

Brazil Viewpoint

Five questions on the credit squeeze and one conclusion: rate cuts will come earlier

Look for credit conditions to further tighten

All signs point to a deterioration in the Brazilian credit markets. Along with higher rates, corporate leverage is rising, consumers are falling behind on loan payments, and more companies are filing for bankruptcy. The economy will likely keep weakening and unemployment will remain high. As we expect further tightening of credit conditions, we answer five key questions on credit markets and update our rates outlook.

Expect the easing cycle to begin earlier

We are revising our end-2023 selic forecast to 11%, from 11.75%. We believe the BCB will frontload the easing cycle and cut rates starting in May (instead of August). Still, we expect a total of 425 bp in cuts to reach 9.5% by end-2024. One caveat: the earlier easing is conditional on the terms of the fiscal framework proposed by the new administration.

Q1: Where does domestic liquidity stand?

Banks' liquidity ratio remains above 1 (banks still have enough liquid assets on their balance sheets to absorb potential losses). However, this ratio is close to historical lows. Also, M1 growth has been negative for 18 months.

Q2: What is the financial leverage situation?

Following the removal of pandemic support measures and the 1175bp increase in interest rates, the credit environment became more challenging. Consumer indebtedness reached 49.4% of disposable income and businesses searched for alternative funding.

Q3: What is happening with non-performing loans?

Economic slowdown and high rates are leading to a pick-up in consumer NPLs 6.1% in Jan (from 4% in Apr/21). NPLs for SMEs reached 3.4% in Jan (from 1.9% in Dec/20).

Q4: What effect did Americanas have on credit markets?

Banks are tightening credit standards, cost of funding is increasing, and demand for local corporate bonds has declined since the retailer disclosed accounting irregularities.

Q5: How tight are financial conditions?

Financial conditions remain tight despite the recent reduction in the 1-year ex-ante real rate at the beginning of March. External financial stability concerns have led to lower expectations of rate hikes by the Federal Reserve ahead and lower commodity prices.

21 March 2023

GEM Economics
LatAm | Brazil**Table of Contents**

Credit: The Post-Honeymoon Blues	2
Where does domestic liquidity stand?	2
What is the financial leverage situation?	3
What is happening to NPLs?	6
Did the Americanas episode affect credit markets?	8
So, how tight are financial conditions?	10
BCB to cut rates sooner	10
Appendix 1: Structural advancements in the banking sector	12

David Beker >>

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

Natasha Perez

Brazil Economist
Merrill Lynch (Brazil)
+55 11 96057 1866
natachaperez@bofa.com

Antonio Gabriel

LatAm Local Markets Strategist
BofAS
+1 646 743 5373
antonio.gabriel@bofa.com

Christian Gonzalez Rojas

LatAm Local Markets Strategist
BofAS
+1 646 855 3254
christian.gonzalezrojas@bofa.com

Trading ideas and investment strategies discussed herein may give rise to significant risk and are not suitable for all investors. Investors should have experience in relevant markets and the financial resources to absorb any losses arising from applying these ideas or strategies.

>> Employed by a non-US affiliate of BofAS and is not registered/qualified as a research analyst under the FINRA rules.

Refer to "Other Important Disclosures" for information on certain BofA Securities entities that take responsibility for the information herein in particular jurisdictions.

BofA Securities does and seeks to do business with issuers covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision.

Refer to important disclosures on page 13 to 15.

12531925

Timestamp: 21 March 2023 05:30AM EDT

Credit: The Post-Honeymoon Blues

A credit crisis often follows a period in which lenders are overly lenient. Banks increase lending, often to borrowers with questionable ability to repay, resulting in higher delinquency rates. While banks may increase rates for those able to repay their loans, the rise in borrowing costs hinders consumer spending and leads companies to cut back on growth plans including hiring. The shrinking credit supply is usually followed by a prolonged recession.

Brazil's credit market has faced many challenges in the past decade including alternating economic policies, an impeachment and the pandemic. After peaking at 54% of GDP in December 2015, outstanding credit shrank in real terms for three consecutive years, on the back of the worst recession in Brazilian history. It was only in December 2022 that total credit was able to recover to its peak level. However, in the past few months increasing concern of a credit squeeze has emerged, particularly after the Americanas episode. In this piece, we present five questions (and answers) to better understand the status of the Brazilian credit sector.

We expect credit markets to show further deterioration ahead given ongoing high interest rates, a weakened economy and an expected increase in unemployment. While public banks may lend more, private banks are tightening credit standards. With this in mind, we now expect the Brazilian Central Bank to begin cutting interest rates in May (from our previous call of rate cuts starting in August). The earlier cutting cycle is conditional to the presentation and approval of a credible fiscal plan by the government.

1. Where does domestic liquidity stand?

Though no indicator on its own provides a full picture of liquidity, we tried to gauge it by taking into account several metrics. Thus we conclude that liquidity appears to be weakening.

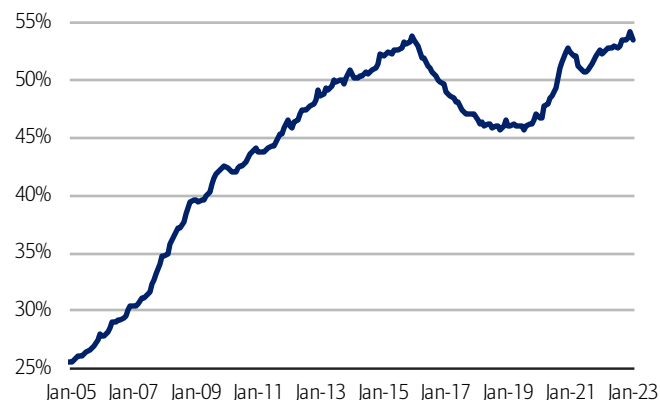
The term liquidity is used here as an indicator of the ease of financing in financial markets. It encompasses both funding liquidity (the ease of raising cash by selling new obligations to investors) and market liquidity (the ease of raising cash by selling assets). Thus liquidity is dependent on the actions of private investors, financial institutions, and the Central Bank.

Financial institutions provide market liquidity to securities markets through trading activities and provide funding liquidity to borrowers through lending. Much of this lending, though not all, is provided by banks. In the Brazilian financial sector, banks' liquidity ratio currently remains above 1 (see Exhibit 2)¹, meaning they still have enough liquid assets on their balance sheets to absorb potential losses in stress scenarios and to comply with regulations. However, this ratio is close to historical lows.

¹ Brazilian Banking System Liquidity Ratio measures whether banks (in aggregate) have enough liquid assets to cover their short-term (21 business days) cash-flow needs in a simulated stress scenario, defined and calibrated by the Brazilian Central Bank. Such cash outflows arise from the run-off of maturing or redeemable liabilities, losses from market risk exposures, for instance, margin calls and derivative pre-settlements, and other contractual outflows maturing in the next month. A ratio above 1.00 indicates that the banking system has enough liquid assets for such scenario. For explanations for the semi-annual movements and for further calculation details, please see the Financial Stability Report (<https://www.bcb.gov.br/en/publications/financialstabilityreport>).

Exhibit 1: Total outstanding credit back to the peak

As % of GDP

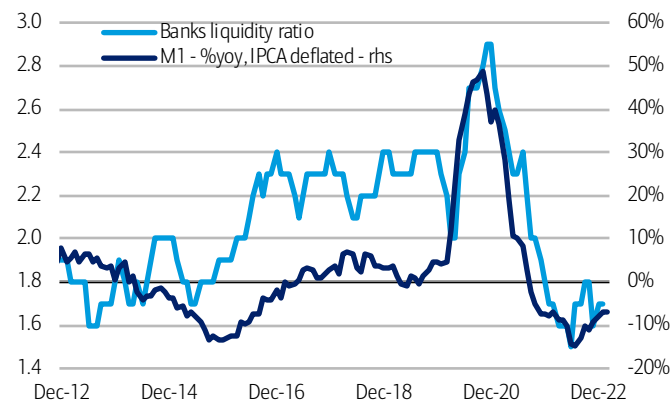


Source: BofA Global Research estimates, BCB

BofA GLOBAL RESEARCH

Exhibit 2: Liquidity seems to be on a downward trend

Banks liquidity and M1 ratio declining



Source: Brazilian Central Bank

BofA GLOBAL RESEARCH

The terms and conditions in which the central bank provides funding is another factor that affects liquidity. During the pandemic, the Brazilian Central Bank (BCB) ensured that funds would reach those that most needed it the most given that consumers were unable to obtain funding at sufficiently attractive conditions. Along with this intervention, BCB increased the asset side of its balance sheet, with larger monetary base. As support measures were reverted, both monetary base and demand deposits contracted. In real terms, up until February 2023, M1 growth has been negative for 18 months.

2. What is the financial leverage situation?

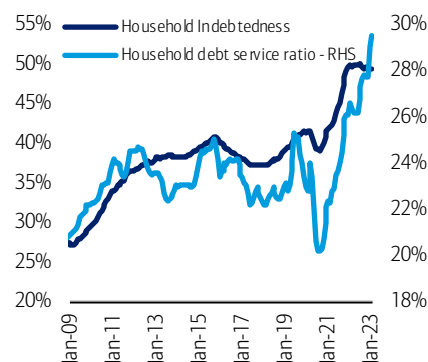
With the reduction of excess liquidity, following the removal of support measures implemented during the pandemic – the 1175bp increase in the base interest rate included – the environment became more challenging. Consumer indebtedness reached record high levels, while businesses diversified their funding sources.

Households are grappling with higher debt levels

According to BCB, in January 2023, 29.5% of household disposable income was committed to debt service of which almost 10p.p. was for the payment of interest due that month. Before Covid, that figure was 23%. Household indebtedness also increased sharply reaching 49.5% of 12-month accumulated disposable income, from 25.5% in December 2019. Families' purchasing power deteriorated with higher inflation and loan conditions worsened with higher spreads and consumers faced difficulty paying off the debt they accumulated (Exhibit 3).

Exhibit 3: Indebtedness at record high levels

Debt service accounts for almost 1/3 of families' disposable income

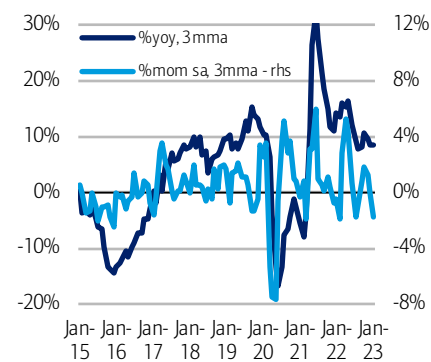


Source: BofA Global Research estimates, BCB.

BofA GLOBAL RESEARCH

Exhibit 4: New credit to families slowing

Non-earmarked concessions marginally contracted in real terms



Source: BofA Global Research estimates, BCB.

BofA GLOBAL RESEARCH

Exhibit 5: Savings withdrawal growth is up

%yoy, 3mma



Source: BofA Global Research estimates, BCB.

BofA GLOBAL RESEARCH

The rather uninviting conditions for borrowers led to a slowdown in lending to households starting in 2H22. Household credit granting growth is decelerating gradually. However, at the margin, after disregarding inflationary effects, new concessions momentum is negative (see, Exhibit 4). With inflation and debt service eroding consumer purchasing power, savings withdrawal is picking up pace. This is a particularly concerning development given that savings accounts are an important source of funding for the financial sector, notably for housing loans.

On a positive note, the *Desenrola* debt renegotiation program, a Lula campaign promise, should improve consumers' financial leverage going forward. With a R\$10bn fund from the National Treasury, the program aims to reach 37million people and renegotiate up to R\$50bn in debt. Those who earn up to two minimum wages (R\$2,640.00 per month) will be eligible to participate in the initiative. Regulatory advancements should further stimulate household credit (for more, see: Appendix 1).

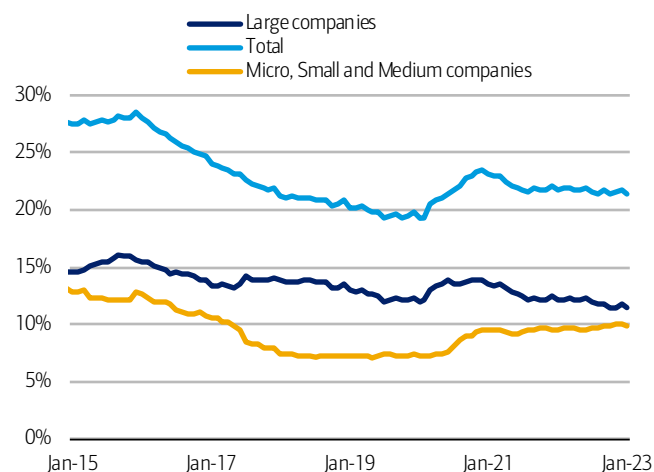
The wheel is running dry for corporates

Corporate credit is also showing signs of a downturn. As the pandemic spread, the government launched several programs to support companies as mobility restrictions took place and economic activity came to a halt. Programs such as *Pronampe* (Support Program to Micro and Small Enterprises) were crucial to increasing the flow of credit among the most vulnerable sectors. The credit granted could be used for investments and working capital. The financial institutions had R\$15.9bn in the Operations Guarantee Fund (FGO), paid by the National Treasury, as collateral for credit operations.

Therefore, corporate credit penetration began to surge in the 1H20, rising from 20.4% of GDP in March to 23.5% in December of that year (Exhibit 6). Bankruptcies also dropped 24.9% yoy by the end of 2020, demonstrating the effectiveness of government support and the positive impact of lower interest rates (Exhibit 7). While default rates were already declining prior to 2020, the measures allowed that trend to continue even amid the negative economic situation. MSMEs (Micro, Small and Medium Enterprises) were the main target – and beneficiary -- of the support agenda, and delinquencies among this sector fell from 4.16% in May 2020 to 1.91% by December 2020, according to the BCB.

Exhibit 6: Corporate credit escalated during the pandemic

Credit penetration (% of GDP)



Source: BofA Global Research, BCB.

BofA GLOBAL RESEARCH

Total credit to companies reached R\$5.1tn in 2022 (52.4% of GDP), a 10% nominal increase in 2022, from 11% in 2021. The virtual unchanged pace of growth was possible, despite the deceleration in credit granting, due to strong acceleration in private bonds issuance.

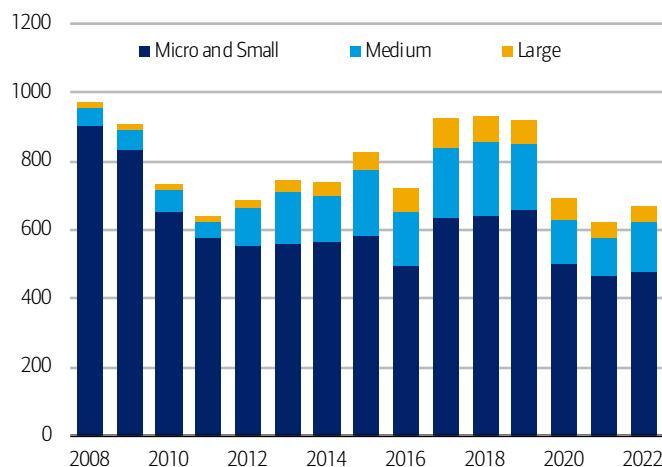
According to the Brazilian Financial and Capital Markets Association (Anbima), issuance in capital markets last year totaled R\$544bn, a 10.9% drop from 2021 (Exhibit 8). The deceleration was driven by the lower volume of issuance in the equities market, which totaled R\$55bn. That was 57% less than the previous year. After a record number of IPOs in 2021, there was only one public offering in 2022, amid the low attractiveness of equities in comparison to fixed-income assets and election uncertainty. Most stock offerings were follow-ons, totaling R\$54.6bn.

On the other hand, fixed-income issuances rose. Total issuance was R271bn and of that 41.5% was earmarked to increase capital. Of the total, almost 83% of private bonds issued indexed to the DI (Interbank rate).

The risk aversion in the secondary market is spilling over to the primary market. As investors seek higher premiums and shorter maturities, the distribution of new debt becomes more expensive. Therefore, total issuance in capital markets should keep declining as fewer companies seek to delay or cancel primary offers. Corporates may wait for a less uncertain scenario to resume operations. In February, the total volume issued of private bonds (debentures) was 73.2% lower compared to February 2022 (Exhibit 9). So far this year there have been no offerings in the equities and external market.

Exhibit 7: Government support avoided insolvencies in 2020

Total bankruptcies per company size

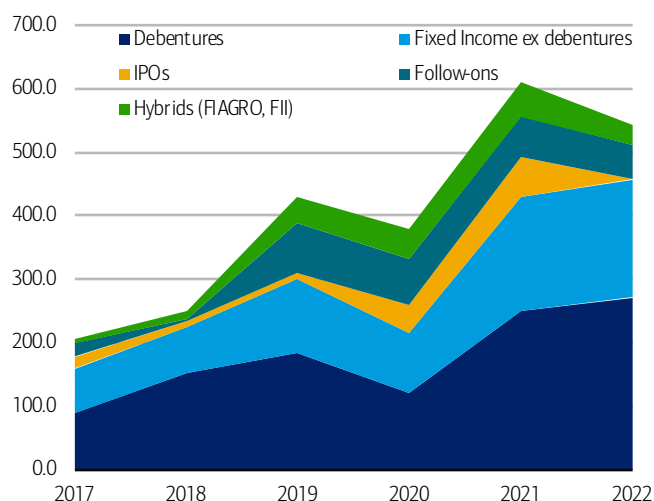


Source: BofA Global Research, Serasa Experian.

BofA GLOBAL RESEARCH

Exhibit 8: New corporate issuances in the equities capital market were practically null in 2022...

... as high rates benefit fixed income assets, such as debentures. Total issuances (R\$ bn).

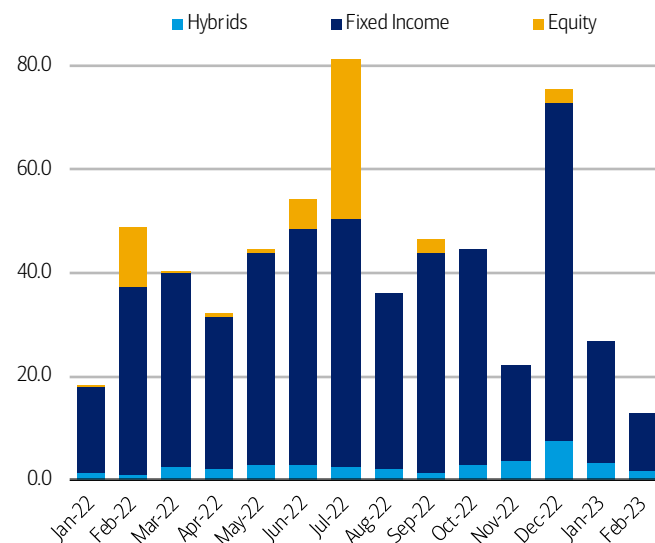


Source: BofA Global Research, Anbima.

BofA GLOBAL RESEARCH

Exhibit 9: Issuances are being cancelled or postponed in 2023...

... as corporates wait for a better economic scenario. Total issuances (R\$bn).



Source: BofA Global Research, Anbima.

BofA GLOBAL RESEARCH

Given the current scenario, the slowdown in corporate credit will likely hamper productivity. Without credit concessions, the productivity capacity gains would be limited by the firms' readiness to self-finance operations.

3. What is happening to NPLs?

Another element holding back credit concessions is the sharp increase in Non-Performing Loans (NPLs). Loan conditions have worsened and spreads have surged as inflation accelerated. In fact, households' delinquency rate on non-earmarked loans rose to 6.1% in January, a level not seen since June 2016. Though companies' delinquency rate on non-earmarked credit remains at a reasonable level (at 2.3%, yet in an upward trend), loans represent about 40% of total corporate funding. Debt securities' share on funding has been increasing since 2016 and reached a peak of 25% in January 2023.

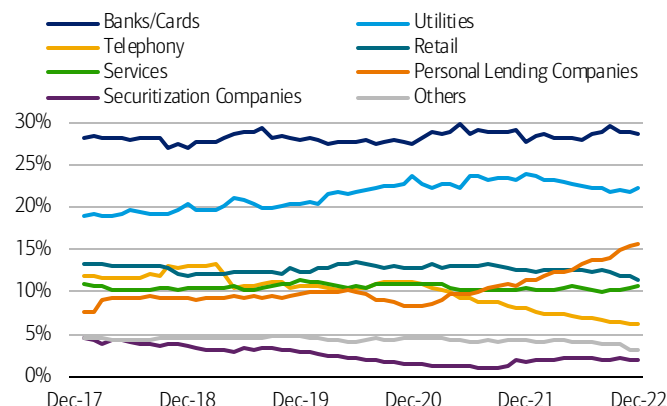
Understanding the household credit default rate

To future gauge household default conditions we looked at the monthly Serasa Experian Consumer Delinquency Indicator. (The index considers an indebted consumer anyone with at least one unpaid loan in a month.)

Looking at the breakdown of household defaults, roughly 30% are in bank loans and credit card debt (See Exhibits 10 & 11 for the breakdown.), Utility bills account for around 22% of NPLs while debt with personal lending institutions totals 16% of NPLs. While bank and credit card consumer debt participation have been relatively stable since the end of 2020, loans from personal lending institutions increased meaningfully in the same period. Also NPLs on the loans from personal lending institutions increased the most in the same period.

Exhibit 10: Financing companies gaining relevance...

Sectors participation on total consumer default (%)

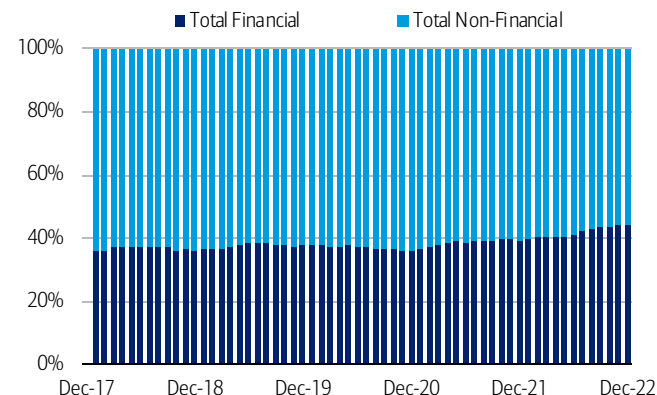


Source: BofA Global Research, Serasa

BofA GLOBAL RESEARCH

Exhibit 11: ...and impacting total NPL on financial loans

Sectors participation on total consumer default (%)



Source: BofA Global Research, Serasa

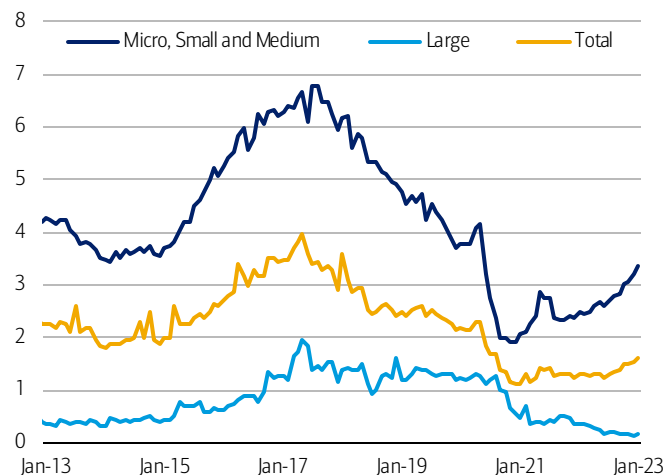
BofA GLOBAL RESEARCH

Corporate loan delinquency rates are on the rise

The surge in household debt has begun to impact companies' financial results in recent months. A look at consumers' capacity to pay credits shows that, as of December 2022, there were 6.4 million companies with at least one commitment due and not paid, according to Serasa Experian data. Of that total, about 89% corresponded to micro and small enterprises. This category also represented 71% of total bankruptcies through last year.

Exhibit 12: Corporate NPLs accelerating, pushed by SMEs

Non-performing loans by company size (%)

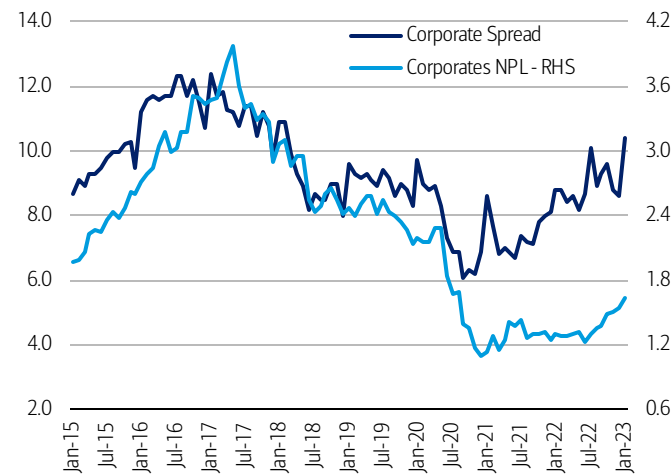


Source: BofA Global Research, BCB

BofA GLOBAL RESEARCH

Exhibit 13: Increased risks and rates pushing spreads and NPLs

Corporate spreads (%) and NPL (%)



Source: BofA Global Research, BCB

BofA GLOBAL RESEARCH

In January 2023, in seasonally adjusted terms, there was a 9 bp increase in corporates' NPL and the level reached 1.63%, mainly driven by Micro, Small and Medium enterprises (MSME's), in an upward trend since October 21 (Exhibit 12). Outstanding loans to corporates dropped 1.1% mom in January, with large companies' loans declining 1.5% mom and MSMEs by 0.7%. New loans for corporates went down by 26.2% mom. Spreads have also increased since the beginning of monetary tightening and have accelerated from 8.6pp in December 2022 to 10.4pp in January of 2023 (Exhibit 13).

A credit shortage was already expected given a muddle-through scenario for activity this year. Nevertheless, a surprise announcement from one of the biggest Brazilian retailers changed the dynamics of the private credit market.

4. Did the Americanas episode affect credit markets?

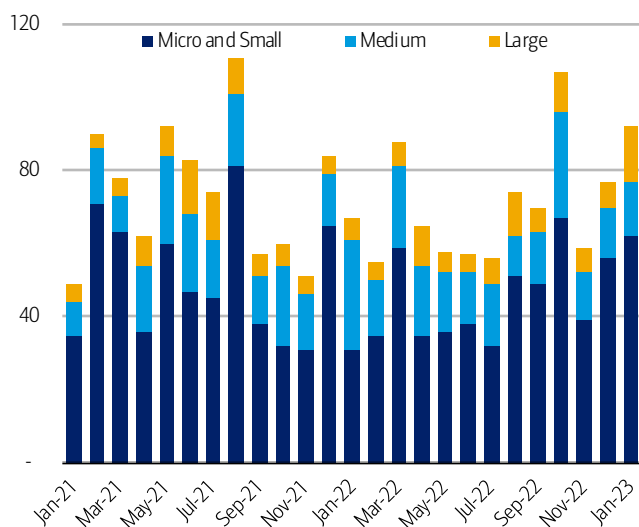
The credit market suffered a shock in the beginning of this year when retailer Americanas released a Material Fact on Jan. 11 2023, announcing inconsistencies in accounting entries impacting accounts payable in multiple years, including 2022. The company published a list of all creditors several weeks later and disclosed debt totaling R\$41.2bn.

Shortly after, the Anbima (Brazilian Association of Financial and Capital Market Institutions) IDA Index – which represents market prices of corporate bond portfolios with the most liquid debentures -- fell by 1.28%. Excluding Americanas' debentures, the index would have risen by 0.13%, a sign that investors thought that the companies woes didn't affect other bonds. However, as days passed, the market's perception of risk became more negative.

Following Americanas' announcement, several negative headlines regarding other large enterprises hit the news. According to data from Serasa Experian, 92 companies filed for judicial reorganization in January 2023, increasing 19.5% mom and 37.3% yoy. The data showed that large companies represented a bigger share of total reorganizations filed. In 2022, they comprised an average of 10.9% of the total, while in January 2023 this share rose to 16.3% (Exhibit 14).

Exhibit 14: Companies are signaling major difficulties in 2023

Total number of files for judicial reorganization per month

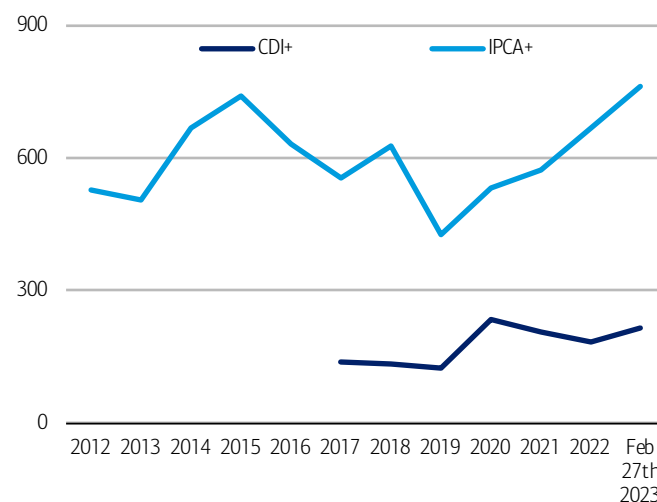


Source: BofA Global Research, Serasa Experian.

BofA GLOBAL RESEARCH

Exhibit 15: Increasing spreads in Brazilian debentures... (in bps)

...reflect the risk aversion sentiment in the domestic market



Source: BofA Global Research, Anbima.

BofA GLOBAL RESEARCH

The increased risk of default has led to a sell-off and drove spreads wider. A new Anbima rule, which went into effect on January 2, also increased the visibility of private credit spreads by mandating that brokerage firms reveal the market price of each asset class in their portfolios.

An analysis of the IDA Index shows the spread increase in Brazilian debentures. Current market spreads for debentures linked to the CDI plus spread (CDI+) are above 200bp over the reference rate. Current market spreads for inflation-linked debentures are above 750bp over IPCA (Exhibit 15). It is worth noting that this measure does not include distressed debentures, such as the ones of Americanas (AMERBZ) and Light

(LIGHTBZ), for example.

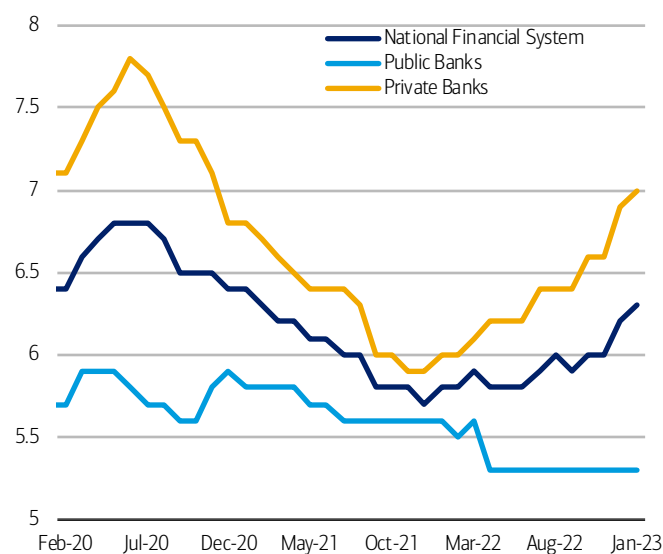
Private Banks: Skating on thin ice

In response to current market conditions and, more specifically, as another consequence of the Americanas news, major Brazilian banks provisioned 100% of their loan exposure in the last quarter (while bankruptcy protection requires banks to provision at least 30%)². Most Americanas loans were short-term and the total provisioning related to the retailer amounted to at least R\$9.5bn. Provisioning in relation to the total portfolio of the National Financial System had already been happening since December 2021, as seen in Exhibit 16, but the increase curve steepened in recent months. As default rates continue to rise, banks could maintain (or further increase) provisions in future quarters.

Another sign that banks are becoming more conservative is the composition of loans. Within the activity slowdown seen in the 2H22, concessions of non-earmarked credit to households increased for secured loans, such as payroll deducted personal credit and financing of goods in general (collateralized loans). On the other hand, unsecured loans, as personal credit without payroll deduction, are declining (Exhibit 17).

Exhibit 16: Banks provisioning more amid high default rates

Provisions over portfolio (%)

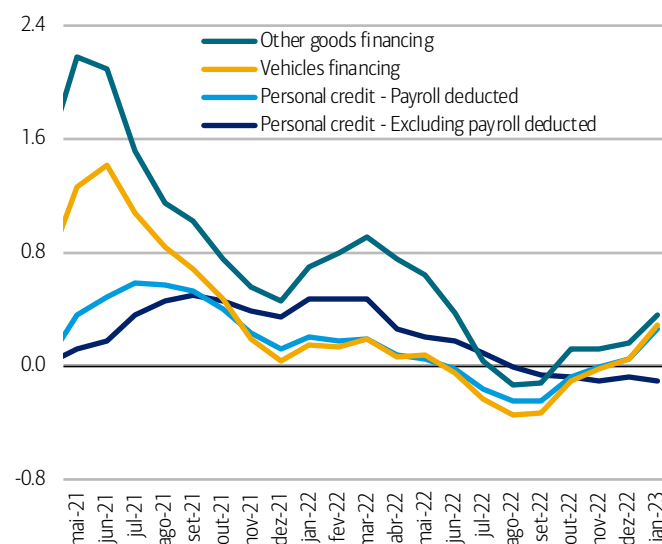


Source: BofA Global Research, BCB.

BofA GLOBAL RESEARCH

Exhibit 17: Unsecured loans drop as lending risks increase

Non-earmarked new operations to households (3mma yoy%)



Source: BofA Global Research, BCB.

BofA GLOBAL RESEARCH

As banks become more conservative in lending and as debt spreads increase, credit conditions will become tighter and tighter. All signs point to increasing indebtedness, especially among micro and small companies, and more restrictive conditions for large companies' funding.

Public Banks: New behavior expected

Public banks scaled back and registered a decline in their lending share from 2017 until just before the pandemic. Recent data suggests that loan growth from public and private banks have gotten closer (Exhibit 18).

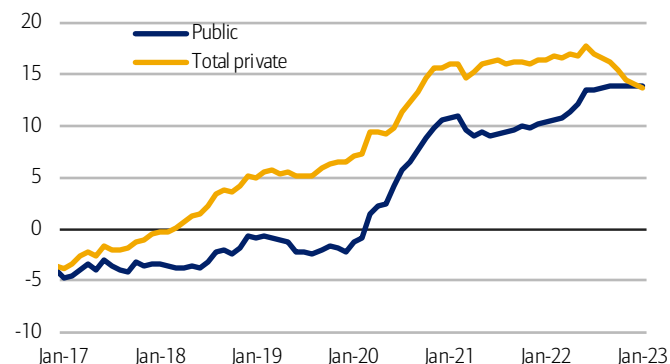
That is considerably different when we compare public and private banks regarding NPL rates. Amid the increasing default context, mainly due to higher household NPL and indebtedness, private banks were the most affected (Exhibit 19), with a consistent increase in NPLs since the last quarter of 2021. Meanwhile, public banks faced some

² The provisioning timetable must follow BCB guidelines, which determines that a loan 180 days overdue should be 100% provisioned.

volatility, but only around the same NPL level of 2.1%, with a more negative trend materializing on the second half of the year. This reinforces the retraction in public bank behavior in the last 8 years, with lower exposure to higher risk credit.

Exhibit 18: Public banks should increase participation ahead

% yoy growth

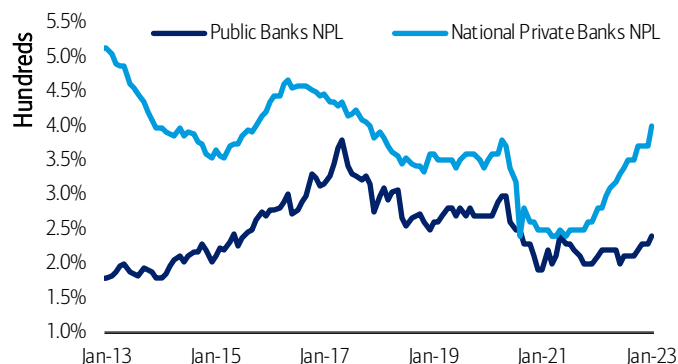


Source: BofA Global Research estimates, BCB.

BofA GLOBAL RESEARCH

Exhibit 19: NPLs going back up, but mainly in private banks

Public and Private banks' NPLs (%)



Source: BofA Global Research, BCB.

BofA GLOBAL RESEARCH

The dynamic is expected to change in the next four years as the new administration has said that it intends to use public banks and SOEs (State-owned enterprises) more actively in its intent to support stronger GDP growth numbers in the country. As a result, credit concessions from public banks should increase meaningfully, with this lower NPL rate in public banks supporting such a dynamic. Among the public banks (Caixa, Banco do Brasil and BNDES), the BNDES should be the biggest highlight in terms of more lending ahead.

5. So, how tight are financial conditions?

Financial conditions in Brazil remain tight. Despite the reduction in the 1-year ex-ante real rate, which occurred at the beginning of March and has been beneficial to financial conditions, tightness continues at record high levels – and close to levels not seen since the 2015-16 recession. This time, however, higher global rates are supporting the restricted environment.

More recently, external financial stability concerns, derived from the risk of contagion in the US financial system, have led to lower expectations of rate increases by the Fed going forward and lower commodity prices. This is supportive to financial conditions domestically.

Regarding exposure to the events in the US banking system, Brazilian banks rely on strong balance sheets and comfortable liquidity position. For more on domestic banking sector, see [Banks - Brazil: Unrealized losses on HTM portfolios seem manageable 14 March 2023](#).

Under these circumstances, we forecast a slowdown in the credit market ahead. The pace of the slowdown, however, is still unclear. Debt renegotiation programs promoted by the government, as well as the role of public banks in the current administration, are key points.

BCB to cut rates sooner

We are revising our Selic forecast for 2023YE to 11.0%, from 11.75%. We believe the Central Bank will frontload the easing cycle and start cutting rates in May (instead of August) with a 25bp move. This would be followed by consecutive cuts of 50bp, reaching

the same budget as we had before of 425bps. We continue to expect the terminal Selic at 9.5% in 2024 year-end.

Even though the new fiscal rule has not yet been approved in Congress, there has been a reduction of uncertainty regarding the fiscal accounts, which should change the board's assessment on balance of risks. Indeed, we expect the March statement to present risks for inflation forecasts tilted to the downside, on the back of continuously deteriorating activity, the downturn in the labor market, decelerating, concerns regarding the domestic credit conditions and the deterioration in the external banking sector.

Lower inflation and a deceleration in underlying measures should help the BCB to start cutting, even though certain price increases (such as the return of federal taxes on gasoline and ethanol) should keep headline inflation above target levels this year.

In our view, inflation expectations are the biggest obstacle to an earlier cutting cycle. Longer horizon inflation expectations have been increasing, mainly driven by the potential change in the inflation target. We expect the 2024 target to be increased from 3% to 4%, following a declining path in subsequent years. Under that assumption, 2024 year-end inflation should reach target-levels, opening room for further cuts this year. Although expectations may suffer in the short-term, the announcement of the new fiscal framework should reduce uncertainty and risk perception.

Appendix 1: Structural advancements in the banking sector

Brazil has one of the most sophisticated banking systems among emerging market economies, following changes and advancements seen in more developed economies. Moreover, domestic financial inclusion is way above peers, with 79% of the population (15 years old or older) currently having active bank accounts, versus 49% in Argentina and 37% in Mexico.

However, the credit market has been historically incipient in the country, with a low credit to private sector/GDP ratio. When compared to developed economies (e.g., Euro Area and OECD), Brazil is way behind concerning the ratio: while the Euro Zone and OECD countries had 93.7% and 160.7% (in 2020 numbers), respectively, Brazil was still at 70% in 2020, as reported by the World Bank. The country has space to expand concessions even when considered among some of its peers, as China (182.9%), Chile (124.6%) and South Africa (111.2%). Institutional changes, through regulatory advancements, are key in such process.

The Open Finance system (deemed to foster competition and lower interest rates) has been put forward since 2020 but is only expected to fully materialize in the coming years, supporting further optimism. The concept proposes the creation of a banking environment where more data is shared between institutions, with the prospect of improvements in services and products for the customer, especially through the reduction of information asymmetries and the resulting increase in competition – intensifying the scenario observed with the rise of fintechs.

A market that is expected to be most benefited by such changes is the credit one. That is because changes should improve the capabilities of banks to offer more precise credit offers, using data from all the credit history of the clients, from different banks – if they allow for the sharing of this data. Amid this expected higher competition for clients, lower spreads and ampler credit access should be positive consequences.

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.bofamli.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 (HKSF); 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 Investment Industry Regulatory Organization of Canada; 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 HKSF; 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:

Copyright 2023 Bank of America Corporation. All rights reserved. iQDatabase® is a registered service mark of Bank of America Corporation. This information is prepared for the use of BofA Securities clients and may not be redistributed, retransmitted or disclosed, in whole or in part, or in any form or manner, without the express written consent of BofA Securities. BofA Global Research information is distributed simultaneously to internal and client websites and other portals by BofA Securities and is not publicly-available material. Any unauthorized use or disclosure is prohibited. Receipt and review of this information constitutes your agreement not to redistribute, retransmit, or disclose to others the contents, opinions, conclusion, or information contained herein (including any investment recommendations, estimates or price targets) without first obtaining express permission from an authorized officer of BofA Securities.

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 or 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.