



**What information can be obtained from the
slope of the yield curve?**

What information to extract from the slope of the yield curve?

The debate around the shape of the curve has been present in our lives for at least 20 years. However, we were recently surprised by the discussion held in Brazil regarding the slope of the yield curve, here defined as the relationship between the short-term interest rate (1 day) and the long interest rate (10y).

Recently, a paradox has spread among market makers' opinions: the existence of a mechanical relationship between the slope of the yield curve and monetary conditions. A very steep curve would mean the presence of an excessive premium in the long part of the curve. In addition, some argued that this premium was partly explained by the shallow level of the Selic rate, implying that the strong cycle of monetary loosening would act opposite to the Central Bank's intention to stimulate the economy. Namely, the very low level of the interest rate established by the Central Bank would generate contractionary effects, as it would create a very inclined curve.

Under this hypothesis, if a policy rate reduction to stimulate the economy generates an increase in the slope of the curve, the impact on monetary conditions is uncertain. On the one hand, the lower Selic would loosen the conditions, but on the other hand, increasing the slope would have a restrictive effect (in the opposite direction to the intention of the fall). At the same time, an interest increase could even have a stimulative impact if it generated a reduction in the slope of the curve (in the opposite direction to the interest increase).

Many of these legislators used this argument to defend a moderation of the cycle of reduction and acceleration of the cycle of high interest rates in Brazil to reduce the slope of the curve. On several occasions, members of the Central Bank themselves mentioned that a fall in interest rates could have a reverse effect if it generated an increase in the slope of the curve.

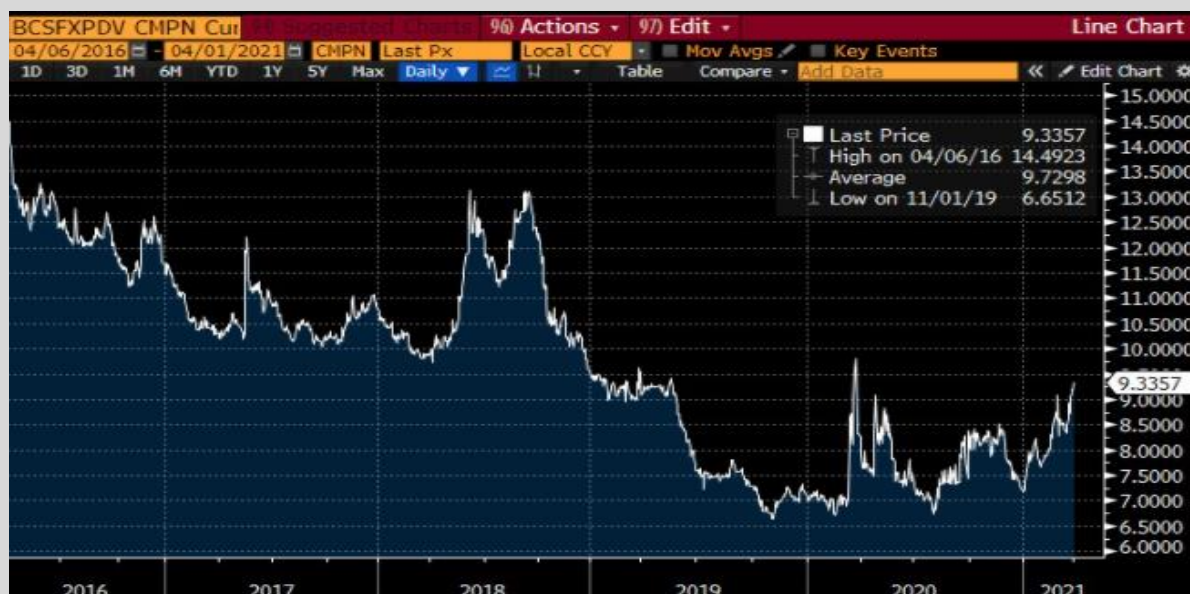
This way of seeing things seems strange to us. As we understand how the yield curve should be priced, whenever the Central Bank decreases the Selic rate, the curve should naturally become steeper. A greater inclination would be a natural and expected behavior, with no effect contrary to the original intention to stimulate the economy. We even understand that it is impossible to have a stimulative one-day interest rate without the curve being positively inclined because if the curve is flat or even reversed, it would mean that the one-day interest rate is not below the neutral rate estimated by market participants.

In our view, this incorrect way of understanding the slope of the curve, as a synonym for the risk premium, even affected the public debt good administration. The level seen in July 2020 for the pre-fixed 10-year rate, around 7%, was the lowest we have ever had in Brazil (Chart 1). Nevertheless, the National Treasury chose to reduce the issuance of longer-term bonds at that time. The institution considered that the interest rate had an excess premium and that,

therefore, the rate of 10y should still be below 7%, which we already considered to be below the fair price. At that time, Selic at 2% and the slope in the 5% curve (difference between Selic and 10y interest rate) generated the incorrect perception that the “premium” was excessive. From the Treasury's perspective, we understood that this translated into a rare opportunity to borrow money in the long-term at a very low cost.

Chart 1: Pre-fixed rate maturing in 10y in Brazil.

%, p.a.



Source: Bloomberg, Mar Asset Management

The divergence of perception between us and the market was translated into an allocation opportunity. We build our portfolio in search of asymmetric opportunities that sometimes have opposite risk directions between them.

We believe that this is how we build a more efficient and balanced portfolio.

To be paid in pre-fixed rate in Brazil was the best risk-off strategy to counter our risk on positions, which we already had in the fund through our equities portfolio. In addition to being a countercyclical asset, the fixed rate pre-presented positive asymmetry.

In the following pages, we describe the simple way we price the long end of the curve and why we consider that looking only at the slope of the yield curve may be inefficient for defining whether or not the price of long interest rates practiced by the market is out of place.

In summary, the long end rate should be equal to the neutral rate plus a risk premium. Our proxy for risk premium and neutral rate do not show any anomalies and are very close to pre-crisis levels. This implies that the great inclination of the curve was due only to the degree of stimuli given by the BCB.

The slope of the yield curve

There are two main determinants of the slope of the yield curve – the difference between the short and neutral interest rate and the long-term risk premium perceived by the market. The slope on account of the difference between the short and neutral interest rates is desired and, to a large extent, defined by the Central Bank. On the other hand, the inclination for risk premium is determined by market forces and reflects the risks perceived by money lenders to the government.

In economies in which the Central Bank has credibility, short-term interest rates follow the market's expectation about the path to be followed by monetary policy. When the economy is not in full employment, the Central Bank deviates the short-term interest rate from the neutral one to generate expansionary or contractionary effects. The ultimate goal is always to bring the economy into balance through monetary policy.

Short-term deviations from the neutral rate are perceived as temporary.

As, in the long run, the economy tends to return to equilibrium, the market understands that the interest rate determined by the Central Bank (ON Rate) will eventually return to levels close to the neutral rate in the future. The long end rate (average of ON rates for the period) reflects market players' perception of the economy's neutral rate.

This implies an inverse relationship between one-day interest rates and the yield curve's slope. Every time the ON Rate is below the neutral rate, the curve must be positively inclined. When the rate is around neutral, the curve must be "flat." Finally, when the curve is reversed, it is a sign that the one-day rate is above the neutral rate. The greater the deviation between the ON Rate and the neutral, the greater the slope of the curve in absolute terms.

Alternatively, the curve may tilt by movements at the long end interest rate. This occurs when there is a change in the economic framework that raises the neutral interest rate or increases uncertainty, affecting the risk premium.

The impact on the activity of an increase in the yield curve's slope depends on which of these two movements is occurring. If the slope occurs due to a reduction in the short end, the effect will be expansionist. If the move is due to an increase in the long end rate, then it is contractionist.

United States Yield Curve

The USA yield curve illustrates these two possible types of movements very well. Because we have a good proxy for the historical neutral interest rate series, it is possible to see how the two components - spread between ON and neutral rate and term premium – contributed to the slope of the yield curve over time.

The proxy for the long-term neutral rate we like is the FRA¹ level of 5y5y (5y forward rate), which represents only the portion of the yield curve between year five and year 10. Unlike what is commonly done, we do not use Treasury's 10-year implied rate as a proxy for our neutral rate. In our view, it is not an accurate estimate, as it is the average rate between all points today and ten years from now. Of course, it is affected by shorter term rates, which do not necessarily reflect the neutral rate of the economy.

Historically, FRA tends to fluctuate close to a level that the Fed points to as the long-term equilibrium rate. In particular, the FRA has a very low correlation and operates at much shorter intervals than the Fed Funds (US one-day rate).

¹ Forward Rate Agreement.

Chart 1: 5y5y USA Fra (white line) versus the FF (red line). There is no correlation between Fra and Fed Funds, Fra trades around the neutral long-term interest level indicated by the Fed (shaded), plus a risk premium.

%, p.a.



Source: Bloomberg, Mar Asset Management

The Fed Funds movements explain most of the changes in the slope of the US yield curve. As the neutral rate oscillates very little, the long rate (5y5y FRA) also tends to be relatively stable over time. This implies a reasonably clear negative relationship between the Fed Funds and the slope of the interest curve (Chart 2).

Therefore, we can conclude that the vast majority of changes in slope are due to the spread between the ON and the neutral rates. Risk premium fluctuations do not explain much of the movements of the US curve. This implies that generally, in the USA, a steep yield curve strongly indicates that financial conditions are stimulative.

The current conjuncture is an excellent example of how the association between curve slope and risk premium is not straightforward. The slope of the yield curve is at the highest level since 2013. Nevertheless, both short- and long-term interest rates are at levels (in real terms) below what they were in the pre-crisis. That is, monetary conditions are more stimulative than before, despite the sharp increase in inclination.

Chart 2: Fed funds (blue line) versus inclination of USA 10y-5y (red line). When the Fed Funds is reduced, the inclination increases and vice versa.

%, p.a.



Source: Bloomberg, Mar Asset Management

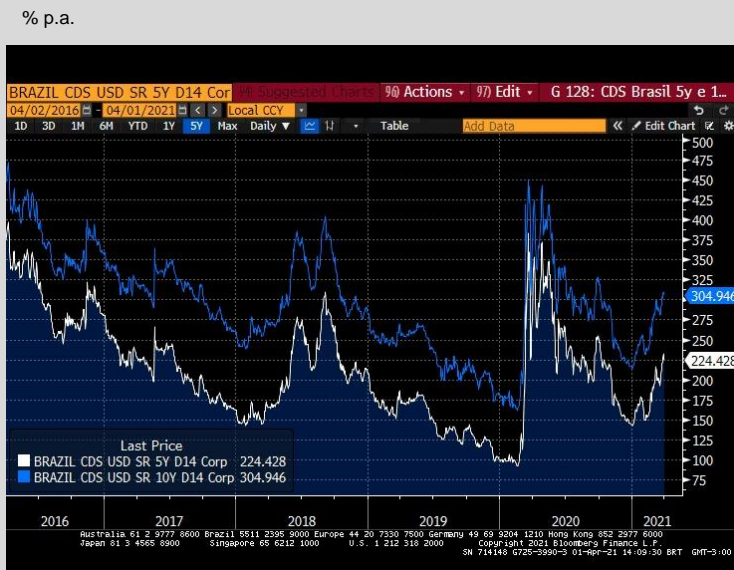
The way we consider to be the correct one to analyze tightening or loosening in the yield curve is through the average long-term rate - if the increase in the current rate leads to a high average rate, conditions are tight and vice versa, with little importance to the degree of slope of the curve.

Brazil Yield Curve

Similarly, the 5y5y DI FRA should be directly related to the level of the long-term neutral rate. But in Brazil, unlike the USA, we have to add the risk premium component.

We like to use the CDS as a proxy for the risk prize (Charts 3 and 4). But, like long-term bond rates, CDS is also an average of short- and long-term rates. To make it compatible with the interest rate FRA methodology, we used the Brazil CDS FRA between 5y and 10y contracts.

Chart 3: In Brazil, we use as a reference for "long-term premium" the 5y (white line) and 10y CDS (blue line)



Source: Bloomberg, Mar Asset Management

Chart 4: The correlation of the 10y CDS (blue line) with the 10y prefixed rate (white line) is very high



Fonte: Bloomberg, Mar Asset Management

To find the premium-free long-term neutral rate, we considered the 5y5y FRA DI minus 5y5y CDS FRA. It gives us an estimate for the neutral rate priced by the market at 5.70% (Chart 5). This level is in line with the levels of neutral rates commonly used for the country. For example, if we consider an inflation target of 3.2% in the future, this would imply a neutral real interest rate of 2.5%. This long-term neutral real rate level is in line with that commonly used by economists. The Central Bank, for example, estimates this real neutral rate at 3%.

The exercise can be done the other way around as well. We can set a long-term equilibrium Selic rate, and we found what the 5y Fra rate in Brazil would be. Setting the neutral Selic to 5.75% and adding the 5y5y CDS FRA, the result would be a rate of 9.45%. FRA traded on the DI curve is currently priced at 9.60% (Chart 6).

Chart 5: Interest 5y5y FRA discounted by 5y5y CDS FRA

% a.a., media móvel de 50 dias



Source: Bloomberg, Mar Asset Management

Chart 6: Arbitrated rate of 5.75% + CDS FRA (white line) and market DI FRA (red line)

% a.a.



Source: Bloomberg, Mar Asset Management

As in the USA, the long part of the curve does not respond to movements at the short rate. Chart 7 illustrates how low the correlation between the 5y5y DI FRA and the Selic rate is (Chart 7). As expected, the long end rate responds a lot to fluctuations in the risk premium – the correlation between the 5y5y FRA with the CDS FRA, as illustrated in Chart 6.

Finally, and most importantly, we do not see excessive premiums in the long part of the interest curve today. When we look at historical patterns, our estimates for both the risk premium and the neutral rate are fairly low. That is, the reason behind the strong slope of the interest curve in Brazil is only the spread between the Selic rate and the neutral rate of the economy.

It does not seem to be a theoretical or empirical reason for us to believe that an increase in the Selic rate would decrease the risk premium embedded in the interest curve that would generate stimulative effects. We agreed that an increase in the Selic would decrease the slope of the curve, but for the usual reason of reducing the spread between the ON Rate and the neutral rate. Nevertheless, this increase will only imply tightening monetary conditions through the overnight interest rate channel.

The only way for a Selic rate hike to be stimulative would be if this increase had a negative impact on the economy's neutral real interest rate. In this case, potential growth would be higher, and we could see an increase in aggregate demand without inflationary pressures. However, there is no causal relationship between Selic and the neutral rate of the economy, except when the credibility of the Central Bank is at stake. We believe this is not the case, especially when we note that long-term inflation expectations are consistently on the “target” of the Central Bank.

Final remarks

The previous discussion illustrates that fluctuations in the interest rate curve slope are explained primarily by short interest rate movements. When you have a credible Central Bank, long-term rates react little to fluctuations in the short part of the curve and reflect the neutral rate + risk premium.

This directly affects the relationship between monetary policy and the forward structure of the interest rate. Since the long nominal rate is roughly the average between the short and long forward rates, an increase in the ON Rate tends to affect the entire structure of the interest curve, always in the same direction as its movement. In practical terms, this implies that additional Selic hikes would increase the average rate of the entire curve, tightening monetary conditions through this channel.

And this movement was precisely what happened in the last weeks. We saw a reduction in the slope between 10y and 2y interest rates (Chart 8 - white line) due to an increase in the short interest rate (2y, blue line). The long nominal rate (10y, red line) also rose, only to a lesser extent and due to the short-term rate increase. That is, we saw a flattening of the curve that implied a tightening of monetary conditions.

The 0.75pp Selic increase promoted by the Central Bank last week did not contribute to the reduction of the risk premium or the neutral rate. The 5y5y FRA remained at the same level as it was before. In the end, the Selic increase had an impact on the short part of the curve and a neutral impact on the long-term risk premium, refuting the hypothesis that an increase in Selic could bring some benefit in terms of relaxing the country's financial conditions.

Chart 7: DI 5y5y FRA (white line) and Selic rate (blue line)



Source: Bloomberg, Mar Asset Management

Chart 8: Short interest rate (2y, blue line), long (10y, red line), and slope of the curve (white line).



Fonte: Bloomberg, Mar Asset Management

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