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Structural Interest Rates: Why Did They Fall and Where Are They Now?

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- **Natural interest rates are declining throughout most of the world.**
- **Demographic changes (e.g., increased life expectancies and declining fertility rates) account for a significant share of this trend, as they can attribute to higher saving rates and dampen economic growth.**
- **Brazil "imports" a portion of these attributes, receiving some of these global savings and facing a more challenging international scenario in terms of economic growth.**
- **Nevertheless, domestic factors (e.g., fiscal adjustments and Central Bank credibility) reinforce declining neutral interest rates in Brazil.**
- **Natural rate estimates tend to be highly imprecise; however; using five different methodologies (see page 4 for details) we find a relative tight range: 2.4% p.a. to 3.2% p.a., averaging 2.7% p.a.**
- **Using these results as an output to our Taylor Rule estimation, which combines output and inflation gaps to forecast what will be the Central Bank's next moves, we conclude that the current easing cycle could end at 4.0-4.25% p.a..**
- **Additionally, the Taylor Rule suggests that the tightening cycle will begin gradually and only in 2021, converging to the natural rate only in 2022, implying an expansionary monetary policy for two years.**
- **Finally, we believe that where interest rates will land in the long term depends not only on current structural rates level but on its future trends as well, which, in our opinion, is completely connected to the evolution of fiscal adjustment and the reform agenda.**

Introduction

In the Central Bank's last Quarterly Inflation Report (QIR), published on December 19, 2019, a box on structural (or neutral) interest rates was included and defined as, according to the document, "that rate consistent with the inflation target and the output growth equal to the potential growth over the medium-run". Still according to the QIR, this rate is a "fundamental reference for the conduct of monetary policy"; hence, the importance of pursuing accurate estimates of interest rate levels, especially at a time when market analysts are trying to anticipate the end of the current easing cycle, as well as the rate that will prevail at the end of the cyclical economic recovery.

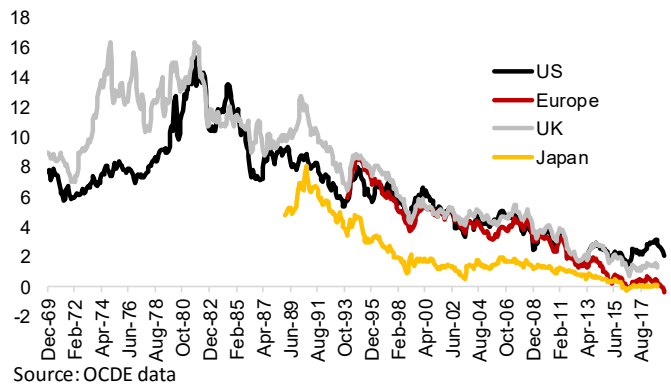
In this report, we present the evolution of the key drivers (external and domestics) of structural interest rates; our estimates for the evolution and the current value of this rate; and the implications for monetary policy in the short and medium term.

International Environment

Interest rates are defined as the price of money over time, which means the cost of advancing financial resources. Like any other price in the economy, its value is determined by the balance between its supply and its demand. The structural rate is what leads to this balance, in the absence of transitory disturbances. Any factor that increases the demand for financial resources (investments) raises the equilibrium rate, while factors that increase the supply (savings) reduce interest rates.

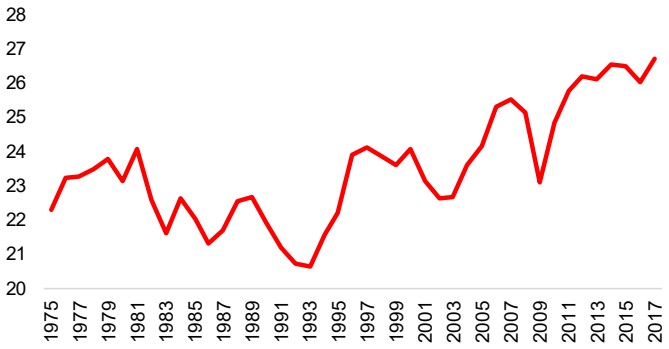
This theme is not only explored in Brazilian Central Bank reports, since over the last few years (or decades) a strong declining trend for interest rates (Figure 1) has also attracted the attention of researchers dedicated to understanding this phenomenon.

Figure 1. 10 years rate % p.a.



Source: OCDE data

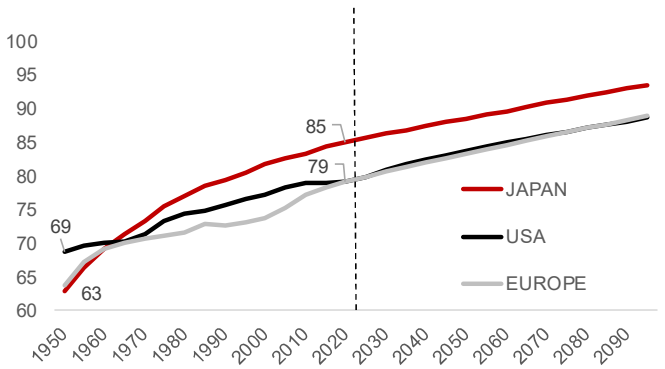
Figure 2. World Gross Savings (% of GNI)*



Source: World Bank *(Gross national Income-Consumption) / Gross national Income

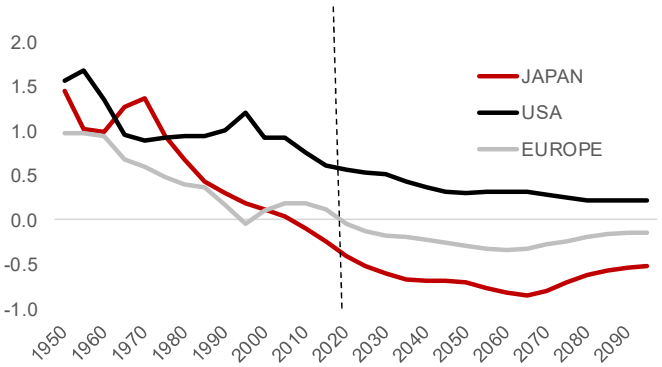
Most of the studies on this subject conclude that most of this drop comes from the supply side of resources, due to the significant increase in saving rates (Figure 2) largely related to demographic factors: increased life expectancies (Figure 3) tend to lead to a higher savings rate, as individuals need to save more while young in order to sustain consumption during retirement, expanding the supply and thereby pressuring the equilibrium rate down. A second factor that explains the trend toward increased savings, though perhaps less important, focuses on the higher concentration of income, given that higher income households save, on average, a larger proportion of their income.

Figure 3. Life expectancy at birth



Source: United Nations database

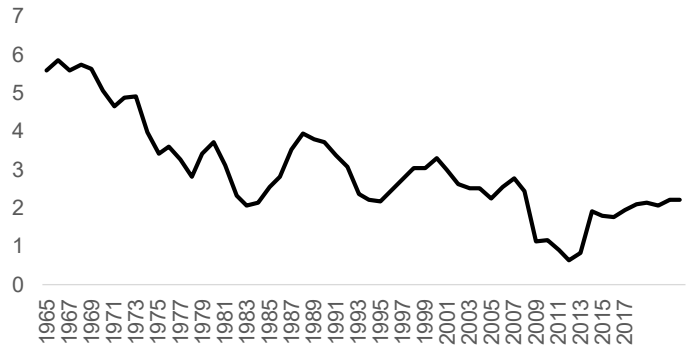
Figure 4. Population Growth Rate %



Source: United Nations database

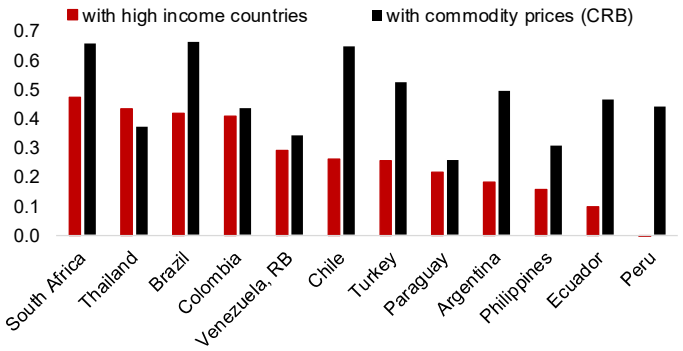
Although explanations on the supply side (savings) prevail, demand (investments) probably also accounts for part of the interest rate movement, in our view. Demography also plays a role here—the downward trend in the world population growth rate (Figure 4) generates weaker economic growth (Figure 5) and, consequently, an expectation of lower returns on investments, reducing its attractiveness and contributing to a reduction in the equilibrium interest rate.

Figure 5. % GDP Growth (high income countries)
5 years average



Source: World Bank

Figure 6. GDP Growth Correlations



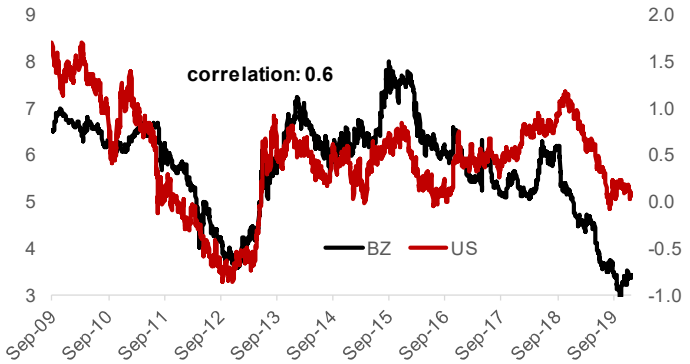
Sources: World Bank and Santander Bank

External factors

The equilibrium between savings and investments has global implications. Thus, we see that increased savings rates in China, for example, contribute to falling interest rates in the U.S. In a similar vein, we see that lower economic growth rates in developed countries dampen trade growth in other countries. Brazil's economy, despite being relatively closed (the exports to GDP rate is 10%, compared to a world average of 30%), is significantly correlated with world economy (Figure 6), suggesting that we "import" part of the more moderate growth trend, thereby limiting the domestic economy's recovery rate. Hence, the "abundance" of world savings and the only moderate pace of economic recovery account for a portion of the drop in domestic interest rates. Figure 7 highlight this effect by illustrating the high correlation between Brazilian and U.S. long-term real rates (with the latter often being used as a proxy for structural interest rates).

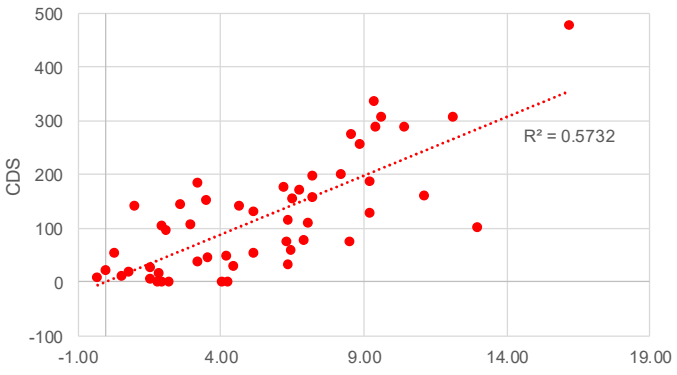
Nevertheless, internal factors also play an important role, especially the evolution of the fiscal situation (current and expected), Central Bank credibility and the monetary policy power.

Figure 7. Real 10 years rate (inflation linked)



Sources: Anbima and BCB

Figure 8. CDS X 10 years rate

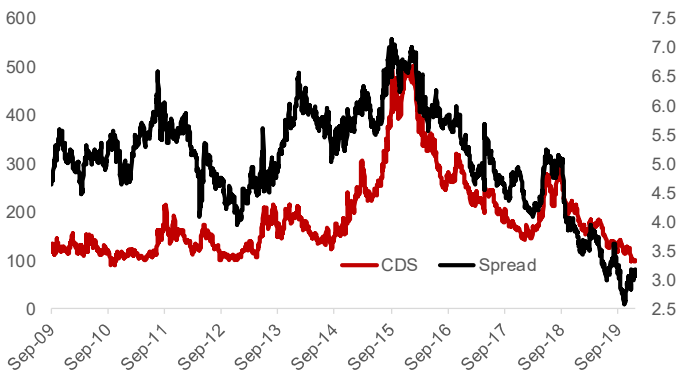


Source: Bloomberg

Domestic factors

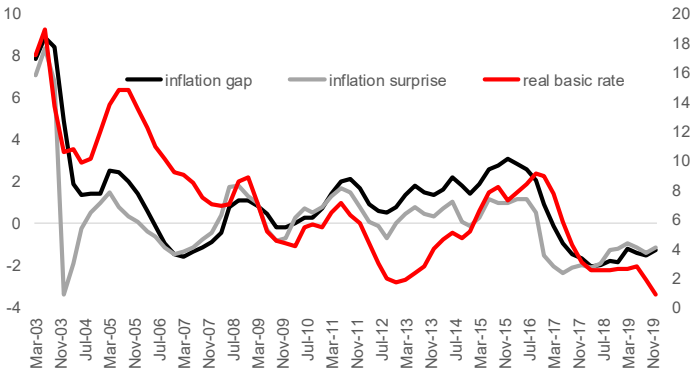
The fiscal situation: Fiscal policy affects domestic interest rates in three ways: (i) more contained spending growth reduces the government's deficit, expanding domestic savings; (ii) lower public investments lead to decreased demand for financial resources; and (iii) healthier public accounts improve the country's risk perception. The drop in risk perception (factor iii) has an ambiguous effect on interest rate equilibrium: the reduced default risk increases the attractiveness of savings, pressuring interest rates down; on the other hand, when an environment is perceived as being safer, this can stimulate demand for investments, subsequently increasing the equilibrium rate. However, Figures 8 and 9 suggest that the first effect prevails, illustrating a positive correlation between risk perception and interest rate (the first using a panel of countries and the last a comparison between Brazil and the U.S.). Therefore, all the connections between fiscal policy and interest rates indicate that ongoing fiscal adjustment plays an important role in the declining interest rates observed in the country—both due to the increase in supply and the moderation of demand.

Figure 9. 10 years spread BZ – US rates X CDS



Sources: Federal Reserve and Anbima

Figure 10. Real Interest Rate X Inflation (GAP and Surprise)



Sources: BCB e IBGE

Central Bank credibility: A second relevant domestic factor is the "inflation gap", or, alternatively, the "inflationary surprise": the first measures the distance between inflation and the target, and the second the difference between expected and actual inflation. The intuition is that deviations in inflation from the target (upward) or inflation above expectations increase neutral interest rates. In fact, as shown in Figure 10, two measures have evolved "positively" (dropped) in recent years, which apparently explains part of the drop in real interest rates.

Monetary policy power: Last but not least, factors that increase the sensitivity of economic activity to interest rates (defined as the power of monetary policy) tend to lower the equilibrium rate. Financial deepening and the reduction of subsidized credit, for example, work in this direction. The intuition, in the case of subsidized credit, is that its reduction has two effects: (i) increasing the sensitivity of the final interest rate to the basic rate, because subsidized credit is less dependent on monetary policy; and (ii) reducing the equilibrium rate, since the subsidized rate is lower than that of non-earmarked resources, so that the decreased subsidy opens room for other rates to be reduced without changing the final rate. This mix changing, in addition to allowing a lower basic rate, increases economic productivity, since the free resource allocation, on average, is more democratic and efficient than that of subsidized resources.

Our estimates

Despite being an essential variable for the assessment of economic health, the structural interest rate has an important weakness: it is not observable, which implies that its analysis requires an estimate subject to inaccuracies. There is no consensus among analysts about the best way to conduct such an estimate, which is the reason why we choose to use several methodologies, namely:

I) Direct observation of the real long-term interest rate (10-year NTN-B);

II) Economists' estimates contained in the Focus report (subtracting the expectation of inflation from the expectation of interest rates in the long run), similarly to that presented by the Central Bank in the last Quarterly Inflation Report;

iii) Data smoothing filter (HP – Hodrick Prescott);

iv) Econometric model that estimates the structural rate through the component of the real interest rate that is explained by its fundamentals (both internal and external, listed in the previous sections of this report). For the latter method, we have two alternative specifications[1]:

a. $R^* = a_0 + a_1 * USrate(1Y) + a_2 * NECredit/GDP + a_3 * InflationSurprise + a_4 * BNDESConc + a_5 * CDS$;

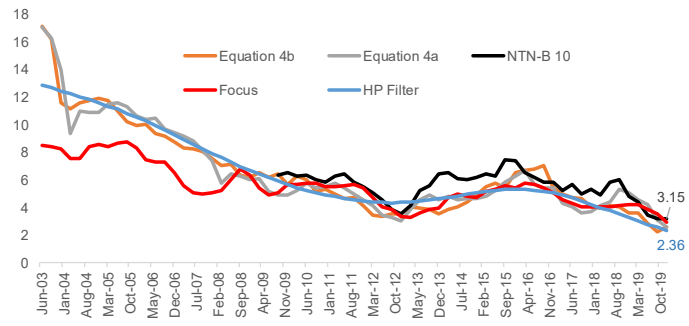
b. $R^* = b_0 + b_1 * Trend + b_2 * NECredit/GDP + b_3 * PrimarySurplus + b_4 * InflationSurprise$;

The results (Figures 11 and 12) lead to four conclusions: (i) all methodologies show a significant decline; (ii) the range of estimates is relatively narrow for the current rate (between 2.40% p.a. and 3.15% p.a.); (iii) 3.15% p.a. looks like a good

[1] Where: USrate(1Y) = 1 year treasury; NECredit/GDP = Non Earmarked Credit to GDP ratio, which is a proxy for financial deepening ; BNDESConc = new credit granted by Brazilian developing bank (BNDES), which is usually subsidized;

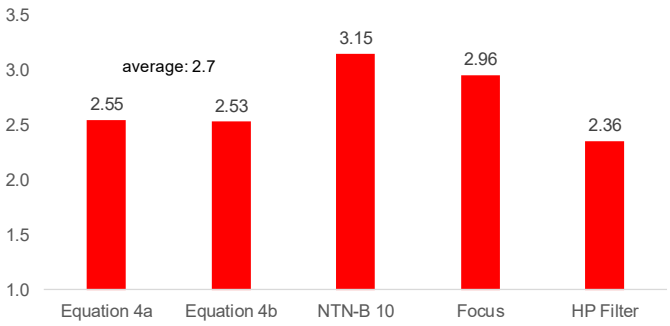
estimate of upper bound of the range, where the real structural rate is, considering that NTN-B estimate (3.15 % p.a.), including the stretch premium, tends to be the most conservative—in fact, all other estimates point to lower values than this; and (iv) equations 4a and 4b corroborate the thesis that domestic factors are also relevant, because even "controlling" by the external interest rate (or by a downward trend in the case of b), these variables proved to be statistically significant.

Figure 11. Structural Interest Rates (p.a.)



Sources: Anbima and BCB. Estimates: Santander

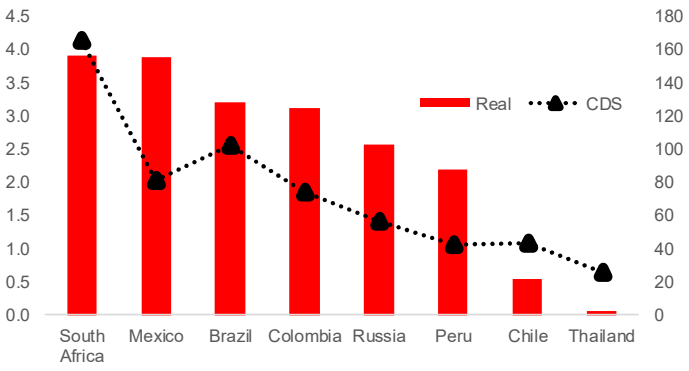
Figure 12. Structural Interest Rate (% p.a.): Alternative methodologies



Source: Santander

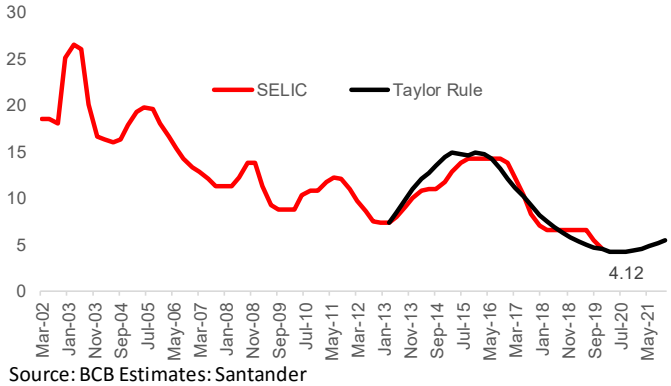
We note that an interest rate close to 3% p.a. places Brazil at a level similar to its emerging peers (Figure 13)— except for those with significantly lower risk, such as Chile and Thailand. The maintenance of the downward trend—reaching levels closer to 1%—is feasible, in our view, but depends upon the consolidation of a positive evolution of internal factors, considering that the international rate is already around 0% p.a., leaving little room for external aid. Thus, using the results of equations 4a and 4b, we believe that consolidation of a healthier fiscal (and parafiscal) scenario, as well as a deeper financial system, are requirements for further declines in the structural interest rate.

Figure 13. Long Term real Rates* X CDS



Sources: Bloomberg and WEO * 10 years rate - Inflation forecast for the long term (20-24)

Figure 14. Selic X Taylor Rule



Source: BCB Estimates: Santander

Structural rates and monetary policy

The theoretical equation that describes monetary policy rule (the Taylor Rule) assumes that the Central Bank sets the interest rate based on: (i) the structural interest rate; (ii) the output gap (idleness of the economy); and (iii) the breadth of deviations from inflation expectations in relation to the target. In other words, the Central Bank observes the economy's idleness and the deviation of inflation from the target to define how far (up or down) the basic rate should be from the structural rate. The weight attributed to each of these factors depends upon the characteristics of each central banker. Based on our estimates for the average weight that the Brazilian Central Bank has assigned to these two variables since the beginning of the inflation targeting regime, and considering our forecasts for the evolution of the output gap and inflation, the simulation for the Taylor Rule suggests that: (i) monetary easing cycle should end at 4.0-4.25% p.a. ; and (ii) the tightening cycle should begin only in 2021, with the pace of convergence toward the neutral rate (close to 3% in real terms, which implies 6.5% p.a. in nominal terms), being moderate.

Conclusions

Our updated estimates for structural interest rates and monetary policy decision rules reinforce our believe that the Central Bank has room to further lower the Selic rate and that it may adopt a gradual normalization pace (starting only in 2021). The rate that will prevail in the long run depends not only on the current level of the structural rate, which we estimate at 2.4-3.2% p.a, but also the direction in which this rate will evolve over the next few years, given that some of its drivers are cyclical and may change in the medium term (e.g., the situation of public accounts and the financial deepening). Therefore, measures that aim to consolidate fiscal adjustments (e.g., containing mandatory spending and administrative reforms) and deepening the financial market should contribute to a further fall in the neutral rate, in our view. On the other hand, an eventual early dissipation of the reformist momentum and fiscal adjustment could translate into a reversal of part of the fall observed in recent years.

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