Decomposition of the Financial Conditions Index into domestic and external factors

It is important for central banks to understand how financial conditions evolve and affect the economy, since these conditions impact upon business cycles and reflect not only current economic condition but also market expectations regarding future economic outlook. In particular, as is well known in literature, tighter financial conditions in the present may indicate lower economic growth in the future.[1]

As disclosed in a previous IR, the BCB has developed a Financial Conditions Index (FCI) to timely monitor the evolution of general market conditions.[2] The FCI incorporates daily information from 26 domestic and external variables, split into seven groups: interest rates in Brazil, interest rates abroad, risk, currencies, oil, commodities, and capital markets. The variables are aggregated into a single indicator via principal components extracted from these groups.[3] Some of them contain both domestic and external variables, such as the risk, currency, and capital market groups. However, it can also be useful to have a measure of how much of the FCI variation comes from domestic factors and how much from external ones.

This box presents the FCI decomposition into domestic and external factors, separating the contribution of external variables on financial conditions from the impact produced exclusively by domestic series. This does not mean, however, that there can be no causal relationship between external and domestic variables.

The employed methodology involves the following steps:

(i) exclusion of domestic variables[4] from the FCI groups of variables[5];

(ii) removal of trend and standardization from the remaining series, according to the FCI construction method;

(Iii) calculation of first principal component of each group;

(iv) estimation of weights of each group[6];

(v) calculation and normalization of the weighted average of the principal components, using the weights from the previous step;

(vi) estimation of a FCI regression on an intercept and on the weighted average from the previous step; and

(vii) definition of the external FCI as the part explained by the regression[7] of the previous step and the domestic FCI as the residue of that same regression.

1/ For example, Adrian et al. (2019) present empirical evidence that the left tail of the conditional distribution of the US GDP growth rate varies with financial conditions.

2/ See box "Financial Conditions Index" of the March 2020 IR.

3/ Further details about the methodology are available in the box mentioned above.

4/ Interest rates of 1-year and 5-year (Pre-DI swap), 5-year Credit Default Swap (CDS) Brazil, exchange rate (USD/BRL), and Ibovespa.

5/ Since the group "interest rates in Brazil" contains only domestic series, it is excluded from this step.

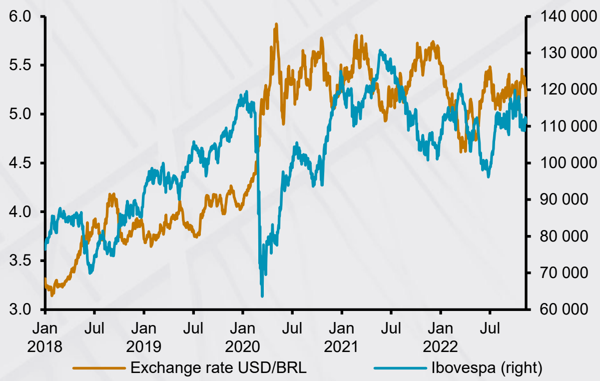
6/ The weights are obtained from regressions of the seasonally adjusted six-month change rate of the BCB's Economic Activity Index – Brazil (IBC-Br) on the first difference of the first principal component of each group, on an intercept and on a dummy variable for the 2008 global crisis. The final weights, normalized to ensure a unit sum, are the following: interest rate abroad (0.85); risk (0.34); currencies (0.12); oil (0.23); commodities (-0.28); and capital markets (-0.26).

7/ In other words, the external FCI is defined as the weighted average of the principal components, multiplied by the respective coefficient estimated in the regression (assuming that, according to the FCI construction, the estimated intercept is statistically equal to zero).

Figures 1 and 2 present the daily frequency of the domestic variables that make up the FCI since 2018. It is worth noting that the outbreak of the Covid-19 pandemic in Brazil, in late 2020Q1, strongly impacted the dynamics of domestic variables that make up the FCI, producing a sudden increase in the domestic risk premium measured by the CDS, a sharp BRL depreciation against the USD, and a significant drop in Ibovespa. Next, mainly due to the adopted anti-cyclical policies, there was a decline in interest rates and a rise in the stock market. As of early 2021, forward interest rates increased, reflecting the start of the monetary tightening.

Figure 1 – Domestic interest rates and CDS

Figure 2 – Exchange rate and Ibovespa



From an external perspective, as of early 2022, events such as the war in Ukraine, with subsequent increases in oil and agricultural commodity prices, the USD appreciation worldwide, and the rise in forward interest rates in advanced economies,[8] among other factors, have brought strong stress into financial conditions, with prospects of lower global economic growth ahead.[9]

Figures 3 and 4 present some external variables that make up the FCI with a daily frequency. Figure 3 shows nominal interest rates, with a 2-year maturity, in the US, the UK, and Germany. It is noteworthy the sharp interest rates increase in these three countries throughout 2022, following, therefore, the rise in domestic interest rates. Figure 4, in turn, shows the USD appreciation trend observed in recent years.

Figure 3 – Foreign interest rates - 2 years

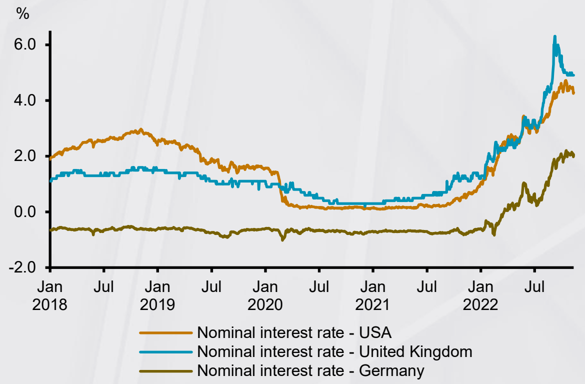


Figure 4 – USD

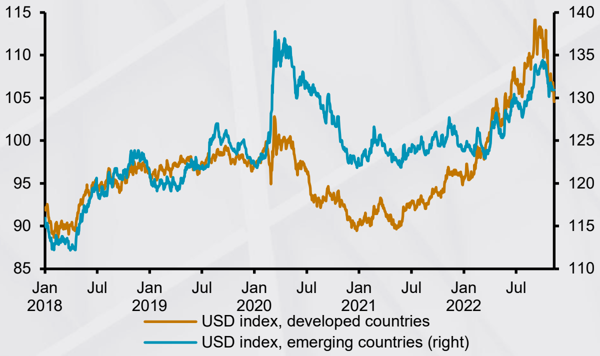


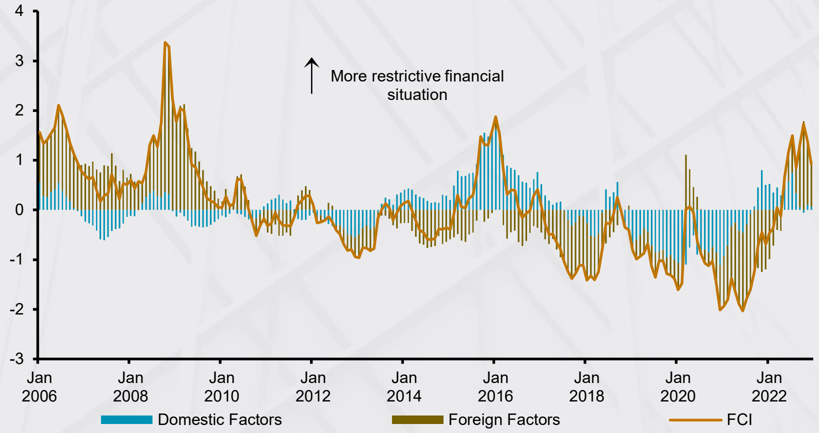
Figure 5 shows the FCI with a monthly frequency and its decomposition into domestic and external factors since 2006. In general, the decomposition is related to the analysis of the main events occurred in the period. According to this decomposition, the tightening of financial conditions in 2008 and 2009 mainly reflects external factors, stemming from the outbreak of the global financial crisis. The tightening of conditions

8/ Ending a period of more than a decade of accommodative monetary policy in these economies, with interest rates at or near zero or their historical lows.

9/ Including expectations of stagflation in the euro area and prospects of recession or low economic growth in the US. Further details are available at the International Monetary Fund's October 2022 Global Financial Stability Report (GFSR).

in 2015 and early 2016, in turn, reflects domestic factors, which are related to the political scenario in the period. A further significant tightening takes place in early 2020, with the outbreak of the Covid-19 pandemic, where the restrictive role of both external and domestic conditions becomes clear, followed by less restrictive conditions resulting from the extraordinary stimuli implemented domestically and worldwide. Considering the most recent period, it becomes evident the difference in the timing of the monetary tightening cycles, which occurred earlier in Brazil compared with advanced economies. Over the last 12 months, nearly 83% of the observed FCI variation was due to external factors and only 17% to domestic ones, whereas, in the previous 12 months,[10] external factors accounted for 15% of the FCI variation, while domestic factors caused 85% of the tightening in financial conditions.

Figure 5 – FCI decomposition



From the domestic perspective, the extraordinarily stimulative monetary policy observed in 2020 was replaced by a new upward cycle of basic interest rate (Selic), as of March 2021. This trajectory contributed to the tightening of financial conditions throughout that period, shifting FCI from historical lows seen in late 2020 to values regarded as the most restrictive since early 2016. Therefore, financial conditions have deteriorated substantially over the last two years, initially due to domestic factors and, more recently, to external ones. In particular, the domestic monetary tightening cycle started in 2021Q1 by the BCB preceded by nearly one year the start of the contractionary monetary policy seen in advanced economies, such as that observed in the US from March 2022, with the Federal Reserve increasing the interest rate.

In summary, this box presents a methodology for the FCI decomposition into domestic and external factors. This decomposition can be used to timely monitor the several factors that impact financial conditions. This initiative is part of the continuous effort to improve the tools used by the BCB, as well as to provide transparency to its actions.

References

Adrian, T., Boyarchenko, N., Giannone, D. (2019). "Vulnerable Growth". The American Economic Review 109(4), 1263-1289.

Banco Central do Brasil (2020). "Financial Conditions Index", Inflation Report, March.

International Monetary Fund (2022). "Global Financial Stability Report, Navigating the High-Inflation Environment", October.

10/ From December 2020 to December 2021.