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ECONOMICS RESEARCH

Tatiana Pinheiro*
5511-3012-5179
tatiana.pinheiro@santander.com.br

LATAM ECONOMICS

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IT'S RAINING CATS AND DOGS; IMPACT OF HYDROLOGY ON TARIFFS AND INFLATION

Tatiana Pinheiro*
Brazil: Banco Santander S.A.
+5511-3012-5179 | tatiana.pinheiro@santander.com.br

Maria Carolina Carneiro*
Brazil: Banco Santander S.A.
+5511-3012-6682 | macarneiro@santander.com.br

André de Mello Sampaio*
Brazil: Banco Santander S.A.
+5511-3553-7426 | ansampaio@santander.com.br

Net/Net: Although we maintain our scenario of lower-than-average reservoir levels through 1Q18 with higher-than-average spot prices in 4Q17 and 1Q18, we believe *red flag level 1* will continue in 2018 and we assign a low probability to the energy-rationing scenario. As a result, we believe the accumulated deficit in parcel A cost coverage should be covered by the flag mechanism, and consequently we see lower pressure for tariffs in 2018. In our baseline scenario, the electricity tariff adjustment could be between 1.9% and 5.9%, which would support our scenario of inflation at the target and Selic rate held at 6.75% p.a.

- Hydrology: improvement on the way. According to Columbia University ENSO cycle reports, the most likely scenario for the 2018 Latin American summer is a La Niña event (which could include below-average rainfall in the southern part of the continent, a wet year for the northeast and cooler temperatures in the southeast region), as the likelihood of the event increased from 57% in mid-October to 60% in mid-November. As a consequence, we still assume a hydro scenario at 80-90% of the long-term average for the integrated system in Brazil. Note, however, that hydrology recently improved in the southeast region, to ~100% of the long-term average in November. If this trend persists, we believe there could be upside risk to our hydrology assumptions; we could adjust our assumption to 90-100% of the long-term average. However, for the northeast region, we continue to see weak hydrology, at ~19% of long-term average in November. This scenario could improve in a La Niña event (as rainfall tends to improve in northern and northeast regions).

- Reservoir and GSF estimates. If hydrology reaches 90% of the long-term average at the end of the rainy season, we believe thermal generation could be reduced to 7-8 GW; thus we estimate that the hydro deficit for 2018 could be ~15% (GSF at 0.85), with thermal cost and spot price around R$185 per MWh. In this scenario, if thermal generation falls to 7.5 GW (or even lower), we believe that the most likely scenario is that the red flag level 1 continues in 2018; in the event hydrology improves to 95% of the long-term average (best-case scenario), we need less than 6 GW thermal generation, the hydro deficit declines to ~10% and consequently we could see the yellow flag triggered. Under both scenarios, baseline and best case, we believe that the GSF cost for disco units would be covered by the new flag mechanism (with no additional deficit).

- Tariffs, inflation and Selic. **An improvement in hydrology would cause very small electricity tariff readjustments**. We foresee an electricity tariff adjustment between 1.9% and 5.9% in 2018, depending on the flag adopted; in the best-case scenario, the yellow flag scenario could be adopted in mid-2018 (-4.0% impact on tariff prices). According to our expectation range, electricity tariffs would support inflation at the target, reinforcing our call of the Selic rate being held at 6.75% during 2018.

RAIN STARTS FALLING: IS THE PROBLEM OVER?

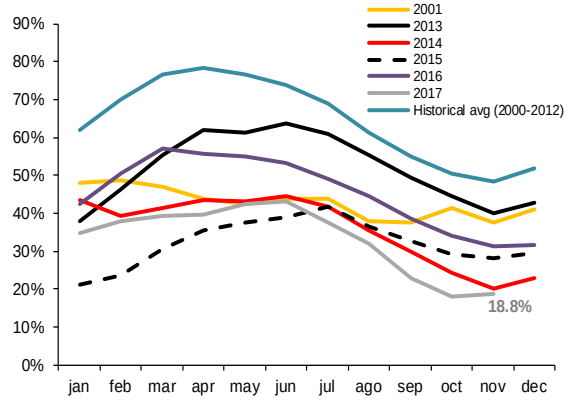
We Don't Think So, but Scenario Improved

Hydrology improving but reservoirs' starting point still concerning. The beginning of the rainy season was disappointing, with October rainfall at 69% of the long-term average. However, the scenario improved significantly in November, as rainfall in the southeast region reached ~100% of the long-term average and the southern region also contributed, at ~134% of the long-term average. However, the northeast region continues to lag at ~19% of the long-term average, with reservoirs low at 4.8% of maximum capacity. Consequently, as the country's average reservoir level reaches 18.5% (a low starting point compared to the average 41% seen over the last 10 years, see Figure 1 for comparison), we believe thermal generation would still be needed at high levels to offset the lower-than-average rainfall seen in 2017 through October (73.3%) and replenish the northeast region's reservoirs levels.

La Niña remains the most likely scenario, but still too soon to predict. According to the most updated ENSO cycle report from Columbia University, La Niña likelihood reached 60% for January-March 2018—the summer season in Latin America and the most important period for rainfall in Brazil (concentrating around 39% of the hydro energy flow expected for the year). La Niña usually implies wet weather in the northern part of the continent (also potentially impacting the northeast region) and cooler temperatures for southeast region (if it occurs between June-August) and potentially dry weather for the southern/southeast part of the continent (if it occurs from December-February). Note that the Australian Bureau of Meteorology also revised its estimates, now indicating a 70% likelihood of a La Niña event. Despite the higher likelihood, we believe it is still too soon to count in this scenario.

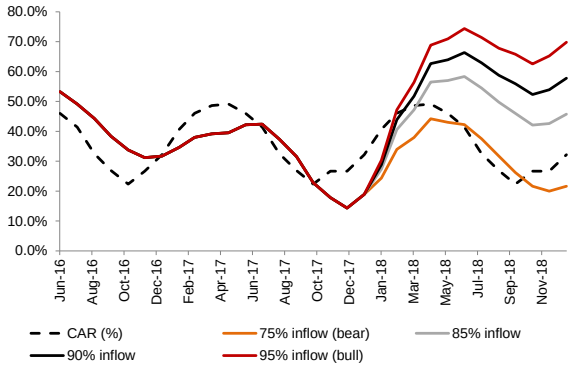
We assume rainy-season rainfall at 90% of the long-term average for 2018. Given the current hydrology and the expectation of a La Niña gaining momentum, we revised our hydro scenario to 90% of the long-term average with upside risk if the southeast region continues to deliver rainfall close to the long-term average. In any event, we expect thermal costs to be fairly high until 1H18; we estimate around 7.5 GW of thermal generation until mid-2018 so as to replenish lower-than-average reservoir levels in the northeast region. For wind/solar generation, we expect 7.0 GW of generation. In Figure 2, we present our reservoir estimates with different inflow scenarios, assuming a fixed 9.5 GW of thermal generation and a 3% year-over-year increase in electricity consumption in 2018. In this scenario, we see a hydro deficit of 14.6% for 2018. (See Figure 3.) If hydrology meets our expectation, red flag 1 should continue in 2018; however, as we see hydrology improving and consumption increasing, if hydrology reaches 95% of the long-term average (with consistent improvement for northeast region), we could see a yellow flag triggered by mid-2018.

Figure 1. Brazilian Water Reservoir Levels (%)



Source: ONS.

Figure 2. Reservoir Model Output—Base Case



Sources: ONS and Santander estimates.

Figure 3. Hydro Deficit Estimate (MWm)

Demand Brazil MWm	62.405
Hydro Firm Capacity*	51.532
Thermal Production	7.500
Others	7.090
Hydro Production*	44.023
Deficit Base Case MWm	7.509
Deficit Base Case %	14.6%

Source: Santander estimates.

New flag mechanism—supposedly lower volatility for monthly variation; different data series from CCEE. The good news is that the proposed regulatory change for the flag mechanism considers the hydro deficit level and cost of generation to trigger different levels. As a consequence, even if the cost of generation is not close to record levels but the estimated hydro deficit is high, a red flag would be triggered, protecting distribution companies' cash flow, and thus reducing the monthly volatility expected from the flag mechanism in case the hydrology trend changes monthly. However, note that Aneel not necessarily used data (spot and GSF) from CCEE; thus it continues to be difficult to estimate flags. With the mentioned improvement in hydrology expected to reach 90% of long-term average, we see a 15% hydro deficit scenario with ~7.5 GW of thermal generation, which continues to see a *red flag level 1* in 2018. A better hydrology (95% of long-term average) could reduce thermal generation needed to meet demand to less than 6 GW of thermal generation, thus triggering the yellow flag and, consequently, which has an impact of -4% in tariffs.

Figure 4. Changes in Flag Mechanism

Mechanism of Flag (Penalties)		
	Proposal	Previous
Green	-	-
Yellow	R$ 1 / 100 kWh	R$ 2 / 100 kWh
Red 1	R$ 3 / 100 kWh	R$ 3 / 100 kWh
Red 2	R$ 5 / 100 kWh	R$ 3.5 / 100 kWh

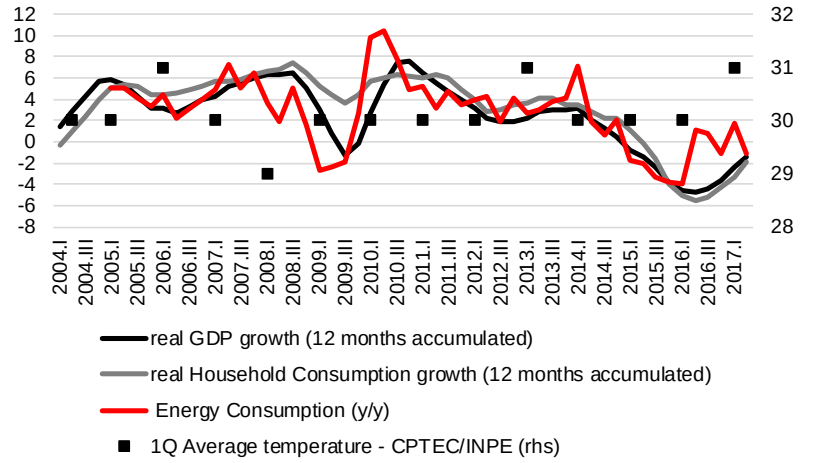
New Proposal (Summary w/ Hydrological Risks)				
GSF	Spot Prices (R$/MWh)			
	Green	Yellow	Red 1	Red 2
0.86 - 1	up to 35.7-500	Above 500	-	-
0.71-0.85	-	up to 34.48-66.67	above 34.48-103.45	above 103.45-200
0.6 - 0.7	-	-	up to 75-100	above 75-100

Source: Aneel. If the hydrological risk is at 1%, the flag will be green.

The Summer Is Coming . . .

Peak summer consumption could be a negative. Next year the full impact of the economic recovery could increase demand in the southeast region even further. In our view, the price elasticity of electric energy consumption is not as relevant as temperatures in Brazil, as seen in consumption peaks even with high tariff hikes. In Brazil, the demand for electricity is seasonally higher in the summer; a phenomenon that we believe is explained by the country's tropical characteristics (long hot summers and mild winters). This suggests that the elasticity of demand is also linked to temperatures. In any event, the Energy Research Bureau's (EPE) estimate of the income elasticity of electric energy consumption is at 1.51 for 2016-2026, assuming energy consumption growth at 3.7% year over year and real GDP growth at 2.5% on average. For 2018, our utilities team estimates that demand would increase 3% year over year in 2018 for a GDP growth of 3.2%. In any event, note that La Niña could trigger cooler temperatures in the southeast region, thus reducing upward pressure to consumption.

Figure 5. GDP Growth, Energy Consumption and Summer Weather



Sources: Santander estimates. Adjusted figures.

Energy Tariffs

Despite the La Niña effect and domestic demand heating up, the improvement of hydrology will cause small electricity tariff readjustments. The lower-than-expected hydrology seen through October 2017 led to higher-than-expected thermal costs for the system. Consequently, the total accumulated cost that needs to be reimbursed reached approximately R$6.2 billion, according to the association of disco companies (ABRADEE). However, the new flag mechanism implemented in November and the improvement of hydrology (November should reach ~100% of historical average in the southeast region) should offset the higher costs and, according to Aneel and ABRADEE, reduce the accumulated loss to zero by March 2018 if hydrology remains in-line with our base-case scenario (90% of the historical average). We also note that, in the best-case scenario, we could see the flag mechanism reaching *yellow mechanism*, which could reduce tariffs by 4.0%.

Electricity energy tariff adjustment in 2018. Under our baseline scenario (7.5 GW of thermal generation), we foresee an electricity tariff adjustment at 5.9% in 2018 if red flag level 1 is maintained throughout 2018. In a best-case scenario (less than 6 GW of thermal generation), our numbers suggest an electricity tariff adjustment at 1.9%. The assumption for our electricity tariffs scenario is the following: annual readjustment + flag mechanism + CDE of 2.15%. In any case, according to our estimate range, electricity tariffs inflation will support inflation at the center of the target in 2018.

In our scenario, inflation bounces back to 4% (still below the center of the target) and the BRL weakens to 3.5 per dollar at year-end 2018; the annual adjustment (that considers inflation and exchange rate variations year over year) will be smaller for cities that have the annual readjustment in 1H18 and greater for cities where the annual readjustment is in 2H18.

Figure 6. Schedule of Electricity Tariff Annual Adjustments

DisCos' Date of Annual Adjustment	Annual Adjustment	CDE Cost	Flag Mechanism (red 1 to yellow)	Flag Mechanism (red 1 to red 2)	Total Adjustment (yellow flag) probb: 30%	Total Adjustment (red 1 flag maintained) probb: 60%	Total Adjustment (red 2 flag) probb: 10%
Mar 15	2.20%	2.15%	-4.00%	3.50%	0.4%	4.4%	7.9%
Mar 15	2.42%	2.15%	-4.00%	3.50%	0.6%	4.6%	8.1%
Apr 8	2.09%	2.15%	-4.00%	3.50%	0.3%	4.3%	7.8%
Apr 19	2.38%	2.15%	-4.00%	3.50%	0.6%	4.6%	8.1%
Apr 22	1.98%	2.15%	-4.00%	3.50%	0.2%	4.2%	7.7%
Apr 22	2.10%	2.15%	-4.00%	3.50%	0.3%	4.3%	7.8%
Apr 29	2.88%	2.15%	-4.00%	3.50%	1.1%	5.1%	8.6%
May 28	3.14%	2.15%	-4.00%	3.50%	1.3%	5.3%	8.8%
Jun 19	2.63%	2.15%	-4.00%	3.50%	0.8%	4.8%	8.3%
Jun 24	3.78%	2.15%	-4.00%	3.50%	2.0%	6.0%	9.5%
Jul 24	4.89%	2.15%	-4.00%	3.50%	3.1%	7.1%	10.6%
Aug 7	4.19%	2.15%	-4.00%	3.50%	2.4%	6.4%	9.9%
Aug 7	4.68%	2.15%	-4.00%	3.50%	2.9%	6.9%	10.4%
Aug 27	5.02%	2.15%	-4.00%	3.50%	3.2%	7.2%	10.7%
Oct 22	5.05%	2.15%	-4.00%	3.50%	3.2%	7.2%	10.7%
Oct 22	4.92%	2.15%	-4.00%	3.50%	3.1%	7.1%	10.6%
Oct 23	5.07%	2.15%	-4.00%	3.50%	3.2%	7.2%	10.8%
Oct 25	4.71%	2.15%	-4.00%	3.50%	2.9%	6.9%	10.4%
Brazil					**1.9%**	**5.9%**	**9.4%**

Sources: IBGE, ANEEL, and Santander estimates.

CONTACTS / IMPORTANT DISCLOSURES

Macro Research			
Maciej Reluga*	Head Macro, Rates & FX Strategy – CEE	maciej.reluga@bzwbk.pl	48-22-534-1888
Sergio Galván*	Economist – Argentina	sgalvan@santanderrio.com.ar	54-11-4341-1728
Maurício Molan*	Economist – Brazil	mmolan@santander.com.br	5511-3012-5724
Juan Pablo Cabrera*	Economist – Chile	jcabrera@santander.cl	562-2320-3778
Diana Ayala	Economist - Colombia	diana.ayala@santander.us	212-350-0979
David Franco*	Economist – Mexico	dafranco@santander.com.mx	5255 5269-1932
Tatiana Pinheiro*	Economist – Peru	tatiana.pinheiro@santander.com.br	5511-3012-5179
Piotr Bielski*	Economist – Poland	piotr.bielski@bzwbk.pl	48-22-534-1888
Marcela Bensión*	Economist – Uruguay	mbension@santander.com.uy	5982-1747-5537
Fixed Income Research			
Diana Ayala	Macro, Rates & FX Strategy – Latin America	diana.ayala@santander.us	212-407-0979
Juan Miguel Arranz*	Chief Rates & FX Strategist – Argentina	jarranz@santanderrio.com.ar	5411-4341-1065
Juan Pablo Cabrera*	Chief Rates & FX Strategist – Chile	jcabrera@santander.cl	562-2320-3778
Aaron Holsberg	Head of Credit Research	aholsberg@santander.us	212-407-0978
Equity Research			
Christian Audi	Head LatAm Equity Research	caudi@santander.us	212-350-3991
Andres Soto	Head, Andean	asoto@santander.us	212-407-0976
Walter Chiarvesio*	Head, Argentina	wchiarvesio@santanderrio.com.ar	5411-4341-1564
Valder Nogueira*	Head, Brazil	jvalder@santander.com.br	5511-3012-5747
Pedro Balcao Reis*	Head, Mexico	pbalcao@santander.com.mx	5255-5269-2264

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