

S&P Dow Jones Indices

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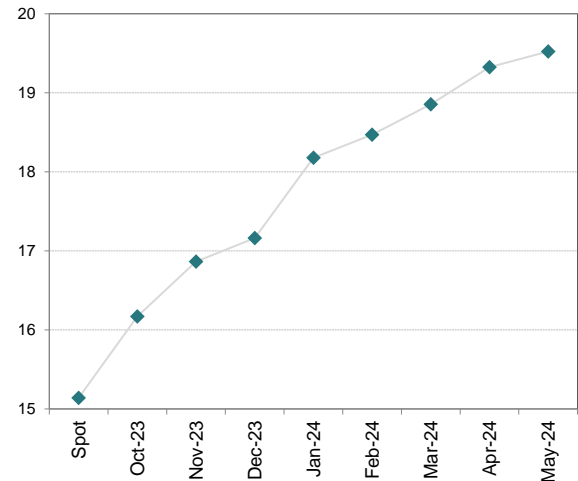
INDEX INVESTMENT STRATEGY

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Index Dashboard: Risk & Volatility September 20, 2023

VOLATILITY MEASURES				
US Equity	VIX	1m ±	200D Ave	Realized (1Yr)
Cboe Volatility Index® (VIX®)	15.14	-1.64	17.68	18.11
Cboe 1-Day Volatility Index (VIX1D)	13.84	-0.32	16.11	18.11
Cboe Short-Term Volatility (VIX9D)	15.27	-1.09	17.21	18.11
Cboe 3-month Volatility (VIX3M)	16.81	-2.16	20.16	18.11
Cboe 1-Year Volatility (VIX1Y)	20.45	-1.79	23.50	18.11
Cboe DJIA Volatility (VXD)	13.11	-2.39	15.91	15.46
Global Equity				
VSTOXX® (V2X)	15.41	-3.14	18.28	16.17
S&P/ASX 200 VIX (A-VIX)	11.08	-1.17	12.45	12.92
S&P/BMV IPC VIX (SPBMVVIX)	21.00	-1.12	23.92	14.68
HSI Volatility (VHSI)	21.86	-4.48	25.34	27.94
Cboe EM ETF (VXEEM)	20.71	0.55	19.37	18.95
Interest Rate				
Cboe 20+ Yr US Treasury ETF (VXTLT)	14.86	-4.16	18.95	18.84
S&P/JPX JGB VIX® (SPJGB)	3.60	0.23	4.26	3.28
Currency				
Cboe Euro ETF (EVZ)	6.80	-0.28	8.06	8.89
Commodity				
Cboe Gold ETF Volatility (GVZ)	10.96	-1.47	15.01	14.48
Cboe Oil ETF Volatility (OVX)	30.38	1.84	36.15	32.67
Volatility of VIX				
Cboe VIX of VIX (VVIX)	88.05	-16.49	89.62	83.46
INVESTABLE VOLATILITY INDICES				
Index	1m ±	YTD	12m ±	
S&P Daily Inverse Short-Term VIX	18.05%	129.45%	187.90%	
Cboe S&P 500 Buy-write Index	-0.21%	9.29%	11.60%	
Cboe S&P 500 Put-write Index	-0.40%	11.28%	13.77%	
S&P 500 VIX Futures Term Structure	-0.91%	0.05%	5.11%	
S&P Dynamic VIX Index	-2.17%	-9.34%	-11.49%	
S&P 500 Dynamic VEQTOR Index	-3.34%	0.46%	-5.27%	
S&P VIX Mid-Term Futures Index	-9.12%	-37.85%	-42.46%	
S&P VIX Short-Term Futures Index	-15.89%	-62.23%	-70.78%	
S&P 500®	0.12%	16.04%	16.12%	

TERM STRUCTURE & SKEW	
VIX Futures Term Structure	



VIX Futures Indices Roll Costs (Monthly)	
Short-term futures	4.30%
Mid-term futures	2.01%
Skew	
Level	1M
Cboe Skew Index (SKEW)	135.74
	2.76%
	16.33%

REALIZED MEASURES			
S&P 500 Correlations (Month-end)	1 Year	3 Year	10 Year
S&P Europe 350®	0.81	0.86	0.84
S&P Emerging BMI	0.68	0.61	0.69
S&P 500 Bond	0.75	0.73	0.53
S&P GSCI Commodity	0.62	0.37	0.42
U.S. Dollar Index	-0.56	-0.56	-0.37
S&P 500 Single Stocks			
	21-Day	12M Ave	3Y Ave
Dispersion (annualized)	16.41%	25.21%	24.41%
Volatility (annualized)	21.37%	27.81%	27.80%
Correlation (pairwise)	0.25	0.30	0.31

COMMENTARY

- Volatility eased slightly in U.S. Equities, after perking up a little in August. Having traded up to 17 in the prior month, VIX retreated 2 points to 15.
- Elsewhere, most of our reported equity implied volatility indicators have mimicked VIX and ground lower, with only Cboe EM ETF VIX bucking the trend, rising by 1 point to 21.
- Longer-dated measures of U.S. equity volatility including the Cboe 3-Month Volatility and the Cboe 1-Year Volatility indices also dropped by a similar magnitude as VIX itself, while the Cboe 1-Day Volatility Index was little changed during the month.
- In other asset classes the picture was more mixed, as the Cboe Oil ETF VIX and the S&P/JGB VIX rose, while measures related to gold and long-dated U.S. Treasury bond implied volatility retreated.
- As is typical in falling volatility environments, the futures curve's contango has steepened. Boosted by a falling spot VIX and the favorable futures roll down, the S&P Daily Inverse Short-Term VIX has consolidated its top spot among our investable volatility indices table with an 18% return over the past month alone and a total return of 188% over the past 12 months.

Sources: S&P Dow Jones Indices LLC and/or its affiliates, Cboe, U.S. Federal Reserve (Dollar index and 10Yr Swap Rate), VIX Network members, Bloomberg LLC as of September 20, 2023. **Volatility measures:** respective VIX and changes in those levels August 16 to September 20, 2023. 200D Average is the moving average based on trading days, colour coded by whether current respective VIX is above or below average. 1 year realized volatility calculated according to previous 1 years daily returns, annualised. Investable Index performance based on total return. Index Correlations of monthly returns between total return indices, in USD to month-end August 2022. **Stock Correlations, Dispersion and Volatility** based on index-weighted averages as of September 20, 2023. VIX futures monthly roll costs are expressed as the weighted sum of the percentage difference in price between each future and the future next closer to expiry, expressed as a fraction of that futures price and weighted according to that future's weight in the either the S&P VIX Short-Term Futures Index, or the S&P VIX Mid-Term Futures Index, as appropriate. Charts and graphs are provided for illustrative purposes. Past performance is no guarantee of future results. For more information, please visit our website at www.spdji.com

About the VIX® Network

The VIX Network is an association of exchanges and index providers dedicated to establishing standards that help investors understand, measure, and manage volatility. The Network's members have obtained, from Chicago Board Options Exchange ("Cboe") and its partner S&P Dow Jones Indices ("S&P DJI"), the rights to use the methodology of the CBOE Volatility Index ("VIX") to calculate their own volatility indices. In addition to Cboe and S&P DJI, members include: Australian Securities Exchange, CME Group, Deutsche Borse AG, Japan Exchange Group, Hang Seng Indexes in Hong Kong, National Stock Exchange of India, LIFFE, Taiwan Futures Exchange, and the TMX Group in Canada.

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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.

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