

S&P Dow Jones Indices

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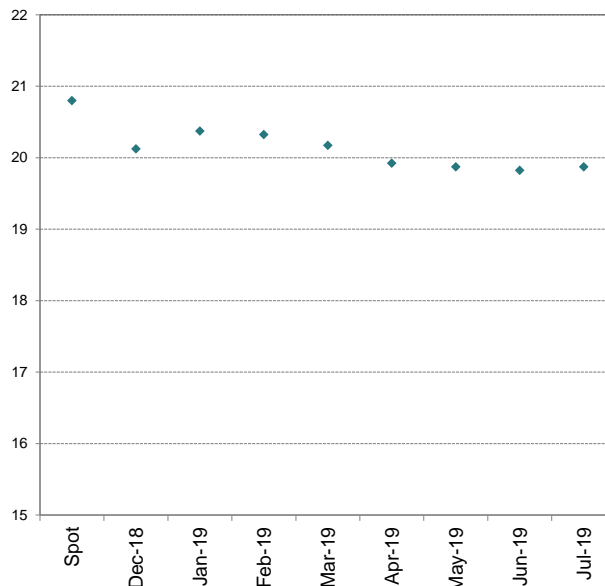
INDEX INVESTMENT STRATEGY

Index Dashboard: Risk & Volatility November 21, 2018

VOLATILITY MEASURES				
Implied Volatility Measures	VIX	1m ±	200D Ave	Realized 1Yr
Cboe Volatility Index® (VIX®)	20.80	3.40	16.15	14.88
Cboe Short-Term Volatility Index (VXST)	19.86	2.11	15.93	14.88
Cboe 3-month Volatility Index (VXV)	21.32	3.22	17.29	14.88
Cboe 1-Year Volatility (VIX1Y)	21.42	2.35	18.64	14.88
Cboe DJIA Volatility Index (VXD)	20.58	2.52	16.76	15.80
VSTOXX® (V2X)	18.24	1.22	16.00	11.60
S&P/ASX 200 VIX (A-VIX)	17.97	1.99	13.46	10.19
S&P/TSX 60 VIX (VIXC)	18.44	1.68	14.66	9.72
HSI Volatility Index (VHSI)	24.80	0.39	20.90	19.40
Cboe/CME FX Yen Volatility (JYVIX)	7.15	-0.12	7.97	6.07
Cboe/CME FX GBP Volatility (BPVIX)	13.66	3.36	8.91	7.74
Cboe/CME FX Euro Volatility (EUVIX)	7.60	0.11	7.65	6.75
Cboe / CBOT 10Yr US Tsy (TYVIX)	4.32	0.65	4.02	3.57
Cboe Interest Rate Swap (SRVIX)	73.21	2.64	72.10	54.42
S&P/JPX JGB VIX® (SPJGB)	1.42	0.11	1.43	1.15
Cboe Gold ETF Volatility Index (GVZ)	12.12	-0.02	11.74	9.87
Cboe Oil ETF Volatility Index (OVX)	51.79	23.66	28.00	26.42
Cboe VIX of VIX (VVIX)	100.27	-9.01	102.20	155.82
Investable Volatility	1m ±	YTD	12m ±	
S&P VIX Short-Term Futures Index	20.69%	38.01%	21.07%	
S&P VIX Mid-Term Futures Index	12.61%	21.71%	10.60%	
S&P Dynamic VIX Index	5.42%	-11.08%	-13.49%	
S&P 500 VEQTOR Switch Index	-0.43%	-0.43%	2.69%	
Cboe S&P 500 Buy-write Index	-2.85%	0.53%	1.58%	
S&P 500 Dynamic VEQTOR Index	-2.87%	1.52%	4.24%	
Cboe S&P 500 Put-write Index	-3.35%	-0.64%	0.11%	
S&P Daily Inverse Short-Term VIX	-20.20%	-96.23%	-95.72%	
S&P 500	-5.67%	-0.89%	1.96%	

HEDGING COSTS

VIX Futures Term Structure



VIX Futures Indices Roll Costs (Monthly)

Short-term futures	1.24%
Mid-term futures	-0.58%

REALIZED MEASURES

S&P 500 Correlations (Month-end)	1 Year	3 Year	10 Year
S&P Europe 350	0.73	0.69	0.86
S&P 500 Bond	0.50	0.33	0.24
S&P GSCI Commodity	0.50	0.36	0.53
U.S. Dollar Index	-0.55	-0.32	-0.53
S&P 500 Single Stocks	21-Day	12M Ave	3Y Ave
Dispersion (annualized)	31.42%	20.61%	19.64%
Volatility (annualized)	35.82%	23.91%	21.38%
Correlation (pairwise)	0.32	0.25	0.23

COMMENTARY

- The fourth quarter has brought higher volatility and higher dispersion to U.S. equities; mixed responses to earnings, weakness in the technology sector and a significant decline in oil prices have set the tone.
- Nearly all of our volatility measures are up since the last report. Implied volatility indices for the Japanese yen / U.S. dollar exchange rate, gold, and the VVIX volatility-of-volatility index are the only measures that have declined.
- The equity volatility markets show signs of nervousness, but not panic. VIX has continued at relatively elevated levels in the past four weeks – typically closing above 20 – but without breaking out to the upside (the highest recent closing level was 25.23 on October 24).
- Larger gains were found in volatility indicators for crude oil and the British pound sterling. Yesterday's closing level of 51.79 for the Cboe Oil ETF Volatility Index was the highest in over two years, and while the Cboe/CME FX GBP Volatility index has pulled back in the past few days as a party leadership challenge to PM Theresa May stalled, the index's most recent close of 13.66 is more than 50% above its 200-day trailing average.

Sources: S&P Dow Jones Indices LLC and/or its affiliates, Cboe, U.S. Federal Reserve (Dollar index and 10Yr Swap Rate), all as of November 21, 2018. **Volatility measures:** respective VIX and changes in those levels October 17, 2018 to November 21, 2018. 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. **Stock Correlations, Dispersion and Volatility** based on index-weighted averages as of November 21, 2018. 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

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Prospective application of the methodology used to construct the index(es) as well as revisions to economic data may not result in performance commensurate with the back-test returns shown. The back-test period does not necessarily correspond to the entire available history of the index(es). Please refer to the index methodology for the particular index in question, available at www.spdji.com, for more details about such index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all in index calculations.

Another limitation of using back-tested information is that the back-tested calculation is generally prepared with the benefit of hindsight. Back-tested data and/or information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities, fixed income, or commodities markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

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