

S&P Dow Jones Indices

A Division of **S&P Global**

INDEX INVESTMENT STRATEGY

Index Dashboard: Risk & Volatility March 18, 2020

VOLATILITY MEASURES

U.S. Equity	VIX	1m ±	200D Ave	Realized (1Yr)
Cboe Volatility Index® (VIX®)	76.45	62.07	17.94	27.60
Cboe Short-Term Volatility (VIX9D)	97.22	85.34	18.28	27.60
Cboe 3-month Volatility (VXV)	72.98	57.16	18.82	27.60
Cboe 1-Year Volatility (VIX1Y)	45.86	28.30	19.54	27.60
Cboe DJIA Volatility (VXD)	67.07	52.19	17.66	28.82
Global Equity				
VSTOXX® (V2X)	84.80	71.91	17.73	21.32
S&P/ASX 200 VIX (A-VIX)	53.10	41.09	14.34	22.47
S&P/BMV IPC VIX (SPBMVVIX)	18.84	5.20	15.55	18.35
HSI Volatility (VHSI)	59.92	42.94	19.63	18.66
Currency				
Cboe/CME Yen Volatility (JYVIX)	19.42	13.25	7.40	7.92
Cboe/CME GBP Volatility (BPVIX)	21.71	15.59	8.89	9.57
Cboe/CME Euro Volatility (EUVIX)	15.58	10.46	5.79	5.75
Interest Rate				
Cboe/CBOT 10Yr Tsy (TYVIX)	15.39	10.89	5.12	5.80
Cboe IR Swap Volatility (SRVIX)	85.53	15.78	70.43	74.89
S&P/JPX JGB VIX® (SPJGB)	4.98	3.03	2.25	2.31
Commodity				
Cboe Gold ETF Volatility (GVZ)	48.98	35.64	14.87	14.35
Cboe Oil ETF Volatility (OVX)	166.79	134.52	39.11	52.35
Volatility of VIX				
Cboe VIX of VIX (VVIX)	181.33	85.41	98.42	150.66

INVESTABLE VOLATILITY INDICES

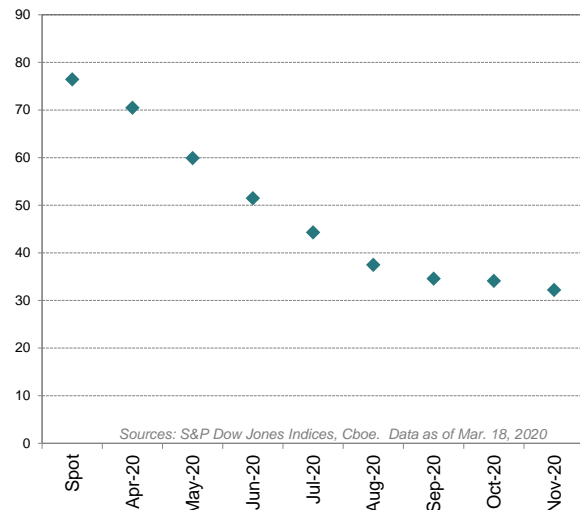
Index	1m ±	YTD	12m ±
S&P VIX Short-Term Futures Index	415.9%	364.9%	145.0%
S&P Dynamic VIX Index	162.5%	152.8%	171.6%
S&P VIX Mid-Term Futures Index	132.8%	120.2%	121.4%
S&P 500 Dynamic VEQTOR Index	16.35%	20.02%	22.53%
S&P 500 VEQTOR Switch Index	16.17%	21.57%	41.82%
Cboe S&P 500 Put-write Index	-26.75%	-25.15%	-19.23%
Cboe S&P 500 Buy-write Index	-27.32%	-25.69%	-19.19%
S&P Daily Inverse Short-Term VIX	-86.66%	-85.85%	-79.80%
S&P 500	-29.05%	-25.45%	-13.66%

COMMENTARY

- It has been only four weeks since an all-time high in the S&P 500® accompanied our previous volatility dashboard. Since then, worldwide equity markets have crashed by a quarter or more from their highs as citizens in developed economies prepare for, or endure, lockdowns aimed at preventing healthcare systems from being overloaded. The equity markets are now pricing for a worldwide recession and a collapse in economic activity.
- On Monday, the S&P 500 completed its worst day since 1987, falling 12%. Marking the decline, VIX® recorded a new all-time closing high of 82.69, having increased five-fold in less than a month. VIX closed last night at 76.45, still the sixth-highest level in the volatility index's three decades of daily history.
- Volatility indicators across the world have soared, with several marking all-time closing records; including 10Y U.S. Treasury Bond volatility (15.39; achieved last night), crude oil volatility (166; achieved last night), and the volatility of volatility itself (207; achieved on Tuesday).
- Investable volatility indices with positive exposure to VIX largely delivered on their hedge potential, with the S&P VIX Short-Term Futures Index rising more than four-fold and the mid-term index gaining 162%.
- The VIX futures curve is in steep backwardation due to the expectation for mean reversion in VIX; a long position in VIX futures will currently benefit from a positive roll yield, should volatility continue at current levels.

TERM STRUCTURE & SKEW

VIX Futures Term Structure



VIX Futures Indices Roll Costs (Monthly)

Short-term futures	-14.97%
Mid-term futures	-9.30%
Skew	
Level	1M
Cboe Skew Index (SKEW)	113.54
	-19.94%
	-10.67%

REALIZED MEASURES

S&P 500 Correlations (Month-end)	1 Year	3 Year	10 Year
S&P Europe 350®	0.95	0.81	0.84
S&P Emerging BMI	0.82	0.73	0.74
S&P 500 Bond	-0.17	0.06	0.09
S&P GSCI Commodity	0.79	0.66	0.56
U.S. Dollar Index	-0.32	-0.26	-0.44
S&P 500 Single Stocks			
	21-Day	12M Ave	3Y Ave
Dispersion (annualized)	52.98%	22.06%	20.41%
Volatility (annualized)	97.36%	27.87%	24.51%
Correlation (pairwise)	0.74	0.31	0.25

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 all as of Mar 18, 2020. **Volatility measures:** respective VIX and changes in those levels Feb. 19 to Mar 18, 2020. 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 Feb. 2020. **Stock Correlations, Dispersion and Volatility** based on index-weighted averages as of Mar 18, 2020. 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, 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 on their products. 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 a given index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which the values of a given 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 S&P Dow Jones Indices's public website or its datafeed 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.

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 dex 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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