21 November 2017

Argentina Strategy

Argentina's disinflation: fighting an army with a bow

Argentina Strategy & Economics

Alejo Costa
Alejo.Costa@btgpactual.com
+54 11 3754 0945

Carolina Gialdi
Carolina.Gialdi@btgpactual.com
+54 11 3754 0947

Argentina Economics

Andrés Borenstein
Andres.Borenstein@btgpactual.com
+54 11 3754 0908

Governor Sturzenegger fights an army with a broken bow & arrow

We believe the disinflation process can only continue alongside fiscal consolidation, and update our 2018 forecast from 16% to 17.5%. The very gradual pace of fiscal consolidation and the adjustment in regulated prices, set a high floor for the disinflation process, above BCRA's target. We expect the BCRA to persist with the current targets, at least in the short term, maintaining a hawkish stance with real rates around 10% in 1H18, but that stance will have a very mild impact on inflation, affecting prices mostly through a stronger ARS, reducing tradable inflation and in turn reducing demand for non-tradables. Inflation will remain persistent, and the BCRA risks losing credibility, with political pressure mounting up by 2H18.

Fiscal dominance and regulated prices set high floor for inflation

In our view, monetary policy on its own will not be able to "disinflate". The use of a Taylor Rule needs a fiscal anchor, as new-Keynesian models suggest under forward-looking expectations. Any fiscal deviation will lead to higher inflation, with higher transfers to the Treasury as a result. Mopping up liquidity through Lebac bills will be short-lived in our view. A higher stock of Lebacs will require higher real rates, with higher consumption in the future, and future pressure on inflation. Regulated prices will add 4 points to 2018 inflation. Beyond these issues, the transmission mechanism is weak. Higher policy rates are not passing through to higher "market" rates, as local banks and companies obtain funds abroad, with credit booming despite the hawkish stance, and public institutions are lending aggressively. In this context, we believe inflation expectations will increase, with higher wage demands in 2Q18, around 17%.

Hawkish stance will continue in 1H18, softer in 2H18

We see the current hawkish stance continuing in 1H18, with real rates of ~10% and average inflation of ~1.4% m/m. We expect a policy rate of 26% by mid-2018, down to 25% by end-2018. We estimate a Taylor Rule for BCRA's behavior, using a Kalman filter to extract the "neutral" real rate behind BCRA's decisions. We find that neutral rate has shifted from 5% to 9%, showing BCRA's time-varying attitude to fight inflation, and expect the current stance to persist in 1H18, though we assign high chances to a change in BCRA's policy in 2H18 despite persistent inflation. We use a simple model to illustrate the difficulties behind the use of BCRA's Taylor rule in the current backdrop.

Local strategy: ArgPom20, ARS Discount above 5.5%

We see the BCRA persisting with its hawkish stance in 1H18, making floaters attractive. The ArgPom20 (BUY) offers policy rate minus 370bps, and we expect real rates on Lebac bills of ~10% in 1H18, offering ~6% for ArgPom. We expect the BCRA to tone down the hawkish stance in 2H18, and we like ARS Discounts (BUY) at 5.5% to complement this view. We expect an FX of USDARS20.5 by end-2018, USDARS18.8 by mid-2018. We maintain Buenos22 (BUY), offering good carry among Badlar-tied.

ANALYST CERTIFICATION AND REQUIRED DISCLOSURES BEGIN ON PAGE 16

Argentina's "disinflation": fighting an army with a bow

Alejo Costa
Alejo.Costa@btgpactual.com

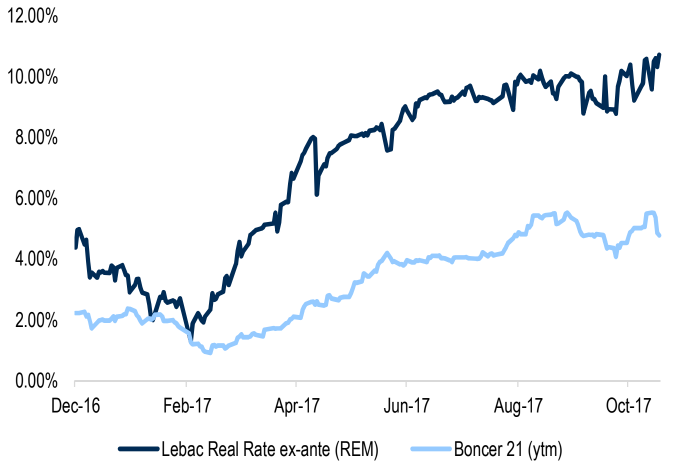
We dig into Argentina's disinflation process, which has disappointed in the last few months, with inflation remaining almost at the same level since 3Q16, and update our inflation expectation for 2018 to 17.5% from 16%. We believe a slow fiscal consolidation, the impact of adjustment in regulated prices, and a very weak transmission mechanism, hampered by lower funding costs abroad, constrain the ability of pure monetary policy to reduce inflation. For 2018, only the expectations channel will be at play, and we believe inflation will end 5 points below 2017 inflation, at 17.5%, despite the BCRA following a hawkish stance, at least in 1H18.

Argentina's BCRA will make today its second monetary policy decision of the month, amid a heated debate over the effectiveness of BCRA's policy following the latest CPI prints, which have eroded BCRA's credibility. We believe the BCRA will remain hawkish in 1H18, in an effort to preserve credibility, as we only expect a mild reduction in inflation, to 17.5%, from 23.5% in 2017. On those lines, we expect a hold today. The recent debate has nevertheless hurt BCRA's credibility, accused of being excessively hawkish with no disinflation gains and some output loss, and will likely lead to wage negotiations around 17% in 2018. We expect the Central Bank to become less hawkish in 2H18, with real rates compressing to 7.5%, in part pressured by the costs of the hawkish stance, but mostly from political pressure mounting up.

High rates have also put pressure on the current account through an overvalued currency, with portfolio flows funding the current account, expected to reach 6% in 2018. As we mentioned in a previous report (see Current account and the FX: mind the (funding) gap), Argentina is more exposed than other EM countries to potential sudden stops, and the combination of a hawkish monetary stance with a gradual fiscal consolidation explains a good chunk of the external imbalance. We expect almost USD10bn of portfolio flows in 2018, driven by high rates, in line with the flows observed in 2017. Argentina's high real rate, however, expose the country to global shocks, and limit the potential response, as rates are already too high. Argentina's high beta to EM has been driven by that fragility, and valuations should carry a load for that risk, something we mentioned in a previous report.

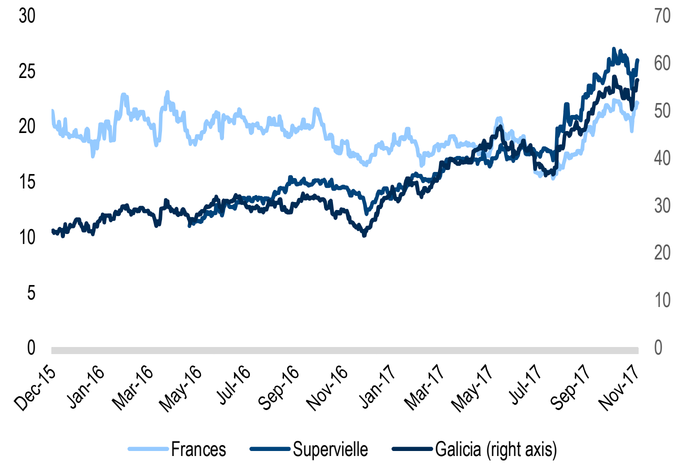
Rates for off-shore funding have been going down relative to 2015 and 2016, limiting monetary policy's transmission mechanism. Equity costs have gone down, as well as USD spreads. Real rates off-shore have remained around 4%-6%, despite Lebac rates moving to 10% ex-ante real rates (see chart 2). Inflation-indexed credit (UVA) is growing at a fast pace, with private banks looking to capture market share, and public banks and ANSES are offering loans at attractive, subsidized rates. For many consumers looking for medium-term loans, any rate is a better rate than past rates, as those loans were not even offered before. All these reveals the weak transmission mechanism from Lebac rates to off-shore rates, and shows average "market" rates have gone down despite higher policy rates, explaining the rapid pace of growth of credit. The policy rate seems to operate purely through i) a stronger FX and lower tradable prices, reducing demand for non-tradable goods; ii) expectations.

Chart 1: Ex-ante Lebac real rate vs Boncer21



Source: BTG Pactual, Bloomberg

Chart 2: Local banks' ADR prices



Source: BTG Pactual, Bloomberg

To look at the current disinflation process, we start with some stylized facts:

• Monthly pure "core" inflation, after subtracting the first and second order effects of regulated prices, has been persistently around 1.6% m/m on average since August 2016, 21% in annualized terms (see chart 10).

• The stock of BCRA's Lebac bills and Repo has increased 64% in terms of GDP since end-2015, and almost 30% since end-2016, and represents more than 8% of GDP (see chart 5).

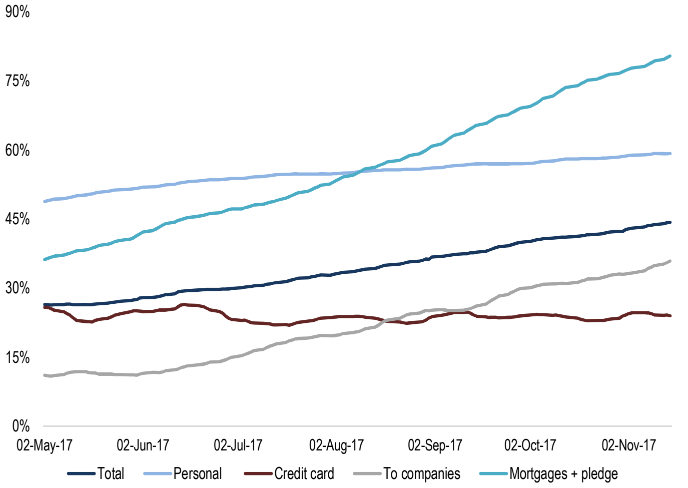
• The pace of monetary aggregates is around 36% y/y for M2 and 27% for high-powered aggregated, 12.5 points and 3.5 points above our inflation forecast for 2017, at 23.5% y/y.

• Credit is growing at a pace close to 44% y/y, 20.5% points in real terms. Credit growth is mostly concentrated in inflation-linked loans, mainly mortgages and pledge loans but also personal loans, showing weak traction from monetary policy into credit growth.

• The financial deficit has been around 6% since, 5.9% in 2016, 6.2% in 2017, and 5.5% in 2018, and the primary deficit remains high, 4.2% in 2017, down to 3.2% in 2018.

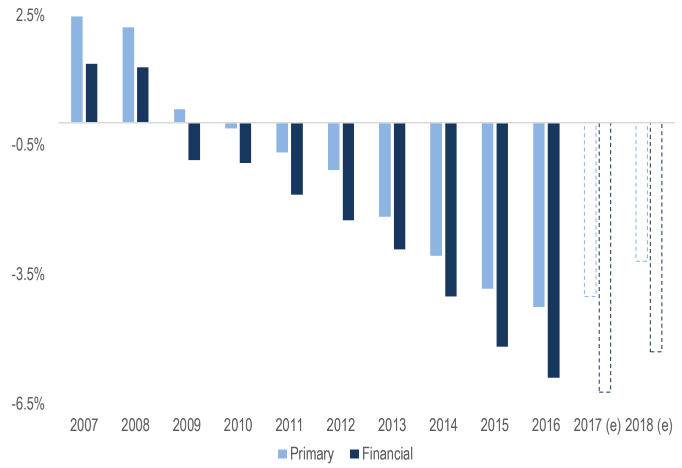
The evidence shows BCRA's policy is short-handed. Even if the BCRA pursues an active Taylor rule, the transmission mechanism is likely weak, and consistency with fiscal policy is necessary to achieve the targets. Furthermore, the additional pressure from adjustments in regulated prices, in a context of high inertial inflation in expenditures and wage negotiations, makes BCRA's targets too ambitious, at the potential cost of losing credibility and political support. In the current context, higher rates could even lead to higher inflation expectations, as the stock of Lebac bills accumulates at a fast pace, increasing future consumption. The fiscal consolidation must act as an anchor if the BCRA focuses exclusively on an interest rate rule.

Chart 3: Loans-to-private sector in ARS (yoy, average last 15 days)



Source: BTG Pactual, Central Bank of Argentina

Chart 4: Central Government's fiscal balance-to-GDP

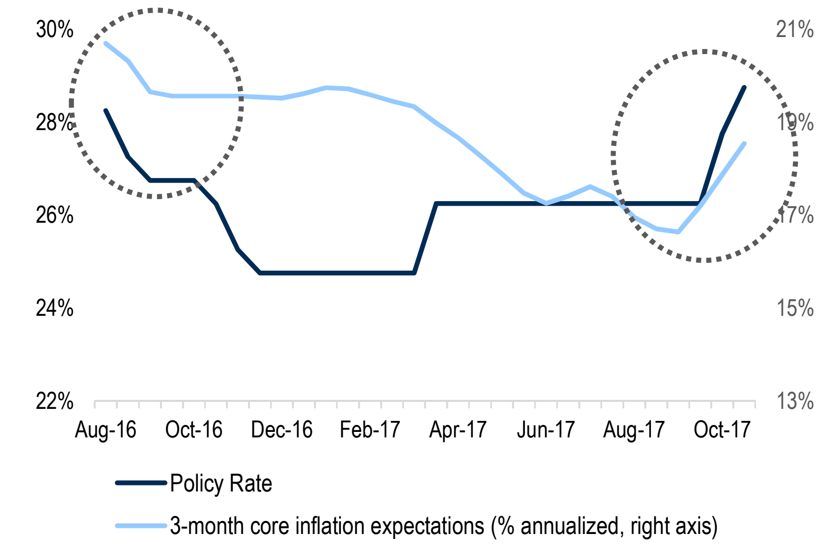


Source: BTG Pactual, Ministry of Public Finance

BCRA's Taylor Rule: active, yet so far powerless

In the last two hikes, Argentina's BCRA seems to have returned to an "active" interest rate rule (see chart 5), reacting more than one-to-one to changes in inflation expectations, in an effort to anchor inflation expectations for 2018. The hawkish stance has not delivered the expected result in 2017, in our view as a result of a weak transmission mechanism and fiscal dominance limiting the pace of the disinflation process, added to one-offs from adjustments in regulated priced fueling inflation.

Chart 5: BCRA's policy rate (%) and 3-month inflation expectations



Source: BCRA's REM, BCRA

We believe that as long as Argentina's high fiscal deficit remains, the disinflation process will be slow, and BCRA's hawkishness will only lead to a stronger

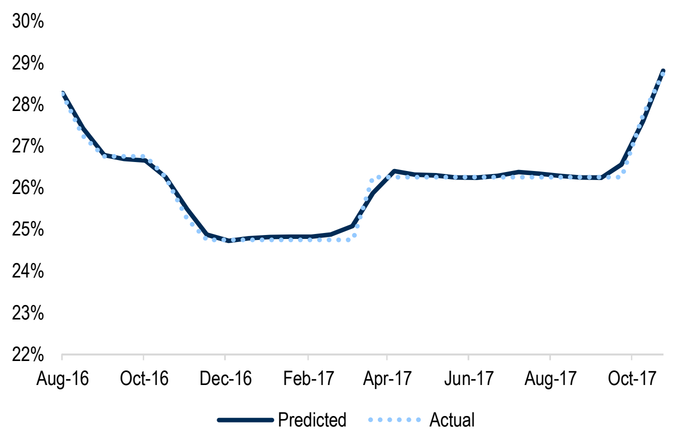
currency with minor disinflation gains, mostly driven by lower tradable inflation from a strong ARS. Furthermore, the use of a Taylor rule could backfire, leading to inflation levels above current expectations, with a higher stock of Lebac bills inducing larger monetary expansions in the future. The use of explicit moving FX bands could solve the indeterminacy problem of current interest rate policy, anchoring expectations throughout the fiscal consolidation with lower real rates, though we believe the BCRA will not adopt such policy, concerned about failed experiments in the past.

We estimate a Taylor rule for recent BCRA policy, using a Kalman filter to obtain Argentina's neutral real rate behind the rule. Recent hikes suggest Argentina's central bank has re-adopted an interest rate rule. The central bank claims it looks at the difference between 3-month inflation expectations and its moving target, currently 1% m/m, as the main driver for interest rate policy. Though the central bank admits there is no explicit rule, we try to approximate its behavior using a "Taylor" rule for the interest rate i of the form:

$$i_t = \alpha i_{t-1} + (1-\alpha)[\bar{r}_t + \bar{\pi}_{t,t+3} + \beta({\pi^e}_{t,t+3} - \bar{\pi}_{t,t+3})] \quad (1)$$

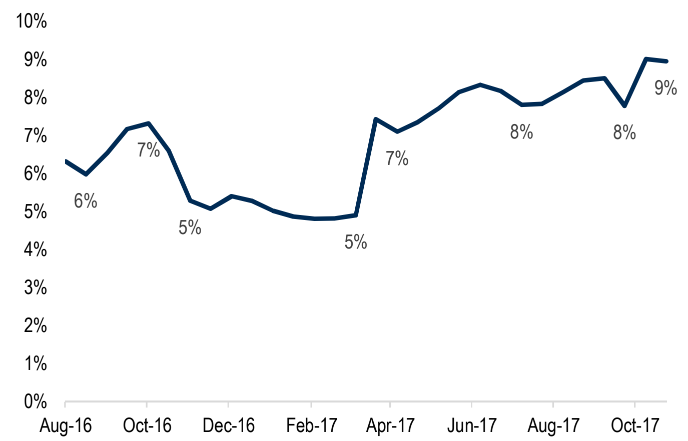
Where we assume some persistence, and refer to $\bar{r}_t$ as the "neutral" real interest rate behind current policy, an unobserved variable, and denote with bars the target. We use a Kalman filter to estimate the unobserved "neutral" rate, and find it has changed significantly, suggesting a time-varying rule, with the BCRA gradually adjusting (see chart 7). The neutral rate is now close to 9%, from 5% by end-2016, in line with Governor Sturzenegger's comments that a 5% real rate was consistent with the level of output by end-2016, though a higher rate would be required once the economy recovered.

Chart 6: BCRA's Policy Rate: actual vs. model predicted



Source: BTG Pactual, BCRA

Chart 7: Filtered-neutral real rate under BCRA's Taylor rule



Source: BTG Pactual

Our estimated rule has performed well, lagging behind to the tune of 100bps of hikes, but capturing the overall dynamic well (see chart 6). We fix the persistence parameter at 50%, and based on that, estimate a β of 1.4, significant at 1%, in line with the idea of an "active" Taylor rule. We don't include the output gap, which in alternative estimations of the rule is not significant. The central bank has not mentioned output as a relevant variable in statements, and we believe inflation and inflation expectations are the main drivers behind interest rate decisions.

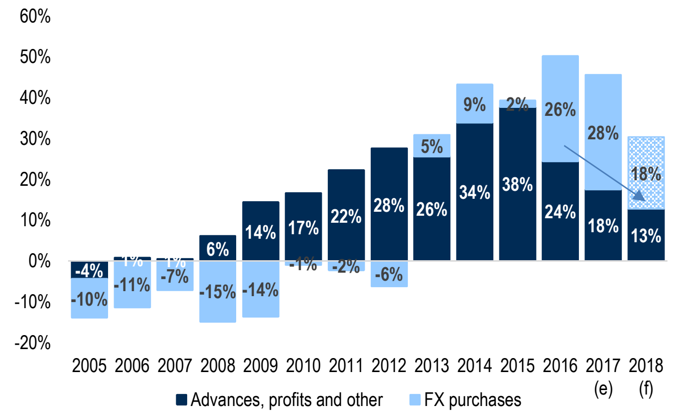
Using our estimated rule and our forecast of 17.5% inflation for 2018, we estimate a rate of 26% by mid-2018 and 25% by end-2018. We assume BCRA's stance remains as hawkish as today in 1H18, with inflation going down throughout the year due to lower inflation expectations in 2019. Our view of rates is slightly below Lebac's implicit forward rates, at 26.4% by mid-2018. We believe the BCRA will ease monetary policy in 3Q18, after wage negotiations, no longer pressured to anchor inflation expectations for 2018. Still, inflation will remain persistent and wage negotiations could surprise on the upside, so we are more comfortable with the front-end of the Lebac curve.

We also use a small model to show that under forward looking expectations, a Taylor rule is not enough to achieve targets. The model we use (see appendix) is a simple new-Keynesian model, which shows that under forward looking expectations, the old-Keynesian logic of higher rates reducing consumption and in turn reducing inflation, does not operate. Instead, under the new-Keynesian framework of forward looking expectations, an active Taylor rule with β>1 leads to an unstable solution where something else in addition to the rule is needed to induce determinacy. This is not a purely theoretical result. In the model, a credible fiscal path is needed to achieve the disinflation path target, as has been the case in countries like Peru, Colombia, or Brazil. The indeterminacy of the Taylor rule also opens a role for other pegs as anchors, such as FX bands, yet negative experiences in the past make its use unlikely. In the current framework, BCRA's policy has been forced to validate excessively high real rates to mop up liquidity from transfers to the Treasury, in the form of advances and FX purchases from FX proceeds. A credible crawling band for the FX, with a band that moves along inflation targets consistent with the fiscal consolidation, could put a cap the interest rate, while preventing a stronger real appreciation. However, we don't expect the BCRA to adopt the FX as anchor, preserving the flexibility to use it as an automatic stabilizer in case of global shocks.

BCRA's Taylor principle needs a fiscal anchor

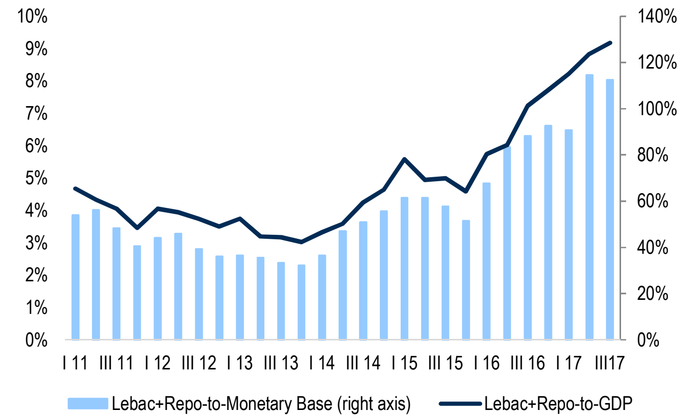
In our view, a credible fiscal consolidation path will be necessary to achieve the targets, and surprises on the fiscal side will lead to adjustments in inflation beyond expectations. As the small model suggests, fiscal policy and monetary policy will need to be mutually consistent with the targets, and we believe that is not currently the case. In our view, current inflation targets are not consistent with the fiscal consolidation path, which was modified from its original version, without any change in inflation targets. The dissonance between the two targets has a monetary corollary in BCRA transfers to the Treasury, either through direct loans or purchasing USD proceeds from debt issuances (see chart 8). Direct loans will be 18% of the monetary base in 2017, and we estimate they will go down to 13% in 2018. The BCRA could afford such an expansion, but will need to sterilize part of the expansion from FX purchases, in a context where BCRA bills already grow at a fast pace (see chart 9).

Chart 8: BCRA transfers to Treasury as % of Monetary Base



Source: BCRA

Chart 9: Lebac and Repo Liabilities as a fraction of MB and GDP



Source: BCRA, INDEC, BTG Pactual

The recent decision of the Finance Ministry to ban insurance companies from purchasing Lebac bills points to reducing funding costs whilst also reducing the pace of reserve accumulation. In the last year, the dynamic of deficit financing and inflation targeting has required the BCRA to purchase foreign currency proceeds from the Treasury to prevent an appreciation of the currency, later on sterilizing a good chunk through Lebac bills. In practice, that has meant that a fraction of the financing to the Treasury has indirectly come from local players buying Lebac bills, with the BCRA accumulating reserves as the counterpart of higher debt with non-residents. That mechanic, however, in the context of inflation targeting, has required high real rates, which have leaked into higher funding costs for the Treasury in local currency. The move to ban insurance companies from buying Lebac bills points at creating a natural buyer for ARS Treasury bills, cutting out the middle man, and also circumventing the high rate of Lebac bills, though in a controversial way. We believe the result will be a lower level of debt issuances abroad and a lower accumulation of reserves, reducing sterilization needs, but also reducing Lebacs' investor base, with a neutral result.

Despite the challenges, we don't expect the Central Bank to abandon the current stance in the short term, and believe a faster disinflation path under the current backdrop will require either a stronger currency or excessively high rates. In our view, both solutions would be short-lasted, as an overvalued currency would lead to a larger current account deficit, and eventually to a strong FX correction with higher inflation. Higher real rates for a sustained period of time would also lead to higher inflation, as the quasifiscal deficit would mount up, with higher inflation eventually diluting the value of debt. We believe the BCRA will insist with the current hawkish stance in 1H18, opening an attractive window for carry trades, though persistently high inflation could eventually lead to policy adjustments down the road, particularly after wage negotiations, in 3Q18.

Regulated prices add another hurdle, reveal persistent "pure" inflation

Carolina Gialdi
Carolina.Gialdi@btgpactual.com

We measure inflation that could have been affected by Central Bank's monetary policy ("pure" inflation) by subtracting from headline inflation both the direct and indirect impact of the adjustment of some regulated prices ("lagged" inflation).

We believe this is a better measure to assess the effectiveness of monetary policy in lowering inflation. Core inflation, as reported by INDEC, does not capture properly these "pure" inflation dynamics, in our view, as it remains affected by tariff increments through their indirect impact on the remaining goods and services. One of the drivers of inflation in the last two years has been a correction of relative prices, between utility tariffs, public transportation tariffs and gasoline prices relative to the rest of the CPI. Increments in these regulated prices, determined by the government, were above overall inflation, as they "caught" up with the rest of the CPI. We believe this inflation driver was mostly outside the control of monetary policy, and represents a validation of unrecognized inflation of past years, rather than being part of current inflation dynamics.

We define "lagged" inflation as inflation driven by the increment, in "excess" of running inflation, of utilities, public transportation and gasoline prices. We include both their direct incidence on the CPI as well as the second round effects through the remaining prices, which we capture through the wholesale index. We define "pure" inflation as the difference between observed inflation and "lagged" inflation. Our calculation is on a monthly basis using a 3-month moving average. The job involved:

i) **recording all 2016-2017 electricity, gas, water, public transportation and gasoline prices' average increments,**

ii) **computing the direct incidence of each increment in the CPI after adjusting the CPI weights accordingly for accumulated inflation, as the CPI is a Laspeyres index;**

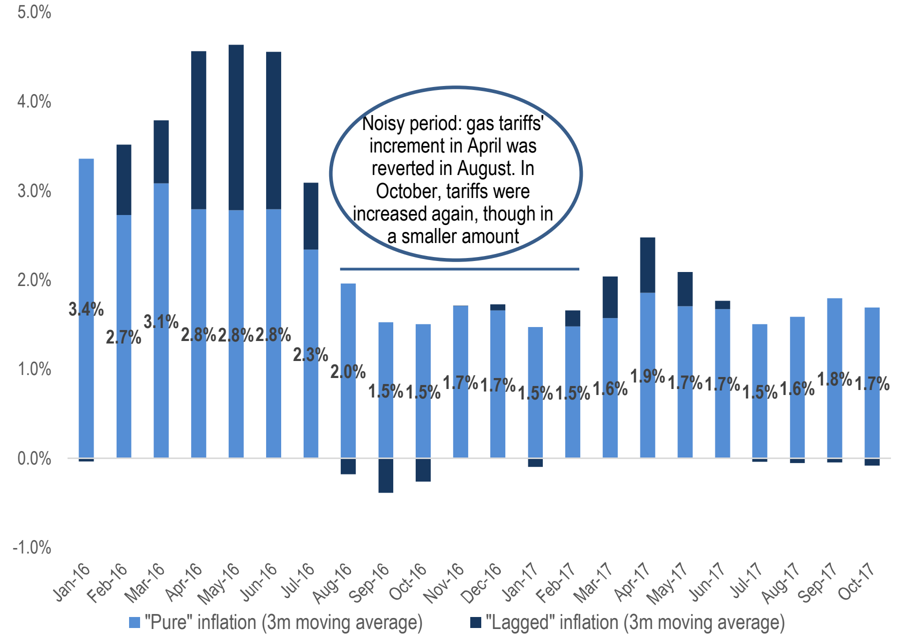
iii) **calculating the incidence on the wholesale price index to measure the indirect impact, using a similar procedure. We assume the remaining prices of the CPI move one-to-one with the incidence of the wholesale prices. We assume this indirect impact takes place within the three months following the tariff increment.**

iv) **building a counterfactual "normal" inflation for regulated prices. Our measured impact of regulated price increments will be the excess to this normal inflation, to capture the impact of relative price changes. We calculate this "normal regulated prices'" inflation as average core inflation of the past three months net of the indirect impact of regulated price increments;**

v) **defining "lagged" inflation as the direct incidence on the CPI plus the indirect incidence through the wholesale price index of the regulated price increments in excess of their counterfactual inflation;**

vi) **finally, calculating "pure" inflation as observed inflation net of "lagged" inflation, on a monthly, 3-month moving average basis.**

Chart 10: "Pure" inflation vs "lagged" (tariffs/gasoline prices) incidence: 3m moving average



Source: BTG Pactual

"Pure" inflation was 30% in 2016, and 19.9% estimated in 2017, though the two full years are a weak comparison, in our view, as 1H16 inflation was affected by other large one-off price shocks, mainly the unification of the FX market, as well as the elimination of export tariffs and quotas affecting food prices. Most of those price increments are much outside the scope of the Central Bank's monetary policy during that period. They mainly affected dynamics during 1H16. Pure inflation is the result of headline inflation of 39% 2016 and expected headline inflation of 23.5% in 2017, with the total incidence of utilities, public transport and gasoline prices' increments amounting to 6.5% in 2016 and 3.1% in 2017.

Average 2H16 "pure" inflation is a better comparison with 2017 "pure" inflation, with most of the price shocks following the liberalization of the capital and current account having been left behind. 2H16 monthly prints are noisy because they were affected in August-September by a reversion in the increment of gas tariffs that took place in April, increased back again in October, though in a smaller amount than the original increase. We control for this in our calculation of "pure inflation", by cleaning-up only for the direct impact on the CPI of the tariff changes in these months, assuming no additional indirect impact, as prices had likely adjusted to April's tariff increment.

Inflation does not show signs of deceleration, in our view: average "pure" inflation remains unchanged since 2H16, 1.6% m/m in 2H16, the same as in 2017, 1.6%m/m. This shows inflation is showing a strong persistence, at an average level of 1.6% monthly rate. The Central Bank has had a more hawkish stance on average during 2017, particularly since July, with average implicit real rates around 10%, compared to 5% in 2H16. However, so far that seems to have had no visible impact.

Summing it all up

We identify several issues behind the current persistence of inflation around 1.6% m/m:

- The real interest rate in Lebacs has minor traction in average “market” rates. Argentina’s dynamics since early 2016 imply tighter spreads, with lower USD rates and higher domestic rates. For banks, the ability to fund themselves offshore means “average” rates have actually gone down, creating incentives for higher intermediation. Financial intermediation has also been channeled by public institutions, through ANSES, as well as public banks, offering credit at subsidized rates relative to private banks. All in, the “average” rate has not only been below policy rates, but has not followed suit changes in the Lebac rate, hampering the power of the Lebac rate to pass-through to other rates. As a result, lending has increased at a fast pace.

- The fiscal consolidation is very gradual, with larger government and BCRA debt as a result of offshore funding, and direct BCRA transfers to the Treasury. As the monetary corollary, transfers to the Treasury in the form of advances and USD purchases remain high, and sterilization requires a high real rate.

- Regulated prices set a high bar for inflation, adding around 4 points a year from direct and indirect effects.

- Expectations need to be anchored among unions to be successful. Unions set wages, and hence a large chunk of non-tradable inflation for the year, between March and June of each year. Though unions form expectations like anybody else, they are risk-averse and demand a premium over expectations, particularly after missing from below two years in a row. We believe current dynamics will lead to negotiations around 17% in 2018, above our previous estimate, and 2017’s inflation, around 23.5%, will beat 2017 negotiations by around 3 points, with unions demanding compensations from trigger clauses.

- Credibility is eroded even among peers, despite Governor Sturzenegger’s strong image. Many local analysts, including some in the Treasury, believe Sturzenegger’s stance has been too hawkish with almost no disinflation gain, and the BCRA will be under pressure in 2018.

- The targets were too ambitious, inconsistent with fiscal policy, particularly after the fiscal consolidation was delayed, and the adjustment in regulated prices was not fully incorporated.

Is there a solution to BCRA’s difficulties? In our view there is not much to do purely from the Central Bank side, as long as the pace of the fiscal consolidation is set in stone and regulated prices require further adjustments. All that is left is simply to admit that the fiscal consolidation will be slower, trying to anchor expectations around a reasonable level to gain credibility, yet with a slower disinflation path than originally announced. Furthermore, unless the fiscal consolidation gains credibility, an alternative anchor could be used, such as moving FX bands, to induce inflation towards the target, as an "equilibrium" selection tool that prevents neo-Fisherian results where higher rates lead to higher inflation than expected. However, using the FX as an anchor would also carry over an overvalued currency. Alternatively, the BCRA could keep rates high in real terms, further appreciating the real exchange rate, using the FX as the *de facto* nominal anchor, yet at the cost of an overvalued currency, with an eventual correction of the policy-driven misalignment down the road.

We upward adjust our inflation forecast to 17.5% from 16%. All in, we believe inflation will be higher than expected as a result of i) 17% wage adjustments in 2018, driven by higher inertial inflation and weaker credibility; ii) a still loose fiscal stance; iii) no space for a large real appreciation, with the current account deficit already reaching 6% of GDP; iv) almost 4 points of pure inflation from regulated prices; v) a very weak transmission mechanism in monetary policy.

Strategy: Strong ARS until May, BCRA's stance favors floaters

From a positive standpoint, we believe the BCRA will persist, at least for a few months, with the current stance, under the assumption that the current policy works, yet with a lag. We don't expect a less hawkish stance in 1H18, but believe that as inflation remains persistent the BCRA could be tempted to mix tools. For investors, Sturzenegger's commitment to pure IT is nevertheless good news. Real rates will remain high, and the ARS will remain strong, favoring positions in floaters for 1H18. The risk of abandoning such hawkish stance also opens the door for inflation-linked instruments, in particular ARS Discounts, to perform well, as real rates are already high, particularly in offshore instruments, and the back-end of the linkers curve has overreacted.

We prefer ArgPom20, 35-day Lebac bills for local clients, and ARS Discounts as the best vehicles to play the current mix of persistently high real rates and high inflation. We expect average real rates in the range of 9% to 10% for Lebac bills in 1H18, implying rates in the range of 5% to 6% for ArgPom20, trading at monetary policy rate minus 370bp. We see Peso Discounts as a good hedge to scenarios where the BCRA abandons the current hawkish stance, with good chances in 2H18, and also providing good carry from a real rate above our medium-term forecast for the real rate. On the USD side, we recommend Buenos24 and Buenos27 (BUY), as we have stressed in our last reports on the provinces.

Appendix: A look at the theory behind the rule

To ground our views on the current controversy around BCRA's policy, we look at a simple model shown in Cochrane (2017), which includes 5 equations: a Fisher equation, a Phillips curve, an IS curve, and a Taylor rule, in line with our estimation of BCRA's Taylor rule, though ignoring the persistent for simplicity. We also add an equation demanding fiscal sustainability, also included by Cochrane (2017).

$$i_t = r_t + \pi_t^e \text{ (1)}$$

$$\pi_t = \pi_t^e + \gamma x_t \text{ (2)}$$

$$x_t = -\sigma\left(r_t - \bar{r} - v_t^r\right) \text{ (3)}$$

$$i_t = \bar{r} + \bar{\pi} + \beta\left(\pi_t - \bar{\pi}\right) + v_t^i \text{ (4)}$$

Where i is the nominal rate, r the real rate, x is the output gap, $\bar{\pi}$ is the target, and $\bar{r}$ is the neutral rate, which we estimated above using a Kalman filter. For simplicity we ignore the time-varying nature of the target and the neutral real rate in the current context. An additional equation, which comes from equilibrium under consumers' budget constraint, implies that the real value of debt must be equal to the present value of future surpluses: ${B_{t-1}}/{P_t} = \sum_{j=0}^{\infty}(1 + r_{t,t+j})^{-1} s_{t+j}$

Eliminating x and r, the model is reduced to two equations, PV of future surpluses and an equation for inflation:

$$(1 + \beta\sigma\gamma)\left(\pi_t - \bar{\pi}\right) = (1 + \sigma\gamma)\left(\pi_t^e - \bar{\pi}\right) + \sigma\gamma(v_t^r - v_t^i)$$

The solution of the model depends on how expectations are formed. We believe the discussion has centered around Old-Keynesian logic, despite making the unreasonable assumption of backward-looking expectations. We believe the problem is the stability of current policies under forward-looking expectations:

. Old-keynesian logic would assume backward-looking expectations, with $\pi_t^e = \pi_{t-1}$. New-keynesian models assume forward-looking expectations, as we believe is currently the case for Argentina, with $\pi_t^e = E_t\pi_{t+1}$.

In the case of backward-looking expectations, the solution is

$$(\pi_t - \bar{\pi}) = \frac{(1 + \sigma\gamma)}{(1 + \beta\sigma\gamma)}(\pi_{t-1} - \bar{\pi}) + \frac{\sigma\gamma}{(1 + \beta\sigma\gamma)}(v_t^r - v_t^i)$$

In this case, only when $\beta > 1$ the model is stable, though if the Taylor principle does not act, inflation spirals away. The old-Keynesian logic acts as usual: higher nominal rates increase the real rate through (1), higher rates lead to lower "aggregate" demand through (3), and hence to lower inflation through the Phillips curve (2). All this is, however, old-Keynesian economics, long left behind, as most economists have adopted a forward-looking view of expectations.

. Under new-Keynesian economics, as we believe is the case for Argentina, unions, consumers, companies set expectations looking forward. Unions might demand a recomposition of real salaries looking backwards, but the negotiation itself will look forward. In that case, $\pi_t^e = E_t\pi_{t+1}$, and the equation is:

$$E_t(\pi_{t+1} - \bar{\pi}) = \frac{(1+\beta\sigma\gamma)}{(1+\sigma\gamma)}(\pi_t - \bar{\pi}) + \frac{\sigma\gamma}{(1+\sigma\gamma)}(v_t^i - v_t^r)$$

If $\beta < 1$ the model is stable, but indeterminate, as only expectations are pinned down, not actual inflation. To the solutions we can add any δ_{t+1} with zero expectation, and see the solution as:

$$(\pi_{t+1} - \bar{\pi}) = \frac{(1+\beta\sigma\gamma)}{(1+\sigma\gamma)}(\pi_t - \bar{\pi}) + \frac{\sigma\gamma}{(1+\sigma\gamma)}\left(v_t^i - v_t^r\right) + \delta_{t+1}$$

Small changes in expectations induce jumps between equilibrium values. The Taylor principle is supposed to correct this indeterminacy, but not because of the "higher rates-lower demand" logic, but rather to exclude "exploding" equilibriums. A value of $\beta > 1$ makes the model unstable, and inflation diverges, except at the value of δ_{t+1} such that inflation is

$$\pi_t - \bar{\pi} = -\frac{\sigma\gamma}{(1+\sigma\gamma)}\sum_{j=0}^{\infty}\left(\frac{1+\sigma\gamma}{1+\beta\sigma\gamma}\right)^{j+1} E_t(v_{t+j}^i - v_{t+j}^r)$$

The problem with this solution is how to induce determinacy. Nothing inherent in the model of the first 4 equations allows the exclusion of unstable paths, where higher rates for instance lead to higher inflation, exploding over time. Cochrane (2011, 2017) proposes the fiscal sustainability, ${B_{t-1}}/{P_t} = \sum_{j=0}^{\infty}(1 + r_{t,t+j})^{-1}s_{t+j}$, as the equation that pins down the value of unexpected inflation, from innovations in the value of the expected present value of surpluses. Other authors have proposed pegs, such as FX bands, to resolve this indeterminacy problem.

We believe this small model sheds light on Argentina's difficulties to anchor inflation expectations successfully under a purely Taylor Rule:

1. If the transmission mechanism is weak (in this model, if σ is small), the reaction of rates to inflation is diminished.
2. The model is neo-Fisherian if rates are sustained, i.e., higher rates for long periods lead to higher inflation, not lower.
3. Under forward-looking expectations, something else is needed in addition to the Taylor rule to pin down inflation, as otherwise we could move to a diverging equilibrium.
4. Inflation surprises, for instance from higher regulated prices or larger fiscal deficits funded by monetary expansions, could derail the equilibrium unless another anchor is used.
5. For Argentina, the fiscal path is not passive as usually implicit in IT models, but rather exogenous, with real surpluses (deficits in this case for the short term) set in stone. Under the fiscal theory of the price level, a larger deficit (for instance from updating the targets, as was the case in Argentina, or from higher expenditure levels below the line) will need a higher level of prices to dilute the value of debt. Argentina, however, has most of its debt in foreign currency or indexed, with the exception of Lebac bills and ArgTes, so higher

prices only impact fixed-rate local currency debt, which indeed has sold off recently, as inflation expectations increase.

We believe the counterpart of a higher fiscal deficit is BCRA's monetary transfers to the Treasury, which have required high real rates to mop up "excessive" liquidity. Those real rates, however, have increased the quasi fiscal deficit, with the BCRA spending more resources on interest payments, and hence reducing its ability to use pure seigniorage to fund the Treasury. As higher rates increase the Central Bank's cost of rolling over, and the Treasury's fiscal consolidation is slow, the larger stock of Lebac bills that has accompanied higher rates has indeed required a higher level of inflation than expected, leading to a neo-Fisherian result.

Analysts

Eduardo Loyo
Chief Economist
eduardo.loyo@btgpactual.com
+55 21 3262 9707

Claudio Ferraz
Head – Brazil, Mexico
claudio.ferraz@btgpactual.com
+55 21 3262 9758

André Batista
andre.batista@btgpactual.com
+55 21 3262 9843

Priscilla Burity
priscilla.burity@btgpactual.com
+55 21 3262 9278

Rafael Costa
rafael.costa@btgpactual.com
+55 21 3262 9059

Bernardo Mota
bernardo.mota@btgpactual.com
+55 21 3262 9660

Luis Oscar Herrera
Head – Argentina, Chile, Colombia, Peru
luis.herrera@btgpactual.com
+562 2587 5442

Mario Arend
mario.arend@btgpactual.com
+562 2587 5903

Andres Borenstein
andres.borenstein@btgpactual.com
+54 11 3754 0908

Alejo Costa
Alejo.Costa@btgpactual.com
+54 11 3754 0945

Carolina Gialdi
Carolina.Gialdi@btgpactual.com
+5411 37540947

Sergio Olarte
sergio.olarte@btgpactual.com
+57 1 307 8090 316

Required Disclosures

This report has been prepared by BTG Pactual Argentina S.A. ("BTG Pactual Argentina")

The figures contained in performance charts refer to the past; past performance is not a reliable indicator of future results.

BTG Pactual S.A. Global Credit Research: Recommendation Definitions

BTG Pactual S.A. employs a recommendation scheme designed to rank potential investment opportunities within non-government fixed income markets and sectors

Outlook for	Time Horizon	BTG Pactual S.A. Terminology	Expectation	Definition
Credit fundamentals of the company	6 months	IMPROVING	Improve	Credit fundamentals of the company are anticipated to <expectation> over the next six months
		STABLE	Remain stable	
		DETERIORATING	Deteriorate	
Bond	3 months	BUY	Outperform	Company/Bond is anticipated to <expectation> other companies/bonds within a given peer group in the local currency investment universe over a three-month horizon
		HOLD	Perform in line	
		SELL	Underperform	
All recommendation types	N/A	Under Review	N/A	The recommendation is under review and a new recommendation may be published within the next 18 days

Analyst Certification

Each research analyst primarily responsible for the content of this investment research report, in whole or in part, certifies that:
(i) all of the views expressed accurately reflect his or her personal views about those securities or issuers, and such recommendations were elaborated independently, including in relation to Banco BTG Pactual, BTG Pactual Argentina and/or its affiliates, as the case may be;
(ii) no part of his or her compensation was, is, or will be, directly or indirectly, related to any specific recommendations or views contained herein or linked to the price of any of the securities discussed herein.
Research analysts contributing to this report who are employed by a non-US Broker dealer are not registered/qualified as research analysts with FINRA and therefore are not subject to the restrictions contained in the FINRA rules on communications with a subject company, public appearances, and trading securities held by a research analyst account.
Part of the analyst compensation comes from the profits of Banco BTG Pactual S.A. as a whole and/or its affiliates and, consequently, revenues arisen from transactions held by Banco BTG Pactual S.A. and/or its affiliates.

Where applicable, the analyst responsible for this report and certified pursuant to any applicable local or international regulation will be identified in bold on the first page of this report and will be the first name on the signature list.

Global Disclaimer

This report has been prepared by BTG Pactual Argentina and it is based on personal opinions from research´s analysts employed by Banco BTG Pactual S.A. and/or its affiliates. The purpose of this report is to expose certain finantial information and certain personal finantial research made by our analyst

BTG Pactual Argentina is a broker dealer (*Agente de Liquidación y Compensación y Agente de Negociación Integral*) organized and regulated by Argentinean law, registered with the Exchange Commission of Argentina (*Comisión Nacional de Valores*) under license Nro. 720. Additionally, the Brazilian Central Bank approved the indirect controlling participation of Banco BTG Pactual S.A. in BTG Pactual Argentina on September 1st, 2017. BTG Pactual S.A. is the responsible for the distribution of this report in Brazil.

BTG Pactual US Capital LLC (“BTG Pactual US,”), a broker-dealer registered with the U.S. Securities and Exchange Commission and a member of the Financial Industry Regulatory Authority and the Securities Investor Protection Corporation is distributing this report in the United States. BTG Pactual US assumes responsibility for this research for purposes of U.S. law. Any U.S. person receiving this report and wishing to effect any transaction in a security discussed in this report should do so with BTG Pactual US at 212-293-4600, 601 Lexington Ave. 57th Floor, New York, NY 10022

This report is being distributed in the United Kingdom and elsewhere in the European Economic Area (“EEA”) by BTG Pactual Europe LLP (“BTG Pactual UK”), which is authorized and regulated by the Financial Conduct Authority of the United Kingdom. This report may also be distributed in the United Kingdom and elsewhere in the EEA by BTG Pactual S.A. and/or BTG Pactual US. BTG Pactual UK has not: (i) produced this report, (ii) substantially altered its contents, (iii) changed the direction of the recommendation, or (iv) disseminated this report prior to its issue by BTG Pactual US. BTG Pactual UK does not distribute summaries of research produced by BTG Pactual US.

BTG Pactual Chile S.A. Corredores de Bolsa (“BTG Pactual Chile”), formerly known as Celfin Capital S.A. Corredores de Bolsa, is a Chilean broker dealer registered with Superintendencia Valores Y Seguros (SVS) in Chile and responsible for the distribution of this report in Chile and BTG Pactual Perú S.A. Sociedad Agente de Bolsa (“BTG Pactual Peru”), formerly known as Celfin Capital S.A. Sociedad Agente e Bolsa, registered with Superintendencia de Mercado de Valores (SMV) de Peru is responsible for the distribution of this report in Peru. BTG Pactual Chile and BTG Pactual Peru acquisition by BTG Pactual S.A. was approved by the Brazilian Central Bank on November 14th, 2012.

BTG Pactual S.A. Comisionista de Bolsa (“BTG Pactual Colombia”) formerly known as Bolsa y Renta S.A. Comisionista de Bolsa, is a Colombian broker dealer register with the Superintendencia Financeira de Colombia and is responsible for the distribution of this report in Colombia. BTG Pactual Colombia acquisition by BTG Pactual S.A. was approved by Brazilian Central Bank on December 21st, 2012.

References herein to BTG Pactual include BTG Pactual S.A., BTG Pactual US Capital LLC, BTG Pactual Europe LLP, BTG Pactual Chile and BTG Pactual Peru, BTG Pactual Colombia and BTG Pactual Argentina as applicable. This report is for distribution only under such circumstances as may be permitted by applicable law. This report is not directed at you if BTG Pactual is prohibited or restricted by any legislation or regulation in any jurisdiction from making it available to you. You should satisfy yourself before reading it that BTG Pactual is permitted to provide research material concerning investments to you under relevant legislation and regulations. Nothing in this report constitutes a representation that any investment strategy or recommendation contained herein is suitable or appropriate to a recipient's individual circumstances or otherwise constitutes a personal recommendation. It is published solely for information purposes, it does not constitute an advertisement and is not to be construed as a solicitation, offer, invitation or inducement to buy or sell any securities or related financial instruments in any jurisdiction. Prices in this report are believed to be reliable as of the date on which this report was issued and are derived from one or more of the following: (i) sources as expressly specified alongside the relevant data; (ii) the quoted price on the main regulated market for the security in question; (iii) other public sources believed to be reliable; or (iv) BTG Pactual's proprietary data or data available to BTG Pactual. All other information herein is believed to be reliable as of the date on which this report was issued and has been obtained from public sources believed to be reliable. No representation or warranty, either express or implied, is provided in relation to the accuracy, completeness or reliability of the information contained herein, except with respect to information concerning Banco BTG Pactual S.A., its subsidiaries and affiliates, nor is it intended to be a complete statement or summary of the securities, markets or developments referred to in the report. In all cases, investors should conduct their own investigation and analysis of such information before taking or omitting to take any action in relation to securities or markets that are analyzed in this report. BTG Pactual does not undertake that investors will obtain profits, nor will it share with investors any investment profits nor accept any liability for any investment losses. Investments involve risks and investors should exercise prudence in making their investment decisions. BTG Pactual accepts no fiduciary duties to recipients of this report and in communicating this report is not acting in a fiduciary capacity. The report should not be regarded by recipients as a substitute for the exercise of their own judgment. Opinions, estimates, and projections expressed herein constitute the current judgment of the analyst responsible for the substance of this report as of the date on which the report was issued and are therefore subject to change without notice and may differ or be contrary to opinions expressed by other business areas or groups of BTG Pactual as a result of using different assumptions and criteria. Because the personal views of analysts may differ from one another, Banco BTG Pactual S.A., its subsidiaries and affiliates may have issued or may issue reports that are inconsistent with, and/or reach different conclusions from, the information presented herein. Any such opinions, estimates, and projections must not be construed as a representation that the matters referred to therein will occur. Prices and availability of financial instruments are indicative only and subject to change without notice. Research will initiate, update and cease coverage solely at the discretion of BTG Pactual Investment Bank Research Management. The analysis contained herein is based on numerous assumptions. Different assumptions could result in materially different results. The analyst(s) responsible for the preparation of this report may interact with trading desk personnel, sales personnel and other constituencies for the purpose of gathering, synthesizing and interpreting market information. BTG Pactual is under no obligation to update or keep current the information contained herein, except when terminating coverage of the companies discussed in the report. BTG Pactual relies on information barriers to control the flow of information contained in one or more areas within BTG Pactual, into other areas, units, groups or affiliates of BTG Pactual. The compensation of the analyst who prepared this report is determined by research management and senior management (not including investment banking). Analyst compensation is not based on investment banking revenues, however, compensation may relate to the revenues of BTG Pactual Investment Bank as a whole, of which investment banking, sales and trading are a part. The securities described herein may not be eligible for sale in all jurisdictions or to certain categories of investors. Options, derivative products and futures are not suitable for all investors, and trading in these instruments is considered risky. Mortgage and asset-backed securities may involve a high degree of risk and may be highly volatile in response to fluctuations in interest rates and other market conditions. Past performance is not necessarily indicative of future results. If a financial instrument is denominated in a currency other than an investor's currency, a change in rates of exchange may adversely affect the value or price of or the income derived from any security or related instrument mentioned in this report, and the reader of this report assumes any currency risk. This report does not take into account the investment objectives, financial situation or particular needs of any particular investor. Investors should obtain independent financial advice based on their own particular circumstances before making an investment decision on the basis of the information contained herein. For investment advice, trade execution or other enquiries, clients should contact their local sales representative. Neither BTG Pactual nor any of its affiliates, nor any of their respective directors, employees or agents, accepts any liability for any loss or damage arising out of the use of all or any part of this report. Notwithstanding any other statement in this report, BTG Pactual UK does not seek to exclude or restrict any duty or liability that it may have to a client under the "regulatory system" in the UK (as such term is defined in the rules of the Financial Conduct Authority). Any prices stated in this report are for information purposes only and do not represent valuations for individual securities or other instruments. There is no representation that any transaction can or could have been effected at those prices and any prices do not necessarily reflect BTG Pactual internal books and records or theoretical model-based valuations and may be based on certain assumptions. Different assumptions, by BTG Pactual S.A., BTG Pactual US, BTG Pactual UK, BTG Pactual Chile, BTG Pactual Peru, BTG Pactual Colombia and BTG Pactual Argentina or any other source, may yield substantially different results. This report may not be reproduced or redistributed to any other person, in whole or in part, for any purpose, without the prior written consent of BTG Pactual and BTG Pactual accepts no liability whatsoever for the actions of third parties in this respect. Additional information relating to the financial instruments discussed in this report is available upon request. BTG Pactual and its affiliates have in place arrangements to manage conflicts of interest that may arise between them and their respective clients and among their different clients. BTG Pactual and its affiliates are involved in a full range of financial and related services including banking, investment banking and the provision of investment services. As such, any of BTG Pactual or its affiliates may have a material interest or a conflict of interest in any services provided to clients by BTG Pactual or such affiliate. Business areas within BTG Pactual and among its affiliates operate independently of each other and restrict access by the particular individual(s) responsible for handling client affairs to certain areas of information where this is necessary in order to manage conflicts of interest or material interests. Any of BTG Pactual and its affiliates may: (a) have disclosed this report to companies that are analyzed herein and subsequently amended this report prior to publication; (b) give investment advice or provide other services to another person about or concerning any securities that are discussed in this report, which advice may not necessarily be consistent with or similar to the information in this report; (c) trade (or have traded) for its own account (or for or on behalf of clients), have either a long or short position in the securities that are discussed in this report (and may buy or sell such securities), with the securities that are discussed in this report; and/or (d) buy and sell units in a collective investment scheme where it is the trustee or operator (or an adviser) to the scheme, which units may reference securities that are discussed in this report.

United Kingdom and EEA: Where this report is disseminated in the United Kingdom or elsewhere in the EEA by BTG Pactual UK, this report is issued by BTG Pactual UK only to, and is directed by BTG Pactual UK at, those who are the intended recipients of this report. This report has been classified as investment research and should not be considered a form of advertisement or financial promotion under the provisions of FSMA 2000 (Sect. 21(8)).

Dubai: This research report does not constitute or form part of any offer to issue or sell, or any solicitation of any offer to subscribe for or purchase, any securities or investment products in the UAE (including the Dubai International Financial Centre) and accordingly should not be construed as such. Furthermore, this information is being made available on the basis that the recipient acknowledges and understands that the entities and securities to which it may relate have not been approved, licensed by or registered with the UAE Central Bank, Emirates Securities and Commodities Authority or the Dubai Financial Services Authority or any other relevant licensing authority or governmental agency in the UAE. The content of this report has not been approved by or filed with the UAE Central Bank or Dubai Financial Services Authority.

United Arab Emirates Residents: This research report, and the information contained herein, does not constitute, and is not intended to constitute, a public offer of securities in the United Arab Emirates and accordingly should not be construed as such. The securities are only being offered to a limited number of sophisticated investors in the UAE who (a) are willing and able to conduct an independent investigation of the risks involved in an investment in such securities, and (b) upon their specific request. The securities have not been approved by or licensed or registered with the UAE Central Bank or any other relevant licensing authorities or governmental agencies in the UAE. This research report is for the use of the named addressee only and should not be given or shown to any other person (other than employees, agents or consultants in connection with the addressee's consideration thereof). No transaction will be concluded in the UAE and any enquiries regarding the securities should be made with BTG Pactual CTVM S.A. at +55 11 3383-2638, Avenida Brigadeiro Faria Lima, 3477, 14th floor, São Paulo, SP, Brazil, 04538-133.