

# Frequently Asked Questions

## Cboe S&P 500<sup>®</sup> Dispersion Index

- 1. What is the Cboe S&P 500 Dispersion Index (DSPX)?** The Cboe S&P 500 Dispersion Index, also referred to as the Dispersion Index or DSPX, is an index that seeks to measure the expected dispersion in the S&P 500 over the next 30 calendar days, as calculated from the prices of S&P 500 index options and the prices of single-stock options of selected S&P 500 constituents, using a modified version of the VIX<sup>®</sup> methodology.

The index level reflects an annualized statistic. For example, an index level of 20 corresponds to an expectation for a standard deviation of 20% among the annualized returns of S&P 500 constituents over the next 30 days.<sup>1</sup>

The index level is calculated every 15 seconds from 9:45 a.m. to 4:00 p.m. New York time during standard equity trading days.

- 2. What is dispersion?** Dispersion is a fundamental measure of risk and opportunity in the stock market. It measures how differently stocks are performing or are expected to perform.

Like volatility and VIX, we may measure dispersion historically or derive an expectation-based measure from the options market. DSPX is an expectation-based measure.

- 3. What does DSPX measure?** The index measures market expectations for dispersion by comparing the prices of S&P 500 constituent stock options and S&P 500 index options with maturities around 30 calendar days.

A complementary measure to market volatility—which measures overall fluctuations in stock averages like the S&P 500—the Dispersion Index measures broad expectations for fluctuations in stocks over and above their participation in market volatility over a short-term horizon.

<sup>1</sup> Although options of every S&P 500 constituent have the potential to be included in the index calculation, there is a quarterly screening of constituents to select those names with more liquid options markets. For more information, see question 14, “What is the Cboe S&P 500 Dispersion Basket Index?”

- 4. What causes DSPX to rise or decline?** The index level rises when single-stock option prices increase relative to index option prices. The index level declines when single-stock and index option prices move closer in price.

The relative cost of stock and index options is driven, theoretically, by the magnitude of expected additional movement in single stocks compared to their index. Accordingly, the level of DSPX is expected to rise and fall together with market expectations for the magnitude of “opportunity” for outperformance via active stock selection among the S&P 500’s constituents.

- 5. Why was DSPX created?** The index was developed in collaboration between Cboe and S&P Dow Jones Indices (S&P DJI), applying the VIX methodology to both single-security and index options in order to create a high frequency indicator. The index may offer:

- A measure of short-term S&P 500 dispersion expectations;
- A benchmark for the evaluation of contracts linked to large-cap U.S. equity dispersion; or
- An indicator of the short-term tracking error that active portfolio managers benchmarked to the S&P 500 may generate through stock selection.

- 6. What are the inputs to DSPX?** The level of the index is determined by the differences in prices of options on selected S&P 500 constituents and the prices of S&P 500 index options, as well as the weights of each constituent in the S&P 500 and representative interest rates for the period to maturity of all options included in the calculation.

The specific list of inputs used in the calculation of the index will vary continuously throughout the trading day.<sup>2</sup> The rules for their selection and combination in the index level are provided in the index methodology.

<sup>2</sup> The Dispersion Index updates every 15 seconds from 9:45 a.m. New York time until the equity market close at 4:00 p.m.

- 7. How is DSPX calculated?** Full details of the calculation are available in the published methodology. In simplified terms, the index is calculated according to the following formula:

$$DSPX = \sqrt{W - VIX^2}$$

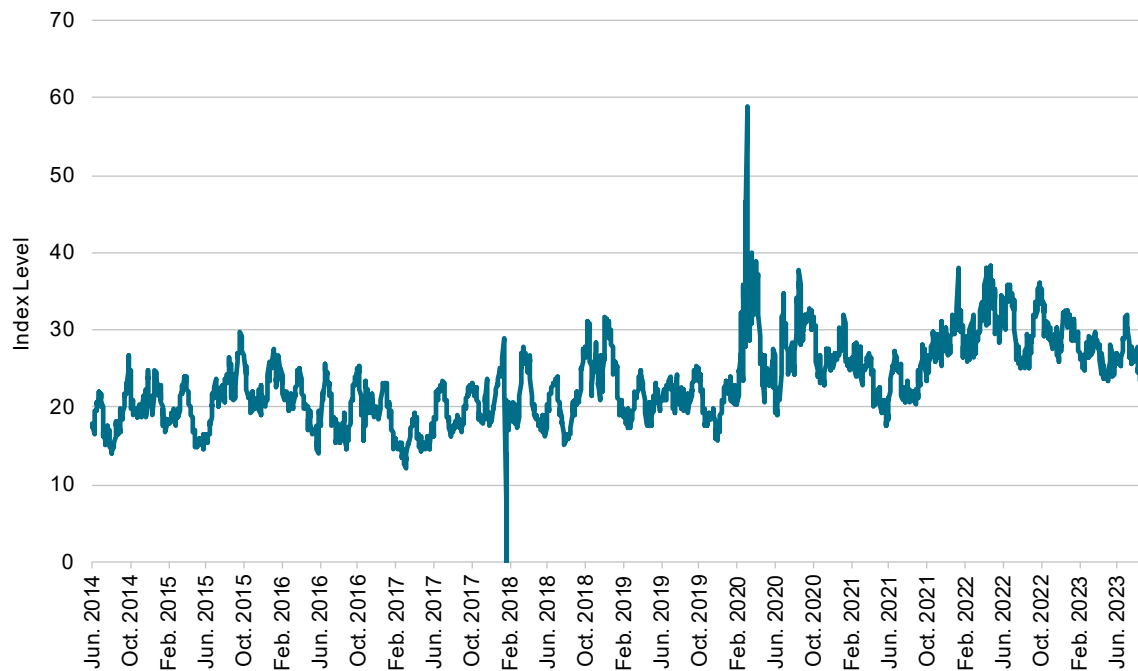
Where:

- *W* is a market-capitalization-weighted average of the expected variance in selected S&P 500 constituents, calculated by applying the VIX methodology to each single-stock constituent.
  - *VIX* is the Cboe Volatility Index, a measure of expected volatility in the S&P 500.
  - If the subtraction in the formula results in a negative number, the index takes a zero value.<sup>3</sup>
- 8. What historical data are available?** The Dispersion Index was launched on Sept. 27, 2023, with daily index levels available on a back-tested, hypothetical basis starting on June 19, 2014. Please see the Performance Disclosure at the end of the document for more information regarding the inherent limitations associated with back-tested data.
- 9. What are the typical historical levels and behavior of DSPX?** Like other volatility-based indices, such as VIX, but unlike many traditional market benchmarks, the Dispersion Index is not expected to display a long-term growth trend. Instead, the index is anticipated to show a degree of mean reversion—returning from extremes of highs or lows to a more “normal” level.

Exhibit 1 shows the levels of the Dispersion Index over the full period for which data are available. Over its hypothetical history, the average index level was 23.35, the maximum index level was 58.87, corresponding to a hypothetical closing level on March 18, 2020, and the minimum index level was 0.00, corresponding to a hypothetical closing level on Feb. 8, 2018.

As illustrated by the mildly upward-sloping trend in the data of Exhibit 1, the “normal” level to which the index reverts may drift somewhat with the prevailing market conditions and mix of securities included in the S&P 500.

<sup>3</sup> For more information, see question 11, “Can DSPX take negative values?”

**Exhibit 1: Back-Tested History of the Cboe S&P 500 Dispersion Index**

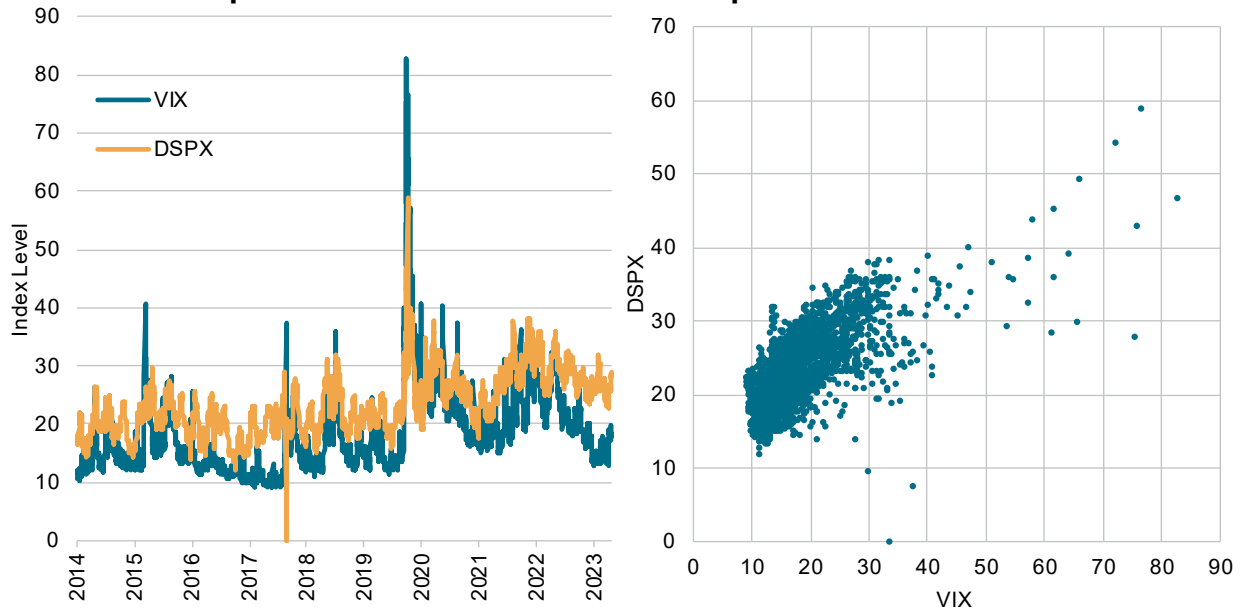
Source: S&P Dow Jones Indices LLC, Cboe. Data from June 19, 2014, to Sept. 26, 2023. The Cboe S&P 500 Dispersion Index was launched Sept. 27, 2023. All data prior to index launch date is back-tested hypothetical data. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of the document for more information regarding the inherent limitations associated with back-tested data.

**10. What is the relationship between VIX and DSPX?** VIX is connected to DSPX theoretically by methodology and practically via the observed statistical relationships between the two index levels.

From a theoretical perspective, the Dispersion Index uses the VIX level as an explicit input to its calculation, where its square is used to represent the expected variance of the S&P 500 over the next 30 days (see question 7, “How is DSPX Calculated?”).

Based on the methodology alone, all else being equal, if the VIX rises, the Dispersion Index would be expected to decline. However, all else is not typically equal: when S&P 500 index variance rises, the variance of S&P 500 constituents typically also increases, and if the market expectations for single-stock variances rise more than the expectations for index variance, then the Dispersion Index would be expected to increase together with VIX. Empirically, this has frequently been the case, as Exhibit 2 demonstrates.

Based on the live history of VIX and the hypothetical historical levels of the Dispersion Index, over the full period for which data are available, Exhibit 2 plots a time-series and scatter plot comparison of the two series. Although clearly distinct, the two indices were positively correlated over time.

**Exhibit 2: Comparison of VIX levels with the Dispersion Index**

Source: S&P Dow Jones Indices LLC, Cboe. Data from June 19, 2014, to Oct. 9, 2023. The Cboe S&P 500 Dispersion Index was launched Sept. 27, 2023. All data prior to index launch date is back-tested hypothetical data. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of the document for more information regarding the inherent limitations associated with back-tested data.

**11. Can DSPX take negative values?** The Dispersion Index cannot take a negative value, but it may take a zero value. The latter occurs if the average expected 30-day variance of the [Cboe S&P 500 Dispersion Basket Index](#) constituents is equal to or lower than the expected 30-day variance of the S&P 500 (or in other words, the level of VIX squared; see question 7, “How is DSPX calculated?”).

Such occasions are expected to be rare, as they effectively indicate an expectation for something that is statistically impossible in terms of observed equity returns over the next 30 days: a zero or negative diversification benefit within the S&P 500. Nonetheless, the market is not required to consistently price “rationally” and, if the prices that market participants are willing to quote for S&P 500 index options exceed the prices quoted for the S&P 500 constituents by a sufficient degree, the Dispersion Index will take a zero value.

Hypothetically, the Dispersion Index would have taken a zero value had it been calculated according to the present methodology on Feb. 8, 2018 (see question 9, “What are the typical historical levels and behavior of the Dispersion Index?”).

**12. What are the roles of Cboe and S&P DJI?** S&P DJI is home to iconic financial market indicators, such as the S&P 500 and [Dow Jones Industrial Average®](#). As the largest global resource for essential index-based market concepts, data and research, it is a major investor resource to measure and trade the markets.

Cboe is the world's go-to derivatives and exchange network, delivering cutting-edge trading, clearing and investment solutions to people around the world. Home to the Cboe Volatility Index, also known as VIX, Cboe provides trading solutions and products in multiple asset classes, including equities, derivatives, FX and digital assets, across North America, Europe and Asia Pacific.

Cboe and S&P DJI collaborated to design and launch the Dispersion Index. Cboe is the index calculation agent, and S&P DJI is the benchmark administrator. Additionally, S&P DJI has provided Cboe with an exclusive license to launch listed contracts linked to the Dispersion Index.

**13. What is the VIX methodology?** The methodology used to calculate the Cboe Volatility Index, or VIX, is a rigorous and transparent approach to providing a market expectation for the future 30-day volatility in the S&P 500, as derived from the quoted prices of S&P 500 index options.

Although the VIX methodology is specific to a 30-day calculation based on the S&P 500, the general principles of the methodology may be applied to other underlying instruments and time horizons. Over time, Cboe and S&P DJI have provided volatility indices based on a range of single securities and indices, and other index providers and exchanges have also obtained from Cboe and S&P DJI rights to use the methodology of the VIX to calculate their own volatility indices.

**14. What is the Cboe S&P 500 Dispersion Basket Index?** The Cboe S&P 500 Dispersion Basket Index, also called the Basket Index, is an index of S&P 500 constituent equity securities whose listed options are eligible for inclusion in the calculation of the Dispersion Index at any point in time.

The objective of the Basket Index is to select S&P 500 securities with a broad range of liquid and actively traded options. The Basket Index is capitalization weighted, rebalances quarterly and is maintained as a standard equity index calculated and published by S&P DJI.

**15. Will there be tradeable products linked to DSPX?** S&P DJI has granted Cboe an exclusive right to launch listed futures and options linked to the Dispersion Index.<sup>4</sup>

<sup>4</sup> S&P Dow Jones Indices does not sponsor, endorse, sell or promote any product based on an S&P Dow Jones index nor does it make any representation regarding the advisability of investing in any products.

## 16. What further resources are available to learn more?

[Introducing the Dispersion Index \(DSPX\)](#)

[Cboe S&P 500 Dispersion Index](#)

[Cboe Dispersion Index](#)

[Cboe VIX](#)

[S&P DJI VIX](#)

[S&P DJI Realized Dispersion, Volatility & Correlation Dashboard](#)

[Dispersion: Measuring Market Opportunity](#)

[The Landscape of Risk](#)

[At the Intersection of Diversification, Volatility and Correlation](#)

## Performance Disclosure

The Cboe S&P 500 Dispersion Index was launched Sept. 27, 2023. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance, and is based on the index methodology 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. In addition, forks have not been factored into the back-test data with respect to the S&P Cryptocurrency Indices. For the S&P Cryptocurrency Top 5 & 10 Equal Weight Indices, the custody element of the methodology was not considered; the back-test history is based on the index constituents that meet the custody element as of the Launch Date. Complete index methodology details are available at [www.spglobal.com/spdji](http://www.spglobal.com/spdji). 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).



## General Disclaimer

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