Financial Conditions Indicator

Financial conditions play a crucial role in business cycles, reflecting not only the current economic situation but also market expectations regarding the future state of the economy. A key element in this issue is the idea that the supply and demand decisions of economic agents are affected not only by the basic interest rate, but also by other financial variables.

This box[1] presents a Financial Conditions Indicator (FCI) for Brazil on a daily basis, being timely and more informative than the monthly or quarterly financial indicators proposed in literature. The objective is to build an indicator that incorporates daily information on general financial market conditions, having as a reference for its construction the ability to generate information on future economic activity.

The extensive literature on monetary transmission mechanisms is a natural starting point for understanding how financial conditions affect the real sector of the economy (e.g., Hatzius et al., 2010). Taking into account only the monetary policy interest rate is not enough to assess the financial conditions of the economy, which are also affected by other factors (such as prices of assets other than those based on public debt instruments).

After the 2008 global crisis, there was a proliferation of financial indicators in the literature[2] and in several central banks.[3] Despite the wide variety of methodologies, FCIs generally have the following characteristics: (i) include variables related to the supply or demand of financial instruments relevant to the economy[4]; (ii) may cover from a few variables to hundreds of series; (iii) the variables are aggregated by means of weighted averages or via principal component analysis; and (iv) the FCIs are presented in terms of z-score (i.e. with zero mean and unit variance).

The FCI presented in this box represents an improvement on the one proposed in Gaglianone and Areosa (2016), mainly on the following aspects: (i) daily rather than monthly frequency; (ii) selection of economic and financial variables in view of future economic activity and a higher relative weight for external variables; (iii) grouping the variables into seven groups instead of five groups; (iv) new indicator construction methodology, allowing a better interpretation of the dynamics of the FCI in terms of its constituent variables; and (v) better predictive capacity of the FCI in terms of future economic activity.

Table 1 presents the variables selected in the construction of the FCI presented in this box. The proposed methodology[5] involves the following steps: (i) removal of the trend of the series from groups 4 to 7; (ii) standardization of all series, in order to present zero mean and unit variance; (iii) extraction of the first principal component of each group of variables[6]; (iv) calculation of the weighted mean of the referred principal components using the weights of Table 1; and (v) definition of the FCI as the weighted mean of the

1/ Results extracted from the ongoing study "A new Financial Conditions Indicator for Brazil using daily data", conducted by Wagner Piazza Gaglianone and Fernando Nascimento de Oliveira.

2/ See, e.g., Beaton et al. (2009), Hatzius et al. (2010), Brave and Butters (2011), Gumata et al. (2012), Kara et al. (2012) and Aramonte et al. (2013). In the case of Brazil, see Sales et al. (2012), Pereira da Silva et al. (2013) and Gaglianone e Areosa (2016).

3/ For example, in the case of the Bank of England, see Kapetanios et al. (2017), for the Federal Reserve Bank of Chicago, see Brave and Kelley (2017), and for the Banque de France, see Petronevich and Sahuc (2019).

4/ For example, prices and volumes of assets (e.g., yields from treasury bonds, spreads, implied volatilities, stock returns), credit availability surveys and degree of capital adequacy of financial institutions, among others.

5/ Largely based on Brave and Butters (2011) and Aramonte et al. (2013).

6/ According to Hatzius et al. (2010), the construction of the FCI from principal components of standardized series is one of the most common and efficient methods for the elaboration of financial indicators. See also Brave and Butters (2011) and Matheson (2012).

previous step, standardized to present zero mean and unit variance in the considered sample.[7] The weights presented come from regressions capturing the ability of the principal components of each group to bring information on the future variation of the Central Bank Economic Activity Index (IBC-Br).[8] The separation into groups of variables allows a better interpretation of the sources of movements in the FCI. The convention used is that growth in the FCI means more restrictive financial conditions.

Table 1 – FCI groups, variables and weights

Groups	Names	Variables	Weights
1	Domestic interest rates	Interest rates (*Swap* Pré-DI) 1 and 5 years	0.34
2	Foreign interest rates	Interest rates of USA, UK, Germany and Japan (3 months, 2 and 10 years)	0.33
3	Risk	CDS Brazil (5 years) and VIX	0.18
4	Currencies	US dollar indexes (developed, emerging countries), exchange rate (R$/US$)	0.20
5	Oil prices	Oil prices in US$ per barrel (WTI and Brent)	0.23
6	Commodities	Commodities indexes CRB (foodstuffs, metals)	-0.13
7	Capital markets	Stock market indexes MSCI (developed, emerging countries) and Ibovespa index	-0.15

Figure 1 presents the proposed daily indicator and the effective Selic interest rate, while Figure 2 shows the breakdown of the monthly FCI in terms of its groups of variables. The FCI tends to follow the main movements of the basic interest rate, but also presents its own movements. For example, between July 2015 and October 2016, the Selic rate remained stable, but the FCI grew significantly in August and September 2015 and reversed between February and April 2016, largely reflecting the movements of the groups Domestic interest rates, Currencies and Risk. Between March 2018 and July 2019, the Selic rate remained stable, but the FCI rose quickly and reversed, essentially reflecting the movements of the groups Domestic interest rates, Currencies, Capital markets and Oil prices.

It can also be observed that the FCI reached its historical lows in early 2020, constituting a stimulus factor in the economy. This behavior basically reflected the stimulative domestic monetary policy, the accommodative nature of monetary policy in the main economies (negative interest rates, close to zero or to their historical low), the growth of asset prices in capital markets and the low levels of risk indicators. More recently, the stress in the financial markets due to the new coronavirus has caused the FCI to rise significantly.

Figure 3 shows the recent evolution of the daily FCI of this box and also the alternatively constructed FCI without including the Currencies group. Historically, risk measures help to understand fluctuations in the exchange rate, as it is observed a positive correlation between risk and the exchange rate at times of greater uncertainty. In 2019, however, there was an inverse correlation between the two variables, with a reduction in risk measures and exchange rate depreciation. As a result, the FCI without Currencies presents more favorable conditions between mid-2019 and the end of the sample.

7/ As FCIs are generally constructed to measure whether financial conditions are more (or less) restrictive by historical standards.

8/ The regressions have the IBC-Br six-month change rate as the dependent variable. The first principal components of the groups, an intercept and a dummy variable for the 2008 global crisis are used as regressors.

Figure 1 – FCI and Selic rate
(12-month accumulated)

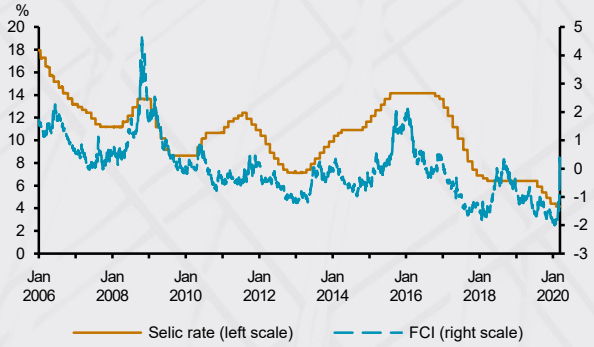


Figure 2 – FCI decomposition

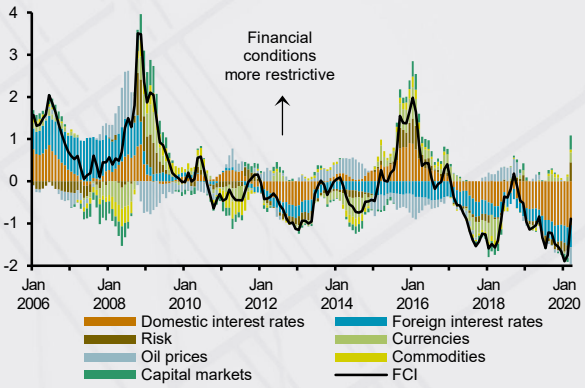
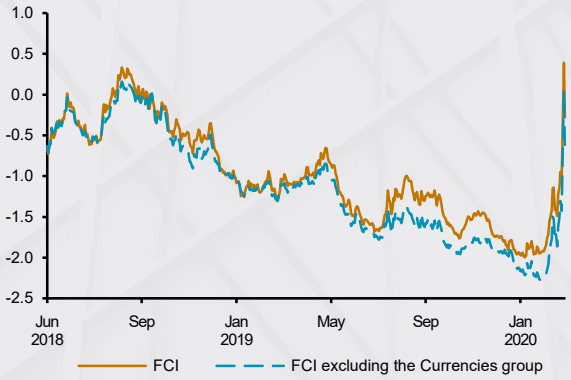


Figure 3 – FCI, with and without the Currencies group



The proposed FCI presents several desirable properties in a financial indicator (such as parsimony[9], timeliness[10] and inclusion of domestic and external variables[11]) and can be used as a leading indicator of economic activity. In this sense, Granger's causality tests do not reject the null hypothesis, at the usual levels of significance, that the dynamics of the proposed FCI temporally precedes variations in the real growth rate of the Brazilian economy, as measured by the monthly IBC-Br. This result can be corroborated by means of exercises to forecast the growth rate of economic activity, for example, using the approach of Hatzius et al. (2010), in which the authors test the capacity of interest rates and FCIs in forecasting economic activity. In this context, we use the econometric model below, with monthly frequency, in which the parameters are estimated for each forecast horizon h considered (direct forecasts):

$$y_{t+h} - y_t = \alpha + \beta \Delta y_t + \gamma \Delta x_t + \delta d_t + \varepsilon_{t+h}\,, \qquad (1)$$

where $y_t = \ln(\text{IBC-Br}_t)$ represents a proxy for economic activity[12] (dependent variable), x_t represents a financial indicator (e.g., real interest rate or FCI), Δ is the first difference operator, d_t is a dummy variable for the 2008 global financial crisis and ε_t is the residual of the regression.[13] Table 2 presents the results of the referred

9/ The relatively small number of groups of variables that make up the FCI makes it possible to analyze and break down the dynamics of the indicator in terms of its constituent groups.

10/ The daily frequency of the FCI makes it possible to monitor developments in financial conditions in real time, while monthly indicators, on the other hand, use series usually released with lags in time.

11/ Rey (2018) highlights the importance of external financial conditions, mainly from the US, in relation to domestic financial conditions, to explain the dynamics of domestic asset prices.

12/ Seasonally adjusted.

13/ In the forecasting exercise, the model parameters are estimated initially, for each horizon h=1,...,12 months, with a sample from January/2006 to December/2014. Based on these parameters, for each horizon h, projections of economic activity for period t+h are constructed. A new observation period of the series y_t, x_t and d_t is then added and the models are estimated again, recursively, repeating the previous steps along the projection evaluation sample, which covers the period from January/2015 to December/2019.

forecasting exercise, in terms of RMSE (Root Mean Squared Error) for six specifications of equation (1), using different financial indicators.

Table 2 – Root Mean Squared Error (RMSE)[1/]

Model	Financial Indicator (x_t)	Forecast horizon (in months)			
		3	6	9	12
1	FCI including the Currencies group	0.02	0.07	0.10	0.19
2	FCI excluding the Currencies group	0.03	0.09***	0.12***	0.24***
		(0.1)	(0)	(0)	(0)
3	Ibovespa	0.03	0.17***	0.13**	0.70***
		(0.7)	(0)	(0.04)	(0)
4	Interest rate (1 year)	1.09***	2.16***	3.44***	8.69***
		(0)	(0)	(0)	(0)
5	Interest rate (5 years)	0.76***	6.58***	6.21***	9.87***
		(0)	(0)	(0)	(0)
6	Term structure, real rates (5 years - 1 year)	1.89***	2.79***	1.91***	3.84**
		(0)	(0)	(0.01)	(0.03)

1/ The Ibovespa is considered in logarithm. The source of real interest rates is Anbima (ETTJ, IPCA, 1 and 5 years maturities). The p-value of the Diebold and Mariano (1995) test is in parentheses. *** and ** indicate, respectively, rejection of the null hypothesis of equal predictive ability of model 1, compared to the considered model, at 1% and 5% significance levels.

In all forecast horizons considered, the econometric model including the FCI with the Currencies group (model 1) presents the lowest RMSE value. In particular, for a forecast horizon of one year, the reduction in the RMSE is 73% compared with the model that uses the Ibovespa as a financial indicator. The aforementioned gain in predictive capacity is statistically significant at 1% level, according to the Diebold and Mariano test (1995). In several other cases, the proposed FCI presents a higher predictive capacity, and statistically significant, in relation to the other models with alternative financial indicators.

In short, this box proposes a methodology for building a daily Financial Conditions Indicator for Brazil. Such an indicator can be used to monitor the economy's financial conditions in a timely manner and as an antecedent indicator of economic activity. This initiative is part of the ongoing effort to improve the tools used by the BCB, as well as to give transparency to its actions.

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