu@bofa.com

Vladimir Osakovskiy >>
EM Sovereign FI/EQ strategist
Merrill Lynch (DIFC)
vladimir.osakovskiy@bofa.com

Jean-Michel Saliba
MENA Economist/Strategist
MLI (UK)
jean-michel.saliba@bofa.com

Merveille Paja
EEMEA Sovereign FI Strategist
MLI (UK)
merveille.paja@bofa.com

Mikhail Liluashvili
EEMEA Local Markets Strategist
MLI (UK)
mikhail.liluashvili@bofa.com

Tatonga Rusike
Sub-Saharan Africa Economist
MLI (UK)
tatonga.rusike@bofa.com

LatAm FI/FX Strategy & Economics

David Beker >>
Bz Econ/FI & LatAm EQ Strategy
Merrill Lynch (Brazil)
+55 11 2188 4371
david.beker@bofa.com

Jane Brauer
Sovereign Debt FI Strategist
BofAS
+1 646 855 9388
jane.brauer@bofa.com

Carlos Capistran
Canada and Mexico Economist
BofAS
+1 646 743 2921
carlos.capistran@bofa.com

Ezequiel Aguirre
LatAm FI/FX Strategist
BofAS
ezequiel.aguirre2@bofa.com

Pedro Diaz
Caribbean Economist
BofAS
pdiaz2@bofa.com

Christian Gonzalez Rojas
LatAm Local Markets Strategist
BofAS
christian.gonzalezrojas@bofa.com

Lucas Martin, CFA
Sovereign Debt FI Strategist
BofAS
lucas.martin@bofa.com

Alexander Müller
Andean(ex-Ven) Carib Economist
BofAS
alexander.muller@bofa.com

Natacha Perez
Brazil Economist
Merrill Lynch (Brazil)
natacha.perez@bofa.com

Sebastian Rondeau
LatAm FI/FX Strategist
BofAS
sebastian.rondeau@bofa.com