

Credit VIX[®]: A New Tool for Measuring and Managing Credit Risk

Contributors

Srichandra Masabathula
Associate Director
Fixed Income Products
srichandra.masabathula@spglobal.com

Nicholas Godec, CFA, CAIA, CIPM
Senior Director
Head of Fixed Income
Tradables
nicholas.godec@spglobal.com

Introduction

The Credit VIX Indices are a new set of benchmarks that seek to measure the expected volatility of credit spreads in North America and Europe over the next one, three and six months. These indices use a modified methodology based on the Cboe[®] Volatility Index[®] (VIX)¹ applied to swaptions based on S&P Dow Jones Indices' (S&P DJI) iTraxx and CDX indices, European-style credit default swap index options,² aggregating prices across different maturities and strike prices. The result is a number representing expected volatility over different Credit VIX tenors.³

Cboe Credit Volatility Index	Ticker
CDX/Cboe NA High Yield 1-Month Volatility Index (BP Volatility)	VIXHY
CDX/Cboe NA High Yield 3-month Volatility Index (BP Volatility)	VIXHY3M
CDX/Cboe NA High Yield 6-month Volatility Index (BP Volatility)	VIXHY6M
CDX/Cboe NA Investment Grade 1-Month Volatility Index (BP Volatility)	VIXIG
CDX/Cboe NA Investment Grade 3-month Volatility Index (BP Volatility)	VIXIG3M
CDX/Cboe NA Investment Grade 6-month Volatility Index (BP Volatility)	VIXIG6M
iTraxx/Cboe Europe Crossover 1-Month Volatility Index (BP Volatility)	VIXXO
iTraxx/Cboe Europe Crossover 3-month Volatility Index (BP Volatility)	VIXXO3M
iTraxx/Cboe Europe Crossover 6-month Volatility Index (BP Volatility)	VIXXO6M
iTraxx/Cboe Europe Main 1-Month Volatility Index (BP Volatility)	VIXIE
iTraxx/Cboe Europe Main 3-month Volatility Index (BP Volatility)	VIXIE3M
iTraxx/Cboe Europe Main 6-month Volatility Index (BP Volatility)	VIXIE6M

¹ The methodology for the Cboe Volatility Index can be found [here](#).

² The CDS swaptions data is provided by the CDS Pricing Team of S&P Global Market Intelligence, Inc., an independent affiliate of S&P DJI.

³ The full methodology for the Credit VIX Indices can be found here: [Credit VIX Index Methodology](#)

The four most liquid of S&P DJI's CDS indices underlie the Credit VIX Indices: the CDX[®] North American High Yield Index (CDX.NA.HY), CDX[®] North American Investment Grade Index (CDX.NA.IG), iTraxx[®] Europe Main Index (iTraxx Europe) and the iTraxx[®] Europe Crossover Index (iTraxx Crossover). The CDX.NA.IG/CDX.NA.HY and iTraxx Europe/iTraxx Crossover indices, each seek to track baskets of CDS in the North American and European investment grade and high yield markets, respectively. These indices are highly liquid, with large trading volumes and tight bid-offer spreads.⁴ They are also transparent, widely followed and provide broad coverage of key market segments, while focusing on pure credit risk, as opposed to corporate bonds, which include an interest rate component. This makes these indices a good starting point for the Credit VIX Indices, which aim to measure market expectations of future credit volatility.

The Credit VIX Indices provide a unique perspective on the credit markets. Unlike other credit risk measures, such as CDS spreads, the Credit VIX Indices are forward looking in that they are designed to take into account the market's expectations of future volatility. This makes the Credit VIX Indices potentially a valuable tool for market participants who want to identify market dislocations, hedge credit risk and make informed investment decisions.

Exhibit 1 shows the back-tested historical levels of the one-month Credit VIX Indices across the investment grade and high yield markets in North America and Europe. Due to the greater credit risk inherent in the high yield indices, the reactions of the VIXHY and VIXXO⁵ indices to some of the key events in credit markets is relatively more pronounced.

How to Read the Credit VIX

The Credit VIX indices are intended to provide an annualized expected volatility number for the underlying CDS index spread changes in bps.⁶ The Credit VIX index levels can be used to calculate the expected range of the underlying CDS index spread changes over the respective Credit VIX tenors of one, three and six months.

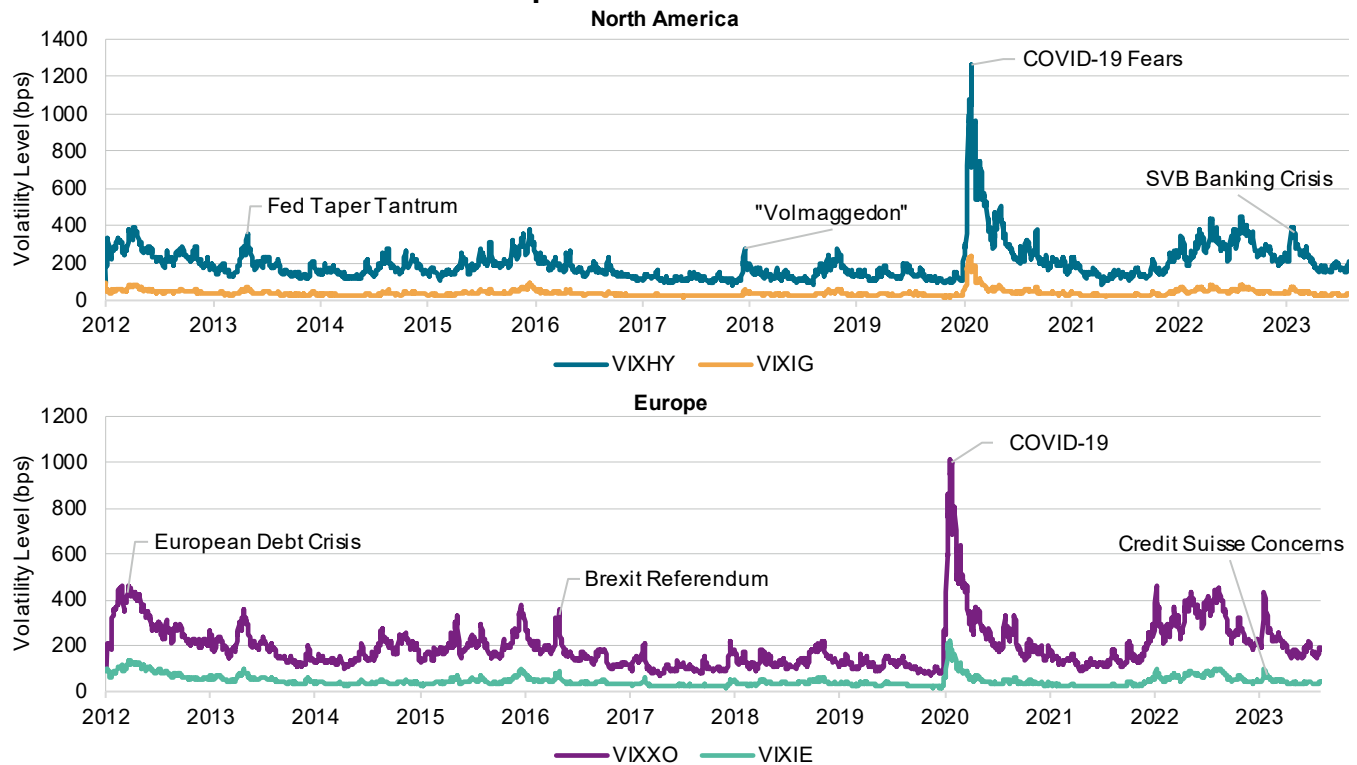
As an illustration of a theoretical calculation of the iTraxx/Cboe Europe Main 1-Month Volatility Index, assuming a VIXIE level of 30 bps and the iTraxx Europe Main Index spread of about 75 bps on a given day, the index methodology measures the market's expectation of the spread range of iTraxx Europe Main Index over the next one month to be roughly between $75 - 30/\sqrt{12} = 66.34$ bps and $75 + 30/\sqrt{12} = 83.66$ bps. The division of the VIXIE level by the square root of 12 is used to convert the annualized VIXIE level to a monthly expected volatility number.

⁴ <https://www.spglobal.com/spdji/en/documents/education/education-the-evolution-of-the-fixed-income-tradable-ecosystem.pdf> (see Exhibit 4)

⁵ A list of the Credit VIX tickers and their respective index names is provided in the Appendix for reference.

⁶ The CDS index pricing data is provided by the CDS Pricing Team of S&P Global Market Intelligence, Inc., an independent affiliate of S&P DJI.

Exhibit 1: Back-Tested Historical Volatility Levels as per the One-Month Credit VIX Indices in North America and Europe



Source: S&P Dow Jones Indices LLC. Data as of Sept. 30, 2023. The Credit VIX Indices were launched Oct. 13, 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 this document for more information regarding the inherent limitations associated with back-tested performance.

How the Credit VIX Indices Are Calculated

The Credit VIX Indices are calculated using a proprietary methodology that aggregates prices of near- and next-term at-the-money and out-of-the-money CDS index options. The methodology takes into account the following factors:

- The strike spread of the CDS index options;
- The time to maturity of the CDS index options;
- The delta of the CDS index options.

The methodology then produces an expected volatility level for the next one, three or six months, quoted as a number in bps volatility terms. The expected volatility number is calculated based on a simplified pricing formula for a hypothetical variance swap contract on forward credit spreads.⁷

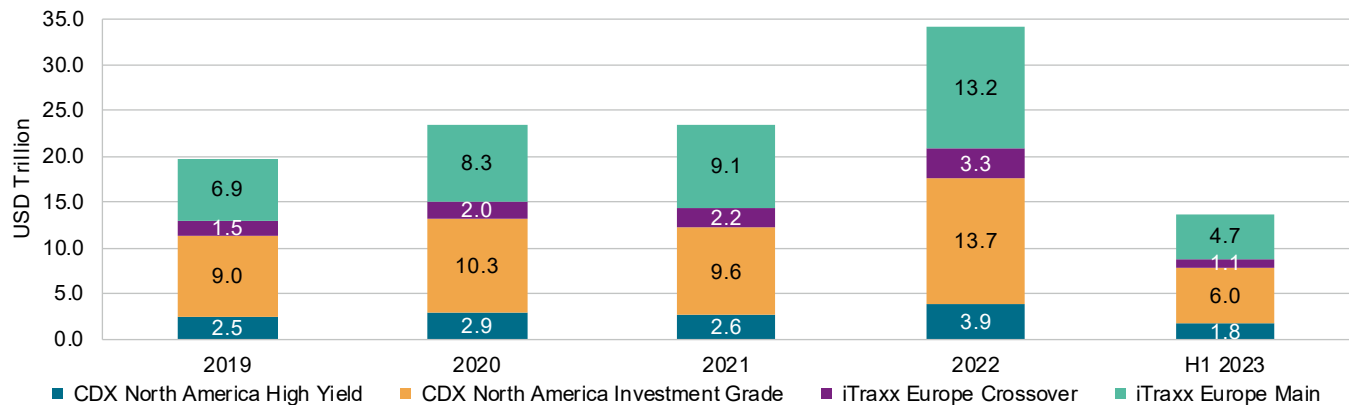
⁷ Please see the detailed index methodology document here: <https://www.spglobal.com/spdji/en/methodology/article/credit-vix-indices-methodology/>.

CDS Index Options in the Credit VIX Framework

CDS indices and CDS index options are highly liquid credit derivatives in the market and focus on pure credit risk across key credit market segments. The options linked to credit market indices cover an array of strike spreads, with the underlying indices covering key regions and credit rating segments. The Credit VIX methodology synthesizes information from CDS index options into a single value of credit volatility estimates across different time horizons for each respective Credit VIX index.

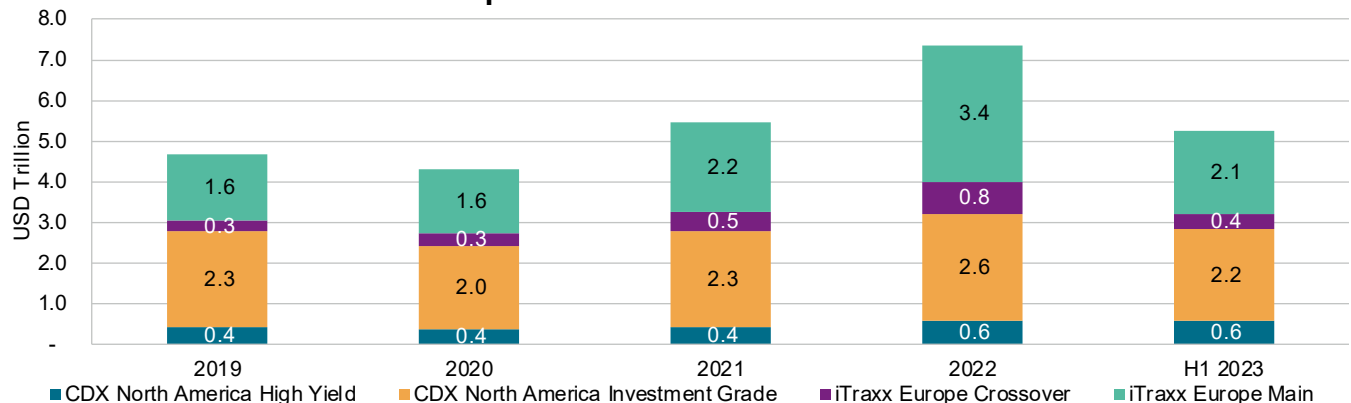
As of 2022, the CDS indices (across iTraxx Main and Crossover, and CDX Investment Grade and High Yield), traded over USD 34 trillion in gross notional (see Exhibit 2). Further, the options on these four CDS indices traded over USD 7 trillion in gross notional (see Exhibit 3). The strong volumes in the underlying CDS indices help ensure the Credit VIX Indices reflect the market volatility based on the most liquid segments of the credit markets.

Exhibit 2: iTraxx/CDX Indices Notional Traded



Source: Depository Trust and Clearing Corporation (DTCC). Data as of June 30, 2023. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance.

Exhibit 3: iTraxx/CDX Indices Options Volumes

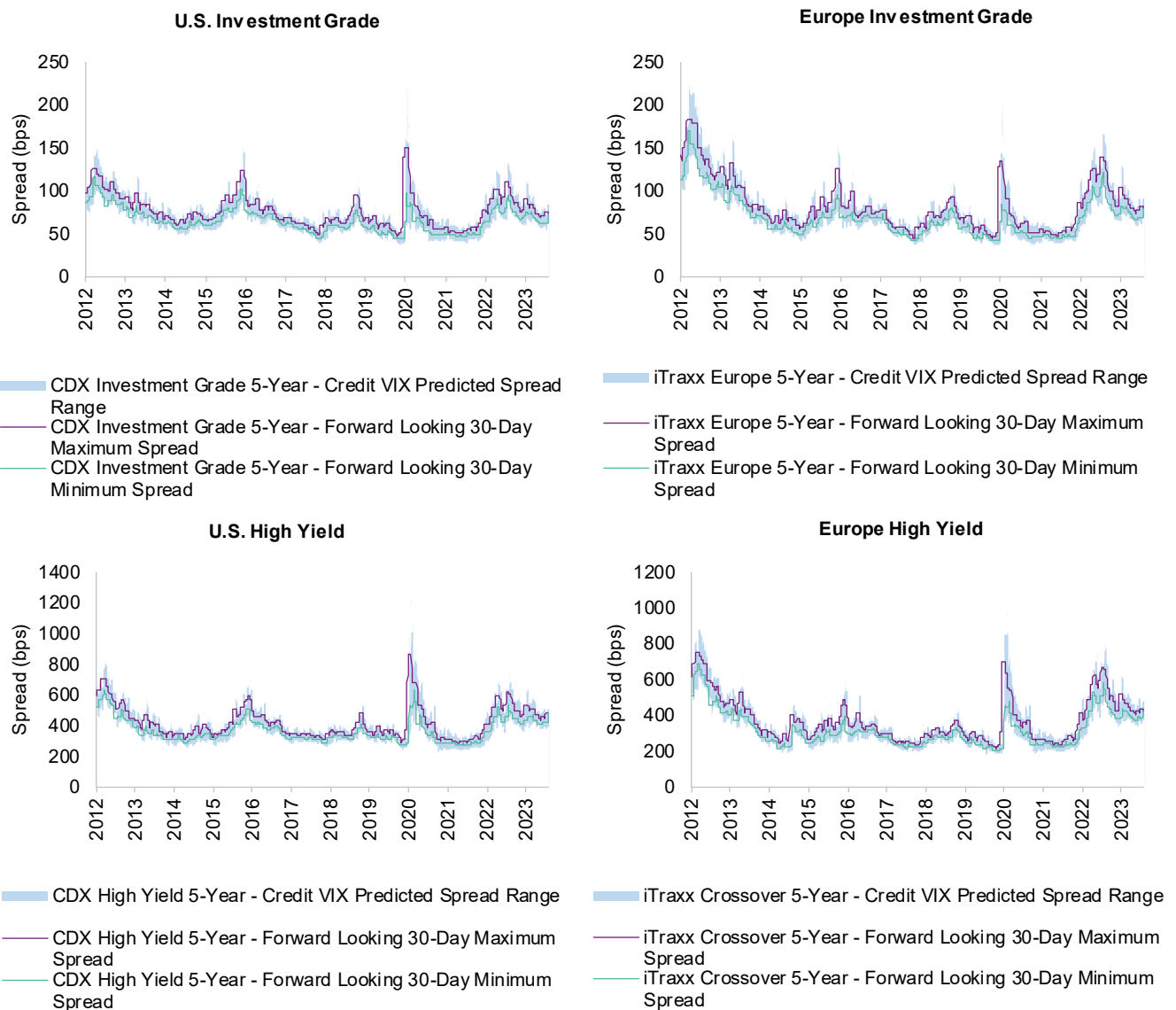


Source: OSTTRA. Data as of June 30, 2023. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance.

Credit VIX Indicated Spread Range versus Actual Spread Range

Exhibit 4 depicts the one-month spread ranges indicated by the Credit VIX Indices compared with the actual ranges observed in that period. Credit VIX is a forward-looking volatility measure, contrasting with measures based on historical credit spreads. It indicates expected credit spread movements over the upcoming month. Similarly, expected ranges for the three- and six-month periods can be determined using their respective Credit VIX Indices.

Exhibit 4: Back-tested One-Month Spread Ranges Indicated by the Credit VIX



Source: S&P Global Market Intelligence and S&P Dow Jones Indices LLC. Data as of Sept. 30, 2023. The Credit VIX Indices were launched Oct. 13, 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 this document for more information regarding the inherent limitations associated with back-tested performance.

Comparison with VIX

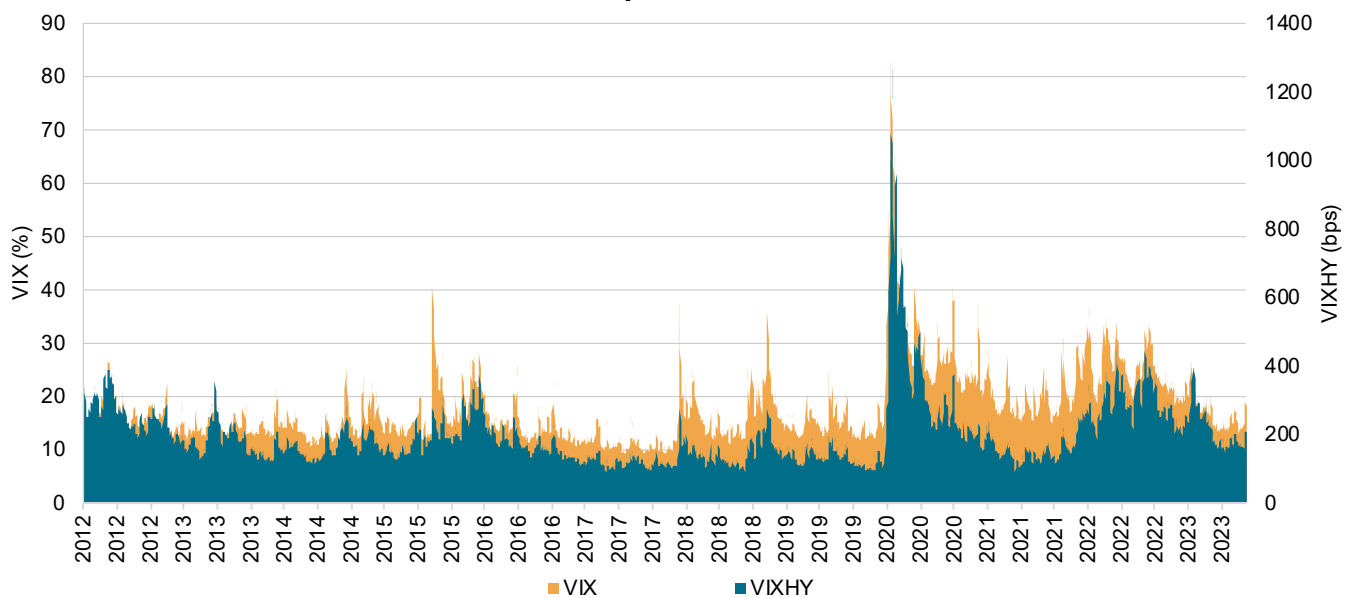
The well-known VIX based on the S&P 500® (SPX®) projects a probable range of movement in the U.S. equity markets, above and below their current level, in the immediate future.

Specifically, VIX measures the implied volatility of the S&P 500 for the next 30 days. When implied volatility is high, the VIX level tends to be high, and the range of likely values is broad. When implied volatility is low, the VIX level tends to be low and the range is narrow.

Similarly, the CDX/Cboe NA High Yield 1-Month Volatility Index is designed to project the probable range of movement in the U.S. high yield credit market over a one-month period. Exhibit 5 shows the VIXHY, which tracks the bps volatility in CDX High Yield Index spreads against VIX, which in turn tracks the percentage moves in the S&P 500. Both VIXHY and VIX track the expected range of movements in their respective indices over the next one month.

VIX gauges sentiment and volatility in the equity market. On the other hand, Credit VIX tracks expected shifts in credit spreads, highlighting the volatility of these spreads rather than corporate bond prices. Essentially, while VIX targets equity-specific risks, Credit VIX hones in on risks in the credit sector. In recent years, although the equity and fixed income markets have shown a positive correlation, both VIX and VIXHY offer insights distinct to their specific markets since the correlation of the two markets is not closely aligned. The variance in how each index moves and what each index seeks to measure underscores the unique characteristics and expectations of the equity and credit markets.

Exhibit 5: Back-tested VIX and VIXHY Comparison



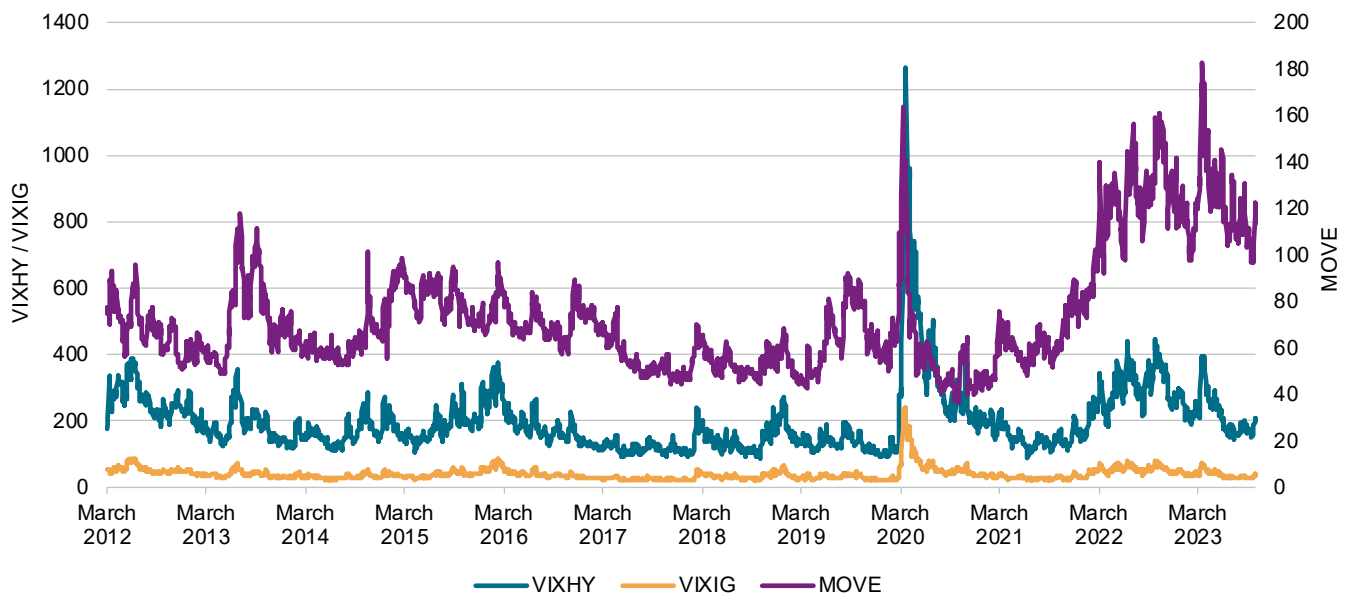
Source: S&P Dow Jones Indices LLC. Data as of Sept. 30, 2023. The Credit VIX Indices were launched Oct. 13, 2023. All data prior to index launch date is back-tested hypothetical data. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Credit VIX versus Rates Volatility

Interest rates and credit risk serve as fundamental determinants in bond valuation. Their levels, interactions and expected trends offer insights for fixed income investors. While interest rates are often a major factor in determining borrowing costs, credit risk is the probability of a financial loss resulting from the borrower not meeting their repayment obligations. Through adept monetary policy, central banks can adjust interest rates, subsequently affecting the inherent credit risk within the economy. A deep understanding of these intertwined dynamics is essential for predicting shifts in the bond market.

Exhibit 5 juxtaposes the VIXHY and VIXIG indices, benchmarks for expected credit volatility in the U.S. high yield and investment grade bond sectors, respectively, against the ICE BofAML MOVE Index (MOVE). The latter indicates expected volatility in U.S. Treasury interest rates. It's important to highlight that since the commencement of interest rate hikes in 2022, back-tested data indicates that the fluctuations in the MOVE index have markedly outpaced those in the Credit VIX Indices.

Exhibit 5: Back-Tested Performance of Credit VIX Indices versus MOVE Index



Source: S&P Dow Jones Indices LLC; Yahoo Finance, ICE BofAML MOVE Index. Data from March 2012 to September 2023. The Credit VIX Indices were launched Oct. 13, 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 this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 6 shows the back-tested correlation matrix comparing the daily percentage changes of the VIXHY, VIXIG and the MOVE indices with one another. The lower correlations (35% and 37%) between the Credit VIX Indices (VIXHY and VIXIG) and the MOVE index indicate that the Credit VIX Indices provide additional information that is not captured by interest rate volatility measures.

Exhibit 6: Back-Tested Daily Return Correlations between Credit VIX Indices and MOVE

Correlation (%)	VIXHY	VIXIG	MOVE
VIXHY	100	-	-
VIXIG	80	100	-
MOVE	35	37	100

Source: S&P Dow Jones Indices LLC; Yahoo Finance, ICE BofAML MOVE Index. Data from March 2012 to September 2023. The Credit VIX Indices were launched Oct. 13, 2023. All data prior to index launch date is back-tested hypothetical data. Past performance is no guarantee of future results. Table 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.

Credit VIX versus Bond Market Performance

With Credit VIX being a gauge for the bond markets, it would be useful to examine the relationship between the Credit VIX Indices and the performance of their respective bond markets. In the equity space, the daily percentage changes of VIX and the S&P 500 exhibit a strong negative correlation with each other. In the fixed income space, the relationship is a bit more nuanced.

Exhibit 7 shows the back-tested correlation between the historical daily percentage changes of the one-month Credit VIX Indices with their respective bond markets from March 2012 to September 2023.

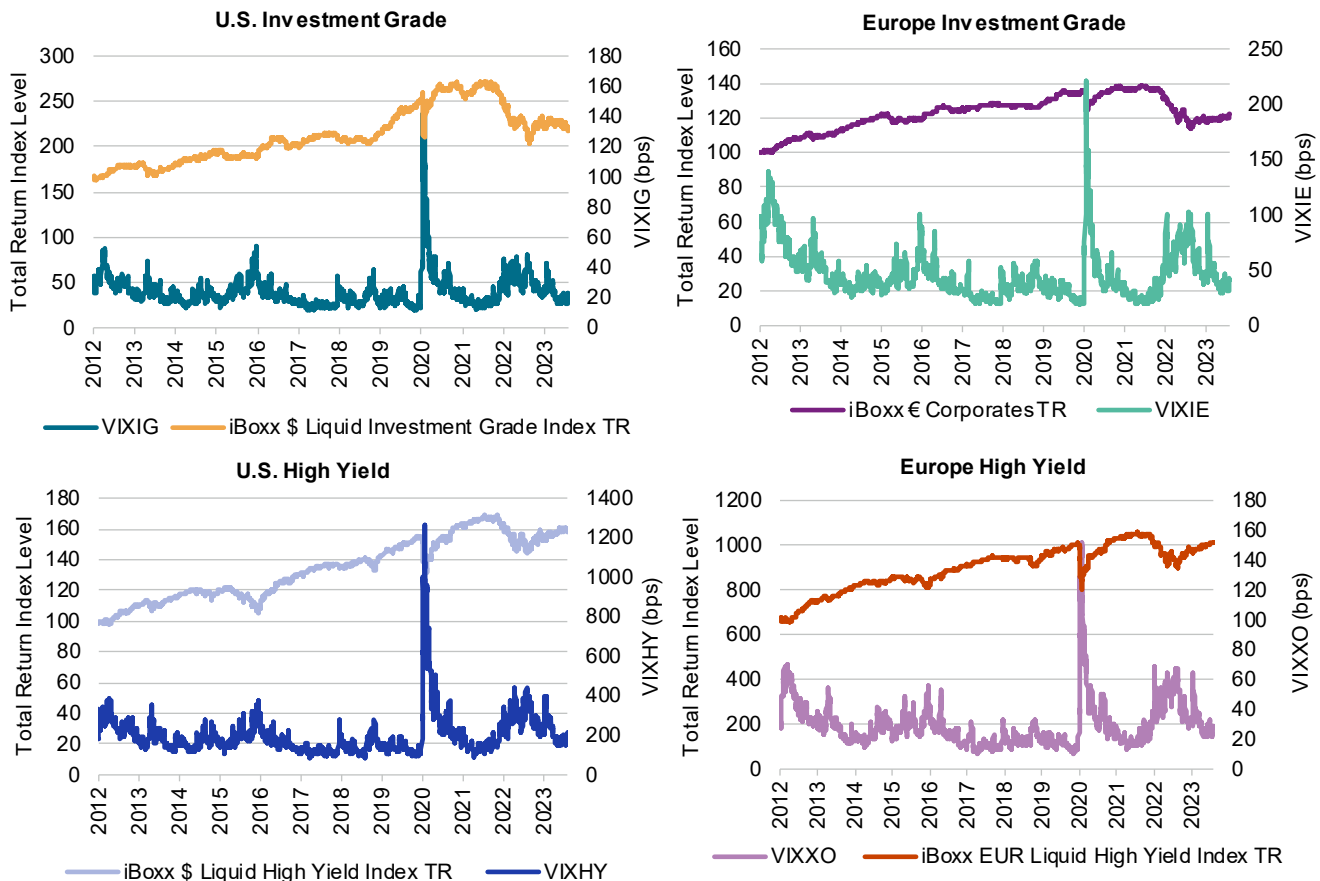
Exhibit 7: Back-Tested Correlation between Daily Percentage Changes of the One-Month Credit VIX Indices

Credit VIX	Bond Index	Correlation (%)
VIXHY	iBoxx USD Liquid High Yield Index Total Return	-57.88
VIXXO	iBoxx EUR Liquid High Yield Index Total Return	-51.26
VIXIG	iBoxx USD Liquid Investment Grade Index Total Return	-11.38
VIXIE	iBoxx EUR Corporates Total Return	-15.54

Source: S&P Dow Jones Indices LLC. Data from March 2012 to September 2023. The Credit VIX Indices were launched Oct. 13, 2023. All data prior to index launch date is back-tested hypothetical data. Past performance is no guarantee of future results. Table 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.

From Exhibit 7, it can be seen that all four of the Credit VIX Indices had a negative correlation with their underlying bond indices, indicating the market's expectation of higher future credit volatility when the bond markets are in a downturn. However, there is a significant difference in the strength of the correlations among the high yield markets relative to those of the investment grade markets, with the high yield markets showing stronger negative correlations. This makes intuitive sense, as the high yield market tends to represent greater credit risk and lower duration exposure compared with the investment grade market. Generally, a greater part of the variation in a high yield index can be explained by changes in the underlying credit risk, whereas a greater part of the of the variation in an investment grade index can be explained by changes in the underlying interest rates risk.

Exhibit 8: Back-tested Credit VIX versus Bond Market Performance



Source: S&P Dow Jones Indices LLC. Data as of Sept. 30, 2023. Bond index performance based on total return in USD and EUR. The Credit VIX Indices were launched Oct. 13, 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 this document for more information regarding the inherent limitations associated with back-tested performance.

Potential Use Cases for the Credit VIX Indices

The Credit VIX Indices are designed to be a useful metric for a broad spectrum of market participants, including investors, hedge funds and banks, among others. The Credit VIX Indices also offer the potential to develop an ecosystem of tradable instruments such as structured products, variance swaps and futures referencing the Credit VIX Indices to effectively manage or gain exposure to credit risk.

The Credit VIX Indices potentially serve several robust applications for credit investors. They may be a tool to help detect disturbances in the credit market. For instance, a notable rise in a market or rating-specific Credit VIX Index at a given tenor might be an early warning of potential credit spread widening. Furthermore, these indices are intended to offer dynamic solutions for credit risk mitigation. Investors can potentially offset specific credit portfolio exposures by leveraging Credit VIX as a hedging instrument. Additionally, the indices overall generally provide valuable insights related to fixed income assets.

Conclusion

The Credit VIX Indices provide a new, potent indicator for investors to help interpret credit risk. By offering a forward-looking lens into credit markets across different tenors, markets and rating segments, they may help market participants to refine decision-making processes and offer unique market insights. As the fixed income ecosystem evolves, these indices can further enhance transparency and efficiency by providing new, meaningful information on the important attribute of credit risk.

Appendix⁸

Exhibit 9: Full List of the Credit VIX Tickers and Their Respective Index Names

Cboe Credit Volatility Index	Ticker
CDX/Cboe NA High Yield 1-Month Volatility Index (BP Volatility)	VIXHY
CDX/Cboe NA High Yield 3-month Volatility Index (BP Volatility)	VIXHY3M
CDX/Cboe NA High Yield 6-month Volatility Index (BP Volatility)	VIXHY6M
CDX/Cboe NA Investment Grade 1-Month Volatility Index (BP Volatility)	VIXIG
CDX/Cboe NA Investment Grade 3-month Volatility Index (BP Volatility)	VIXIG3M
CDX/Cboe NA Investment Grade 6-month Volatility Index (BP Volatility)	VIXIG6M
iTraxx/Cboe Europe Crossover 1-Month Volatility Index (BP Volatility)	VIXXO
iTraxx/Cboe Europe Crossover 3-month Volatility Index (BP Volatility)	VIXXO3M
iTraxx/Cboe Europe Crossover 6-month Volatility Index (BP Volatility)	VIXXO6M
iTraxx/Cboe Europe Main 1-Month Volatility Index (BP Volatility)	VIXIE
iTraxx/Cboe Europe Main 3-month Volatility Index (BP Volatility)	VIXIE3M
iTraxx/Cboe Europe Main 6-month Volatility Index (BP Volatility)	VIXIE6M

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

⁸ Further reading:

[Credit VIX Index Methodology](#)

[CDS Indices Primer](#)

[The Evolution of the Fixed Income Tradable Ecosystem](#)

Performance Disclosure/Back-Tested Data

The Credit VIX Indices were launched October 13, 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. 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

© 2023 S&P Dow Jones Indices. All rights reserved. S&P, S&P 500, SPX, SPY, The 500, US500, US 30, S&P 100, S&P COMPOSITE 1500, S&P 400, S&P MIDCAP 400, S&P 600, S&P SMALLCAP 600, S&P GIVI, GLOBAL TITANS, DIVIDEND ARISTOCRATS, Select Sector, S&P MAESTRO, S&P PRISM, S&P STRIDE, GICS, SPIVA, SPDR, INDEXOLOGY, iTraxx, iBoxx, ABX, ADBI, CDX, CMBX, LCDX, MBX, MCDX, PRIMEX, TABX, HHPI, IRXX, I-SYND, SOVX, CRITS, CRITR are registered trademarks of S&P Global, Inc. ("S&P Global") or its affiliates. DOW JONES, DJIA, THE DOW and DOW JONES INDUSTRIAL AVERAGE are trademarks of Dow Jones Trademark Holdings LLC ("Dow Jones"). VIX® is a trademark of Cboe Exchange, Inc. These trademarks together with others have been licensed to S&P Dow Jones Indices LLC. Redistribution or reproduction in whole or in part are prohibited without written permission of S&P Dow Jones Indices LLC. This document does not constitute an offer of services in jurisdictions where S&P Dow Jones Indices LLC, S&P Global, Dow Jones or their respective affiliates and licensors (e.g., Cboe Exchange, Inc.) (collectively "S&P Dow Jones Indices") do not have the necessary licenses. Except for certain custom index calculation services, all information provided by S&P Dow Jones Indices is impersonal and not tailored to the needs of any person, entity or group of persons. S&P Dow Jones Indices receives compensation in connection with licensing its indices to third parties and providing custom calculation services. Past performance of an index is not an indication or guarantee of future results.

It is not possible to invest directly in an index. Exposure to an asset class represented by an index may be available through investable instruments based on that index. S&P Dow Jones Indices does not sponsor, endorse, sell, promote or manage any investment fund or other investment vehicle that is offered by third parties and that seeks to provide an investment return based on the performance of any index. S&P Dow Jones Indices makes no assurance that investment products based on the index will accurately track index performance or provide positive investment returns. S&P Dow Jones Indices LLC is not an investment advisor, and S&P Dow Jones Indices makes no representation regarding the advisability of investing in any such investment fund or other investment vehicle. A decision to invest in any such investment fund or other investment vehicle should not be made in reliance on any of the statements set forth in this document. S&P Dow Jones Indices is not an investment adviser, commodity trading advisor, commodity pool operator, broker dealer, fiduciary, promoter" (as defined in the Investment Company Act of 1940, as amended), "expert" as enumerated within 15 U.S.C. § 77k(a) or tax advisor. Inclusion of a security, commodity, crypto currency or other asset within an index is not a recommendation by S&P Dow Jones Indices to buy, sell, or hold such security, commodity, crypto currency or other asset, nor is it considered to be investment advice or commodity trading advice.

These materials have been prepared solely for informational purposes based upon information generally available to the public and from sources believed to be reliable. No content contained in these materials (including index data, ratings, credit-related analyses and data, research, valuations, model, software or other application or output therefrom) or any part thereof ("Content") may be modified, reverse-engineered, reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of S&P Dow Jones Indices. The Content shall not be used for any unlawful or unauthorized purposes. S&P Dow Jones Indices and its third-party data providers and licensors (collectively "S&P Dow Jones Indices Parties") do not guarantee the accuracy, completeness, timeliness or availability of the Content. S&P Dow Jones Indices Parties are not responsible for any errors or omissions, regardless of the cause, for the results obtained from the use of the Content. THE CONTENT IS PROVIDED ON AN "AS IS" BASIS. S&P DOW JONES INDICES PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT'S FUNCTIONING WILL BE UNINTERRUPTED OR THAT THE CONTENT WILL OPERATE WITH ANY SOFTWARE OR HARDWARE CONFIGURATION. In no event shall S&P Dow Jones Indices Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs) in connection with any use of the Content even if advised of the possibility of such damages.

S&P Global keeps certain activities of its various divisions and business units separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain divisions and business units of S&P Global may have information that is not available to other business units. S&P Global has established policies and procedures to maintain the confidentiality of certain non-public information received in connection with each analytical process.

In addition, S&P Dow Jones Indices provides a wide range of services to, or relating to, many organizations, including issuers of securities, investment advisers, broker-dealers, investment banks, other financial institutions and financial intermediaries, and accordingly may receive fees or other economic benefits from those organizations, including organizations whose securities or services they may recommend, rate, include in model portfolios, evaluate or otherwise address.