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Brazil: Monetary Policy and Fixed Income

Is the BRL Yield Curve Too Steep?

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- **We believe so, but . . .**
- **The current steepness is compatible, in our view, with the approaching end of the monetary easing cycle and an expansionary monetary policy stance.**
- **Most of the steepness can be explained by market expectations of higher real interest rates, as inflation expectations look well anchored, in our opinion, and the embedded risk premium is not decoupled from other country risk gauges, such as CDS spreads.**
- **Both the current level of long-term rates and the curve slope are well explained by a simple econometric model, taking into account expectations, country risk, and U.S. rates.**
- **Given our inflation scenario and the difficulties surrounding structural reforms, receiving BRL nominal rates looks relatively unattractive. Real rates are a slightly better option, in our view. We expect the yield curve to flatten throughout 2018, following the end of the current monetary policy cycle.**

Conclusions

We believe the lion's share of the BRL yield curve steepness (currently at multi-year highs) can be attributed to expectations of higher real interest rates in the long term, since inflation risk premium and other term premiums are relatively low (probably due to contained country risk), and inflation expectations are well anchored. Expectations of higher real rates, in their turn, are justified, in our view, by the expansionary monetary policy we expect (with the policy rate, in real terms, below any estimates of the neutral real rate) and by some skepticism about a structural compression of the neutral real rate, which depends on structural reforms and further fiscal consolidation. We find no evidence that the BRL yield curve is abnormally high because of increased political/policy risk or other factors that are not reflected in the country risk gauge (CDS).

The main implications for trade, in our view and given our inflation scenario, are: (i) receiving BRL rates does not look particularly attractive at current levels; (ii) in relative terms, BRL inflation-linkers look more attractive than fixed-rate bonds; (iii) yield curve flatteners may benefit as the end of the current monetary policy cycle approaches, although the risk of a tighter U.S. monetary policy should be considered; and (iv) as a defensive/bearish position, paying BRL rates looks as effective as buying protection through credit default swaps.

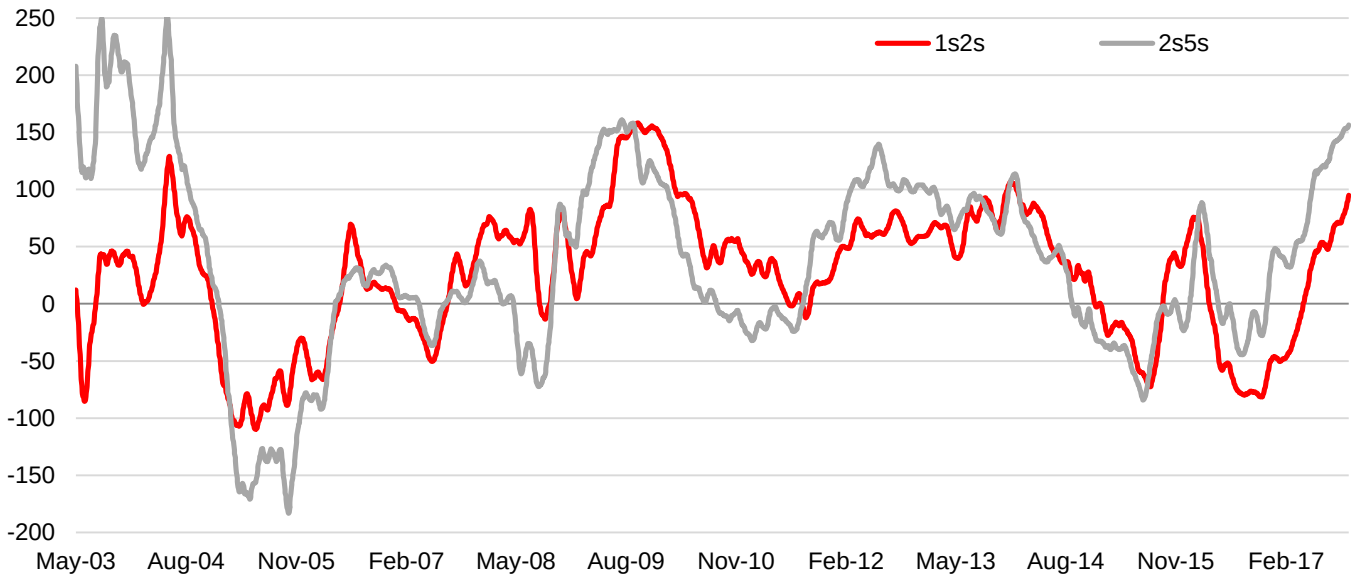
The BRL yield curve is quite steep, but . . .

A simple look at a historical chart of the Brazilian yield curve slope, as shown in Figure 1, may result in an emphatic "yes" as an answer to the question in the title of this report. The difference between two-year and one-year yields (1s2s), at around 120 bps, is at the highest level since 2009. In a similar analysis, the long end of the curve is even steeper, with the difference between five-year and two-year rates (2s5s) higher than at any point after mid-2004 (at around 175 bps)[1]. Furthermore, we find it noteworthy how those two spreads, which usually trade at similar levels, have been diverging lately – the 2s5s/1s2s

[1] We use 21-day moving averages of market prices in most of our analyses, so some numbers presented here may diverge from current market prices.

differential is also at a 13-year high. Such observations have been leading several analysts to associate the current steep yield curve with uncertainties related to political scandals and the 2018 elections[2].

Figure 1. BRL yield curve slopes (bps, 21-day moving averages)



Sources: Anbima, Santander.

However, we think that the question posed above deserves a more qualified answer, taking into account: (i) the relationship between the yield curve slope and the monetary policy cycle; (ii) the distinct drivers of each segment of the curve; and (iii) what combination of expectations and risk premium is embedded in the rates. In the following sections, we use the 1s2s and 2s5s as benchmarks to establish some stylized facts, explain how the current market prices are associated with other variables, and assess the consequences for expected market dynamics and asset prices.

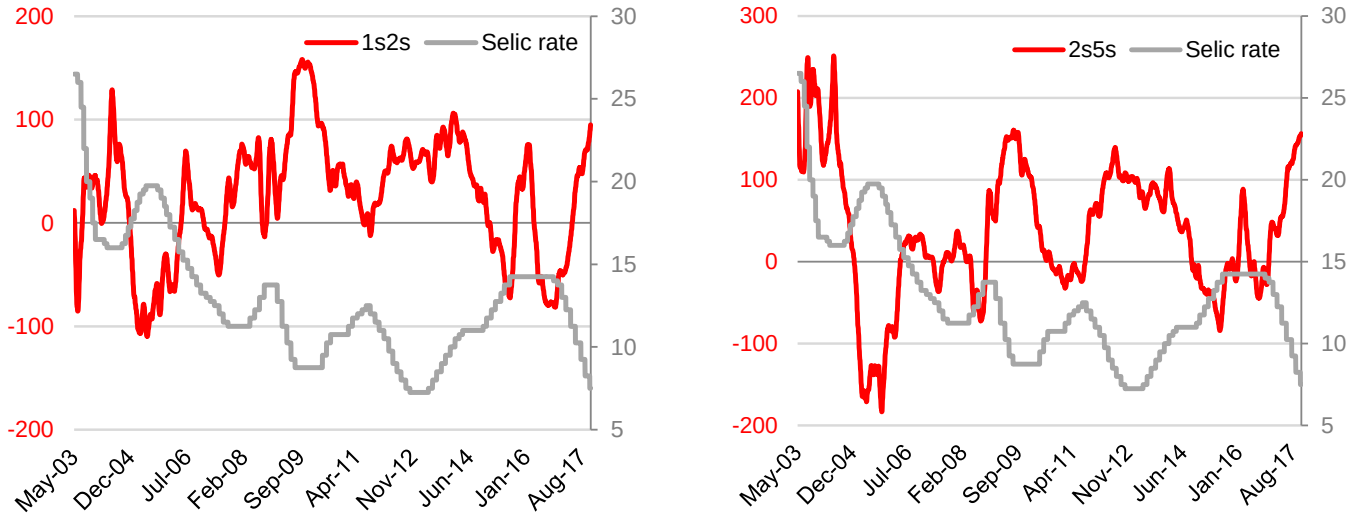
Yield curve slope and the monetary policy cycle

The first determinant of the yield curve shape is expectations about the future path of monetary policy[3]. Assuming the existence of a neutral interest rate, to which the policy rate converges in the long run, we can expect the yield curve slope to be higher the lower the policy rate is (i.e., the farther from the neutral rate). Therefore, yield curve steepness can be expected to peak when the policy rate is at a local low and the market expects, for any given point in the future, a flat or higher policy rate.

With the limitation of a small data sample (we consider only the last five monetary cycles under the current exchange regime, excluding the period 1999-2002 due to high volatility and poor data availability), this theoretical expectation has been holding for Brazil's most recent easing cycles. As can be seen in Figures 2-4, most 1s2s and 2s5s local highs are contained within a relatively short time interval (with a few exceptions, less than 100 calendar days), centered on the day of the last policy rate cut of each cycle.

[2] See, for example, Bruno Federowski (October 25, 2017), "Curva de juros aponta primeiros sinais de ansiedade eleitoral" (https://br.reuters.com/article/topNews/idBRKBN1CU278-OBRTP)
[3] See, for example, Antti Ilmanen and Ray Iwanowski (1997), "Dynamics of the Shape of the Yield Curve", *Journal of Fixed Income*, vol. 7, no. 2.

Figure 2. BRL yield curve slopes (bps) and Selic rate (%)



21-day moving averages. Sources: Anbima, Santander.

Figure 3. 1s2s slope peak in recent monetary easing cycles

Start	End	1s2s peak					
		Date	Days from cycle end*	Level (bps)**	Change from cycle start (bps)***	5y CDS level (bps)**	5y CDS level change (bps)****
Jun 18, 2003	Apr 14, 2004	May 31, 2004	47	121	249	805	19
Sep 14, 2005	Sep 05, 2007	Jan 25, 2008	142	76	26	138	-176
Jan 21, 2009	Jul 22, 2009	Sep 30, 2009	70	158	107	127	-224
Aug 31, 2011	Oct 10, 2012	Sep 18, 2012	-22	80	70	101	-41
Oct 19, 2016	?	?	?	95	173	170	-93

*Negative numbers: before the end of the cycle. **For the last cycle, data as of November 3, 2017. ***For the last cycle, change until November 3, 2017. ****From cycle start to peak (to November 3, 2017 for the last cycle).
Sources: Anbima, Santander.

Figure 4. 2s5s slope peak in recent monetary easing cycles

Start	End	2s5s peak					
		Date	Days from cycle end*	Level (bps)**	Change from cycle start (bps)***	5y CDS level (bps)**	5y CDS level change (bps)****
Jun 18, 2003	Apr 14, 2004	May 31, 2004	47	250	378	805	19
Sep 14, 2005	Sep 05, 2007	Dec 14, 2007	100	37	-13	100	-214
Jan 21, 2009	Jul 22, 2009	Jul 31, 2009	9	161	110	134	-217
Aug 31, 2011	Oct 10, 2012	Jun 28, 2012	-104	139	129	162	21
Oct 19, 2016	?	?	?	156	169	170	-93

*Negative numbers: before the end of the cycle. **For the last cycle, data as of November 3, 2017. ***For the last cycle, change until November 3, 2017. ****From cycle start to peak (to November 3, 2017 for the last cycle).
Sources: Anbima, Santander.

The current cycle stands out because it led to a significant steepness in the curve, which may keep rising (in three of the four previous cycles presented here, slopes peaked after the day of the last rate cut – see Figures 3 and 4 above and Figures 5 and 6 below). Furthermore, the steepening movement in both segments is already the strongest excluding the 2003-04 cycle (which took place throughout a period of much higher country risk, measured by the five-year CDS premium). However, during two of the cycles studied, the compression in CDS prices was considerably stronger than in the latest observation. If we could statistically adjust for this effect, probably the present anomaly would be attenuated, in our view.

Figure 5. 1s2s slope during recent monetary easing cycles

		Rate cuts	1s2s slope (bps)			Slope before the cycle end**		
Start	End	(bps)*	Start	End*	Change*	m-1	m-2	m-3
Jun 18, 2003	Apr 14, 2004	1050	-85	31	115	6	3	33
Sep 14, 2005	Sep 05, 2007	850	-62	38	100	1	-24	-50
Jan 21, 2009	Jul 22, 2009	500	5	145	140	103	85	71
Aug 31, 2011	Oct 10, 2012	525	-12	70	82	81	69	61
Oct 19, 2016	?	675	-78	95	173	?	?	?

*For the last cycle, data as of November 3, 2017. **m = month.
Sources: Anbima, Santander.

Figure 6. 2s5s slope during recent monetary easing cycles

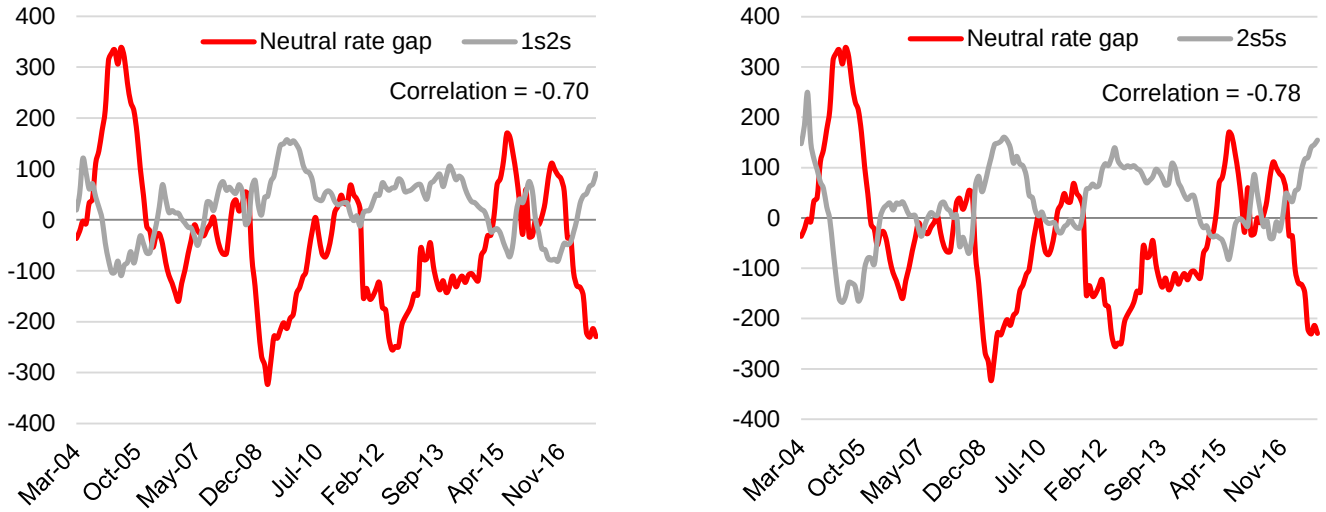
		Rate cuts	2s5s slope (bps)			Slope before the cycle end**		
Start	End	(bps)*	Start	End*	Change*	m-1	m-2	m-3
Jun 18, 2003	Apr 14, 2004	1050	116	161	45	140	120	152
Sep 14, 2005	Sep 05, 2007	850	-128	11	139	3	-7	-36
Jan 21, 2009	Jul 22, 2009	500	50	159	108	151	150	137
Aug 31, 2011	Oct 10, 2012	525	10	108	98	101	104	132
Oct 19, 2016	?	675	-13	156	169	?	?	?

*For the last cycle, data as of November 3, 2017. **m = month.
Sources: Anbima, Santander.

Another way to look at the relationship between the yield curve slopes and the monetary policy stance is relating the former with the spread between the policy rate and some neutral rate proxy. In Figure 7, we estimated that spread (we will call it "neutral rate gap") as the difference between the one-year real ex ante policy rate (average expected Selic 12 months ahead deflated by the expected inflation for the same period, with data from Brazil's Central Bank Focus survey)[4] and a long (six-month) moving average of the yield-to-maturity of five-year inflation-linked government bonds (NTN-Bs). There are high negative correlations between our neutral rate gap and the yield curve slopes – of -0.70 and -0.77, respectively, for 1s2s and 2s10s; in addition, simple OLS regressions (using monthly data) of the slopes on the neutral rate gap have high (R^2>0.5) explanatory power and highly significant coefficients (p-value<0.01) associated with the neutral rate gap. Brazil five-year CDS prices do not help to explain the 1s2s spread, but are highly significant (p-value<0.01) for the 2s10s spread (and help to correct for the effect described above). Relative to the latest available data, the 1s2s and 2s10s slopes are, respectively, 6 bps and 36 bps above the models' predictions.

[4] This is the methodology used by the Brazil's Central Bank – see the box "Real interest rates during disinflations" in the March 2017 Quarterly Inflation Report.

Figure 7. BRL yield curve slopes (bps) and neutral rate gap (bps)

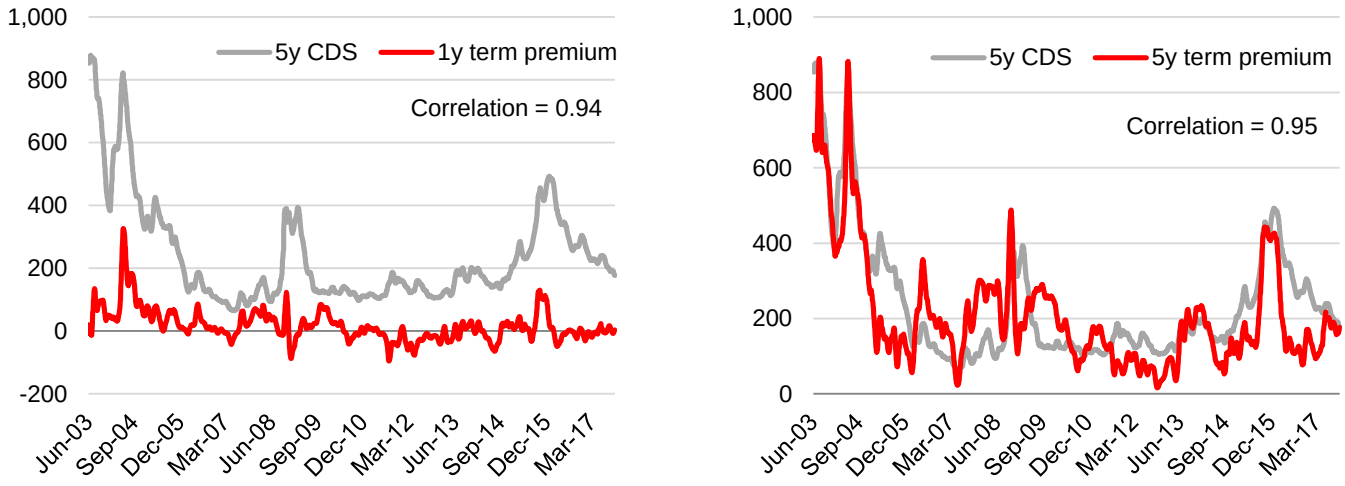


Sources: Anbima, Brazil Central Bank, Santander estimates.

Is the term premium too high?

A second factor influencing the yield curve shape is term premium – "the additional [to the spot interest rate that market participants currently expect to prevail at the corresponding date in the future] compensation that investors require for the risk of holding longer-term instruments"[5]. We used the framework proposed by Sharon Kozicki and Gordon Sellon[6] to arrive at term premium estimates embedded in Brazilian future interest rates. The aggregated term premium is estimated as the difference between benchmark swap (*pré x CDI*) rates and bootstrapped rates constructed from the Brazil Central Bank's Focus expectations survey data[7]. Figure 8 shows our estimates for one- and five-year term premiums compared to Brazil five-year CDS spreads.

Figure 8. Term premium and five-year CDS spread (bps)



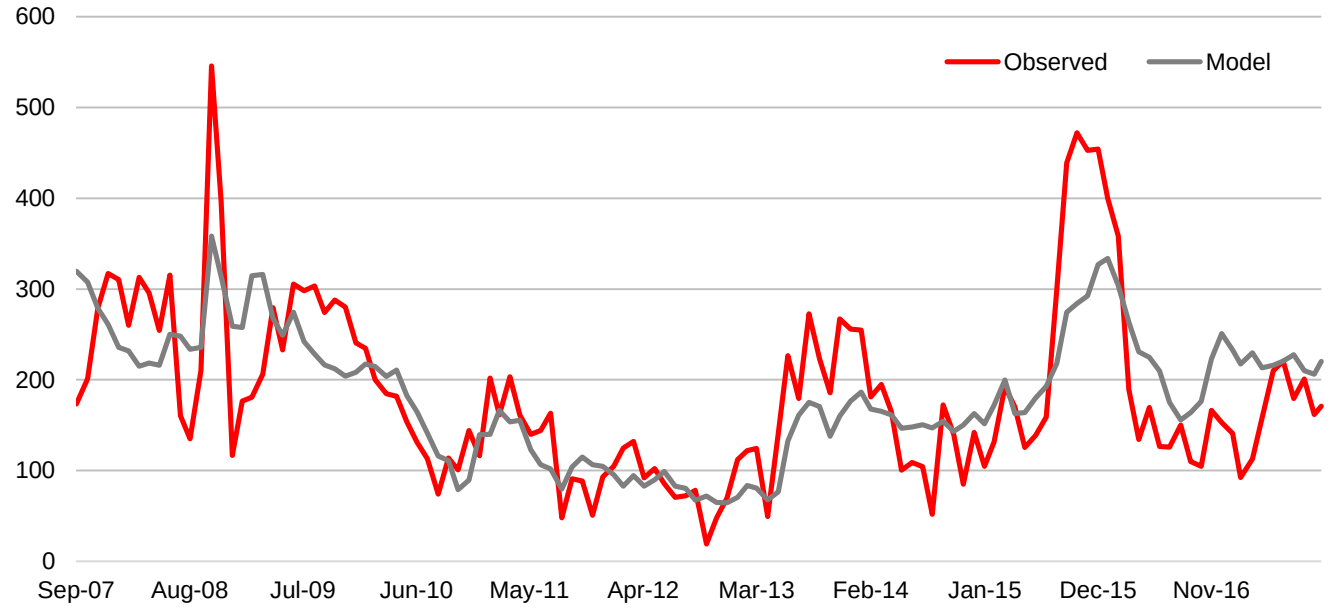
Sources: Anbima, Brazil Central Bank, Bloomberg, Santander estimates.

[5] Ben S. Bernanke (March 20, 2006), "Reflections on the Yield Curve and Monetary Policy", speech before the Economic Club of New York.
[6] Sharon Kozicki and Gordon Sellon (2005), "Longer-Term Perspectives on the Yield Curve and Monetary Policy", *Federal Reserve Bank of Kansas City Economic Review*, Fourth Quarter 2005.
[7] Additionally, we adjusted the bootstrapped rates by the Selic-CDI differential. See equations in the appendix.

As expected, the one-year term premium is almost negligible most of the time (averages 18 bps for the period studied), and is currently at less than 5 bps. Hence, the one-year rate pricing is probably almost completely driven by expectations for the future path of the overnight rate. The five-year premium averages 209 bps for the period and is trading at 176 bps. Both premiums are highly correlated with the five-year CDS spread, a broad risk premium gauge, and none looks particularly decoupled from its recent price action. This, in our view, considerably weakens the hypothesis that the BRL yield curve is pricing in an extraordinarily high political or policy risk that is not reflected in the market for USD-denominated bonds. For the hypothesis to hold, we would need to see both a high term premium and a rising spread between term premium and country risk.

That conclusion is reinforced by running a simple linear econometric model explaining the term premium using the five-year CDS, the five-year U.S. Treasury rate, and the 1s5s slope in the bootstrapped curve built from the Focus survey data as independent variables. All coefficients obtained using monthly data are statistically significant (p-value<0.05) and have the expected signals. Observed five-year premium is currently not far from (and below) what the model predicts (see Figure 9), implying that the influence of other factors not included in the model is relatively small.

Figure 9. Five-year term premium, observed versus model results

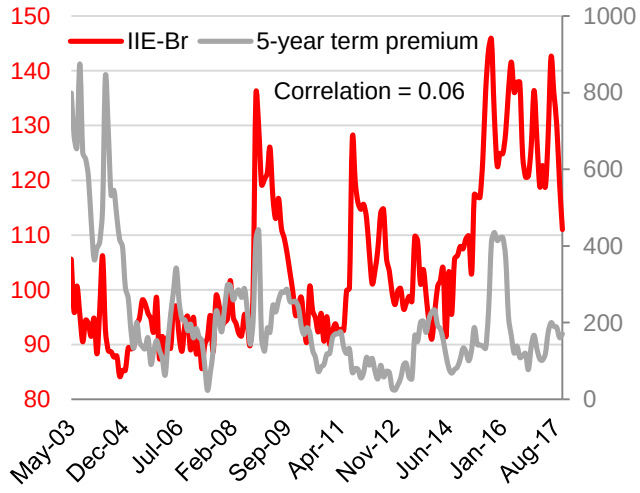


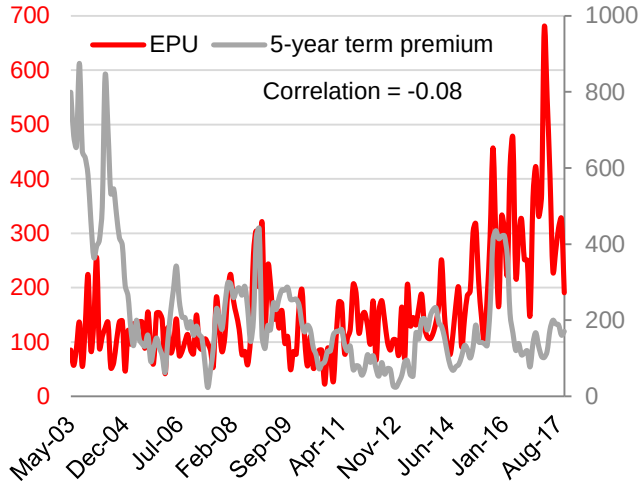
Source: Santander estimates.

In Figure 10, we compare the five-year term premium with two economic/policy uncertainty indices – FGV's Economic Uncertainty Indicator (IIE-Br) and the Economic Policy Uncertainty by Baker, Bloom and Davis (EPU)[8]. It is notable that both indices have been falling recently and that correlations with the term premium are very low. This suggests to us that the uncertainty measured by them (which may not be equivalent political uncertainty, but it is not a stretch, in our view, to assume that both correlate well) is usually not a significant driver of the term premium.

[8] For more details about the indices, please see FGV IBRE (November 2016), "Indicador de Incerteza da Economia Brasil" and Scott Baker, Nicholas Bloom and Steven J. Davis (November 2016), "Measuring Economic Policy Uncertainty", *The Quarterly Journal of Economics*, Volume 131, Issue 4.

Figure 10. Five-year term premium (bps) and uncertainty indices





Sources: Anbima, Brazil Central Bank, Bloomberg, Santander estimates.

Finally, we extracted the long-run inflation risk premium from the five-year term premium, also following Kozicki and Sellon's framework[9] and using data from the Focus survey (see Figure 11). The inflation risk premium, at around 80 bps, does not look particularly high or low (see Figure 12), either in absolute terms or relative to the aggregated term premium (on average during the period, it has corresponded to 56% of the total premium; it is now at 44%). This means, in our view, that the market is not attributing a particularly high risk that future inflation will exceed economists' expectations, and that other factors influencing the term premium for nominal rates are not behaving abnormally, reinforcing the conclusions stated previously.

Figure 11. Decomposition of five-year term premium (bps)

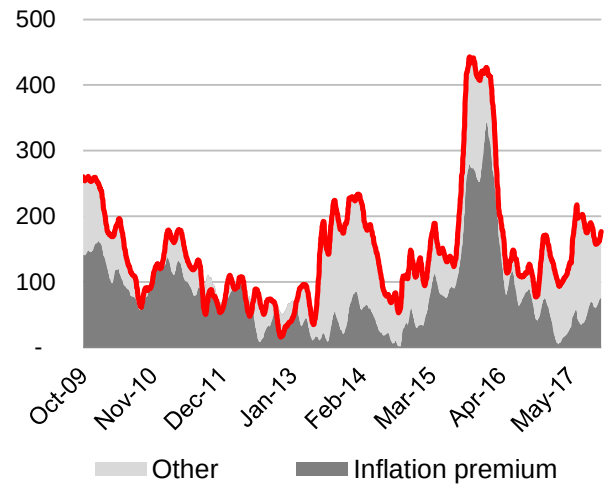
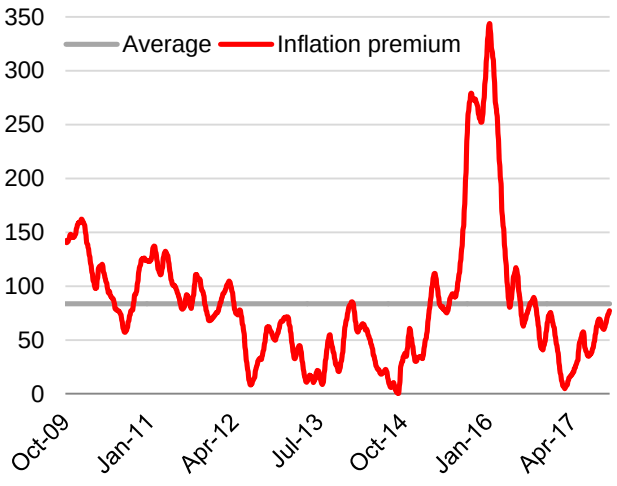


Figure 12. Five-year inflation risk premium (bps)



21-day moving averages. Sources: Anbima, Brazil Central Bank, Santander estimates.

[9] For a more detailed approach, see José Valentim Machado Vicente and Flávia Mourão Graminho (2014), "Decompondo a Inflação Implícita", Banco Central do Brasil, Trabalhos para Discussão 359.

Back to expectations

The previous analysis suggests, in our view, that the bulk of the current yield curve steepness is explained by market expectations regarding inflation and the future path of the overnight rate, and that the uncertainty associated with those expectations does not look particularly high. Practically speaking, political and policy risks are affecting the shape of the curve only to the extent that inflation and interest rate expectations are affected by such risks. To confirm that, we ran a simple (OLS) econometric model, using future interest rate survey expectations, five-year CDS spreads, and U.S. Treasury rates for different tenors (one, two, three, five, and ten years) to explain corresponding BRL rates. As expected, the regression coefficients associated with survey expectations decrease for longer tenors, whereas, in the same direction, CDS spreads and U.S. rates gain weight (see Figure 13). Observed 10-year rate and 1s10s slope are close to what the model would predict (see Figures 14 and 15) – again, confirming the view that both variables are not abnormally high.

Figure 13. Estimated coefficients of the interest rate regression model

	1-year	2-year	3-year	5-year	10-year
Survey expectations	1.00	1.04	1.03	0.96	0.82
5-year CDS	0.001	0.003	0.004	0.006	0.009
U.S. Treasury	0.05	0.11	0.18	0.35	0.64
Intercept	-0.02	-0.25	-0.14	0.31	0.62
R-squared	0.97	0.89	0.84	0.81	0.80

All coefficients significant at 5% level, except the intercept.
Source: Santander estimates.

Figure 14. 10-year rates, observed versus model (%)

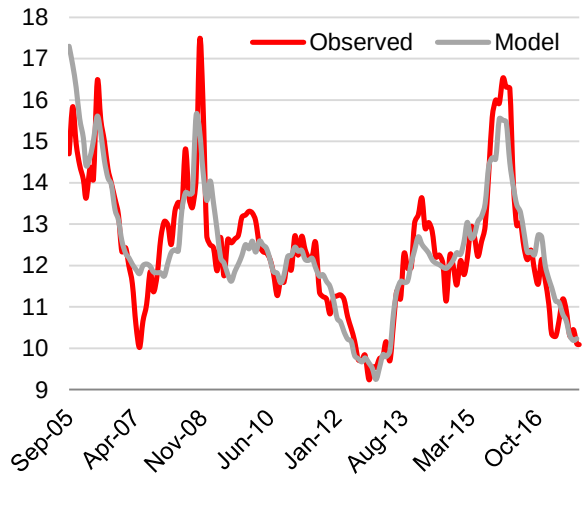
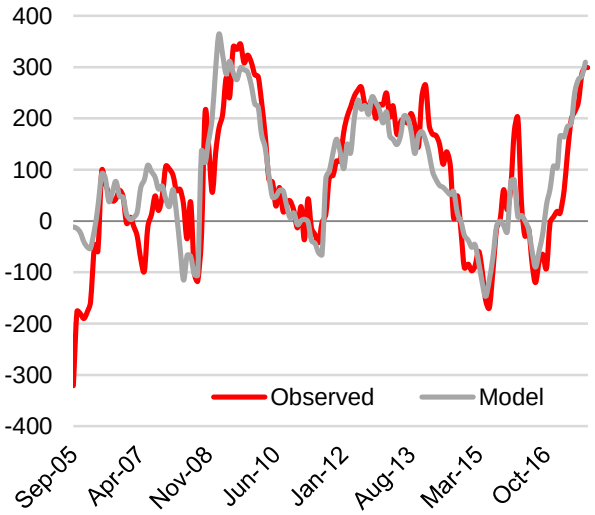


Figure 15. 1s10s slope, observed versus model (bps)



Sources: Anbima, Santander estimates.

Since inflation expectations until 2020 have been well anchored at their respective targets' midpoints (see Figure 16), and the inflation risk premium is not very high, we believe lower nominal rates in the future should mostly depend on expectations regarding real rates (in addition to their dependence on external factors, such as CDS spreads). We believe sustainably lower long rates will depend on markets' assessment of the neutral (i.e., compatible with stable inflation close to the target midpoint) real rate. We presented our estimates for the neutral real rate in our report *Monetary Policy and the Last Crusade* (August 30, 2017). Most of our estimates are within the 5-6% range, compatible with current market prices for long inflation-linked bonds (see Figure 17).

Figure 16. Calendar year inflation expectations (%)

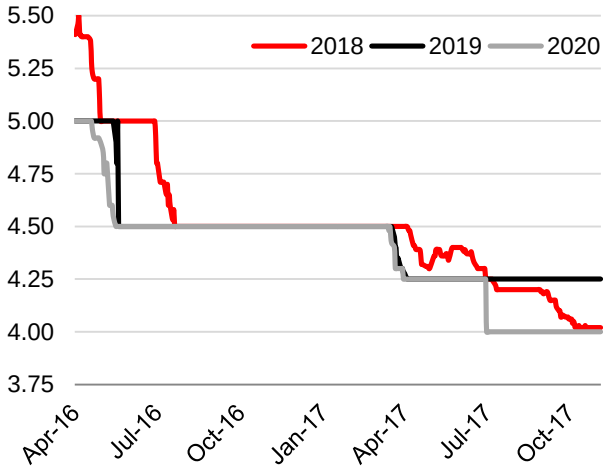
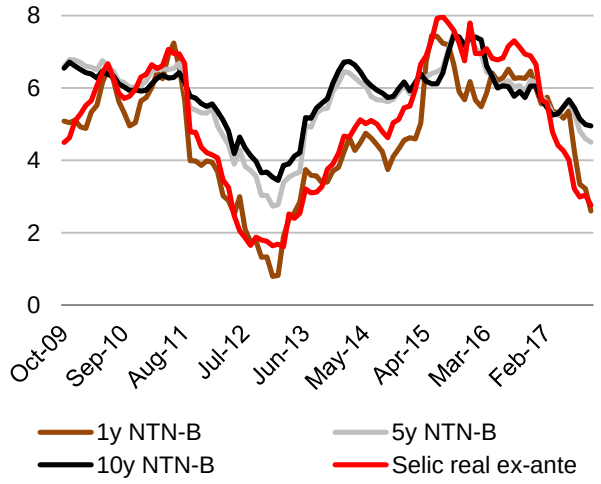


Figure 17. Real ex ante and market rates



Sources: Anbima, Santander estimates.

Market implications

Based on our analysis in this report, we can derive some implications for markets:

- Compression in long-term BRL rates will depend on:
    - A tightening in CDS spreads – Brazil USD credit is trading in-line with other BB countries, so, since we believe there are no rating upgrades in sight, this is almost a pure beta play, in our view.
    - Lower U.S Treasury rates.
    - Lower (and credible) inflation targets.
    - A repricing of the real neutral interest rate, which, as the Central Bank has been affirming, may depend on the outcomes of structural reforms and the fiscal consolidation process.
    - Any combination of those factors.
- With that in mind, we see no short-term triggers for BRL rates, especially considering the difficulties surrounding the negotiation of the pension reform in Congress.
- Considering well-anchored inflation expectations and a relatively low inflation risk premium, inflation-linked bonds look more attractive than receiving nominal yields, offering relatively cheap insurance against higher future inflation, in our view. We expect CPI inflation to accelerate to 4.2% in 2018 and stay at 4.0% in 2019 and 2020.
- As we approach the end of the current monetary easing cycle (we expect the last rate cut in February 2018), we expect the yield curve steepness to peak soon, providing an opportunity for flatteners (although tighter-than-expected U.S. monetary policy is a risk factor for such trades). Figure 18 shows that the 2s5s differential shrank six and 12 months after the end of each of the previous four monetary easing cycles (in only one case, the curve got steeper after three months). Bear flattening is dominant within six months after the cycle end; within one year, bull flattening occurred in half of the cases.
- Since the risk premium embedded in domestic rates does not look excessively high, we believe paying BRL rates can be as effective as buying protection through credit default swaps for those fearing an increase in volatility during the 2018 elections or a deterioration in the global environment.

Figure 18. Changes in rates and curve slope after monetary easing cycles (bps)

Cycle End	Slope at cycle end	Changes in 3 months			Changes in 6 months			Changes in 12 months		
		2y	5y	Slope	2y	5y	Slope	2y	5y	Slope
Apr 14, 2004	11	162	110	-52	170	61	-109	276	-93	-369
Sep 05, 2007	159	39	69	31	60	44	-16	258	163	-94
Jul 22, 2009	159	104	43	-61	122	60	-62	136	-13	-149
Oct 10, 2012	108	-10	-24	-15	70	30	-40	294	262	-32

Sources: Anbima, Santander.

Appendix

Relationships connecting forward rates to market estimates (from Kozicki and Sellon):

1. *Forward Rate = Neutral Rate + Term Premium.*
2. *Neutral Rate = Long-Run Equilibrium Real Rate + Long-Run Expected Inflation.*
3. *Term Premium = Long-Run Inflation Risk Premium + Other Risk Premium.*
4. *Forward Rate = Real Rate + Expected Inflation + Inflation Risk Premium + Other Risk Premium.*

Other references (not included in the footnotes)

Marcel Z. Aranha and Marcelo L. Moura (2009), "The impact of monetary policy on the yield curve in the Brazilian economy", *Insper Working Paper* 167/2009.

Michael D. Bauer and Glenn D. Rudebusch (December 5, 2016), "Why Are Long-Term Interest Rates So Low?", *FRBSF Economic Letter* 2016-36.

Julio Callegari (October 31, 2017), "Juros: queda estrutural ou mais um sonho de verão?", *Valor Econômico*.

Antti Ilmanen (1995), "Understanding the Yield Curve", Salomon Brothers United States Fixed-Income Research Portfolio Strategies.

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