

Frequently Asked Questions

S&P/B3 Ibovespa VIX

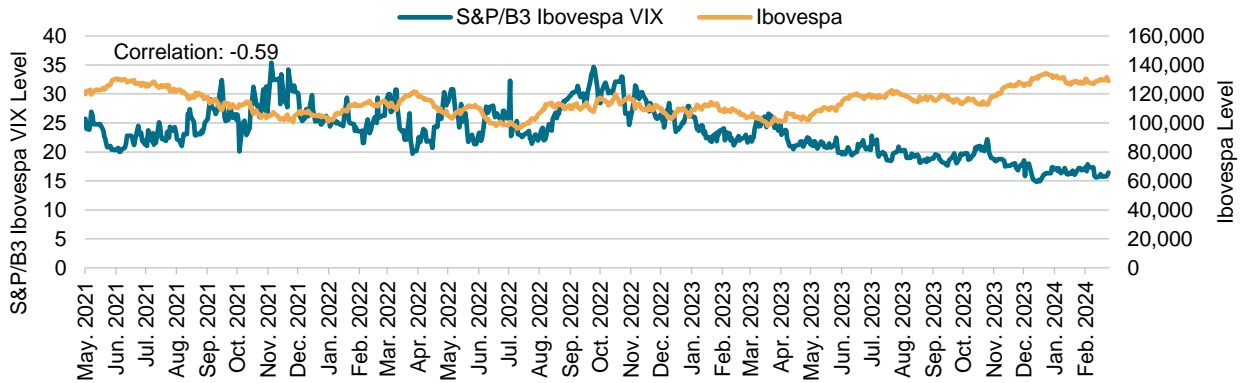
- 1. What is the S&P/B3 Ibovespa VIX?** The [S&P/B3 Ibovespa VIX](#) seeks to measure the 30-day implied volatility in the Brazilian stock market. It is a real-time index that reflects investor sentiment about the expected volatility in the Brazilian benchmark equity index, the Bovespa index (Ibovespa B3). It is the first implied volatility index designed for the domestic market and uses the same methodology framework as the widely followed [Cboe Volatility Index \(VIX®\)](#), which measures near-term volatility implied by [S&P 500®](#) options prices.
- 2. How is the index calculated?** The S&P/B3 Ibovespa VIX is calculated throughout each trading day by averaging the weighted prices of a specific group of Ibovespa index options. The index generally uses put and call options in the two nearest-term expiration months in order to bracket a 30-day calendar period. Variances at these two different expirations are derived and are interpolated to calculate a constant 30-day variance. VIX is derived by transforming this variance into a standard deviation and multiplying by 100. Please see the [methodology](#) document for complete details regarding the calculation methodology.
- 3. How does VIX indicate market sentiment?** Implied volatility typically increases when markets are turbulent and the economy is faltering. In contrast, if stock prices are rising and no dramatic changes seem probable in the near-term, VIX tends to fall or remain steady at the lower end of its range. Since VIX reaches its highest levels when the stock market is most unsettled, the media tend to refer to VIX as a “fear gauge.”
- 4. What is the difference between implied and realized volatility?** Implied volatility refers to the market’s assessment of future volatility based on options prices, whereas realized volatility measures historical volatility of returns. VIX measures implied volatility, specifically 30 days in the future.
- 5. What does a VIX level signify?** The index level represents an annualized volatility statistic. For example, an index level of 20 corresponds to an expectation for a standard deviation of 20% in Ibovespa returns over the next 30 days. VIX also projects the probable range of movement in the equity market above and below its current level, over the next 30 days. When implied volatility is high, the VIX level is high and the range of values is broad. When implied volatility is low, the VIX level is low and the range is narrow. Mathematically, a relatively low VIX level of 10 implies an expected range of the

Ibovespa of plus/minus 2.9%. A relatively high VIX of 35 implies an expected range of the Ibovespa of plus/minus 10.1%.

6. What is the relationship between the S&P/B3 Ibovespa VIX and the Ibovespa?

Volatility indices and their associated equity indices are typically negatively correlated—meaning they tend to move in opposite directions. Based on back-tested data from May 6, 2021, we’ve observed a negative correlation between the S&P/B3 Ibovespa VIX and the Ibovespa of -0.59.

Exhibit 1: Comparison between the S&P/B3 Ibovespa VIX and the Ibovespa

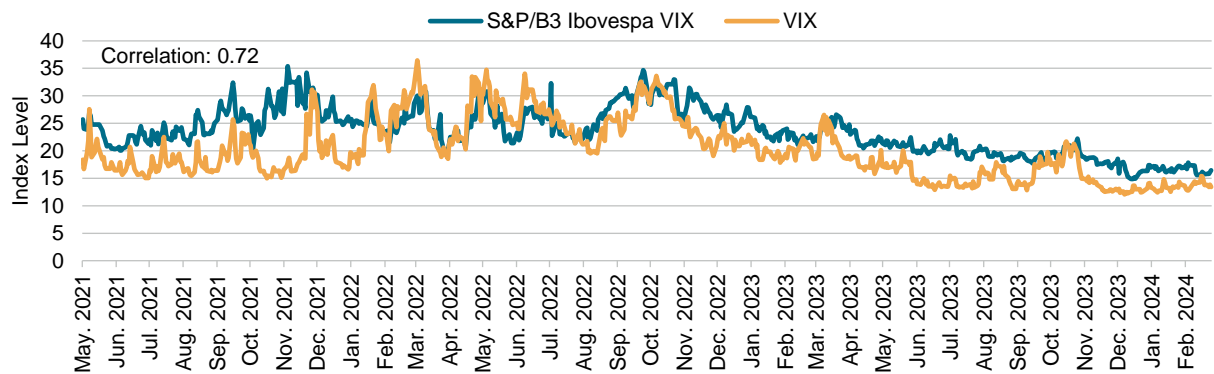


Source: S&P Dow Jones Indices LLC, B3. Data from May 6, 2021, to Feb. 29, 2024. The S&P/B3 Ibovespa VIX Index was launched March 18, 2024. All data prior to index launch date is back-tested hypothetical data. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

7. What is the relationship between the S&P/B3 Ibovespa VIX and the Cboe Volatility Index (VIX)?

Volatility indices are typically positively correlated with each other—meaning they often move in the same direction. Based on back-tested data from May 6, 2021, we’ve observed a positive correlation of 0.72 between the S&P/B3 Ibovespa VIX and Cboe VIX.

Exhibit 2: Comparison between the S&P/B3 Ibovespa VIX and the Cboe VIX



Source: S&P Dow Jones Indices LLC. Data from May 6, 2021, to Feb. 29, 2024. The S&P/B3 Ibovespa VIX Index was launched March 18, 2024. All data prior to index launch date is back-tested hypothetical data. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

- 8. How might the index be used?** The S&P/B3 Ibovespa VIX is a potential tool for investors, financial media, researchers and economists to monitor the level of near-term volatility in the Brazilian equity market. This may provide useful information about the level of perceived risk in the market and the potential range of Ibovespa returns over the next 30 days. The index could also be used as an input or signal for use in multi-asset systematic investment strategies.

While the index is not directly tradable, over time there is the potential for financial products to be created—similar to what exists based on VIX in the U.S. Because of their strong inverse correlation to U.S. equities, VIX futures and options as well as exchange-traded funds and notes based on the S&P 500 VIX Futures Indices are widely used by investors to hedge their portfolios from market downturns and to trade volatility.

- 9. Why is the S&P/B3 Ibovespa VIX being launched now?** The depth and liquidity in Ibovespa index options has matured to the point where it is now possible to calculate a robust VIX for the Brazilian equity market. Furthermore, market participants in and outside of Brazil have expressed interest in a volatility index for the Brazilian equity market.
- 10. Do volatility indices based on the VIX methodology exist in other markets?** Yes, S&P DJI and Cboe have licensed the use of the VIX methodology to several exchanges and index firms around the world. Exhibit 3 illustrates a selection of these indices.

Exhibit 3: Selected Global VIX Indices

Index	Underlying Index
VIX	S&P 500
S&P/ASX 200 VIX	S&P/ASX 200
VSTOXX	Euro STOXX 50
S&P/TSX 60 VIX	S&P/TSX 60
HSI Volatility Index	Hang Seng Index
S&P/JPX JGB VIX	S&P 10-Year JGB Futures Index (TR)
CBOE/CME FX Euro Volatility	EUR/USD Spot Rate
CBOE/CME FX GBP Volatility	GBP/USD Spot Rate
CBOE/CME FX Yen Volatility	JPY/USD Spot Rate
CBOE Gold ETF Volatility	LBMA Gold Price PM
CBOE VIX of VIX	VIX
CDX/Cboe NA High Yield 1-Month Volatility Index	CDX North American High Yield Index
CDX/Cboe NA High Yield 3-month Volatility Index	
CDX/Cboe NA High Yield 6-month Volatility Index	
CDX/Cboe NA Investment Grade 1-Month Volatility Index	CDX North American Investment Grade Index
CDX/Cboe NA Investment Grade 3-month Volatility Index	
CDX/Cboe NA Investment Grade 6-month Volatility Index	
iTraxx/Cboe Europe Main 1-Month Volatility Index	iTraxx Europe Main Index
iTraxx/Cboe Europe Main 3-month Volatility Index	
iTraxx/Cboe Europe Main 6-month Volatility Index	
iTraxx/Cboe Europe Crossover 1-Month Volatility Index	iTraxx Europe Crossover Index
iTraxx/Cboe Europe Crossover 3-month Volatility Index	
iTraxx/Cboe Europe Crossover 6-month Volatility Index	

Source: S&P Dow Jones Indices LLC. Data as of Feb. 29, 2024. Table is provided for illustrative purposes.

11. What historical data are available? S&P DJI and B3 have created back-tested history dating back to May 6, 2021.

12. When is the index calculated? The index is calculated and published every 15 seconds intraday from 10:30 AM to 4:45 PM local time (UTC-3) when the U.S. is in daylight savings time, and from 10:30 AM to 5:45 PM local time (UTC-3) when the U.S. is not in daylight savings time.

13. What further resources are available to learn more?

- [S&P DJI VIX Web Page](#)
- [Cboe VIX Web Page](#)
- [S&P/B3 Ibovespa VIX Methodology](#)
- [Ibovespa Options Webpage](#)

Performance Disclosure/Back-Tested Data

The S&P/B3 Ibovespa VIX Index was launched March 18, 2024. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. Complete index methodology details are available at www.spglobal.com/spdji. Past performance of the Index is not an indication of future results. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results. Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations. Back-tested performance is for use with institutions only; not for use with retail investors.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the index is set to a fixed value for calculation purposes. The Launch Date designates the date when the values of an index are first considered live: index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public website or its data feed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

Typically, when S&P DJI creates back-tested index data, S&P DJI uses actual historical constituent-level data (e.g., historical price, market capitalization, and corporate action data) in its calculations. As ESG investing is still in early stages of development, certain datapoints used to calculate S&P DJI's ESG indices may not be available for the entire desired period of back-tested history. The same data availability issue could be true for other indices as well. In cases when actual data is not available for all relevant historical periods, S&P DJI may employ a process of using "Backward Data Assumption" (or pulling back) of ESG data for the calculation of back-tested historical performance. "Backward Data Assumption" is a process that applies the earliest actual live data point available for an index constituent company to all prior historical instances in the index performance. For example, Backward Data Assumption inherently assumes that companies currently not involved in a specific business activity (also known as "product involvement") were never involved historically and similarly also assumes that companies currently involved in a specific business activity were involved historically too. The Backward Data Assumption allows the hypothetical back-test to be extended over more historical years than would be feasible using only actual data. For more information on "Backward Data Assumption" please refer to the [FAQ](#). The methodology and factsheets of any index that employs backward assumption in the back-tested history will explicitly state so. The methodology will include an Appendix with a table setting forth the specific data points and relevant time period for which backward projected data was used.

Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices maintains the index and calculates the index levels and performance shown or discussed but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US \$100,000 investment for a 12-month period (or US \$10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US \$1,650), the net return would be 8.35% (or US \$8,350) for the year. Over a three-year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US \$5,375, and a cumulative net return of 27.2% (or US \$27,200).

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