

## Scenario

Na comparação com o mês de novembro, nosso Mapa de Riscos sinalizou em dezembro uma alta no indicador de risco de liquidez. Vale ressaltar que esse movimento ocorreu a despeito da alta generalizada observada no mês para diversos indicadores, sejam eles do mercado acionário (gráfico 2.1) ou índices de referência (gráfico 2.5). O indicador de apetite pelo risco, por sua vez, permanece como o mais alto do Radar.

O contexto no qual o Mapa de Riscos operou no mês de novembro foi um no qual os índices acionários no Brasil acumularam retornos positivos (vide gráfico 2.1), incorrendo em uma queda em sua volatilidade (vide gráfico 2.2), conforme suscitado acima. Alguns indicadores macroeconômicos estiveram em linha com esse cenário, tais como a entrada líquida de capitais estrangeiros na B3 (vide gráfico 1.5), estabilidade no indicador de taxas de juros (vide gráfico 1.2) e queda do indicador de CDS soberano (vide gráfico 1.3).

Observando em retrospectiva, constata-se que no ano de 2017 a tônica foi a de uma maior exposição ao risco, no esteio de uma queda na percepção de risco macroeconômico e de uma contenção no risco de mercado (a exceção do choque de ordem política observado em maio), conforme pode ser auferido pelos indicadores do Radar. Observando os retornos nominais acumulados de grandes classes de ativos em 2017, verifica-se que diversas categorias de ativos de risco<sup>[1]</sup> tiveram retornos acima do CDI, ao passo que o dólar valorizou-se apenas 1,5% em relação ao real brasileiro (a despeito das flutuações no ano). Ressalta-se ainda que outros indicadores financeiros que sinalizam risco encontraram-se sistematicamente abaixo dos patamares de 2016, como, por exemplo, a inflação implícita de longo prazo<sup>[2]</sup> e o spread entre o cupom cambial brasileiro e os juros de curto prazo do mercado americano<sup>[3]</sup>.

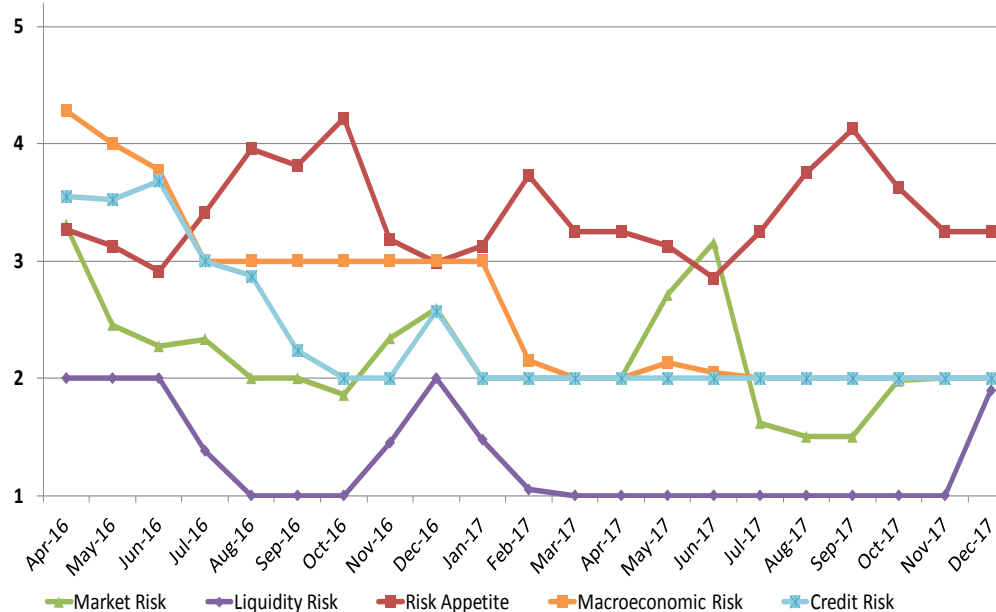
O cenário de 2018 provavelmente incluirá um aumento na volatilidade

(associada ao risco de mercado) atrelado ao desfecho do processo eleitoral brasileiro. Por sua vez, estudos do Deutsche Bank e do BoFA apontam para uma frenagem mais brusca no ritmo de crescimento do balancete dos principais bancos centrais, o que poderá se transformar numa redução propriamente dita dos balancetes a partir de 2019<sup>[4]</sup>. Nessa linha, o processo de elevação das taxas básicas de juros nos EUA tende a prosseguir<sup>[5]</sup>, dando maior respaldo à consideração de que movimentos de reversão de política monetária podem vir a acarretar numa redução do apetite pelo risco a nível global.

### Risk Map - Trend

Sources: Bloomberg; CVM. Design: Office of Economic and Risk Analysis/CVM.

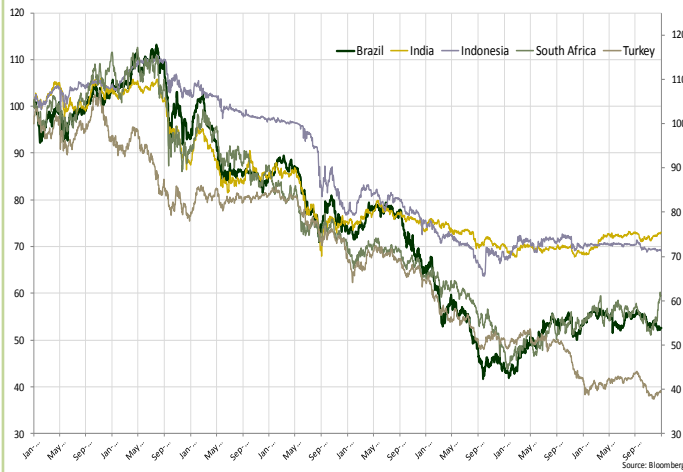
Note: Changes in the depicted scenarios are calculated based on selected "Bulletin" indicators. For a detailed explanation of the criteria utilized in the Map construction, check the "Methodology" section.



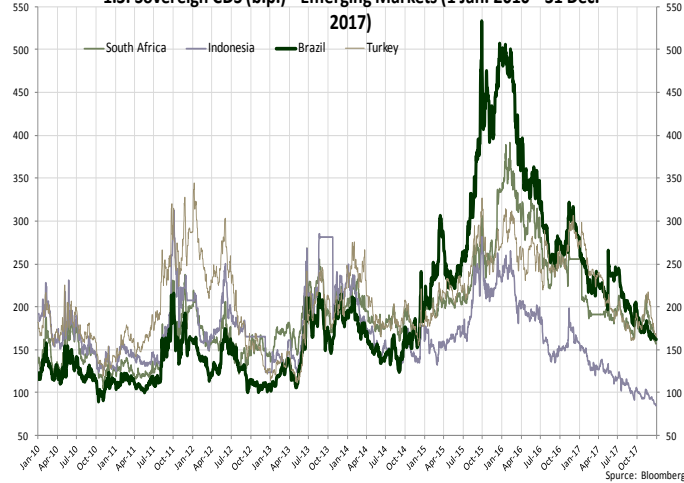
Note: Data collected until 12/29/2017 and does not reflect any future changes that may have occurred after such date. Reference Notes available in the last page.

# 1. Macroeconomic Risk

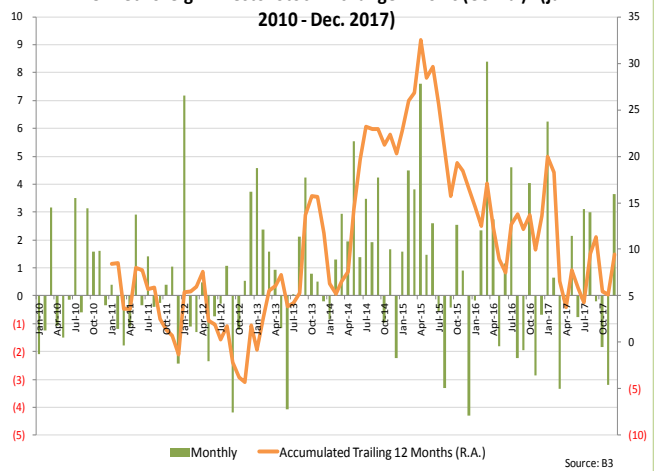
1.1. Selected FX return (USD pairs) - (2 Jan. 2010 - 31 Dec. Sunday)



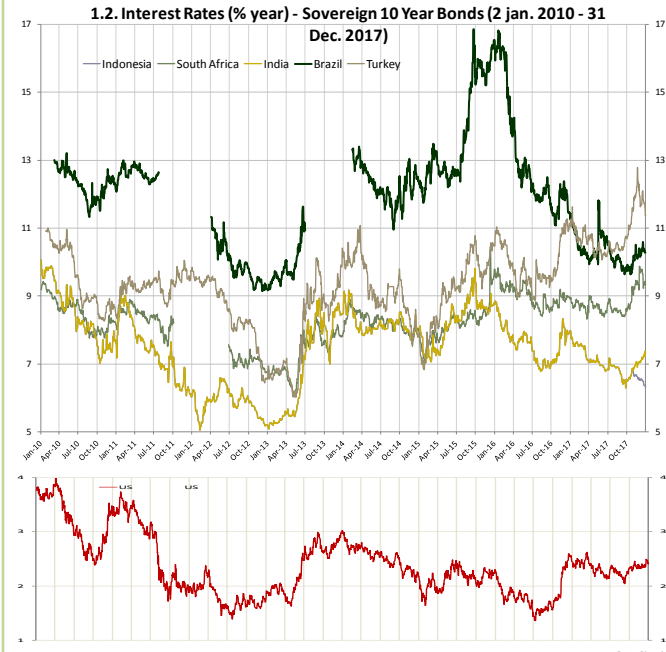
1.3. Sovereign CDS (b.p.) - Emerging Markets (1 Jan. 2010 - 31 Dec. 2017)



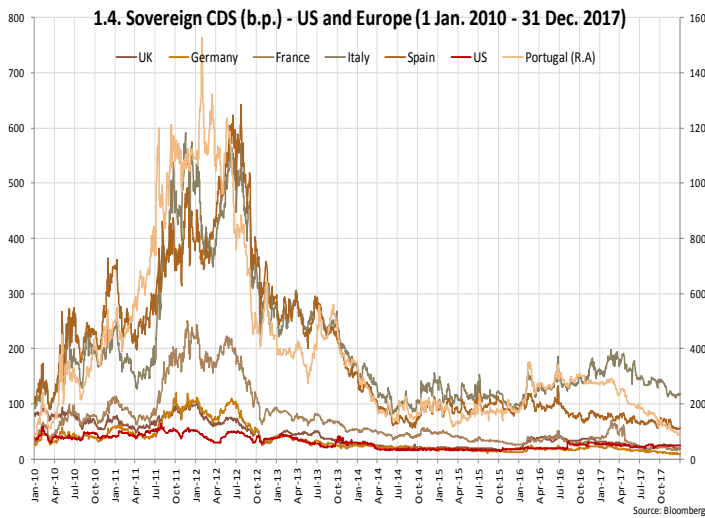
1.5. Net Foreign Investor Stock Exchange Inflows (USD bi) - (Jan. 2010 - Dec. 2017)



1.2. Interest Rates (% year) - Sovereign 10 Year Bonds (2 Jan. 2010 - 31 Dec. 2017)



1.4. Sovereign CDS (b.p.) - US and Europe (1 Jan. 2010 - 31 Dec. 2017)

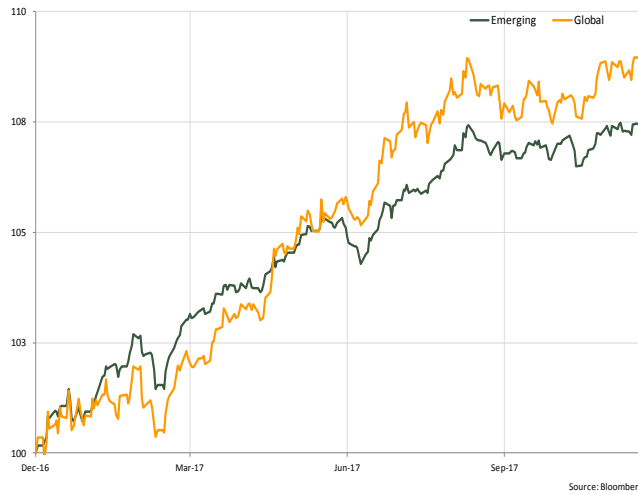


## 2. Market Risk

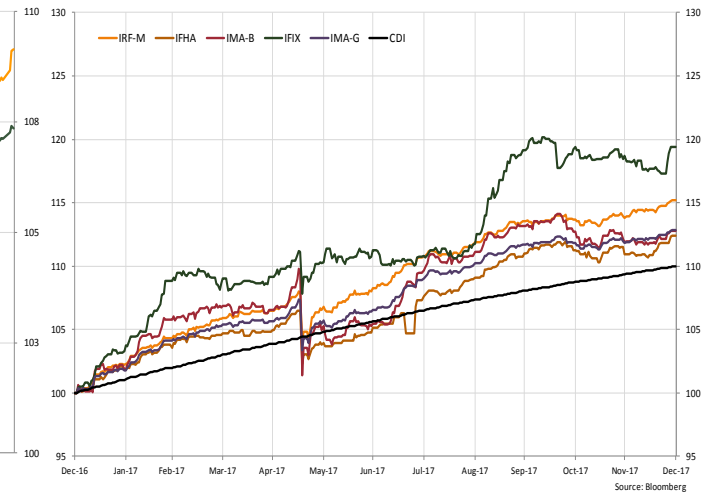
2.1. Equity indexes (MSCI) - trailing 12 months (USD)



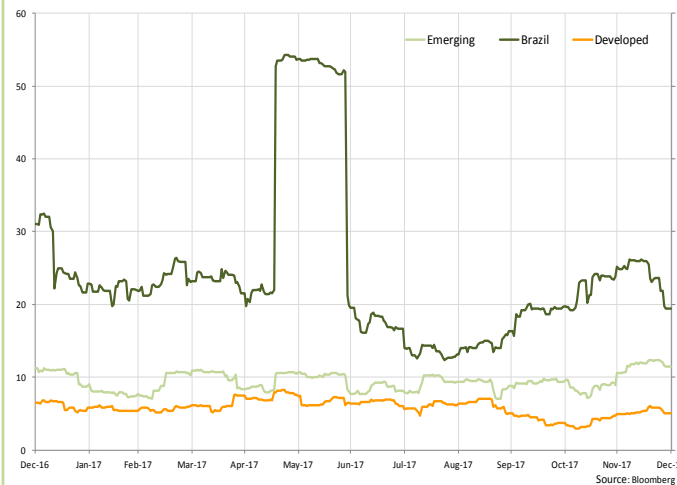
2.3. Corporate bond indexes - trailing 12 months return - base 100



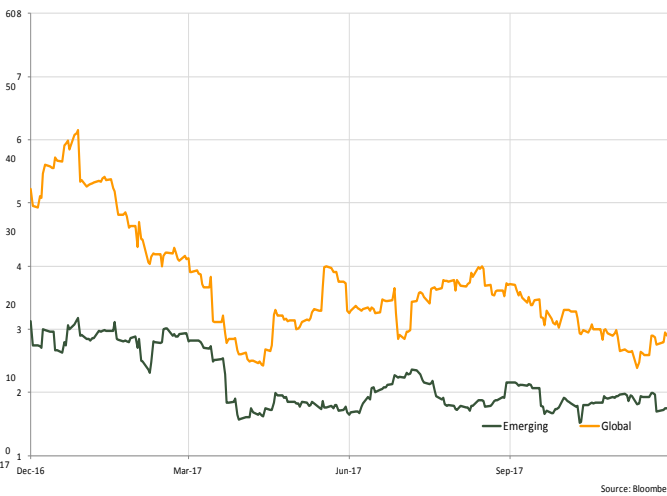
2.5. Reference indexes trailing 12 months return - base 100



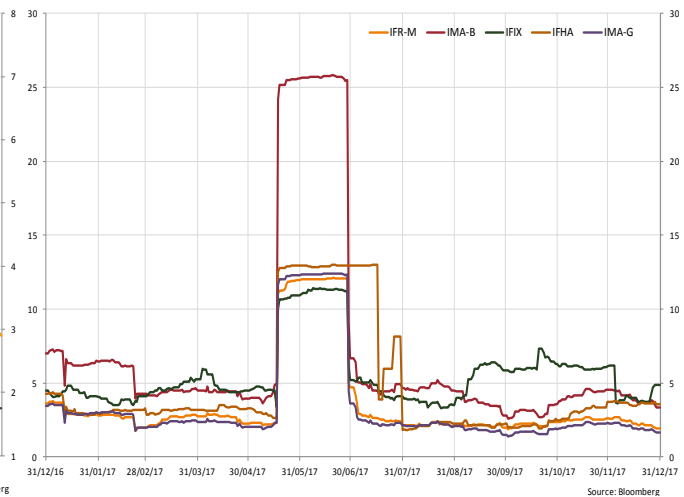
2.2. Equity indexes (MSCI) - 30 day realized annualized volatility (%)



2.4. Corporate bond indexes - 30 day realized annualized volatility (%)

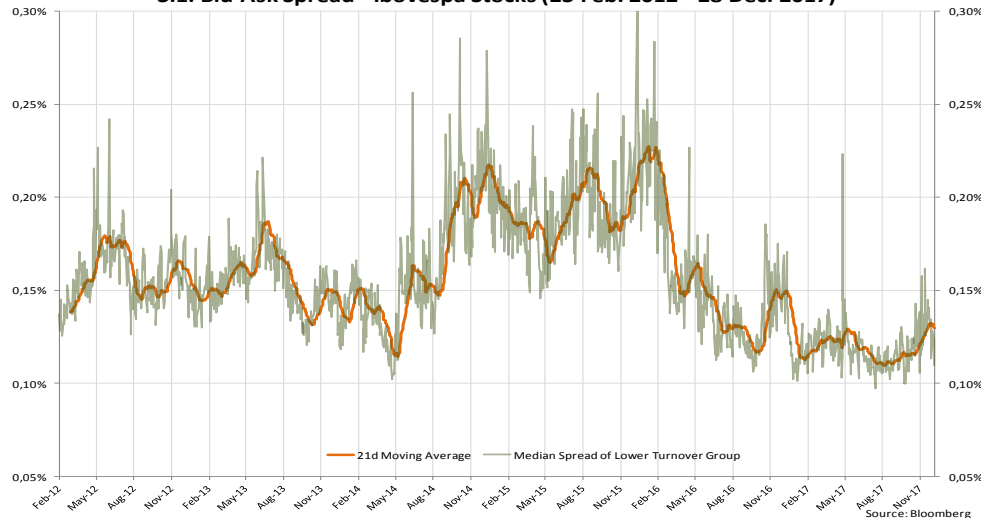


2.6. Reference indexes - 30 day realized annualized volatility (%)

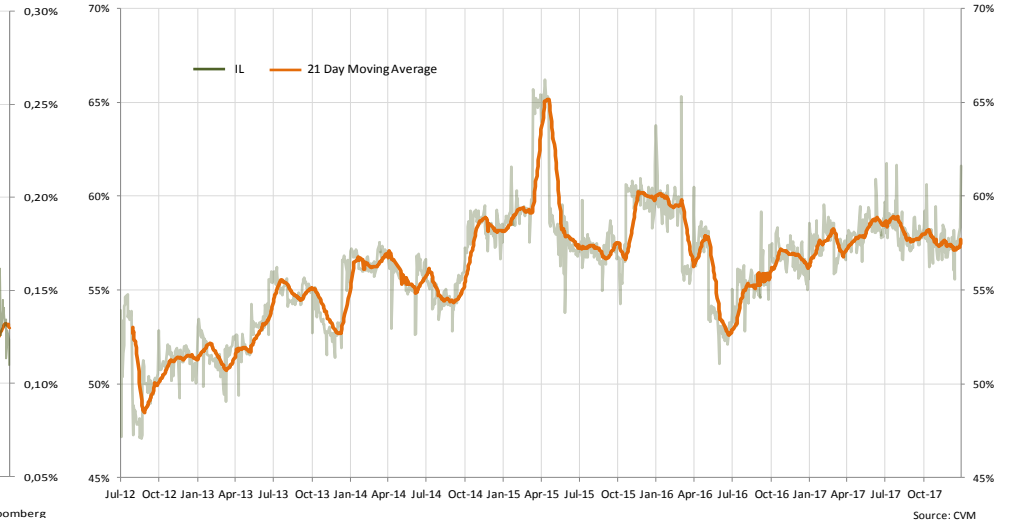


### 3. Liquidity Risk

3.1. Bid-Ask Spread - Ibovespa Stocks (23 Feb. 2012 - 28 Dec. 2017)



3.2. Liquidity Index - ICVM 555 Funds (2 Jul. 2012 - 29 Dec. 2017)

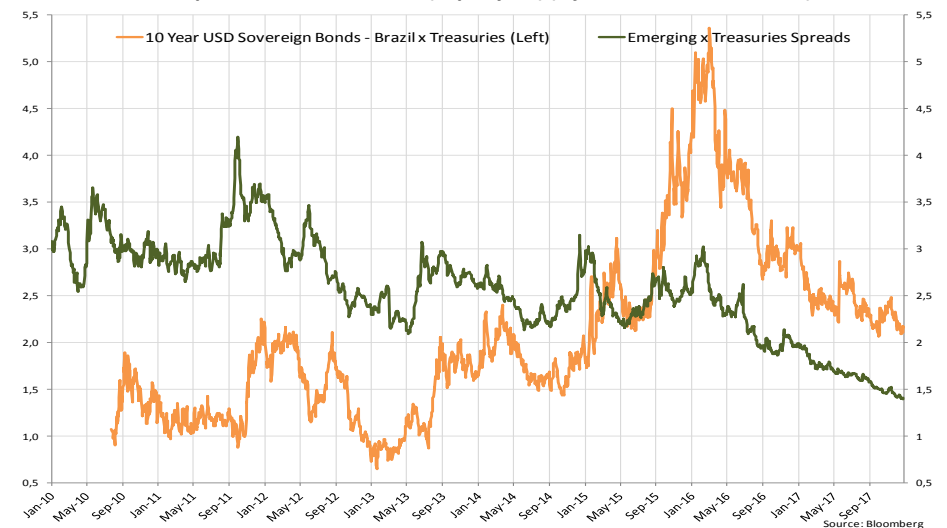


### 4. Risk Appetite

4.1. Adjusted Estimated PE Ratio - MSCI Indices (9 Jul. 2010 - 29 Dec. 2017)



4.2. Spreads vs US Treasuries (% per year) (4 Jan. 2010 - 28 Dec. 2017)



## 5. Credit Risk

**5.1. Weighted Average Default Probability Index (4 Jan. 2010 - 28 Dec. 2017)**



### Scenario – Reference Notes

[1] Ex: Ibovespa (26.9%), IFIX (19.5%), IRF-M (15.2%), IMA-B (12.8%), IFHA (12.4%), ao passo que o CDI valorizou 9.9%. Fonte: Economática.

[2] Taxa a termo vértice 5 anos/5 anos oriunda do IPCA implícito nos títulos públicos. Fonte: Bloomberg.

[3] Spread entre o cupom cambial de 6 meses e a taxa dos Overnight Indexed Swaps para o mesmo prazo. Fonte: Bloomberg.

[4] Ver: <https://www.zerohedge.com/news/2017-10-27/2-trillion-hole-2019-central-bank-liquidity-finally-turns-negative>

[5] De acordo com estimativas oriundas do mercado de derivativos, o consenso de mercado é para duas altas de 25 pontos-base na taxa básica de juros americanos nas duas próximas reuniões do FOMC. Fonte: Bloomberg, função WIRP.

**Methodology** Graphs and analysis contained in this report are partially or fully based on non—proprietary data, including commercial providers and other public authorities. CVM does utilize this data in good faith and does not hold itself responsible for its accuracy and completeness. The content of this report is merely analytic and does not constitute neither does it imply investment recommendations.

#### Risk Map

**Macroeconomic Risk:** simple monthly average of the daily Z-score (2500 day rolling window) of the Brazilian sovereign CDS (graph 1.3). Z-score Intervals and corresponding Risk Scale: Above 2sd => 5; Between 1,5 e 2sd => 4; Between 0,5 e 1,5sd => 3; Between -1 e 0,5sd => 2; Below -1sd => 1.

**Market Risk:** simple average of two indicators, the first indicator corresponding to the arithmetic monthly average of the daily Z-score (1250 day rolling window) of the 30 day realized annualized volatility of the MSCI Brasil Index, and the second corresponding to the Anbima IMA-G Index (see below) counterpart. Z-score Intervals and corresponding Risk Scale: Above 2sd => 5; Between 1,5 e 2sd => 4; Between 0,5 e 1,5sd => 3; Between -1 e 0,5sd => 2; Below -1sd => 1.

**Liquidity Risk:** simple monthly average of the daily Z-score (1250 day rolling window or maximum window, in case the number of observations is lower 1250) of the bid-ask spread indicator (graph 3.1). Z-score Intervals and corresponding Risk Scale: Above 2sd => 5; Between 1,5 e 2sd => 4; Between 0,5 e 1,5sd => 3; Between -1 e 0,5sd => 2; Below -1sd => 1.

**Risk Appetite:** weighted average of three values: the simple monthly average of the weekly Z-score of the Adjusted Estimated PE Ratio (graph 4.1 – see below), this series with a 0.5 weight; the simple monthly average of the daily Z-score (1250 day rolling window) of the two series that compose the Spreads vs US Treasuries graph (graph 4.2 – see below), each series with a weight equal to 0.25. Z-score Intervals and corresponding Risk Scale for the Adjusted Estimated PE Ratio: Above 2sd => 5; Between 1,5 e 2sd => 4; Between 0,5 e 1,5sd => 3; Between -1 e 0,5sd => 2; Below -1sd => 1. Z-score Intervals and corresponding Risk Scale for series composing the Spread x US Treasuries graph: Below -2sd => 5; Between -1,5 e -0,5sd => 4; Between -0,5 e 1sd => 3; Between 1 e 2sd => 2; Above 2sd => 1.

**Credit Risk:** the Weighted Average Default Probability Index (described below, corresponding to the graph 5.1) is daily transformed in a number in the range of 1 to 5 based on the Z-score (1250 day rolling window) of the indicator, and as a further step the simple monthly average is calculated. Z-score Intervals and corresponding Risk Scale: Above 2sd => 5; Between 1,5 e 2sd => 4; Between 0,5 e 1,5sd => 3; Between -1 e 0,5sd => 2; Below -1sd => 1.

#### Macroeconomic Risk

**Selected FX return (USD pairs).** Daily trend of the local currencies of some emerging markets usually considered peers to Brazil against the USD.

**Interest Rates.** Daily trend of yearly interest rates for local currency sovereign bonds, calculated based on Bloomberg bond indexes for the US and for some emerging markets usually considered peers to Brazil.

**CDS (Credit Default Swap).** Credit derivative in which its buyer disburses a series of payments (known as “spread” or “premium”) for the seller in exchange for protection against a credit event impacting the reference entity. The higher the default probability, the higher will be the traded CDS premium, hence working as a proxy for the credit risk of the reference entity. The graphs depict the daily trend of the closing price (in b.p.) of the 5YR sovereign CDS spreads of some emerging markets usually considered peers to Brazil, and of some European countries most followed by the market analysts.

**Foreign Investment in Stocks.** Monthly foreign investor net inflows in the B3 secondary market (equity and equity derivatives only).

**Foreign Investment in Portfolio.** Monthly foreign investor net inflows according to ICVM 560, only related to flows in the Brazilian organized secondary markets, not corresponding to the Balance of Payments methodology.

#### Market Risk

**MSCI Indexes.** Equity indexes calculated by the Morgan Stanley Capital International. The MSCI World Index (denominated in this report as “Developed”) reflects the performance of the equity markets of several developed markets. The MSCI Emerging Markets Index (denominated in this report as “Emerging”) reflects the performance of the equity markets of several emerging markets, including the so called “BRICS”. The MSCI also values single markets, such as the case of the MSCI Brazil Index.

**Fixed income indexes.** Indexes developed by Barclays/Bloomberg to measure the performance of investment grade bonds, converted to USD when appropriate. The BEHGTRUU Index (denominated in this report as “Emerging”) refers to bonds in emerging markets, while the LGCPTRUU Index (denominated in this report as “Global”) does the same for the developed markets. In Bloomberg methodology, the bonds are weighted by market value, without currency hedge.

**Reference indexes.** IRF-M = index composed by a basket of sovereign fixed-rate bonds (LTN and NTN-F). Works as a benchmark for the fixed-rate fixed income portfolios. IMA-B = fixed income index that depicts the trend, at market prices, of a basket of inflation-linked sovereign bonds (NTN-B). IHFA = index for the mutual fund industry in Brazil, whose value reflects, in local currency, the performance of a hypothetical portfolio of mutual funds selected according to a methodology developed by ANBIMA. IFIX = theoretical portfolio composed by shares of the most traded REITs and measures the performance of the Brazilian REIT industry. IMA-G = weighted average of the daily returns of IMA-B, IMA-C (wholesale price inflation linked sovereign bond index), IMA-S (floating rate sovereign bonds index) e IRF-M indexes.

**Volatility.** It is a dispersion measure for the realized returns of an index or of a security. The 30 day realized volatility refers to the annualized standard deviation of the closing price returns in the last 30 trading days, expressed in percentage terms. It is one of the most frequently used indicators to measure the market risk of a security. The higher the volatility, the higher the market risk of the security.

#### Liquidity Risk

**Bid/Ask Spread.** It is the difference of bid and ask prices of a security, utilized as a measure of market liquidity. In comparing different securities, it is common to refer to the ratio of the bid-ask spread against the midprice of the security. The lower this percentage ratio, the more liquid the security is. The graph refers to the daily trend of the median spread calculated based on a sample comprised by the half of the Ibovespa Index stocks with the lowest turnover for a given month.

**Liquidity Index –ICVM 555 Funds.** Daily trend of the ratio between the total reported Liquid Assets (according to ICVM 512) and the total reported NAV, expressed as a percentage. Excludes funds of funds.

#### Risk Appetite

**Adjusted Estimated PE Ratio.** It is the ratio between the current price of an index or security and its estimated positive earnings for the following accumulated 12 months, according to the consensus of market analysts, excluding companies with negative EPS projections. Hence, the PE ratio can be understood as the payback time necessary to recover through its profits the capital investment in a given company. A high PE ratio indicates that the security might be overvalued relative to its recent profit potential. Inversely, a low PE ratio points that the security might be undervalued relative to its profit potential. In this report, the country/region analysis is done using the weekly PE ratio for the corresponding MSCI Indexes as a reference. The calculated indicators refer to the Z-score (250 week rolling window) of such ratios. Finally, values above 2 standard deviations indicate that stocks are, on average, overvalued (+2sd) or undervalued (-2sd).

**Emerging vs US Treasuries Spread.** Spread between the yields of a corporate and sovereign bond index (*investment grade*) for emerging markets and the yield of US treasuries, expressed as an annual percentage yield. Calculations use the BEHGTRUU Index (emerging markets corporate and sovereign investment grade bond index) and the BUSY Index (US treasuries bond index), both available through Bloomberg.

**10YR USD Sovereign Bond Spread – Brazil x US Treasuries.** Difference between the yields of a generic 10YR USD-denominated sovereign Brazilian bond and an analogous US bond, both calculated by Bloomberg.

#### Credit Risk

**Weighted Average Default Probability Index.** Daily indicator built in order to grasp the average default probability of non-financial corporates traded in the B3 exchange. The calculation of the index proceeds as follows: for each trading day and for the whole available sample of companies in that day, the weighted average (by market cap of the companies traded in that day) of the 1YR default probabilities is calculated (“BB\_1YR\_DEFAULT\_PROB”), as made available by Bloomberg.